Flora of the Southern and Mid-Atlantic States

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by

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TABLE OF CONTENTS

53d. MELANTHIACEAE Batsch 1802 (Bunchflower Family) [in LILIALES] .................................................................................. 115
55. ALSTROEMERIACEAE Dumortier 1829 (Peruvian-lily Family) [in LILIALES] ................................................................. 118
56. COLCHICACEAE A.P. de Candolle 1805 (Meadow Saffron Family) [in LILIALES] ............................................................... 118
59. SMILACACEAE Ventenat 1799 (Greenbrier Family) [in LILIALES] .................................................................................... 119
61. CUCURBITACEAE A. L. de Jussieu 1789 (Lily Family) [in LILIALES] .................................................................................. 120
62. ORCHIDACEAE A. L. de Jussieu 1789 (Orchid Family) [in ASPARAGALES] ................................................................. 127
67. HYPOXIDACEAE R. Brown 1814 (Stargrass Family) [in ASPARAGALES] ................................................................. 143
71. IRIDACEAE A. L. de Jussieu 1789 [in ASPARAGALES] .............................................................................................. 144
73. XANTHORRHOEACEAE R. Brown 18310 (Day-lily Family) [in ASPARAGALES] ............................................................ 151
74. AMARYLLIDACEAE J. St. Hilaire 1805 (Amaryllis Family) [in ASPARAGALES] .............................................................. 151
75a. ASPARAGACEAE A. L. de Jussieu 1789 (Asparagus Family) [in ASPARAGALES] ..................................................... 159
75b. RUSCACEAE M. Roemer 1840 (Ruscus Family) [in ASPARAGALES] ........................................................................... 160
75c. AGAVACEAE Endlicher 1841 (Agave Family) [in ASPARAGALES] ................................................................................. 163
75d. HOSTACEAE B. Mathew 1898 (Hosta Family) [in ASPARAGALES] ........................................................................ 165
75e. THEMIDACEAE Salisbury 1866 (Brodiaea Family) [in ASPARAGALES] ........................................................................ 165
75f. HYACINThACEAE Batsch 1786 (Hyacinth Family) [in ASPARAGALES] ................................................................. 165
76. ARECACEAE Schult 1832 or PALMAE de Jussieu 1789 (Palm Family) [in ARECales] ..................................................... 167
77. COMMELINACEAE R. Brown 1810 (Spiderwort Family) [in COMMELINALES] ...................................................... 169
78. HYPOXIDACEAE R. Brown 1810 (Bloodwort Family) [in COMMELINALES] .............................................................. 175
81. HAEMODORACEAE R. Brown 1810 (Blood Family) [in ASPARAGALES] ........................................................................ 175
86. CANNACEAE A. L. de Jussieu 1789 (Canna Family) [in ZINGIBERALES] ................................................................. 175
87. MARANTACEAE Petersen in Engler & Prantl 1888 (Arrowroot Family) [in ZINGIBERALES] ...................................... 176
89. ZINGIBERACEAE Martynov 1820 (Ginger Family) [in ZINGIBERALES] ........................................................................ 176
91. TYPHACEAE A. L. de Jussieu 1789 (Cattail Family) [in POALES] .................................................................................... 176
92. BROMELIACEAE A. L. de Jussieu 1789 (Bromeliad or Pineapple Family) [in POALES] ................................................... 176
94. AGAVACEAE C. Agardh 1822 (Yucca Family) [in ASPARAGALES] ................................................................. 180
95. ERIOCaulACEAE Antibiotis 1828 (Pipewort Family) [in POALES] ................................................................................ 183
96. MAYACEAE Kunth 1840 (Bogmoss Family) [in POALES] ..................................................................................... 185
98. JUNCACEAE A. L. de Jussieu 1789 (Rush Family) [in POALES] ............................................................................. 185
99. CYPERACEAE A. L. de Jussieu 1789 (Sedge Family) [in POALES] ............................................................................. 192
106. POACEAE (R. Brown) Barnhart 1895 or GRAMINEAE A. L. de Jussieu 1789 (Grass Family) [in POALES] .......... 267

SECTION 6: EUDICOTYLEDONAE (EUDICOTS) .......................................................................................................................... 362
106. STROPHILOPhyACEAE S. F. Gray 1821 (Hornwort Family) [in CATOPHYLLALES] ......................................................... 362
109a. FUMARIACEAE A. P. de Candolle 1821 (Fumitory Family) [in RANUNCULALES] .................................................. 362
109b. PAxVERACEAE A. L. de Jussieu 1789 (Poppy Family) [in RANUNCULALES] ......................................................... 362
111. LARDIZABALACEAE Decaisne 1839 (Lardizaba Family) [in RANUNCULALES] ...................................................... 367
112. MENISPERMACEAE A. L. de Jussieu 1789 (Moosseed Family) [in RANUNCULALES] ......................................... 367
113. BERBERIDACEAE A. L. de Jussieu 1789 (Barberry Family) [in RANUNCULALES] .................................................... 368
114a. HYDRASTIDACEAE Martino 1820 (Golden-seal Family) [in RANUNCULALES] .................................................. 370
114b. RANUNCULACEAE A. L. de Jussieu 1789 (Buttercup Family) [in RANUNCULALES] .................................................. 371
114c. NEJEBRACEAE Dumortier 1829 (Lotus-lily Family) [in PROTEALES] ....................................................................... 383
117. PLATANACEAE Dumortier 1829 (Plane-tree Family) [in PROTEALES] ........................................................................ 389
121. BUXACEAE Dumortier 1822 (Boxwood Family) [in BUXALES] ................................................................................... 390
127. ALTINGiACEAE Lindley 1846 (Sweet-gum Family) [in SAXIFRAGALES] ................................................................. 390
128. HAMAMELiACEAE R. Brown 1818 (Witch Hazel Family) [in SAXIFRAGALES] .......................................................... 391
131. ITTEACEAE J. Agardh 1858 (Sweetspire Family) [in SAXIFRAGALES] ............................................................................ 392
132. GROSSULARiACEAE A. P. de Candolle 1805 (Currant Family) [in SAXIFRAGALES] .................................................. 392
133. BORAGOACEAE A. L. de Jussieu 1789 (Saxifrage Family) [in SAXIFRAGALES] ....................................................... 392
134. CRASSULACEAE A. P. de Candolle 1825 (Stonecrop Family) [in SAXIFRAGALES] .................................................... 400
137. PENTHORACEAE Rydberg ex Britton 1901 (Ditch-stonecrop Family) [in SAXIFRAGALES] ....................................... 404
138. HALORAGACEAE R. Brown 1814 (Water-milfoil Family) [in SAXIFRAGALES] .......................................................... 404
140. VITACEAE A. L. de Jussieu 1789 (Grape Family) [in VITALES] ................................................................................ 406
141. KRAMERiACEAE Dumortier 1829 (Krameria Family) [in ZYGOPHYLLALES] .......................................................... 410
142. ZYGOPHYLLACEAE R. Brown 1814 (Cressote-bush Family) [in ZYGOPHYLLALES] .................................................. 410
144. EARACEAE Lindley 1836 or LEGRiNOSiACEAE A. L. de Jussieu 1789 (Legume Family) [in FabALES] ............ 411
146. POLYGALACEAE R. Brown 1814 (Milkwort Family) [in FABALES] ........................................................................... 461
147. ROSACEAE A. L. de Jussieu 1789 (Rose Family) [in ROSALES] .................................................................................. 464
150. ELAEAGNACEAE A. L. de Jussieu 1789 (Olaster Family) [in ROSALES] ........................................................................ 495
151. RHAMNACEAE A. L. de Jussieu 1789 (Buckthorn Family) [in ROSALES] ................................................................. 495
152. ULMACEAE de Mirbel 1815 (Elm Family) [in ROSALES] .......................................................................................... 499
153. CANNABACEAE Endlicher 1827 (Hops Family) [in ROSALES] .................................................................................. 500
154. MORACEAE Lindley 1847 (Mulberry Family) [in ROSALES] .................................................................................. 502
155. URTICACEAE A. L. de Jussieu 1789 (Nettle Family) [in ROSALES] ........................................................................ 504
157. FAGACEAE Dumortier 1829 (Beech Family) [in FAGALES] .................................................................................... 507
158. MYRiCACEAE Blume 1829 (Bayberry Family) [in FAGALES] .................................................................................. 518
159. JUGLANACEAE A. Richard ex Kunth 1824 (Walnut Family) [in FAGALES] ................................................................. 520
160. CASUARINACEAE R. Brown 1814 (Casuarina Family) [in FAGALES] ........................................................................ 523
162. BETULACEAE S. F. Gray 1821 (Birch Family) [in FAGALES] ................................................................................ 524
163. DORATiACEAE Darwin 1782 (Graft Family) [in CUCURBITALES] .............................................................................. 524
170. BEGONiACEAE C. Agardh 1824 (Begonia Family) [in CUCURBITALES] ................................................................. 532
172a. PARNSiACEAE Gray 1821 (Grass-of-Parnassus Family) [in CELASTRALES] .......................................................... 532
172b. CELASTRiACEAE R. Brown 1814 (Bittersweet Family) [in CELASTRALES] .......................................................... 533
175. OXALiDACEAE R. Brown 1818 (Wood-sorrel Family) [in OXALiDAlES] ................................................................. 536
181. RHiZOPHORiACEAE R. Brown 1814 (Red Mangrove Family) [in MALPHiGHiALES] ......................................................... 537
<table>
<thead>
<tr>
<th>184. EUPHORBIACEAE</th>
<th>A.L. de Jussieu 1789</th>
<th>Spurge Family</th>
<th>[in MALPIGHIALES]</th>
</tr>
</thead>
<tbody>
<tr>
<td>189. PHYLLANTHACEAE</td>
<td>Martinov 1820</td>
<td>Leaf-flower Family</td>
<td>[in MALPIGHIALES]</td>
</tr>
<tr>
<td>190. ELATINACEAE</td>
<td>Dumortier 1829</td>
<td>(Waterwort Family)</td>
<td>[in MALPIGHIALES]</td>
</tr>
<tr>
<td>196. CHRYSOBALANACEAE</td>
<td>R. Brown 1818</td>
<td>(Coco-plum Family)</td>
<td>[in MALPIGHIALES]</td>
</tr>
<tr>
<td>198. MALPIGHIAEAE</td>
<td>A.L. de Jussieu ex Kanch 1817</td>
<td>(Tussac Family)</td>
<td>[in MALPIGHIALES]</td>
</tr>
<tr>
<td>201. SALICACEAE</td>
<td>de Mirbel 1815</td>
<td>(Willow Family)</td>
<td>[in MALPIGHIALES]</td>
</tr>
<tr>
<td>202. VIOLACEAE</td>
<td>Batsch 1802</td>
<td>(Violet Family)</td>
<td>[in MALPIGHIALES]</td>
</tr>
<tr>
<td>208. LINACEAE A.P. de Candolle ex Gray 1821</td>
<td>(Flax Family)</td>
<td>[in MALPIGHIALES]</td>
<td></td>
</tr>
<tr>
<td>213. PODOSTEMACEAE</td>
<td>Richard ex C. Agardh 1822</td>
<td>(Riverweed Family)</td>
<td>[in MALPIGHIALES]</td>
</tr>
<tr>
<td>214. HYPERICACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(St. John's-wort Family)</td>
<td>[in MALPIGHIALES]</td>
</tr>
<tr>
<td>215. GERANIACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Geranium Family)</td>
<td>[in GARRYALES]</td>
</tr>
<tr>
<td>216. LYTHraceae</td>
<td>J. St.-Hilaire 1805</td>
<td>(St.-Hilaire Family)</td>
<td>[in MYRTALES]</td>
</tr>
<tr>
<td>220. ONAGRAEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Evening-prime rose Family)</td>
<td>[in MYRTALES]</td>
</tr>
<tr>
<td>222. MYRTACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Myrtle Family)</td>
<td>[in MYRTALES]</td>
</tr>
<tr>
<td>223. MELASTOMACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Melastome Family)</td>
<td>[in MYRTALES]</td>
</tr>
<tr>
<td>230. STAPHYLAECCEAE</td>
<td>Martynov 1820</td>
<td>(Bladdernut Family)</td>
<td>[in CROSSOSOMATALES]</td>
</tr>
<tr>
<td>232. EBENACEAE</td>
<td>R. Brown 1818, nom. cons. (Cashew Family)</td>
<td>[in SAPINDALES]</td>
<td></td>
</tr>
<tr>
<td>234. SAPINDACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Soapberry Family)</td>
<td>[in SAPINDALES]</td>
</tr>
<tr>
<td>236. CACILACEAE</td>
<td>C. Agardh 1824</td>
<td>(Cica Family)</td>
<td>[in SAPINDALES]</td>
</tr>
<tr>
<td>240. SIMARORACEAE</td>
<td>A.P. de Candolle 1811</td>
<td>(Quassia Family)</td>
<td>[in SAPINDALES]</td>
</tr>
<tr>
<td>243. MELIACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Mahogany Family)</td>
<td>[in SAPINDALES]</td>
</tr>
<tr>
<td>250. MALVACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Mallow Family)</td>
<td>[in MALVALES]</td>
</tr>
<tr>
<td>252. THYMELAEACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Mezereum Family)</td>
<td>[in MALVALES]</td>
</tr>
<tr>
<td>255. CISTACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Rockrose Family)</td>
<td>[in MALVALES]</td>
</tr>
<tr>
<td>258. TROPAEOLACEAE</td>
<td>A.L. de Jussieu ex A.P. de Candolle 1824</td>
<td>(Nasturtium Family)</td>
<td>[in BRASSICALES]</td>
</tr>
<tr>
<td>260. BORAGACEAE</td>
<td>R. Brown 1838</td>
<td>(False-marigold Family)</td>
<td>[in BRASSICALES]</td>
</tr>
<tr>
<td>264. BATAEAE</td>
<td>von Martius ex Meissner 1842</td>
<td>(Batis Family)</td>
<td>[in BRASSICALES]</td>
</tr>
<tr>
<td>267. RESEDACEAE</td>
<td>A.P. de Candolle ex Gray 1821</td>
<td>(Mignonette Family)</td>
<td>[in BRASSICALES]</td>
</tr>
<tr>
<td>272. CLEOMACEAE</td>
<td>Horaninow 1834</td>
<td>(Cleome Family)</td>
<td>[in BRASSICALES]</td>
</tr>
<tr>
<td>273. BRASSICACEAE</td>
<td>Burnett 1835 ex CRUCIFERAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Mustard Family)</td>
</tr>
<tr>
<td>279. SANTALACEAE</td>
<td>R. Brown 1820</td>
<td>(Sandalwood Family)</td>
<td>[in SANTALALES]</td>
</tr>
<tr>
<td>282. LECITACEAE</td>
<td>Link 1821</td>
<td>(Tamarisk Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>285. PLUMBAGINACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Leadwort Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>288. POLYGONACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Smartweed Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>293. DROSERACEAE</td>
<td>Salisbury 1808</td>
<td>(Sundew Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>296. CARYOPHYLLACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Pink Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>298. AMARANTHACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Amaranth Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>304. AIIZOACEAE</td>
<td>Rudolphi 1830</td>
<td>(Fig-marigold Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>305a. PHYLLACCEAE</td>
<td>R. Brown 1818</td>
<td>(Pokeweed Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>310. PENTAPHYLACEAE</td>
<td>C. Agardh 1824</td>
<td>(Petiveria Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>313. NYCTAGINACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Four-o'clock Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>320. MOLLUGINACEAE</td>
<td>Hutchinson 1926</td>
<td>(Carpetweed Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>329. MONTIACEAE</td>
<td>Rafinesque 1820</td>
<td>(Montia Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>331. BASELLACEAE</td>
<td>Moquin-Tandon 1840</td>
<td>(Madeira-vine Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>333. TALINACEAE</td>
<td>Doweld 2001</td>
<td>(Fameflower Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>334. PORTULACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Purslane Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>336. CIRRIACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Cactus Family)</td>
<td>[in CARYOPHYLLALES]</td>
</tr>
<tr>
<td>338. CORNACEAE</td>
<td>Berchtold &amp; J. Presl 1829</td>
<td>(Dogwood Family)</td>
<td>[in CORNALES]</td>
</tr>
<tr>
<td>340. NYSSACEAE</td>
<td>A.L. de Jussieu ex Dumortier 1829</td>
<td>(Tupelo Family)</td>
<td>[in CORNALES]</td>
</tr>
<tr>
<td>341. HYDRANGEACEAE</td>
<td>Dumortier 1829</td>
<td>(Hydrangea Family)</td>
<td>[in CORNALES]</td>
</tr>
<tr>
<td>342. LOASCACEAE</td>
<td>A.L. de Jussieu 1804</td>
<td>(Loasa Family)</td>
<td>[in CORNALES]</td>
</tr>
<tr>
<td>343. BALSAMINACEAE</td>
<td>A. Richard 1822</td>
<td>(Touch-me-not Family)</td>
<td>[in ERICALES]</td>
</tr>
<tr>
<td>347. POLEMONACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Jacob's-ladder Family)</td>
<td>[in ERICALES]</td>
</tr>
<tr>
<td>350. GENTIANACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Genus Family)</td>
<td>[in GENTIANALES]</td>
</tr>
<tr>
<td>351. EPHEDRACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Ephedra Family)</td>
<td>[in GENTIANALES]</td>
</tr>
<tr>
<td>352. LOGANIACEAE</td>
<td>R. Brown ex Martinus 1827</td>
<td>(Logania Family)</td>
<td>[in GENTIANALES]</td>
</tr>
<tr>
<td>353. GELSEMIACEAE</td>
<td>(G. Don) Struwe &amp; V. Albert 1995</td>
<td>(Jessamine Family)</td>
<td>[in GENTIANALES]</td>
</tr>
<tr>
<td>354. APOCYNACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Dogbane Family)</td>
<td>[in GENTIANALES]</td>
</tr>
<tr>
<td>356. BORAGINACEAE</td>
<td>A.L. de Jussieu 1789</td>
<td>(Borage Family)</td>
<td>[order assignment uncertain]</td>
</tr>
</tbody>
</table>
357. **CONVOLVULACEAE** A.L. de Jussieu 1789 (Morning Glory Family) [in SOLANALES] ......................................................... 774
358. **SOLANACEAE** A.L. de Jussieu 1789 (Nightshade Family) [in SOLANALES] .......................................................... 781
360. **SPIRINCULACEAE** von Martius ex A.P. de Candolle 1839 (Chickenspike Family) [in SOLANALES] ..................... 789
361. **HYDROLOEACEAE** Berchtold & J. Presl 1820 (Hydrolat Family) [in SOLANALES] .............................................. 789
364. **OLEACEAE** Hoffmannsegg & Link 1813 (Olive Family) [in LAMIALES] .............................................................. 789
365. **TETRACHONDRAEAE** Wettstein 1924 (Tetrachondra Family) [in LAMIALES] ......................................................... 794
369. **SCROPHULARIACEAE** A.L. de Jussieu 1789 (Snapdragon Family) [in LAMIALES] ................................................ 807
371. **LINDERNIACEAE** Borsch, K. Müller, & Eb. Fischer 2005 (False-pimpernel Family) [in LAMIALES] ....................... 808
372. **PEDALIACEAE** R. Brown 1810 (Sesame Family) [in LAMIALES] ........................................................................... 810
373. **LAMIACEAE** Lindley 1836 or **LABIATAE** A.L. de Jussieu 1789 (Mint Family) [in LAMIALES] ............................. 810
374. **PHRYMACEAE** Schauer 1847 (Lopseed Family) [in LAMIALES] ........................................................................ 836
375. **PAULOWNIACEAE** Nakai 1949 (Paulownia Family) [in LAMIALES] ................................................................. 837
376. **OROBANCHACEAE** Ventenat 1799 (Broomrape Family) [in LAMIALES] ............................................................... 837
377. **LENTIBULARIACEAE** Richard 1808 (Bladderwort Family) [in LAMIALES] .......................................................... 845
378. **ACANTHACEAE** Durand 1762 (Acanthus Family) [in LAMIALES] ............................................................... 848
379. **BIGNONIACEAE** A.L. de Jussieu 1789 (Bignonia Family) [in LAMIALES] ............................................................ 853
380. **VERBENACEAE** J. St.-Hilaire 1805 (Verbena Family) [in LAMIALES] ............................................................... 854
384. **MARTYNIACEAE** Staff 1895 (Martynia Family) [in LAMIALES] ........................................................................ 857
389. **AQUIFOLIACEAE** Barrington 1830 (Holly Family) [in AQUIFOLIALES] .............................................................. 857
390. **CAMPANULACEAE** A.L. de Jussieu 1789 (Bellflower Family) [in ASTERALES] ................................................... 861
397. **MENYANTHACEAE** Dumortier 1829 (Buckbean Family) [in ASTERALES] .......................................................... 867
399. **GOODENIACEAE** R. Brown 1810 (Goodenia Family) [in ASTERALES] .............................................................. 868
399. **CALYCERACEAE** R. Brown ex Richard 1820 (Calycera Family) [in ASTERALES] ........................................... 868
400. **ASTERACEAE** Dumortier 1822 or **COMPOSITAE** Giseke 1792 (Aster Family) [in ASTERALES] ......................... 869
405. **ADOXACEAE** Trautvetter 1853 (Moschatel Family) [in DIPSACALES] ............................................................ 789
406b. **CAPRIFOLIACEAE** A.L. de Jussieu 1789 (Honeysuckle Family) [in DIPSACALES] ........................................ 985
406c. **LINNAEACEAE** Hoffmannsegg & Link 1813 (Olive Family) [in LAMIALES] ..................................................... 789
406d. **DIPSACACEAE** Hoffmannsegg & Link 1813 (Olive Family) [in LAMIALES] ..................................................... 789
406e. **VALERIANACEAE** Hoffmannsegg & Link 1813 (Olive Family) [in LAMIALES] ................................................ 789
413. **APIACEAE** Lindley 1836 or ................................................... 993
414. **UMBELLIFERAE** A.L. de Jussieu 1789 (Carrot Family) [in APIALES] ............................................................. 993

**BIBLIOGRAPHY** ...................................................................................................................................................... 1010

**INDEX OF FAMILIES AND GENERA** .......................................................................................................................... 1059
INTRODUCTION

The Flora

Floras serve as the basic reference of the plant biota of an area; they are critical tools that serve botanists, conservationists, ecologists, foresters, gardeners, agronomists, researchers, and the general public. In the nineteenth and early twentieth centuries, the botanical exploration of an area and writing a flora to summarize that information was seen as a basic societal need leading to the discovery of economically valuable information. Financial support for the research and writing of floras has waned in recent decades, though, as they have been increasingly regarded as “old science” and resources have shifted to areas of plant science seen as more “cutting edge.” Even in taxonomic research, the advent of molecular techniques has largely supplanted detailed taxonomic research (at generic levels and below) and the writing of floras, and the majority of papers in plant systematics now address phylogenetic relationships within a particular group of plants, and mostly at higher taxonomic levels. Traditional monographic taxonomy, with descriptions of taxa, keys to facilitate their identification, distribution maps, and assessments of habitat and relative abundance or rarity, has become increasingly rare.

Yet, paradoxically, the societal uses and needs for the translation of taxonomic information to a useable form, such as floras, have never been greater. Globalization of human societies and economies has meant that plants are regularly introduced far away from their regions of nativity, and many become established and can be either benign or cause economic and conservation damages. Increasing human utilization of land resources has fueled a biodiversity crisis, with many species now considered imperiled. In the United States and elsewhere, this has resulted in considerable governmental and nongovernmental activity focused on biodiversity inventory and conservation, “recovery” of endangered and threatened species, ecological studies and ecological restoration, and assessment and suppression of invasive exotics. All these activities require an accurate and sophisticated understanding of the flora of an area. These activities also generate new information about the taxonomy, distribution, and conservation status of components of a region’s flora which then needs to be incorporated into new iterations.

In the southeastern United States, the publication thirty-seven years ago of the Manual of the Vascular Flora of the Carolinas, by A.E. Radford, H.E. Ahles, and C.R. Bell (Radford, Ahles, & Bell 1968), was a landmark. In the decades since its publication, it has served as the primary reference for the identification of plants in the Carolinas, and throughout the southeastern United States (since most other states were not covered by comparable, recent references. The effort to research and write the Manual of the Vascular Flora of the Carolinas took about 11 years, and resulted in a series of publications, the Guide to Vascular Flora of the Carolinas (Radford, Ahles, & Bell 1964), the Atlas of the Vascular Flora of the Carolinas (Radford, Ahles, & Bell 1965), and finally the Manual itself (1968). Once published, the existence of “the Manual” helped generate an interest in and further studies of the flora of the region; since then, many additional species have been documented as part of the region's flora, additional alien species have become naturalized, new species have been described, monographs have given new taxonomic insights into groups, nomenclature accepted in 1968 has been found to be invalid, new and more reliable keys have been developed, and systematic treatments have changed and advanced. Increasingly, identification of the flora of our area (and other states of the Southeast and Mid-Atlantic) by academic researchers, agency personnel, and the interested public is hampered by the lack of an up-to-date flora. Without such a flora, identification must involve reference to herbaria and thousands of monographs, papers, and other floras – resources not readily available to many people who need them. The absence in the region of a single-source modern standard for the systematic treatment, nomenclature, and identification of the flora compromises scientific studies, ecological research, and agency inventory, management, and monitoring of ecosystem and species biodiversity.

Chapter 1 consists of a new treatment of the flora of the Carolinas, Virginia, and Georgia, to fill the need for a new standard reference to aid in the consistent identification of the flora of the region. While building on the tradition of the Manual, the Flora is not a revision or second edition; it takes some different approaches, has features the Manual lacks, lacks features the Manual has, and has an expanded geographic scope. At the present time, the Flora includes treatment of all species in the flora area of Delaware, Virginia, West Virginia, North Carolina, South Carolina, Georgia, northern Florida (the Panhandle and northeastern Florida, south to and including Dixie, Gilchrist, Columbia, Union, Bradford, Clay, and Duval counties), Alabama, Mississippi, Tennessee, Kentucky, the District of Columbia, and Maryland, and portions of the additional states of New Jersey (southern New Jersey, south of and including Monmouth and Burlington counties), and Louisiana (the Florida Parishes, east of and including West Feliciana, East Baton Rouge, Ascension, St. James, St. John the Baptist, St. Charles, Jefferson, and Plaquemines parishes) (see Figure 1.A.). Approximately 6800 taxa are keyed and treated, making the Flora a comprehensive resource for understanding the flora of all of the Southeastern United States east of the Mississippi River and south of the Ohio River and Mason-Dixon Line, excluding peninsular Florida.

Sources of information.

This new flora is based on all resources available: herbarium specimens, published literature, grey literature, Natural Heritage databases and rare species lists, and personal communication with a regional network of botanists and taxonomic experts. Herbarium specimens have been consulted at major institutions in the region.
INTRODUCTION

Figure 1.A. Map of the area covered by the Flora.

Criteria for inclusion of taxa.

One of the first challenges that the author of a flora encounters is to decide the criteria for the inclusion of taxa. The general rule in most floras can simply be summarized as “all native taxa and naturalized alien taxa,” but within this simplistic phrase hide many complicated issues, and floras often differ widely in the actual criteria and judgments that they apply (Pyšek et al. 2004; Palmer, Wade, & Neal 1995). In particular, coverage of alien species is very uneven in floras, and the frequent exclusion of many alien species from floras hampers ecological studies, conservation efforts, and efforts to minimize the ecological and economic impacts of invasive aliens.

The following categories of taxa are included and treated fully as “primary” species:

1. Native taxa documented from the Flora (Georgia, South Carolina, North Carolina, Virginia, West Virginia, Delaware, and northern Florida, Alabama, Mississippi, Tennessee, Kentucky, Maryland, District of Columbia, Maryland, eastern Louisiana, and southern New Jersey), whether extant or presumed extinct. Some authors, such as Isely (1990), have “excluded” taxa from a flora if they believed them to be extinct or extirpated. This philosophy seems poorly considered: these taxa may prove not to be extinct or extirpated and their inclusion in the Flora will facilitate possible rediscovery, even if never found again specimens of them in the herbarium need to be identified or confirmed, and their former existence in the region should be documented.

2. Alien taxa introduced by whatever means and demonstrably established and reproducing (sexually or vegetatively) as a component of the flora. Parallel to #1 above, established alien taxa which have been presumably eradicated (such as Striga asiatica in the Carolinas) are included, as their eradication may not have been effective, they may be reintroduced, specimens need to be identifiable using the Flora, and their former existence should be documented.

3. Alien taxa substantially cultivated in the Flora area as crops, such as Triticum aestivale, Zea mays, Vitis vinifera, and Pinus clausa. Such species are variably represented in herbaria, and are often included in floras only if one or more herbarium specimens indicate that the species is persisting, or has been collected around a dump or in the edge of a field “out of cultivation.” This seems an arbitrary criterion to apply to species which are among the most commonly seen and economically most important in a region, and may cover many thousands of acres or square miles in the region covered by the flora.

Additional categories of taxa are included and treated as “secondary” species:

1. Native taxa with uncertain documentation, this varying from literature reports not definitely verifiable with specimens (some of these old and some new), to sight reports regarded as probably correct. Taxa in this category are included as secondarily-treated taxa, and their imperfect documentation is described.

Species which have been reported from the Flora area but which are excluded for one reason or another are also listed and the reason for their exclusion mentioned or discussed.

Taxonomic philosophy. Taxonomic treatments generally follow recent monographic and revisionary work, but an effort has been made to provide a certain rough consistency of “splitting” vs. “lumping” across different taxonomic groups. As is generally true in recent treatments, generic and family concepts are often narrower than those used in the Radford, Ahles, and Bell (1968) Manual, based on new evidence, including (but not limited to) cladistic methods applied to morphologic and molecular data. Ironically, these results have often resulted in a validation of earlier, narrower generic (and familial) concepts espoused by J.K. Small, P.A. Rydberg, and others (see Weakley 2005 for extensive discussion). Varieties are less frequently recognized than by
INTRODUCTION

Fernald (1950), though a considerable number of species and infraspecific taxa “lumped” by Radford, Ahles, and Bell (1968) are recognized (generally following more recent monographic or revisionary work). Some taxa not formally recognized are discussed and characters for their recognition provided in the text, to draw attention to putative taxa that may warrant recognition after further evaluation.

Format and features.

Detailed keys. Keys have been subjected to rigorous testing in the field and herbarium by hundreds of users. To the degree feasible, keys are structured to emphasize characters that are readily observable and available for long parts of the year, such as vegetative characters; this is not feasible for all groups, of course. Multiple characters are provided. Terminology strives to be precise and not abstruse. Technical terms which do not significantly add meaning (for some genera, an introduction to morphological characters and terms used is provided as “Identification notes” preceding the key). Geographic distributions and habitats are sometimes included in the keys as pragmatic, useful, secondary “characters,” but are placed in brackets to indicate that they are not “true” characters. The keys include all species from the primary and secondary flora areas (North Carolina, South Carolina, Virginia, Georgia, Alabama, Mississippi, Tennessee, Kentucky, West Virginia, Maryland, Delaware, the District of Columbia, and parts of Florida, Louisiana, and New Jersey). In some cases, several alternate keys are provided. The primary emphasis of the keys is pragmatism – effective and efficient identification. For this reason, a key to a genus sometimes includes closely similar taxa not in the genus that may be mistaken for it. Another example is that the “family key” to ferns and fern allies is actually a key to genera, allowing an emphasis in the key on readily observable characteristics, rather than the technical characters often needed to distinguish fern families. Keys are based on herbarium specimens, though reference is made when characters based on pressed and dried specimens may differ. Some keys have been adapted from literature cited; where the adaptation is particularly close, credit is given to the source by specific citation.

Habitat. Information is provided about the habitat of the taxon. This information is largely from the field experience of the author, supplemented by information from other botanists, from herbarium labels, and from the literature. For species with wide ecological amplitudes, the habitat may be described simply and broadly (“a wide variety of upland forests”), while the habitat of more localized, specialized, or rare taxa may be described in considerable detail (“moist outcrops of calcareous metamorphic rocks, such as mylonite or marble, near waterfalls in humid escarpment gorges with high rainfall, at low elevations”).

Native status. The native or alien status is stated. Also, an asterisk prior to the species’ name indicates that it is considered alien throughout the primary flora area. Some past floras, including Radford, Ahles, and Bell (1968), were haphazard in their inclusion of this information, which is a very important attribute of each recognized taxon. If there is a question, it is mentioned or discussed. For aliens, an opinion is given as to whether the taxon is naturalized, persistent, waif, etc. in the primary flora area.

Flowering/fruiting dates. Flowering and fruiting dates are provided for the primary flora area. These are derived from herbarium specimens viewed by the author (collected from within the Flora area), from field observations by the author (within the Flora area), and from literature cited.

Distribution of species. A statement of the rangewide distribution of each taxon treated is provided. This is based on published distribution maps and distribution statements in other floras, amended and improved by additional herbarium specimens and published records (such as the “Noteworthy Collections” section in the journal Castanea). The distribution within the primary area is provided by state and physiographic province.

These distribution statements are being replaced by a map. The map shows distribution within the Flora area symbolically, with each state × physiographic province area, except that on the maps, the very small areas of the DC Piedmont, the DC Coastal Plain, and the DE Piedmont are not shown separately from the MD Piedmont, the MD Coastal Plain, and the MD Piedmont, respectively. The native/alien status of the taxon is shown by squares for native occurrence and triangles for alien occurrence. Note that some species have distributions including both alien and native distributions, so Dionaea muscipula for instance is native in the Coastal Plain of NC and SC, but alien in the Coastal Plain of FL. The abundance in that state × physiographic province area is shown by the symbol, an open symbol is rare, a symbol with a dot is uncommon, and a filled symbol is common.

In the lower right corner is a space designated for distributional information. If the species is endemic to the Flora Area, you will see "EN." If the species is alien, you will see the region of the world to which it is native. If the species is native but not endemic, you will see a compass rose. Eight arrows depict the native distribution of the taxon outside of the Flora area. Arrows can be long (common at least somewhere in that region), or short (only uncommon or rare in that region).

The regions to which the eight arrows point are:
N arrow -- ne. North America (PA and n. NJ north to the Canadian maritime provinces, west through QC to se. ON and e. and s. OH);
NW arrow -- nw. North America (w. OH, MI, w. ON, and NU west to AK, BC, and OR, north of and including n. MO, NE, WY, ID, and OR);
W arrow -- w. United States (the western “Southeast” of trans-Mississippi LA, AR, s. MO, OK, and e. TX), west to sw. United States;
SW arrow -- Mexico, Central America, and South America;
S arrow -- peninsular FL;
SE arrow (dashed to indicate oversea) -- West Indies (including Bahamas) and Bermuda;
E arrow (dashed to indicate oversea) -- Asia and/or Africa;
NE arrow (dashed to indicate oversea) -- Europe.

<table>
<thead>
<tr>
<th></th>
<th>Native</th>
<th>Exotic</th>
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<tbody>
<tr>
<td>Rare</td>
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<tr>
<td>Uncommon</td>
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<td>Common</td>
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<tr>
<td>Endemic</td>
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<td>n/a</td>
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Figure 1.B: Sample distribution maps and distribution map key

**Literature.** Nearly all genera have citations to recent, pertinent systematic literature, as well as more limited citations to literature on ecology and population biology. The intent is to provide the user with access into more detailed literature, and to document the literature basis of the treatment followed in the *Flora*. About 2100 references have been consulted and are cited.

KEYS TO FAMILIES AND GENERA

ARTIFICIAL KEY TO THE GENERA AND FAMILIES OF LYCOPHYTES AND PTERIDOPHYTES

1 Plant a free-living gametophyte, consisting of filaments or thalli, generally a single cell thick, usually with abundant single-celled gemmae .............. Key A

1 Plant a sporophyte, consisting of a stem, rhizome, corm, or crown producing well-developed leaves, > 1 cell thick (except in Didymoglossum, Crepidomanes, Vandenboschia, and Hymenophyllum), generally reproducing by spores.

2 Plant aquatic, either floating and unattached, or rooting and largely submerged .........................................................Key B

2 Plant of various habitats, including wetlands, where sometimes growing in soils saturated or intermittently flooded, but not aquatic.

3 Leaves "fern-like," variously lobed or divided, ranging from pinnatifid to 4-pinnate.

4 Leaf blades (not including the petiole) small, < 30 cm long or wide (some species will key either here or in the next lead).

5 Epipetric or epiphytic, growing on rock, tree bark, walls, or over rock in thin soil mats or in small soil pockets .........................Key D

6 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key E

7 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key F

8 Leaf blades medium to large, > 30 cm long or wide.

9 Leaf blades small, < 30 cm long or wide.

10 Leaf blades (not including the petiole) small, < 30 cm long or wide (some species will key either here or in the next lead).

11 Epipetric or epiphytic, growing on rock, tree bark, walls, or over rock in thin soil mats or in small soil pockets .........................Key G

12 Epipetric or epiphytic, growing on rock, tree bark, walls, or over rock in thin soil mats or in small soil pockets, or on tree trunks ........Key H

13 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key I

14 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key J

15 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key K

16 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key L

17 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key M

18 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key N

19 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key O

20 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key P

21 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key Q

22 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key R

23 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key S

24 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key T

25 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key U

26 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key V

27 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key W

28 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key X

29 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key Y

30 Terrestrial, growing in soil, not associated with rock outcrops ......................................................................................Key Z

Key A – Pteridophytes reduced to thalloid or filamentous, free-living gametophytes

1 Gametophytes thalloid, ribbon-like and branched.

2 Gemmae absent or spathulate (> 1 cell wide) ................................................................. Hymenophyllum (HYMENOPHYLLACEAE)

2 Gemmae uniseriate (1 cell wide) .................................................................................... Vittaria (PTERIDACEAE)

Key B – Pteridophytes and lycophytes growing as floating or rooted aquatics

1 Plant with at least some leaves palmately or pinnately lobed or 1-4× pinnately divided (“fern-like”) and > 2 cm long............................. Ceratopteris (PTERIDACEAE)

2 Plant either a floating aquatic with leaves <5 cm long, or with clover-like or linear leaves.

3 Leaves < 1 mm long, reddish or green, without hairs on the upper surface................................. Azolla (SALVINIACEAE)

4 Leaves linear.

5 Plants corose or with short rhizomes; leaves numerous, undivided leaves ............................................... Isoetes (ISOETACEAE)

6 Plants with creeping rhizomes; leaves few, reduced to a winged petiole ........................................... Pilularia americana (MARSILEACEAE)

Key C – Lycophytes and pteridophytes with leaves not "fern-like"

(unlobed, variously awl-shaped, scale-like, or terete)

1 Stem obviously jointed; leaves scale-like, borne in a whorl at each of the distant joints; spores borne in a terminal strobilius with peltate scales ......................................................... Equisetum (EQUISETACEAE)

2 Stem not jointed; leaves scale-like or larger, but if scale-like not borne in whorls at distant joints; spores borne variously, but if in a terminal strobilius the scales not peltate.

3 Leaves solitary (though often the internodes very short from a thin, creeping rhizome); sporangia borne on a separate branch from the rhizome .................................................. Pilularia (MARSILEACEAE)

4 Leaves straight, arching, or flaccid, from a 2-3-lobed corm; sporangia borne in the expanded, hyaline leaf bases................................. Isoetes (ISOETACEAE)

5 Leaves not notably spiral-curved, from a short rhizome; sporangia borne in 2 rows at the tip of the linear fertile leaves ................................................................. Schizaea (SCHIZACEAE)

6 Leaves various (scale-like, awl-like, moss-like, or flat), but not linear and grass-like, mostly 1-10× as long as wide.

7 Leaves inconspicuous, reduced to a few nerveless scales (< 1.5 mm long), the internodes much longer than the leaves; sporangia yellowish, 3-locular, 1-2 mm in diameter; stems upright, repeatedly branched dichotomously .................. Psilotum (PSILOTACEAE)

8 Leaves either larger or, if scale-like, with nerves and longer than the internodes (the leaves thus overlapping); sporangia yellowish to brownish, 1-locular, < 1 mm in diameter; stems either subterranean or surficial rhizomes or erect or ascending (and sometimes dichotomously branched in whole or in part in Hyperzia, Diphasiastrom, and Dendrolycophodium).

9 Plant with leaves very numerous and overlapping along the creeping, ascending, or erect stems, the leaves usually scale-like or awl-like, 0.5-2 (~3) mm wide, typically acute, acuminate, or hair-tipped; sporangia either in terminal strobili (axillary to specialized, smaller leaves) or axillary to normal leaves.
KEYS TO FAMILIES AND GENERA

7 Sporangia borne in flattened or quadrangular strobili sessile at the tips of leafy branches; spores and sporangia of two sizes, the megaspore smaller and borne basally in the strobili .......................................................... Selaginella (SELAGINELLACEAE)

7 Sporangia borne in the axils of normal foliage leaves, or in strobili sessile at the tips of leafy branches or stalked on specialized branches with fewer and smaller leaves; spores and sporangia of one size.

8 Leafy stems erect, simple or dichotomously branched, the ultimate branches vertically oriented; sporophylls like the sterile leaves or only slightly reduced, in annual bands along the stem; vegetative reproduction by leafy gemmae near stem apex.............. Huperzia (LYCOPODIACEAE)

8 Leafy stems prostrate or erect, if erect then generally branched, the ultimate branches spreading (horizontal) or ascending; sporophylls differing from sterile leaves, either broader and shorter, or more spreading, aggregated into terminal cones; lacking vegetative reproduction by gemmae.

9 Leaves herbaceous, pale or yellow-green, dull, deciduous; leafy stems creeping; rhizome dying back annually to an underground vegetative tuber at apex; [of wetlands, mostly on moist or wet sands or peats].

10 Leaves of the prostrate stems 0.5-1.2 mm wide, ciliate-toothed or not toothed; leaves of the erect stem many, overlapping, spirally arranged; leaves of the strobili resembling leaves of the prostrate and upright stems in size and shape; upright stems 1.5-15 mm in diameter (including the leaves) .......................................................... Lycopodiella (LYCOPODIACEAE)

10 Leaves of the prostrate stems 1.3-2.1 mm wide, not toothed; leaves of the erect stem few, not overlapping, whorled; leaves of the strobili much reduced relative to the leaves of the prostrate and upright stems; upright stems 1.5-3 mm in diameter (including the leaves) .................................................. Pseudolycopodiella (LYCOPODIACEAE)

9 Leaves rigid, bright to dark green, shiny, evergreen; leafy stems mainly erect, treelike, fanlike, or creeping (if creeping, then the leaves with elongate, hyaline hair-tips); rhizome perennial, elongate, surficial or subterranean; [of uplands, mostly in moist to dry soils].

11 Branches 1-5 mm wide (including the leaves), compressed to quadrangular, with 4 ranks of leaves; branching of strobili stalks dichotomous ................................................................. Diphasiastrum (LYCOPODIACEAE)

11 Branches 4-12 mm wide, terete (to somewhat compressed in Dendrolycopodium obscurem), with 6 or more ranks of leaves; branching of strobili stalks (when present), pseudomonopodial (falsely appearing to have a main axis from which branches arise).

12 Strobili borne on elonagte, sparsely leafy peduncles borne at the tips of leafy, ascending branches; leaves with attenuate, hyaline hair-tips .................................................. Lycopodium (LYCOPODIACEAE)

12 Strobili sessile, borne directly above densely leafy portions of upright branches; leaves acuminate to acute.

13 Erect leafy stems 3-8 mm in diameter (including the leaves), treelike or fanlike, with a definite main axis; leaves acute at the apex; horizontal shoots subterranean, without winter bud constrictions ................................................................. Lycopodium (LYCOPODIACEAE)

13 Erect leafy stems 10 mm or more in diameter (including the leaves), branched 1-4 times sub-dichotomously; leaves with a 0.4-1.0 mm long stiff spine; horizontal shoots at or near the ground surface, with winter bud constrictions ................................................................. Spinulum (LYCOPODIACEAE)

6 Plant with leaves not as above (see below).

14 Plant with 1 (-several) leaves, the sterile leaf blade 0.3-24 cm long, ovate to lanceolate, entire-marginated, obuse, the longer fertile portion with 2 rows of sporangia somewhat imbedded in it................................. Ophioglossum (OPHIOGLOSSACEAE)

14 Plant with many leaves, generally 5 or more, not divided into separate sterile and fertile segments, the leaves either (a) small, 0.3-1.6 cm long, obovate, scattered along a very thin creeping rhizome, or (b) larger, (2-) 8-30 cm long, cordate at base, the tip long-attenuate (often proliferous, bearing a plantlet at the tip).

15 Leaf blades (2-) 8-30 cm long, cordate at the base, the tip long-attenuate, often proliferous (bearing a plantlet at the tip); spirally arranged; sorus in indusiate sori on the undersurface; leaf texture moderately thick; rhizome erect or ascending, 1.0-1.5 mm in diameter, the leaves clustered from its tip ................................................................. Asplenium rhizophyllum (ASPLENIACEAE)

15 Leaf blades 0.3-1.6 cm long, cuneate at the base, rounded at obtuse at the tip, not proliferous; sporangia solitary in a marginal pocket on the leaf; leaf texture very thin; rhizome creeping on the surface of rock or bark, 0.1-0.3 mm in diameter, the leaves scattered along it ................................. Didymoglossum pettersii (HYMENOPHYLLACEAE)

Key D – Small pteridophytes, epipetric or epiphytic, growing on rock, tree bark, walls, or over rock in thin soil mats or in small soil pockets

1 Leaves pinnatifid or bipinnatifid, most of the pinnia not fully divided from one another (the rachis winged by leaf tissue most or all of its length).

2 Leaves bipinnatifid, at least the lowest pinnia deeply lobed.

3 Leaves of a very delicate texture, 1 cell thick; sori borne in cups on the leaf margins; [of rock outcrops with high air humidity].

4 Rhizomes filiform, <0.5 mm in diameter, glabrous or with sparse light-colored hairs; indusium ("involucre") bivalve (deeply divided into 2 flaps); receptacle not exserted from between the deeply bilobed indusium................................................................. Hymenophyllum (HYMENOPHYLLACEAE)

4 Rhizomes moderately stout, 0.8-1.5 mm in diameter, densely clad with dark-colored hairs; indusium ("involucre") tubular or funneliform, sometimes slightly 2-lobed; receptacle long and whiplike, exserted from the mouth of the tubular (slightly bilobed) indusium ................................................................. Vandenboschia (HYMENOPHYLLACEAE)

3 Leaves of an herbaceous, subcoriaceous, or coriaceous texture, >1 cell thick; sori otherwise; [of various habitats, not strictly of moist sites].

5 Lowermost (and other) pinnia with numerous, rather even lobes ................................................................. Phegopteris (THELYPERIDACEAE)

5 Lowermost pinnia with a few, irregular lobes (the upper pinnia unlobed) ................................................................. Pteris multifida (PTERIDACEAE)

2 Leaves pinnatifid, the pinnia not lobed.

6 Leaf blades with a long-attenuate apex, blade unlobed for 1/3 its length; sori elongate .................................................. Asplenium (ASPLENIACEAE)

6 Leaves without a long-attenuate apex, blade lobed for most of its length; sori round.

7 Plants dwarf, the leaf blades < 5 cm long; [occurring only in permanently moist habitats, as in grottoes behind waterfalls] ................................................................. Microlycopodium (POLYPODIACEAE)

7 Plants larger, the leaf blades 7-30 cm long; [occurring on moist to dry habitats].

8 Leaf blade densely scaly on the lower surface; leaf segment margins entire; rhizome 1-2 mm in diameter ................................................................. Pleopeltis (POLYPODIACEAE)
8 Leaf blade scale-less on the lower surface; leaf segment margins denticulate; rhizome 3-6 mm in diameter.......................... Adiantum (PTERIDACEAE)

1 Leaves pinnate, pinnate-pinnatifid, 2-pinnate, or even more divided (the rachis naked for most of its length, often winged in the apical portion).

9 Leaves pinnate or pinnatifid.

10 Leaves of a very delicate texture, 1 cell thick; sori borne in cups on the leaf margins; [of rock outcrops with high air humidity].

11 Rhizomes filiform, <0.5 mm in diameter, glabrous or with sparse light-colored hairs; indusium ("involute") bivalve (deeply divided into 2 flaps); receptacle not exserted from between the deeply bilobed indusium.................................................................Hymenophyllum (HYMENOPHYLLACEAE)

12 Pinnae > 1 cm wide; leaves subcoriaceous to coriaceous; veins anastomosing, rejoining to form a netlike pattern.......................... Pteris (PTERIDACEAE)

13 Pinnae < 1 cm wide; leaves herbaceous to subcoriaceous; veins free, not rejoining.

14 Leaf undersurface densely covered with stellate and ciliate scales.................... Astrolepis sinuata ssp. sinuata (PTERIDACEAE)

15 Rachis green or tan; leaf margin modified into a false indusium, reflexed to cover the sori .......... Pteris viitata (PTERIDACEAE)

16 Leaf blade pentagonal or broadly triangular in outline, ca. 1/3 as long as wide.

17 Leaf blade pentagonal in outline, the terminal pinna by far the largest; rhizome 5-8 mm in diameter; indusia present, thick, persistent, and reniform; [introduced species, naturalized in moist ravines in SC].......................Arachniodes (DRYOPTERIDACEAE)

18 Sori on the undersurface of the leaf, marginal and more-or-less hidden beneath either the unmodified revolute leaf margin or under a modified, reflexed false indusium.

19 Sori on the undersurface of the leaf, away from the margins.

15 Rachis dark-brown or purple; leaf margin unmodified, though often revolute ..........................Pellaea (PTERIDACEAE)

16 Leaf blade elongate, mostly lanceolate, generally > 4× as long as wide (except in Adiantum capillus-veneris, with leaf blade only 1.5-3× as long as wide, but not notably triangular or pentagonal in outline).

17 Leaf blade pentagonal in outline, the basal pinnae by far the largest; rhizome ca. 1 mm in diameter; indusia absent; [native species of mountain peaks of n. NC and VA]..........................Gymnocarpium (CYSTOPTERIDACEAE)

18 Leaf blade broadly triangular in outline, 1.5-3× as long as wide, but not notably triangular or pentagonal in outline.

19 Leaf blade pentagonal or broadly triangular in outline, ca. 1/3 as long as wide.

20 Veins ending short of the margin; indusium attached under one side of the sorus, hoodlike or pocketlike, arching over the sorus; petioles glabrous or sparsely beset with scales, the petiole bases not persistent.......................Cystopteris (CYSTOPTERIDACEAE)

21 Sori continuous along the pinnule margins; leaves mostly dark-green or glaucous, often pubescent, coriaceous, tough, and stiff.

22 Leaves monomorphic, the fertile leaves obviously longer than the sterile and with narrow elongate ultimate segments ............. Cryptogramma (PTERIDACEAE)

23 Lower leaf surfaces covered with whitish powder, otherwise glabrous or sparsely pubescent..........................Argyrochosma (PTERIDACEAE)

24 Lower leaf surfaces pubescent (or glabrous in Cheilanthes alabamensis), never with conspicuous whitish powder..........................Cheilanthes (PTERIDACEAE)

Key E – Small pteridophytes, terrestrial, growing in soil, not associated with rock outcrops

1 Petiole branched once dichotomously, each branch bearing 3-7 pinnae in one direction only, the outline of the blade fan-shaped, often broader than long.................................Adiantum pedatum (PTERIDACEAE)

2 Petiole not branched dichotomously, the blade either longer than broad or triangular and about as wide as long.

3 Sporangia borne on an erect stalk that arises at or above ground level from the petiole of the sterile leaf blade (joining the petiole of the sterile leaf above the rhizome).......................... Botrychium (OPHIOGLOSSACEAE)

4 Sporangia either borne on normal leaf blades or on specialized (fertile) leaves separate from the rhizome.

4 Leaves monomorphic, the sori borne on normal leaf blades ........................................Phegopteris (THELYTERIDACEAE)

5 Fertile leaf woody, with beak-like segments; pinnae margins entire, often wavy or the lowermost even somewhat lobed; pinnae mostly with obscure apices, tending to be borne opposite ........................................Onclea (ONOCLEACEAE)

6 Leaves dimorphic, the sori borne on leaves significantly different than normal leaves.

5 Fertile leaf stiff but herbaceous, the pinnae linear, not at all beak-like; pinnae mostly with acute apices, tending to be borne alternate..........................Woodwardia areolata (BLECHNACEAE)

2 Leaves pinnate, pinnate-pinnatifid, 2-pinnate, or even more divided (the rachis naked for most of its length, often winged in the apical portion).

6 Leaves broadly triangular in outline, about as broad as long; sporangia borne on an erect stalk that arises at or above ground level from the petiole of the sterile leaf blade (joining the petiole of the sterile leaf above the rhizome).............Sceptridium (OPHIOGLOSSACEAE)
KEYS TO FAMILIES AND GENERA

6  Leaves lanceolate in outline, much longer than broad; sporangia either borne on normal leaf blades, on slightly dimorphic blades, or on an erect stalk that arises at or above ground level from the petiole of the sterile leaf blade (joining the petiole of the sterile leaf above the rhizome).

7  Leaf blades 1-8 cm long; sporangia borne on an erect stalk that arises at or above ground level from the petiole of the sterile leaf blade (joining the petiole of the sterile leaf above the rhizome). .............................................. Botrychium (OPHIOGLOSSACEAE)

7  Leaf blades 10-30 (-100) cm long; sporangia either borne on normal leaf blades or on slightly dimorphic blades.

8  Leaves dark green, subcoriaceous, evergreen.

9  Leaves 2 pinnate, the pinnules toothed ................................................................. Rumohra (DRYOPTERIDACEAE)

9  Leaves 1-pinnate, the pinnate toothed ................................................................. Polystichum (DRYOPTERIDACEAE)

8  Leaves light to medium green, herbaceous, deciduous to semi-evergreen.

10  Sori continuous along the midrib of the pinna .................................................... Blechnum (BLECHNACEAE)

11  Sori distinct.

11  Sori elongate; leaf blades somewhat dimorphic, the fertile larger and erect, the sterile smaller and prostrate, the larger leaf blades 2-4 (-6.5) cm wide ......................................................... Asplenium platyphyllum (ASPLENIAEAE)

11  Sori round; leaf blades monomorphic; the larger leaf blades 5-15 cm wide............... Thelypteris (THELYPTERIDACEAE)

Key F – Medium to large pteridophytes, epiphytic, growing on rock, walls, over rock in thin soil mats or in small soil pockets, or on tree trunks

1  Leaves vine-like, 0.3-10 m long, the branching dichotomous, 1 branch of each dichotomy terminating in a pair of pinnate, the pinnate often widely spaced (> 10 cm apart) ................................................................. Lycopodium (LYGODIACEAE)

1  Leaves not vine-like, 0.3-3 m long, the branching not as described above, the pinnate regularly and more-or-less closely spaced (mostly < 10 cm apart).

2  Leaves 1-pinnate-pinnatifid or less divided, the pinnate entire, toothed, lobed or pinnatifid.

3  Sori marginal, continuous, covered by a reflexed false indusium along the leaf margin; pinnate usually opposite, linear, not toothed or lobed ...................................................................................................................... Pteris vittata (PTERIDACEAE)

3  Sori neither marginal nor continuous, slightly to entirely covered by an elongate or roundish indusium (sometimes ciliate, toothed, or divided into narrow segments); pinnate usually at least in part alternate, mostly lanceolate, toothed, lobed, or pinnatifid.

4  Sori elongate, the indusium flap-like, attached along the side; leaf blades (if > 30 cm long) < 7 cm wide ................................................................. Asplenium platyphyllum (ASPLENIAEAE)

4  Sori circular or globular, the indusium peltate, reniform, or cuplike; leaf blades (if > 30 cm long) > 5 cm wide.

5  Leaves pinnatifid.

6  Larger leaves with > 25 pairs of segments, each 1.5-5 (-8) mm wide; [of ne. FL southward] Plecuma (POLYPODIACEAE)

6  Larger leaves with < 25 pairs of segments, (3-) 5-40 mm wide; [collectively widespread in our area.

7  Venation highly reticulate, with 3-4 rows of areoles between the midvein and the margin; rhizome 8-15 (-30) mm in diameter; leaf blade 10-50 cm wide ................................................................. Phlebodium (POLYPODIACEAE)

7  Venation free or with a row of areoles between the midvein and the margin; rhizome 3-6 mm in diameter; leaf blade < 9 cm wide ................................................................. Polypodium (POLYPODIACEAE)

5  Leaves 1-pinnate or more divided.

8  Leaves 1-pinnate, the pinnate toothed and each with a prominent lobe near the base on the side toward the leaf tip; indusia peltate (Cytromium and Polystichum) or reniform or crescent-shaped (Nephrolepis).

9  Leaves pale green, thin in texture; pinnate articulate to rachis, deciduous with age; thin, rhizome bearing elongate, thin, waxy stolons ................................................................. Nephrolepis (NEPHROLEPIDACEAE)

9  Leaves dark-green, subcoriaceous to coriaceous; pinnate not articulate and deciduous with age; rhizome not producing stolons.

10  Veins anastomosing, rejoining to form a netlike pattern; pinnate 4-25 pairs per leaf; [non-native, rarely naturalized] .................... Dryopteris (DRYOPTERIDACEAE)

10  Veins branching dichotomously, free, not rejoining to form a netlike pattern; pinnate 25-50 pairs on larger leaves; [native, common] ................................................................. Thelypteris (THELYPTERIDACEAE)

8  Leaves 1-pinnate-pinnatifid, the pinnate pinnatifid, generally lacking a prominent basal lobe; indusia either reniform or cuplike.

11  Vascular bundles in the petiole 3-7 ................................................................. Thelypteris (THELYPTERIDACEAE)

11  Vascular bundles in the petiole 2, uniting above.

12  Indusium reniform, arching over the sorus ............................................................. Thelypteris (THELYPTERIDACEAE)

12  Indusium cuplike, attached beneath the sorus and consisting of 3-6 lanceolate to ovate segments ................................................................. Woodsia obtusa (WOODSIACEAE)

2  Leaves 2-pinnate or more divided, the pinnate divided to their midribs.

13  Sori marginal and borne on the underside of the false indusium; petioles and rachis shiny black or reddish-black, glabrous except at the very base of the petiole; pinnules fan-shaped or obliquely elongate .............................................. Adiantum (PTERIDACEAE)

13  Sori not marginal, borne on the underside of the leaf blade (if marginal, as in Pteridium and Dennstaedtia, borne on the underside of the leaf); petioles darkened only basally (if at all), rachis green, tan, or reddish; pinnules not notably fan-shaped or obliquely elongate.

14  Leaf blades pentagonal or broadly triangular in outline, ca. 1 x as long as wide.

15  Leaf blade pentagonal in outline, the terminal pinna the largest; sori submarginal, roundish, the indusium reniform; [alien, rarely naturalized] ................................................................. Arachniodes (DRYOPTERIDACEAE)

15  Leaf blade broadly triangular in outline, the basal pinna the largest; sori marginal, linear, indusium absent, protected by the revolute leaf margin and a minute false indusium; [native, common] ................................................................. Pteridium (DENNSTAEDTIACEAE)

14  Leaf blades elongate, mostly lanceolate, generally 4+ or more as long as wide.

16  Outline of leaf blade slightly if at all narrowed to the base, the widest point < 5 pinna pairs from the base, the lowestmost pinnae < 1/4 as long as the longest pinna; rhizomes long-creeping, the leaves scattered, forming clonal patches ................................................................. Thelypteris novohaleporossis (THELYPTERIDACEAE)

16  Outline of the leaf blade slightly if at all narrowed to the base, the widest point > 5 pinna pairs from the base, the lowestmost pinnae > 1/2 as long as the longest pinna; rhizomes short-creeping, the leaves clustered, not forming clonal patches (or with rhizomes long-creeping, leaves scattered, forming clonal patches in Dennstaedtia).
17 Rhizomes long creeping, leaves scattered, forming clonal patches; vascular bundles in the petiole 1, U-shaped (even in the lower petiole); sori very small, marginal in sinuses, the indusium cuplike, 2-parted, the outer part a modified tooth of the leaf blade; leaf blades conspicuously puberulent with sepaloid hairs..............................Dennstaedtia (DENNSTAEDTIACEAE)

17 Rhizomes short-creeping, the leaves clustered, not forming clonal patches; vascular bundles in the petiole 2-7 (sometimes uniting to 1 in the upper petiole); sori mostly larger, mostly not marginal, the indusium not as above (though cuplike in Woodsia obtusa); leaf blades either glabrous, glabrescent, with flattened scales, or puberulent with glandular trichomes.

18 Vascular bundles (3-) 5 (-7) in the petiole.................................................................Dryopteris (DRYOPTERIDACEAE)

18 Vascular bundles 2 in the petiole (or uniting near the leaf blade into 1).

19 Leaves 25-65 cm wide, with whitish, straight, acicular hairs; [species adventive and weedy].................................................................Macrophyllum (THELYPTERIDACEAE)

19 Leaves 5-25 (-30) cm wide, with scales and minute glands (sometimes also with sepaloid hairs); [native species]

20 Leaves 1-pinnate-pinnatifid; indusium cuplike, attached beneath the sorus and consisting of 3-6 lanceolate to ovate segments.......................................................Woodsia obtusa (WOODSIACEAE)

20 Leaves 2-pinnate-pinnatifid; indusium flapple or pocketlike, attached at one side of the sorus and arching over it.

21 Leaves 10-30 cm wide, the tip acute to acuminate; indusium flapple............................Athyrium (ATHYRIACEAE)

21 Leaves 4-9 cm wide, the tip long-attenuate; indusium pocketlike or hoodlike.................................Cystopteris bulbifera (CYSTOPTERIDACEAE)

Key G – Medium to large pteridophytes, terrestrial, growing in soil, not associated with rock outcrops

1 Leaves vine-like, 0.3-10 m long, the branching dichotomous, 1 branch of each dichotomy terminating in a pair of pinnate, the pinnate often widely spaced (> 10 cm apart)

2 Vine-like leaves scrambling or trailing; sporangia borne 6-12 per sorus .................................................Dicranopteris (GLEICHENIACEAE)

2 Vine-like leaves twining; sporangia borne singly, each subtended by an indusium-like flap......................Lygodium (LYGODIACEAE)

1 Leaves not vine-like, 0.3-3 m long, the branching not as described above, the pinnate regularly and more-or-less closely spaced (mostly < 10 cm apart).

3 Leaf blades broadly (about equilaterally) triangular, pentagonal, or flabellate in outline, 0.7-1.3× as long as wide.

4 Leaf blades flabellate or fan-shaped in outline, the petiole branched once dichotomously, each branch bearing 3-7 pinnae in one direction only.................................................................Adiantum pedatum (PTERIDACEAE)

4 Leaf blades pentagonal or broadly triangular in outline, the petiole not branched dichotomously.

5 Leaf blade pentagonal in outline, the terminal pinna the largest; sori submarginal, roundish, the indusium reniform; [alien, rarely naturalized]...............................................................................................................................Arachniodes (DRYOPTERIDACEAE)

5 Leaf blade broadly triangular in outline, the basal pinnae the largest; sori marginal, linear, indusium absent, protected by the revolute leaf margin and a minute false indusium (Pteridium), or sporangia borne in a stalked, specialized, fertile portion of the blade (Botrychium); [native, collectively common].

6 Sporangia borne in a stalked, specialized, fertile portion of the blade; texture of mature blades somewhat fleshy; plants solitary from a short underground rhizome with thick, mycorrhizal roots; [primarily of moist forests]............................Botrypus (OPHIOGLOSSACEAE)

6 Sporangia borne in marginal, linear sori, indusium absent, protected by the revolute leaf margin and a minute false indusium; texture of mature leaf blades hard and stiff; plants colonial from deep-seated rhizomes; [primarily of moist to dry woodlands and savannas].................................................................Pteridium (DENNSTAEDTIACEAE)

7 Leaves elongate in outline, mostly ovate, lanceolate, oblanceolate, or narrowly triangular, 1.5-10× or more as long as wide.

8 Leaf blade divided into sterile and fertile portions, the pinnate often widely spaced (> 10 cm apart).

8 Leaf blade divided into sterile and fertile portions, the pinnate often widely spaced (> 10 cm apart).

9 Rhizomes long-creeping, leaves scattered, forming clonal patches; vascular bundles in the petiole either 1, U-shaped (even in the lower petiole) or > 3; sori very small, marginal in sinuses, the indusium cuplike, 2-parted, the outer part a modified tooth of the leaf blade; leaf blades conspicuously puberulent with sepaloid hairs (Dennstaedtia); glabrous to puberulent with glandular trichomes (Hypolepis).

9 Rhizomes short-creeping, the leaves clustered, not forming clonal patches; vascular bundles in the lower petiole 2-7 (sometimes uniting to 1 in the upper petiole); sori mostly larger, mostly not marginal, the indusium not as above (though cuplike in Woodsia obtusa); leaf blades either glabrous, glabrescent, with flattened scales, or puberulent with glandular trichomes.

10 Vascular bundles (3-) 5 (-7) in the petiole.

10 Vascular bundles 2 in the petiole (or uniting near the leaf blade into 1).

11 Indusia reniform; leaf blade (at least of larger leaves on mature plants) usually > 40 cm long.................................Dryopteris (DRYOPTERIDACEAE)

11 Indusia peltate; leaf blade < 40 cm long.....................................................................................Runohra (DRYOPTERIDACEAE)

12 Indusia reniform; leaf blade (at least of larger leaves on mature plants) usually > 40 cm long.................................Dryopteris (DRYOPTERIDACEAE)

12 Indusia peltate; leaf blade < 40 cm long.....................................................................................Runohra (DRYOPTERIDACEAE)

13 Leaves 2-pinnate-pinnatifid; indusium tubular or cuplike; leaves generally < 1 m long; petiole and rachis unarmed; [of n. GA and n. AL northward].................................................................Dennstaedtia (DENNSTAEDTIACEAE)

13 Leaves 3-4-pinnate-pinnatifid; indusium flapple-like; leaves generally > 1 m long; petiole and rachis with prickles; [of n. FL southward]............................................................................................................................Hypolepis (DENNSTAEDTIACEAE)

14 Rhizomes short-creeping, the leaves clustered, not forming clonal patches; vascular bundles in the lower petiole 2-7 (sometimes uniting to 1 in the upper petiole); sori mostly larger, mostly not marginal, the indusium not as above (though cuplike in Woodsia obtusa); leaf blades either glabrous, glabrescent, with flattened scales, or puberulent with glandular trichomes.

15 Vascular bundles 2 in the petiole (or uniting near the leaf blade into 1).

15 Vascular bundles 2 in the petiole (or uniting near the leaf blade into 1).

16 Veins free, simple or forked.................................................................................................Athyrium (ATHYRIACEAE)
KEYS TO FAMILIES AND GENERA

16 Leaves anastomosing. .......................................................... ............... Diplozium (ATHYRIACEAE)
17 Leaves 1-pinnate-pinnatifid or less divided, the pinnae entire, toothed, lobed or pinnatifid.
18 Fertile leaf woody, with head-like segments; pinnae margins entire, often wavy or the lowermost even somewhat lobed; pinnae mostly with obtuse apices, tending to be borne opposite. ......................................................... Osmunda (OSMUNDACEAE)
19 Fertile leaf stiff but herbaceous, the pinnae linear, not at all head-like; pinnae margins finely serrulate, otherwise slightly wavy or straight; pinnae mostly with acute apices, tending to be borne alternate. ............... Woodwardia areolata (BLECHNACEAE)
17 Leaves 1-pinnate or 1-pinnate-pinnatifid, the pinnae fully divided from one another (the rachis naked for most of its length, often winged in the terminal portion); leaves dimorphic or not.
19 Rhizomes long-creeping, leaves scattered, forming clonal patches.
20 Sori roundish, borne end to end along either side of the main veins; pinna lobes of sterile leaves with reticulate, chain-like venation along the central vein. ................................................................. Woodwardia virginica (BLECHNACEAE)
20 Sori roundish, borne away from the main veins; pinna lobes of sterile leaves with the lateral veins free and pinnately arranged (the lowermost lateral vein sometimes joining that of the adjacent pinna lobe just below the sinus, but the remainder of the lateral veins all free) ................................................................................................................... Thelypteris (THELYPTERIDACEAE)
19 Rhizomes short-creeping, the leaves clustered, not forming clonal patches (or rhizomes of both types, but leaves borne only in clusters on the short erect ones, in Matteuccia)
21 Plants moderately to very robust, the leaves typically 6-50 dm tall; leaves either strongly dimorphic, the fertile leaves very unlike the sterile, brown at maturity, borne as an interruption in the blade, with normal green pinnae above and below (Osmunda claytoniana), or the fertile pinnae very unlike the sterile, brown at maturity, borne as an interruption in the blade, with normal green pinnae above and below (Osmunda claytoniana), or the fertile pinnae towards the tip of the leaf and with sporangia entirely covering the lower surface (Acrostichum); rhizomes scaleless, petioles scaleless (except in the base in Matteuccia).
22 Leaves 1.5-5 m long; fertile pinnae with sporangia covering the lower surface; [of n. FL southward].................................
22 Leaves 0.6-2.5 m long; fertile portions otherwise.
23 Leaves strongly tapering to the base from the broadest point (well beyond the midpoint of the blade), the basalmost pinnae much < ½ as long as the largest pinnae ........................................... Matteuccia (ONOCLEACEAE)
23 Leaves slightly if at all tapering to the base, about equally broad through much of their length, the basalmost pinnae much > ½ as long as the largest pinnae.
24 Leaves hemidimorphic (juvenile leaves with only sterile pinnae, leaves bearing sporangia with sterile and fertile pinnae, the fertile pinnae borne mediately); photosynthetic pinnae lacking tufts of hairs. Osmunda (OSMUNDACEAE)
24 Leaves dimorphic (each leaf normally either completely photosynthetic or completely fertile); photosynthetic pinnae with tufts of reddish hairs near the junction with the rachis. Osmundastrum (OSMUNDACEAE)
25 Plants mostly less robust, the leaves 3-10 dm tall (except Dryopteris ludoviciana, D. celsa, D. goldiana, and Nephrolepis exaltata to 15 dm), leaves not at all or only slightly dimorphic, the fertile differing in various ways, such as having narrower pinnae (as in Dryopteris ludoviciana, Polystichum acrostichoides, Diplazium, and Thelypteris palustris) or the fertile leaves taller and more deciduous (as in Asplenium platyneuron and Dryopteris cristata), but not as described in the first lead; rhizomes and petioles variously scaly or scaleless, but at least the petiole and often also the rachis scaly if the plants over 1 m tall.
25 Sori elongate, the indusium elongate, attached along one side as a flap.
26 Petiole and rachis lustrous brownish-black; fertile leaves 2.8 (-12) cm wide. Asplenium platyneuron (ASPLENIACEAE)
26 Petiole and rachis green; fertile leaves 10-20 (-30) cm wide. Deparia (ATHYRIACEAE)
27 Leaves 1-pinnate-pinnatifid (the pinnae pinnatifid) .......................................................... ....................... Homalosorus (DIPLAZIOPSIDACEAE)
27 Leaves 1-pinnate (the pinnae entire)..........................................................................
28 Leaves 1-pinnate, the pinnae toothed and each with a slight to prominent lobe near the base on the side toward the leaf tip (except Nephrolepis exaltata); indusia peltate (Polystichum) or reniform or crescent-shaped (Nephrolepis).
29 Leaves pale green, thin in texture; pinnae articulate to rachis, deciduous; rhizome not producing stolons; [native, common] ... Polystichum (DRYOPTERIDACEAE)
28 Leaves 1-pinnate-pinnatifid, the pinnae pinnatifid, generally lacking a prominent basal lobe; indusia reniform.
30 Vascular bundles in the petiole 4-7.............................................................. Dryopteris (DRYOPTERIDACEAE)
30 Vascular bundles in the petiole 2, uniting above...................................................... Thelypteris (THELYPTERIDACEAE)

KEY TO THE GENERA AND FAMILIES OF GYMNOSPERMS

The gymnosperms are a likely artificial grouping of about 16 families, about 86 genera, and about 850 species. References: Kramer & Green (1990).

Standard Key to Families

1 Leaves pinnately compound................................................................. ZAMIACEAE
1 Leaves simple.
2 Leaves fan-shaped, dichotomously-veined, deciduous ......................................................... GINKGOACEAE
2 Leaves needle-like or scale-like, not dichotomously veined, evergreen (rarely deciduous).
3 Seeds 2-many, borne in a woody or fleshy cone (sometimes resembling a rather hard berry).
4 Foliage leaves needle-like or scale-like, alternate, opposite, or whorled; cone scales valvate or imbricate (if imbricate, the leaves scale-like and opposite) ................................................................. CUPRESSACEAE
4 Foliage leaves needle-like, alternate or fascicled; cone scales imbricate ................................................. PINACEAE
3 Seeds borne singly in a soft fleshy to leathery aril
5 Leaves opposite.................................................................................. CEPHALOTAXACEAE
KEYS TO FAMILIES AND GENERA

5 Leaves alternate to irregularly subopposite........................................................................................................... TAXACEAE

Key to genera of gymnosperms, emphasizing vegetative characters

1 Leaves 1-pinnately compound ............................................................................................................................ Zamia (ZAMIACEAE)

1 Leaves simple.

2 Leaves broad and fan-shaped, > 30 mm wide, with conspicuous dichotomous venation, seasonally deciduous................................. Ginkgo (GINKGOACEAE)

2 Leaves needle-like or scale-like, < 5 mm wide, evergreen (seasonally deciduous in Larix and Taxodium).

3 Leaves opposite or in whorls of 3.

4 Leaves linear, 15-45 mm long; mature female cones fleshy and berry-like, > 15 mm in diameter

5 Leaves without distinct midrib; 2 stomatal bands on the lower surface each ca. 0.5 mm wide; berry-like "cone" sessile................. Torreya (TAXACEAE)

5 Leaves with distinct midrib; 2 stomatal bands on the lower surface each ca. 0.5 mm wide; berry-like "cone" stalked.................. Cephalotaxus (CEPHALOTAXACEAE)

6 Branchlets not disposed in one plane, thus bushy and not fan-like; plants dioecious, male and female cones on separate plants; mature female cones fleshy and berry-like, with smooth surfaces, indehiscent; leaves opposite (decussate) or in whorls of 3............. Juniperus (CUPRESSACEAE)

6 Branchlets disposed in one plane, thus flattened and fan-like; plants monoecious, male and female cones on the same plant; mature female cones woody or leathery, with irregular surfaces, dehiscent; leaves opposite (decussate).

7 Leaves acute; female cones globose and woody, the hard scales peltate, not imbricate; ultimate branchlets (including the scale leaves) about 1 mm broad................................................................................................................. Chamaecyparis (CUPRESSACEAE)

7 Leaves obtuse; female cones ellipsoid and leathery, the pliable scales basally attached, imbricate; ultimate branchlets (including the scale leaves) about 1.5 mm broad

8 Branchlets flattened in vertical planes; seeds wingless; [planted tree, sometimes persistent] ......................................................... Platycladus (CUPRESSACEAE)

8 Branchlets flattened in horizontal planes; seeds winged; [native tree, but also sometimes planted] ...................................................... Thuja (CUPRESSACEAE)

3 Leaves alternate, or in fascicles of 2-5, or on short shoots in clusters of many leaves in apparent whorls.

9 Leaves borne in fascicles of 2-5 (basally bound by a scurious sheath) or on short shoots in clusters of many leaves in apparent whorls.

10 Leaves borne in short shoots in clusters of many (>10) leaves in apparent whorls.

11 Leaves evergreen; cones 6-12 cm long .............................................................................................................. Picea (PINACEAE)

11 Leaves deciduous; cones 1-2 cm long .............................................................................................................. Pinus (PINACEAE)

9 Leaves alternate.

12 Leaves 4-angled in cross-section ..................................................................................................................... Tsuga (PINACEAE)

12 Leaves distinctly flattened (2-sided) in cross-section.

13 Leaves very soft in texture, seasonally deciduous as twiglets ................................................................. Thuja (CUPRESSACEAE)

13 Leaves stiffer in texture, evergreen.

14 Leaves tapering from base to a long-acuminate tip .................................................................................... Cunninghamia (CUPRESSACEAE)

14 Leaves with parallel margins for most of their length, or widest near middle and gradually tapering to base and apex, the apex acute, obtuse, or retoxe.

15 Cone dry and brown at maturity.

16 "Cone" fleshy, red or purplish at maturity.

17 Leaves flexible, the tips pointed but not piercing to the touch; fleshy "cone" ca. 5 mm long, ca. 5 mm in diameter, red when ripe, the seed exposed at the top by a gap in the aril ......................................................... Taxus (TAXACEAE)

17 Leaves stiff, the tips piercing to the touch; fleshy "cone" 2.5-3 cm long, ca. 2 cm in diameter, dark green to purple when ripe, seed entirely surrounded by fleshy tissue......................................................... Torreya (TAXACEAE)
LI. LYCOPODIACEAE

THE FLORA

SECTION 1: LYCOPODIOPHYTA (CLUBMOSES)

LI. LYCOPODIACEAE Palisot de Beauvois 1802 (Clubmoss Family) [in LYCOPODIALES]

A family of 10-15 genera and about 400 species. Lycopodiaceae, along with Selaginellaceae and Isoetaceae, have now been shown to be only distantly related to other extant pteridophytes and seed plants (Pryer et al. 2001). The division of North American Lycopodium into three or more genera has been strongly advocated by Wagner & Beitel (1992), Wagner & Beitel in FNA (1993), Haines (2003a), and nearly all other recent authors. The traditionally broad Lycopodium appears to include a number of natural groups which are strikingly different from one another and have constituted separate lineages for tens to hundreds of millions of years. These natural groups are separable by numerous morphological, developmental, and anatomical characters, karyotype, and inability to hybridize. Wagner & Beitel (1992) divide Lycopodium (sensu lattissimo) of our area into six genera in three subfamilies, as follows: Huperzia in Subfamily Huperzioidae, Lycopodium and Diphasiastrum in Subfamily Lycopodioidae, and Lycopodiella, Palhinhaea, and Pseudolycopodiella in Subfamily Lycopodielloideae. Haines (2003a) further divides Lycopodium (sensu lati) into three genera: Dendrolycopodium, Spinulum, and Lycopodium (sensu stricto). The reasoning behind this division is very strong, and it is here followed. Profound differences in anatomy, morphology, reproduction, gametophyte morphology, and karyotype support this separation. The chromosome numbers of our genera: Lycopodium (x=34), Diphasiastrum (x=23), Huperzia (x=67, 68), Lycopodiella (x=78), Lycopodium (x=34), Palhinhaea (x=55), Pseudolycopodiella (x=35), and Spinulum (x=34). Øllgaard in Kramer & Green (1990) and Wikström & Kenrick (2000) follow a somewhat broader coarse, recognizing three genera for our species (corresponding to the subfamilies of Wagner & Beitel 1992), and recognizing as sections the genera of Wagner & Beitel (1992). Øllgaard states that the "genera are very distinct, and also the sections within Lycopodiella and Lycopodium seem to represent ancient, independent evolutionary lines." Wikström & Kenrick (2000, 2001) suggest that the phylogenetic separation of Lycopodium (including Diphasiastrum) and Lycopodiella (including Pseudolycopodiella and Palhinhaea) occurred at least as long ago as the early Jurassic (208 million years before present), and the divergence of Huperzia from Lycopodium and Lycopodiella still longer ago. Based on this deep division between Huperzia and the other genera, some authors additionally advocate the recognition of Huperzia in a separate family, Huperziaceae, a suggestion which is by no means outlandish (though not followed here). References: Lellinger (1985); Mickel (1979); Wagner and Beitel (1992); Beitel (1979); Snyder & Bruce (1986); Wagner & Beitel in FNA (1993b); Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000, 2001); Øllgaard (1987); Haines (2003a). Key based in part on Haines (2003a).

1. Leafy stems erect, simple or dichotomously branched, the ultimate branches vertically oriented; sporophylls like the sterile leaves or only slightly reduced, in annual bands along the stem; vegetative reproduction by leafy gemmae near the stem apex; [subfamily Huperzioidae] ... .............................................................. 1. Huperzia

1. Leafy stems prostrate or erect, if erect then generally branched, the ultimate branches spreading (horizontal) or ascending; sporophylls differing from sterile leaves, either broader and shorter, or more spreading, aggregated into terminal cones; lacking vegetative reproduction by gemmae.

2. Leaves herbaceous, pale or yellow-green, dull, deciduous; principal leafy stems creeping (except erect and repeatedly branched in Palhinhaea); rhizome dying back annually to an underground vegetative tuber at apex; spores rugulate; [of wetlands, mostly in moist to dry soils]; [subfamily Lycopodielloideae].

3. Upright shoots repeatedly branched; strobili nodding at the ends of the branches; [known to occur from se. SC southward] ......... ................................. 3. Pseudolycopodiella

3. Upright shoots not branched; strobili erect on upright shoots; [widespread in our area].

4. Leaves of the prostrate stems 0.5-1.2 mm wide, ciliate-toothed or not toothed; leaves of the erect stem many, overlapping, spiral; leaves of the strobilus (sporophylls) resembling leaves of the prostrate and upright stems in size and shape; upright stems 1.5-15 mm in diameter (including the leaves) ................................................................. 4. Pseudolycopodiella

4. Leaves of the prostrate stems 1.3-2.1 mm wide, not toothed; leaves of the erect stem few, not overlapping, whorled; leaves of the strobilus (sporophylls) much reduced relative to leaves of the prostrate and upright stems; upright stems 1.5-3 mm in diameter (including the leaves) ........................................................................................................ 2. Lycopodiella

4. Leaves of the prostrate stems 0.5-1.2 mm wide, ciliate-toothed or not toothed; leaves of the erect stem many, overlapping, spirial; leaves of the strobilus (sporophylls) resembling leaves of the prostrate and upright stems in size and shape; upright stems 1.5-15 mm in diameter (including the leaves) ................................................................. 3. Pseudolycopodiella

5. Leaves rigid, bright to dark green, shiny, evergreen; principal leafy stems mainly erect, treelike, fanlike, or creeping (if creeping, then the leaves with elongate, hyaline hair-tips); rhizome perennial, elongate, surficial or subterranean; spores reticulate; [of uplands, mostly in moist soil]; [subfamily Lycopodielloideae].

5. Branches 1-5 mm wide (including the leaves), compressed to quadrangular, with 4 ranks of leaves; branching of strobilus stalks dichotomous ................................................................. 6. Diphasiastrum

5. Branches 4-12 mm wide, terete (to somewhat compressed in Dendrolycopodium obscurum), with 6 or more ranks of leaves; branching of strobilus stalks (when present), pseudomonopodial (falsely appearing to have a main axis from which branches arise).

6. Strobili borne on elongate, sparsely leafy peduncles borne at the tips of leafy, ascending branches; leaves with attenuate, hyaline hair-tips ............................................................................................ 8. Lycopodium

6. Strobili sessile, borne directly above densely leafy portions of upright branches; leaves acuminate to acute.

7. Erect leafy stems 3-8 mm in diameter (including the leaves), treelike or fanlike, with a definite main axis; leaves acute at the apex; horizontal shoots subterranean, without winter bud constrictions ...................................................... 5. Dendrolycopodium

7. Erect leafy stems 10 mm or more in diameter (including the leaves), branched 1-4 x sub-dichotomously; leaves with a 0.4-1.0 mm long stiff spine; horizontal shoots at or near the ground surface, with winter bud constrictions ...................................................... 7. Spinulum

I. Huperzia Bernhardi (Firmoss, Clubmoss)
A genus of about 10-15 species, north temperate and arctic (and tropical mountains of Asia). Within the Lycopodiaceae, *Huperzia* has "an isolated position", basal to the remainder of the family, and is sometimes separated in a separate family, the Huperziaceae (Haines 2003a). References: Wagner & Beitel in FNA (1993b); Haines (2003a)=Z; Öllgaard in Kramer & Green (1990); Wikström & Kenrick (2000).

**Identification notes:** Several hybrids are known from our area; they usually occur in intermediate habitats (such as in thin soil at the base of cliffs) and generally are found in proximity to both parents, but sometimes occur in the absence of one or both parents. Hybrids can be recognized by their intermediate morphology. In addition, *Huperzia selago* (Linnaeus) Bernhardi ex Martius & Schrank, Northern Firmoss, is circumboreal, ranging south in North America to NY, New England, and the Great Lakes region, and is disjunct to OH. It could easily occur as a disjunct in our area, and should be sought in the high mountains.

1. Leaves oblong-lanceolate, the apical portion toothed with 1-8 large, irregular teeth; leaves 6-15 mm long, 1.0-2.5 mm wide; stomates on lower leaf surface only (visible at 10×, or preferably 20-40×, magnification); spores 23-29 μm in diameter; [mainly of forest soils] ........................................... *H. lucidula*
2. Leaves spreading, 2-7.5 mm long, 0.6-0.8 (-1.0) mm wide, not toothed (though sometimes with minute, single cell bumps); stomates relatively many on the upper leaf surface (30-90 on each side of midrib); [of high to medium elevations].
3. Leaves dimorphic, those at the base longer and spreading wider from the shoot axis than those from the apical portion of the plant; gemma-bearing branches borne throughout the apical portion of mature shoots; lateral leaves of gemmae 0.5-1.1 mm wide .......................................................... *H. appressa*
4. Leaves relatively monomorphic; gemma-bearing branches, if present at all, borne in 1 pseudowhorl at the apex of seasonal growth; lateral leaves of gemmae 1.3-2.5 mm wide ........................................................................................................... *[H. selago]*

**Huperzia appressa** (Desvaux) A. Lóve & D. Lóve, Appalchian Firmoss. Rock outcrops at high elevations (very rarely at middle elevations), rarely also in seepage or along banks of small streams at high elevations, and in fens (on hummocks). June-August. N. QC and NL (Newfoundland) west to ON, MI, and MN and south along the Appalachians to w. NC, e. TN, and ne. GA. This species was named in 1992 as *H. appalachiana* (Beitel & Mickel 1992), but *H. appressa* (Desvaux) A. Lóve & D. Lóve is an older combination that applies to the same species (Haines 2003a). Though morphologically only subtly differentiated from the circumboreal *H. selago* (for distinctions see Beitel & Mickel 1992; Brunton, Wagner, & Beitel 1992; Haines 2003a), the case for the distinctness of *H. appressa* is confirmed by the production of sterile (abortive-spored) hybrids where it co-occurs with *H. selago.* [= Z = *H. appalachiana* Beitel & Mickel – FNA; K, = *Lycopodium selago* Linnaeus – RAB, S, W; = < *Lycopodium selago* Linnaeus var. appressum (Desvaux) Petrovic – C; F; > < *Lycopodium selago* var. selago – C, G]


**Huperzia × bartleyi** (Cusick) Kartesz & Gandhi [H. lucidula × porophila]. Rock outcrops. Reported for NC by Waterway (1986). This hybrid can be told from its parents by the presence of stomates on both surfaces of the leaf (unlike *H. lucidula*), but their marked lower density on the upper surface (unlike *H. porophila*). [= K, Z]

**Huperzia × protoporophila** A. Haines [H. appressa × lucidula]. Rock outcrops and cliff bases. Known from Chimney Rock Park, Rutherford County, NC (the lowest elevation occurrence of *H. appressa* in NC) and from Roan Mountain, Mitchell County, NC, and Grandfather Mountain, Avery County, NC. Expected at other cliff bases where the two parents are in proximity. This hybrid can be told from its parents by the presence of stomates on both surfaces of the leaf (unlike *H. lucidula*), but their marked lower density on the upper surface (unlike *H. appressa*). An additional useful character is the distribution of gemma-bearing branches: those of *Huperzia appressa* are abundantly distributed throughout the apical portion of mature plants, while those of the hybrid are confined to 1 or 2 pseudowhorls at the apex of annual growth (i.e., there are large gaps between the pseudowhorls of gemma-bearing branches). [= Z]

2. **Lycopodiella** Holub 1964 (Bog Clubmoss)

A genus of about 15-20 species, temperate and tropical. Additional research on this genus in our area is needed. Two fertile tetraploid species were recently named from MI (Bruce, Wagner, & Beitel 1991), and additional cryptic or semicryptic species
may be found in the Southeastern Coastal Plain. This group is variably treated as genus Lycopodiella, or as Lycopodiella section Lycopodiella (Øllgaard in Kramer & Green 1990, Wikström & Kenrick 2000). References: Wagner & Beitel in FNA (1993b); Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000); Haines (2002a, 2003a, 2003b)=Z. [also see Pseudolycopodiella]

**Identification notes:** Species of this genus are difficult to identify. They often grow together; it is not uncommon to find two or more species at a single site in the Coastal Plain. Hybrids occur. Juvenile plants, resprouting in spring or after fire, are especially difficult to identify. In contrast to the other species, Pseudolycopodiella caroliniana and, to a lesser degree, L. prostrata, are dorsiventrally flattened (or apparently distichous), but it seems that juvenile sprouts of all species are somewhat flattened.

1 Leaves of the horizontal shoots entire (rarely those toward the shoot apex with a few teeth); horizontal shoots, excluding the leaves, 0.5-0.9 (-1.0) mm in diameter; each horizontal shoot segment commonly producing a single upright shoot; [in our area, a plant of the Mountains] ..............

1 Leaves of the horizontal shoots toothed (except when inundated); horizontal shoots, excluding the leaves, 1.5-5.0 mm in diameter; each horizontal shoot segment producing 2-6 upright shoots; [collectively primarily of the Coastal Plain, with some disjunctions inland into the Piedmont and Mountains].

2 Fertile leaves (sporophylls) 2.9-5.0 (-5.2) mm long, appressed at maturity, entire or with short teeth < 0.3 mm long; stroboli 3-6 mm in diameter at maturity ..............................................................L. inundata

2 Fertile leaves (sporophylls) 5.5-9 mm long, spreading, with 1-8 teeth per margin, some or all of the teeth exceeding 0.3 mm in length; stroboli 10-20 mm in diameter at maturity.

3 Prostrate stems arching, not in contact with the ground (and rooting) all along their length, 8-11 mm wide (including leaves), the stem (striped of leaves) 2-4 mm in diameter; leaves of the prostrate stem of one size and shape, spreading to ascending, 3-7 mm long, 0.5-0.7 mm wide; erect stems many, equally spaced along the prostrate stems, progressively shorter and sterile toward the apex of the prostrate stems ..........................................................L. alopecuroides

3 Prostrate stems creeping, in contact with the ground (and rooting) all along their length, 12-19 mm wide (including leaves), the stem (striped of leaves) 1-2.2 mm in diameter; leaves of the prostrate stems dimorphic, spreading to reflexed, the upper leaves smaller (4-5 mm long, 0.4-0.6 mm wide) than the lateral leaves (7-8 mm long, 0.7-1.8 mm wide); erect stems few, clustered well behind the apex of the prostrate stems, mostly fertile and subequal in length ..............................................................L. prostrata

**Lycopodiella alopecuroides** (Linnaeus) Cranfill, Foxtail Clubmoss. Savannas, seepages, and other wet, sandy sites. July-September. Primarily Southeastern Coastal Plain: se. MA south to FL and west to e. TX, and disjunct in the Cumberland Plateau of KY, TN, and VA, the Allegheny Mountains of WV (Morton et al. 2004), the e. Highland Rim of TN, and in ME (Haines 2002a, 2003a, 2003b); s. Mexico south through Central America to n. South America; Cuba. [= FNA, K, Z; = Lycopodium alopecuroides Linnaeus – RAB; = Lycopodium alopecuroides Linnaeus – C, F, G, Md, S, W]


**Lycopodiella inundata** (Linnaeus) Holub, Northern Bog Clubmoss. Gravelly or sandy seepage areas, bogs. July-September. A circumboreal species, ranging south in the Appalachians to NC, where it was first found in 1986 (Weakley, in prep.). [= FNA, K, Z; = Lycopodium inundatum Linnaeus – C, Md, W, WV; = Lycopodium inundatum var. inundatum – F, G]

**Lycopodiella prostrata** (Harper) Cranfill, Featherstem Clubmoss, Prostrate Bog Clubmoss. Savannas, seepages. July-September. A Southeastern Coastal Plain endemic: se. NC south to FL and west to TX, with scattered occurrences disjunct inland (as in n. GA and n. AL). [= FNA, K; < Lycopodium prostratum – RAB; = Lycopodium prostratum Harper – C, S]

All pairwise combinations of sympatric species form fertile hybrids (only L. inundata and L. prostrata are entirely allopatric and not known to hybridize). The following hybrids should be expected where the parents grow together.

- Lycopodiella alopecuroides × appressa. [ = Lycopodiella ×copelandii (Eiger) Cranfill – K, Z; = Lycopodium ×copelandii Eiger]
- Lycopodiella alopecuroides × prostrata. [ = Lycopodiella ×brucei Cranfill – K; = Lycopodium ×brucei (Cranfill) Lellinger]
- Lycopodiella appressa × prostrata.

3. Pseudolycopodiella Holub 1983 (Carolina Bog Clubmoss)
A genus of about 12 species, sub-cosmopolitan. This group has often been treated as section of Lycopodium (or of Lycopodiella); it appears to warrant status as a genus separate from Lycopodiella. In addition to the morphologic distinctions, this species has considerable anatomical differences, a different base chromosome number than the four species of Lycopodiella (x = 35 vs. x = 78), and does not hybridize with Lycopodiella (Wagner & Beitel 1992). Øllgaard in Kramer & Green (1990) and Wikström & Kenrick (2000) retain it as Lycopodiella section Caroliniana. References: Wagner & Beitel in FNA (1993b); Haines (2003a)=Z; Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000).

Pseudolycopodiella caroliniana (Linnaeus) Holub, Carolina Bog Clubmoss, Slender Clubmoss. Savannas, seepages. July-September. This species occurs in se. North America, the West Indies, and is widespread in the Southern Hemisphere; in North America, it ranges from MA south to s. FL and west to e. TX. [= FNA, Z; = Lycopodium carolinianum Linnaeus – C, F, G, Md, RAB, S; > Lycopodiella caroliniana (Linnaeus) Pichi Sermolli var. caroliniana – K]

4. Palhinhaea Vasconcellos & Franco 1967 (Nodding Clubmoss)
A genus of 4 species, temperate and subarctic. This group is variously treated as the genus Palhinhaea or as Lycopodiella section Campylostachys (Øllgaard in Kramer & Green 1990, Wikström & Kenrick 2000). References: Wagner & Beitel in FNA (1993b); Øllgaard in Kramer & Green (1990); Wikström & Kenrick (2000).

Palhinhaea cernua (Linnaeus) Vasconcellos & Franco, Nodding Clubmoss, Staghorn Clubmoss. Wet savannas, ditches and other disturbed moist areas. This species is pantropical, occurring in both the Neotropics and the Paleotropics. Some of its occurrences in our area may be adventive. [= FNA; =? Lycopodiella cernua (Linnaeus) Pichi Sermolli var. cernua – K; = Lycopodium cernuum Linnaeus – S]

5. Dendrolycopodium A. Haines 2003 (Tree-clubmoss)
A genus of 4 species, temperate and subarctic. Haines (2003a) makes the case for this genus as distinct from Lycopodium s.s. and other relatives. References: Wagner & Beitel in FNA (1993b); Wagner, Beitel, & Moran (1989); Hickey (1977); Øllgaard in Kramer & Green (1990); Haines (2003a)=Z.

1 Leaves of the main vertical axis spreading (30-90° angle to stem) in the vicinity of the lower lateral branches, prickly to the touch; branchlets round in cross-section, the 6 ranks of leaves (2 lateral ranks, 2 adaxial ranks, and 2 abaxial ranks) equal in length and spreading to ascending. 

.......................................................................................................................... D. dendroideum

.......................................................................................................................... D. hickeyi

.......................................................................................................................... D. obscurum

Dendrolycopodium dendroideum (Michaux) A. Haines, Tree Ground-pine, Round-branch Clubmoss, Prickly Tree-clubmoss. Openings, grassy balds, high elevation spruce-fir and northern hardwood forests. July-September. The northernmost of the L. obscurum complex, ranging from n. QC and NL (Newfoundland) west to AK, south to s. NJ, w. NC, MO, MN, SD, CO, MT, ID, and WA; also in Asia. [= Z; < Lycopodium obscurum var. dendroideum (Michaux) D.C. Eaton – RAB, F, G, Md, WV; = Lycopodium dendroideum Michaux – F, G, Md, RAB, S; < L. obscurum – C] 


Dendrolycopodium obscurum (Linnaeus) A. Haines, Common Ground-pine, Flat-branched Clubmoss. Acidic forests.; July-September. NS and NB west to MI and WI, south to n. GA, ne. AL, s. IN, n. IL, and c. MN. [= Z; < Lycopodium obscurum Linnaeus – FNA, K; = Lycopodium obscurum var. obscurum – F, G, Md, RAB, W, WV; < L. obscurum – C, S]

6. Diphasiastrum Holub 1975 (Flat-branched Clubmoss, Running Cedar)

1 Foliage dark green, not glaucous; horizontal branchlets 2-4 mm wide (including the leaves); branchlets without conspicuous annual constrictions; rhizomes 0-1 cm deep (which can be determined by pulling up a single upright shoot – the depth to rhizome is approximately the length of the white portion of the vertical stem); abaxial rank of leaves shorter than lateral ranks (thus the branchlets flat in cross-section). .............................................................................................................................................. D. digitatum

1 Foliage blue-green, glaucous; horizontal branchlets 1-2 mm wide (including the leaves); branchlets with conspicuous annual constrictions; rhizomes (1-) 5-12 cm deep; abaxial rank of leaves as long as lateral ranks (thus the branchlets more-or-less square in cross-section).............. D. tristachyum

Diphasiastrum digitatum (Dillenius ex A. Braun) Holub, Common Running-cedar, Fan Ground-pine. Dry to mesic, usually acid forests and openings, especially common in disturbed sites, such as successional pine forests. July-September. NL (Newfoundland) west to MN, south to SC, GA, AL, MS, and AR. Hickey & Beitel (1979) and Holub (1975a & 1975b) explain the nomenclatural decision to accept the epithet over the more familiar 'flabelliforme.' [= FNA, Z; = Lycopodium flabelliforme (Fernald) Blanch – Md, RAB, S, WV; = Lycopodium digitatum Dillenius ex A. Braun – C, K, W; = Lycopodium complanatum Linnaeus var. flabelliforme Fernald – F, G]

Diphasiastrum ×habereri (House) Holub [D. digitatum × tristachyum]. Mt (KY, NC, VA, WV), Pd (VA): dry forests; rare. Known from widely scattered localities in our area; not always in close proximity to its parents. [= FNA, Z; = Lycopodium × habereri House – K; = L. ×habereri – WV, orthographic error] [not keyed; not mapped]


7. Spinulum A. Haines (Bristly Clubmoss)

A genus of 3 species, north temperate and subarctic. References: Wagner & Beitel in FNA (1993b); Wagner, Beitel, & Moran (1989); Hickey (1977); Ölgaard in Kramer & Green (1990); Haines (2003a)=Z.

Spinulum annotinum (Linnaeus) A. Haines, Stiff Clubmoss, Bristly Clubmoss. High elevation hardwood or coniferous forests. August-October. A circumboreal species, south in North America to n. NJ, MN, SD, NM, AZ, and OR, and in the Appalachians to WV, sw. VA, and e. TN (Blount County). Two varieties have been considered to reach our area in VA: var. acrifolium Fernald and var. annotinum. They are doubtfully distinct but need further study. This species was reported for NC by Lellinger (1985) and FNA, and is apparently indicated as occurring in NC on the range map in Mickel (1979); there is apparently no documentation for these reports, though the species occurs in Grayson County, VA, a county adjacent to NC. [= Z; = Lycopodium annotinum Linnaeus – C, FNA, K, W; > L. annotinum var. acrifolium Fernald – F, G, WV; > L. annotinum var. annotinum – F, G, Md, WV; > L. annotinum var. pungens (La Pylaie) Desvaux – WV]

8. Lycopodium Linnaeus 1753 (Running Clubmoss)

A genus of 5-10 species, mainly temperate and subarctic. The fractionation of Lycopodium has resulted in the creation of more natural genera, more comparable to those in other groups of plants. References: Wagner & Beitel in FNA (1993b); Wagner, Beitel, & Moran (1989); Hickey (1977); Ölgaard in Kramer & Green (1990); Haines (2002b, 2003a)=Z. [also see Dendrolycopodium, Diphasiastrum, Huperzia, Lycopodiella, Palhinhaea, Pseudolycopodiella, and Spinulum]

1 Strobili (1-) 2-5, borne on alternate "pedicels" branching from the central "peduncle"; leaves 4-6 mm, spreading to loosely ascending; upright shoots each usually bearing 3-6 branches.............................................................................................................................................. L. clavatum

1 Strobili 1 rarely 2, if then, the 2 strobili not on separate "pedicels," but sessile and paired at the top of the "peduncle"; leaves 3-5 mm long, ascending to appressed; upright shoots each usually bearing 3-6 branches.............................................................................................................................................. L. lagopus

Lycopodium clavatum Linnaeus, Running Clubmoss. Openings, balds, roadbanks, open forests. July-September. Circumboreal, south in e. North America along the Appalachians to NC and n. GA; also c. Mexico south through Central America to n. South America; West Indies. [= RAB, FNA, K, Md, W, Z; < L. clavatum – C, WV]; = L. clavatum var. clavatum – F, G, S]

L1. LYCOPODIACEAE

A family of a single genus and about 300 species. Isoetaceae, along with Selaginellaceae and Lycopodiaceae, now appear to be only distantly related to other extant pteridophytes and seed plants (Pryer et al. 2001). References: Jermy in Kramer & Green (1990).

Isoetes Linnaeus 1753 (Quillwort, Merlin's-grass)


Identification notes: Hybrids are possible between many combinations of species.

Key fragment to eastern granite outcrop species by Heafner et al. (in prep.)

1. Megaspores black or gray, leaves usually no more than 5.0 cm long.
2. Corms transversely oblong to oblong, roots dichotomously branched, phyllotaxy spiraled
   - I. melanospora

3. Corms horizontally elongate, roots fibrous and not dichotomously branched, phyllotaxy distichous
   - I. tegetiformans

1. Megaspores white, leaves to 18.7 cm long or longer.
2. Plants diploid (2n = 22); widespread from VA to AL in the Piedmont
   - I. piedmontana

3. Plants tetraploid (2n = 44); endemic to a few counties in the Piedmont of AL and NC
   - I. species 5 "analogous"

4. Velum covering 0-10% of the sporangium; leaves (7.9-) avg. 11.5 (-14.9) cm long; endemic to Franklin County, NC
   - I. species 6 "alabamensis"

5. Leaves (5.9-) avg. 9.3 (-14.2) cm long; endemic to Wake County, NC
   - I. species 4 "carolinae-septentrionalis"

 Isoetes acadiensis L. Kott, Acadian Quillwort. Freshwater tidal marshes. A tetraploid species (2n=44). [= FNA, K; < I. tuckermanii A. Braun – C, F, G]


 Isoetes boomii N. Luebke, Boom's Quillwort. Shallow water of slow-moving streams. Known from Laurens County, GA, AL, and FL. A hexaploid species (2n=66). [= FNA, K; < I. boomii – Z (also see I. georgiana)]

 Isoetes butleri Engelmann, Butler's Quillwort. Seepage areas on calcareous glades. Occurs in calcareous areas of the Midwest, extending east to c. TN, nw. GA (Jones & Coile 1988), and n. AL. A diploid species (2n=22), genotype=BB. [= C, F, FNA, G, K, S, Z]

 Isoetes engelmannii A. Braun. Usually in permanent water bodies with active current. A diploid species (2n=22). Apparently there are 2 cryptic taxa currently comined under the name I. engelmannii (Hoot, Napier, & Taylor 2004), genotype NN and genotype SS. [= K, Z; < I. engelmannii – RAB, C, G, FNA, W, WV (also see I. appalachiana, I. hyemalis, and I. valida); < I. engelmannii var. engelmannii – F, S]
**L3. ISOETACEAE**

**Isoetes flaccida** A. Braun var. *flaccida*. Winged Florida Quillwort. Springs, stream bottoms, river bottoms, ditches. S. GA and se. AL south to s. FL. A diploid species (2n=22). [= K, S; < *I. flaccida* FNA, Z]

**Isoetes georgiana** N. Luebke, Georgia Quillwort. Streams. Known only from GA (Colquitt, Dodge, Irwin, Tift, Turner, and Worth counties). A hexaploid species (2n=66). See Brunton & Britton (1996b) for additional information. Musselman (2001) indicates that this may be conspecific with *I. boomii*. [= FNA, K; < *I. boomii* – Z]

**Isoetes hyemalis** D.F. Brunton, Wintergreen Quillwort. Blackwater streams and sandy streambanks. Sc. VA south through e. and c. NC to GA, AL, and FL Panhandle (Nelson 2000), in the Coastal Plain and lower Piedmont. A tetraploid species (2n=44), apparently derived from 2 unknown or extinct species, X and Y (Hoot, Napier, & Taylor 2004). See Brunton, Britton, & Taylor (1994) and Brunton & Britton (1996a) for additional information on this species. [= K, Z; < *I. engelmannii* var. engelmannii – F, S]


**Isoetes lacustris** Linnaeus, Lake Quillwort. {hábitat}. July-September. A decaploid species (2n=110). [= FNA, C, K; > *I. macrospora* Durieu – F, G, W]

**Isoetes louisianensis** Thieret, Louisiana Quillwort. Small streams. S. AL, MS, and LA. [= FNA, K] {add to synonymy}


**Isoetes melanopoda** Gay & Durieu ex Durieu *ssp. melanopoda*. Blackfoot Quillwort. Floodplains. S. IN, IL, and MO south to ne. LA; probably represented eastward to c. TN and s. MS (the available material ambiguous) (Brunton & Britton 2006). [<*I. melanopoda* – FNA, K, C, G, Z]

**Isoetes melanopoda** Gay & Durieu ex Durieu *ssp. sylvatica*. D.F. Brunton & D.M. Britton, Eastern Blackfoot Quillwort. Clay soils in low woods, seeps on sandstone or granitic rocks, in NJ in clay-based depressions on Cape May. VA south (in the Piedmont and Coastal Plain) to sw. GA, s. and n. AL, and s. MS; disjunct in s. NJ. A diploid species (2n=22), genotype= PP. [<*I. melanopoda* – FNA, K, C, G, Z; <*I. melanopoda* – RAB (also see *I. melanospora, I. virginica, I. piedmontana*)]


**Isoetes piedmontana** (N.E. Pfeiffer) C.F. Reed, Piedmont Quillwort. In seepage on granitic flatrocks and on Altamaha grit. [= K, Z; <*I. melanopoda* – RAB; <*I. virginica* – C, F, FNA, G]

**Isoetes riparia** Engelmann ex A. Braun, Shore Quillwort. Tidal waters, lakes. A tetraploid species (2n=44), apparently derived from the southern *I. engelmannii* entity and *I. echinospora* (Hoot, Napier, & Taylor 2004). [<*I. riparia* – RAB, C, FNA (also see *I. saccharata*); >*I. riparia* var. riparia – G, K; >*I. riparia* var. amesiis (A.A. Eaton) Proctor – G, K; >*I. riparia* var. robbiisii (A.A. Eaton) Proctor – G; >*I. riparia* var. reticulata (A.A. Eaton) Proctor – G]

**Isoetes saccharata** Engelmann. Tidal waters, lakes. {disentangle from *I. riparia*} [= K; <*I. riparia* – C, FNA; =*I. riparia* var. palmeri (A.A. Eaton) Proctor – G]

**Isoetes species 1.** Pools on granite flatrocks. Forty Acre Rock, Lancaster County, SC. Being worked on by W.C. Taylor.
**L3. ISOETACEAE**


*Isoetes* species 4 “carolinae-septentrionalis”. Granite flatrocks

*Isoetes* species 5 “analogous”. Granite flatrocks.

*Isoetes* species 6 “alabamensis”. Granite flatrocks.


*Isoetes tegetiformans* Rury, Merlin's-grass. In shallow pools on granite flatrocks. Endemic to a few granite flatrocks in ec. GA (notably Heggies Rock), near the SC line. A diploid species (2n=22), genotype=TT. [= FNA, K, Z]

*Isoetes tenella* Léman, Spiny-spore Quillwort. In acid lakes, ponds, and rivers (submerged to emersed), tidal mud flats. Circumboreal, in North America from Greenland, NL (Labrador), and AK south to DE, n. OH, MI, WI, CO, and CA. South to PA and NJ (Kartesz 1999). [= K; = *I. echinospora* Durieu – FNA; > *I. echinospora* var. echinospora – F, G; > *I. echinospora* var. *muricata* (Durieu) Engelmann – C, F, G; > *I. echinospora* var. *braunii* (Durieu) Engelmann – G; > *I. muricata* Durieu] [syonymy incomplete]


*Isoetes tuckermanii* A. Braun, Tuckerman's Quillwort. South to MD (Kartesz 1999). A tetraploid species (2n=44), apparently derived from hybridization of a northern *I. engelmannii* entity and an unknown or extinct species, Z (Hoot, Napier, & Taylor 2004), genotype=NNZZ. [= FNA, K; < *I. tuckermanii* – C, F, G]


**L3. SELAGINELLACEAE** Willkomm 1854 (Spikemoss Family) [in SELAGINELLALES]

A family of a single genus (as currently broadly conceived) and about 700-750 species. References: Valdespino in FNA (1993b); Tryon (1955); Lellinger (1985); Buck (1977); Somers & Buck (1975); Jermy in Kramer & Green (1990). Key adapted in part from Valdespino in FNA (1993b).

*Selaginella* Palisot de Beauvois 1804 (Spikemoss)

As currently conceived broadly, a genus of about 700-750 species, cosmopolitan, but mostly tropical. It appears likely that *Selaginella* will be subdivided, based on morphology and molecular phylogenetic analyses (Soják 1992; Škoda 1997; Korall, Kenrick, & Therrien 1999). Selaginellaceae, along with Lycopodiaceae and Isoetaceae, now appear to be only distantly related to other extant pteridophytes and seed plants (Pryer et al. 2001). References: Valdespino in FNA (1993b); Tryon (1955); Lellinger (1985); Buck (1977); Somers & Buck (1975); Jermy in Kramer & Green (1990). Key adapted in part from Valdespino in FNA (1993b).

Sterile leaves dimorphic, in 4 ranks, the ventral pair spreading laterally, the dorsal pair ascending; leaves acute, mucronate, lacking a white or translucent apical hair-tip; fertile branch tips strongly differentiated (into strobili) from the sterile portions of the stem; [subgenus *Stachygynandrum* or genus *Lycopodioides*].

1 Main stems erect, the plants to 5 dm tall .......................................................... ................................................................................................................................. *S. braunii*

2 Main stems creeping or ascending.

3 Lateral leaves of the main stems 2.5-4 mm long, elliptic; lateral stems ascending or erect, 2-6 cm long; rhizophores (modified, leafless, root-producing shoots) borne on the upper side of the stem ........................................................................ *S. kraussiana*
L2. SELAGINELLACEAE

3 Lateral leaves of the main stem 1-2.5 (or to 3.6 in S. uncinata) mm long, ovate; lateral stems creeping (or the tips sometimes slightly ascending), 0.2-1 cm long; rhizophores auxiliary.
4 Margins of lateral leaves entire; lateral branches of the stems further branching 2-3 times ................................................................. S. uncinata
5 Margins of lateral leaves dentate-serrate; lateral branches of the stems further branching 1-2 times.

6 Apical hair-tip of the leaves twisted-contorted, 1.2-1.7 mm long (sometimes deciduous); strobili 3-6 mm long, 1.5-2 mm wide; leaves 0.15-0.3 mm wide, the marginal cilia absent, toothlike, or as much as 1/6 as wide as the leaf blade; budlike “arrested” branches present ................................................................. S. tortipila
7 Apical hair-tip of the leaves straight, 0.3-1.4 mm long (sometimes deciduous); strobili (5-) 10-35 mm long, 1-1.5 mm wide; leaves 0.2-0.45 mm wide, the marginal cilia 1/4-1/3 as wide as the leaf blade; budlike “arrested” branches present or absent.

Selaginella acanthonota Underwood, Spiny Spikemoss, Sand Spikemoss. Sandhills, Altamaha Grit glades. June-August. S. acanthonota ranges from se. NC south to s. FL, west to w. Panhandle FL. The complex comprising S. acanthonota, S. arenicola, and S. riddellii has been controversial. The complex ranges from se. NC south to s. FL and west to c. TX; see Tryon (1955) and Valdespino in FNA (1993b) for additional information on the complex. [= FNA, K; < S. arenicola – RAB; = S. arenicola Underwood ssp. acanthonota (Underwood) R. Tryon; = Bryodesma acanthonota (Underwood) Škoda]

Selaginella apoda (Linnaeus) Spring, Meadow Spikemoss. Seepages, bogs, spray cliffs, stream margins, wet meadows, marsh edges, wet spots in lawns, other moist habitats. June-October. S. ME, NY, OH, s. IN, AR, and e. OK south to FL, GA, AL, MS, LA, and e. TX; c. Mexico south to Guatemala. Often overlooked by vascular plant botanists as a moss or liverwort. S. ludoviciana of the Gulf Coast east to GA, and S. eclipes, more northern, are superficially very similar. [= C, F, FNA, G, K, Md, RAB, W, WV; = Diplostachyum apodum (Linnaeus) Beauvois – S; = Lycopodioides apodum (Linnaeus) Kuntze]


Selaginella braunii Baker, Treelet Spikemoss, Braun’s Spikemoss. Naturalized around graveyards or gardens; rare, introduced, native of China. [= FNA, K; = Lycopodioides species I]

Selaginella corallina (Riddell) Wilbur & Whitson, Riddell’s Spikemoss. Dry sands, granite outcrops, sandstone outcrops. E. and c. GA west to c. TX and s. OK. See Wilbur & Whitson (2005) for an explanation of the nomenclatural change. [= S. arenicola Underwood ssp. riddellii (Van Eseltine) R.M. Tryon – FNA, K; = Bryodesma arenicola (Underwood) Soják ssp. riddellii (Van Eseltine) Škoda]

Selaginella kraussiana (Kunze) A. Braun, Krauss’s Spikemoss, Mat Spikemoss. Naturalized around gardens or lawns; native of s. Africa. [= FNA, K; Lycopodioides species 2]

Selaginella ludoviciana (A. Braun) A. Braun, Gulf Spikemoss, Louisiana Spikemoss. Swamp margins, wet meadows. Gulf Coastal Plain from ne. FL and sw. GA west to e. L.A. [= FNA, K; = Diplostachyum ludovicianum (A. Braun) Small – S; = Lycopodioides ludovicianum (A. Braun) Kuntze]

Selaginella rupestris (Linnaeus) Spring, Rock Spikemoss. Granite flatrocks, other, mostly acidic, rock outcrops, occasionally on greenstone or calcareous shales. June-September. S. Greenland and NS west to BC, south to GA, AL, AR, OK, and WY. Valdespino in FNA (1993b) suggests that two or more cryptic or semicryptic species are present within what is currently called S. rupestris; additional study is needed. [= C, F, FNA, G, K, Md, RAB, S, W, WV; = Bryodesma rupestris (Linnaeus) J. Soják]

Selaginella tortilis A. Braun, Twisted-hair Spikemoss. Rock outcrops, mostly at high elevations. July-September. Endemic to the Southern Appalachians (rarely into the Piedmont) of NC, SC, and GA. Occurring close to TN and VA; it should be sought there. [= RAB, FNA, K, S, W; = Bryodesma tortilis (A. Braun) J. Soják]
* Selaginella uncinata (Desvaux ex Poiret) Baker, Blue Spikemoss. Moist forests; native of China. Introduced in sw. GA and other places in the Southeastern United States. [= FNA, K, Lycopodioides species 3]
SECTION 2: MONILOPHYTA (FERNS)

Family circumscriptions and sequence follow Christenhusz, Zhang, & Schneider (2011), with relatively minor modifications from Smith et al. (2006). References: Smith et al. (2006); Christenhusz, Zhang, & Schneider (2011).

**F4. EQUISETACEAE** Michaux ex de Candolle 1804 (Horsetail Family) [in EQUISETALES]

A family with a single genus and about 15 species. References: Hauke in FNA (1993b); Lellinger (1985); Mickel (1979); Hauke in Kramer & Green (1990); Des Marais et al. (2003).

*Equisetum* Linnaeus 1753 (Horsetail, Scouring Rush)

A genus of about 15 species, nearly cosmopolitan in distribution. References: Hauke in FNA (1993b); Lellinger (1985); Mickel (1979); Hauke in Kramer & Green (1990); Des Marais et al. (2003); Guillon (2004).

<table>
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<th>Species</th>
<th>Notes</th>
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<td><em>Equisetum × ferrissii</em> Clute (pro sp.) [← <em>E. hyemale × laevigatum</em>]. Riverbanks, wet forests. There are old reports, repeated in RAB, S, and FNA, of the occurrence of <em>E. × ferrissii</em> in NC and SC; documentation of these reports is not known; it is reported for Prince George's County, MD (Shetler &amp; Orli 2000) and for KY (Campbell &amp; Medley 2007). <em>E. × ferrissii</em> may be distinguished from <em>E. hyemale</em> var. <em>affine</em> (to which it will key above) by the failure of its cones to produce spores at all or the production of aborted spores (vs. production of normal spores) and most stem sheaths lacking a blackish band well below the teeth (vs. most stem sheaths with a narrow to broad blackish band well below the teeth). [= C, FNA, K; = <em>E. ferrissii</em> Clute – G; = Hippochaete × ferrissii (Clute) Škoda &amp; Holub]</td>
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<td><em>Equisetum laevigatum</em> A. Braun. [habitats]. QC and BC south to NY, w. PA, s. OH, s. IN, s. IL, AR, c. TX, NM, AZ, CA, and n. Mexico. There are old reports, repeated in RAB, and S, of this species further south; documentation of these reports is not known. It will key to <em>E. hyemale</em> ssp. <em>affine</em> in the above key, but has the strobilus apex rounded (vs. pointed), and aerial stems annual (vs. perennial). [= C, FNA, G, K; &gt; <em>E. hyemale</em> Linnaeus var. <em>intermedium</em> A.A. Eaton – F; &gt; <em>E. kansanum</em> Schaffner – F; = Hippochaete laevigata (A. Braun) Farwell]</td>
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<td><em>Equisetum × litorale</em> Kühlewein ex Ruprecht (pro sp.) [← <em>arvense × fluviatile</em>] is reported by FNA for VA. It can be distinguished from <em>E. arvense</em> by its white, misshapen spores. [= C, F, FNA, K; = <em>E. litorale</em> Kühlewein ex Ruprecht – G]</td>
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* *Equisetum × ramosissimum* Desfontaines ssp. *ramosissimum*, Branched Scouring Rush. Disturbed areas; native of the Old World, where it is widespread in Europe, Asia, and Africa. This species was apparently introduced long ago on ship's ballast to various old ports, such as Wilmington (New Hanover County, NC), Pensacola (Escambia County, FL) and New Orleans, LA. It is naturalized on the Wilmington waterfront, persisting in disturbed areas, such as in gravel along railroad tracks. Hauke (1979, 1984, 1992) discusses the occurrence of this species in North America. Ssp. *dehile* (Roxburgh) Hauke occurs in se. Asia and southern Pacific Islands; it is not known to be naturalized in North America. [= FNA; < *E. ramosissimum* – K; = Hippochaete ramosissima (Desfontaines) Farwell ssp. *ramosissima*]
Equisetum sylvaticum Linnaeus, Woodland Horsetail. Seepage swamps. Circumboreal, south in North America to MD, n. VA, ec. WV, OH, MI, WI, IA, WY, MT, and WA. [= C, FNA, K; > E. sylvaticum var. sylvaticum – F, G; > E. sylvaticum var. multiramosum Wherry – Md, WV]

F5. Ophioglossaceae (R. Brown) Agardh 1822 (Adder's-tongue Family) [in OPHIOGLOSSALES]

A family of 7-8 genera and about 75-115 species. The Ophioglossaceae is only distantly related to the leptosporangiate ferns; Kuo et al. (2011) and Pryer et al. (2004) indicate that it is most closely related to Psilotaceae. References: Wagner & Wagner in FNA (1993b); Wagner in Kramer & Green (1990).

1 Sterile portion of the leaf simple, unlobed; fertile stalks unbranched, the sporangia embedded in a linear spike

2 Sterile portion of the leaf blade pinnate, pinnatifid, or more divided; fertile stalks branched, the sporangia sessile or stalked.

3 Sterile portion of the leaf blade pinnate; plants usually < 20 cm tall; sterile blade fleshy in texture, 1-8 cm long

4 Botrychium

5 Sterile portion of the leaf blade 3-pinnate or even more finely divided; plants (9-)30-50 cm tall; sterile blade herbaceous in texture, 10-40 cm long

6 Botrypus

1. Ophioglossum Linnaeus 1753 (Adder's-tongue)


1 Underground stem globose, nearly spherical, 3-11 mm in diameter; fertile spikes commonly with a conspicuous, acute or attenuate sterile portion (apiculum) at its apex; sterile blade 1-4 cm long, 0.5-2.5 cm wide, borne horizontally near the ground

2 Sterile blade 0.1-1 cm wide, the polygonal venation areoles usually lacking both smaller areoles and free included veinlets

3 Large areoles of the sterile blade subdivided into smaller areoles, which lack free veinlets; sterile blade obtuse or acute.

4 Sterile blade ovate-lanceolate, the base obtuse to nearly truncate, broadest < 1/3 of the way from the base to the apex; primary areoles mostly > 2 mm wide, without included veinlets

5 Sterile blade elliptic, broadest near the middle, acute to attenuate at the base, pale green, dull, herbaceous in texture; basal frond sheath membranaceous and ephemeral; spores 50-60 pm in diameter

6 Sterile blade ovate, broadest below the middle, obtuse at the base, dark green, shiny, firm in texture; basal frond sheath leathery and tending to persist; spores 35-45 pm in diameter

Ophioglossum crotalophoroides Walter, Bulbous Adder's-tongue. Moist ditch banks and grassy roadside flats. March-September. E. NC (Dare County) south to FL and west to TX; also in Mexico, the West Indies, Central America, and South America. [= RAB, FNA, S, WH; > O. crotalophoroides var. crotalophoroides – K; > O. crotalophoroides var. nanum Osten ex de Lichtenstein – K]

Ophioglossum engelmannii Prantl, Engelmann's Adder's-tongue, Limestone Adder's-tongue. Dry barrens and glades over calcareous rocks, very rarely on granite. March-June. W. VA, IN, IL, KS, and AZ south to Panhandle FL and TX; also in Mexico and Central America. Ascribed to NC by Wagner & Wagner in FNA (1993b), the documentation unknown. [= C, F, FNA, G, K, S, WH]

Ophioglossum nudicaule Linnaeus f., Slender Adder's-tongue. Lawns and other moist, grassy areas. E. NC south to s. FL, west to TX; also in Mexico, the West Indies, Central America, South America, and Africa. First reported from NC by Thomas & Marx (1979). [= RAB, FNA, K, WH; > O. nudicaule E.P. St. John – S; > O. mononeuron E.P. St. John – S; > O. tenerum Mettenius – S]

Ophioglossum petiolatum Hooker, Long-stem Adder's-tongue. Maritime wet grasslands, moist ditch banks, and grassy roadside flats. March-November. Se. VA south to FL and west to TX and OK; also in the West Indies, Mexico, n. South America, and Asia. First reported for NC by Thomas & Marx (1979). Wagner & Wagner in FNA (1993b) suggest that this species is likely introduced in North America. [= RAB, FNA, K, WH; > O. floridanum E. St. John – S]
**Ophioglossaceae (F5)**

**Ophioglossum pusillum** Rafinesque, Northern Adder’s-tongue. Wet meadows, swamp edges. March-July. NS west to ND and BC, south to w. VA, n. IN, n. IL, and w. NE, w. WY, w. MT, and CA. [= FNA, K; = *O. vulgatum* Linnaeus var. pseudopodum (Blake) Farwell – C, F, WV; < *O. vulgatum* – G]


2. *Botrychium* Richard 1801 (Rattlesnake Fern)


**Botrychium virginianum** (Linnaeus) Holub, Rattlesnake Fern, Sang-find. In a wide range of fairly dry, mesic, and wet forests, cove forests, especially in nutrient-rich, moist bottomlands and slopes. April-June. NL (Newfoundland) and BC south to n. peninsular FL and CA, and Mexico south through Central America and n. South America; West Indies; Asia; Australia; scattered in Europe. [= *Botrychium virginianum* (Linnaeus) Swartz – RAB, C, FNA, G, K, W, WH, WV; = *B. virginianum* var. *virginianum* – F; = *Osmundopteris virginiana* (Linnaeus) Small – S]

3. *Sceptridium* Lyon 1905 (Grape Fern)


1 Sterile leaf 4-pinnate-pinnatifid, finely divided, the ultimate segments lacerate and linear, < 3 mm wide .......................................................... *S. dissectum*

2 Sterile leaf 2-pinnate to 4-pinnate, not finely divided, the ultimate segments ovate or oblong, > 8 mm wide.

3 Sterile pinnae entirely divided into short, round or acute pinnules; lateral pinnules with an incontinuous and poorly-developed central vein; plant producing 1 or 2 leaves per season.

4 Stalk of the basal sterile pinnae (10-) 15-70 mm long; roots irregularly ribbed, blackish; ultimate leaf segments fan-shaped, obovate, longer than wider, pinnately veined, the midrib weakly developed; sporulating August-October .............................................................. *S. jennanii*

5 Sterile pinna and pinnule apices obtuse to rounded; ultimate segments cuneate, rounded, or truncate at the base; ultimate segments remote or overlapping.

6 Sterile pinnae (or their terminal portion) elongate (the sides often nearly parallel), entire to shallowly lobed, not divided into pinnules; lateral pinnules with a conspicuous and well-developed central vein; plant producing 1 leaf per season.

5 Sterile pinna and pinnule apices obtuse to rounded (to somewhat acute); ultimate segments mostly ovate, narrow ovate, or oblong, mostly about 2x as long as broad or less; overwintering leaves green, not bronze .................................................... *S. oneidense*

6 Sterile pinnae and pinnule apices acute; ultimate segments mostly oblanceolate-oblong, often > 2x as long as broad; overwintering leaves bronze (or green if covered by leaves).

7 Sterile blade mostly 2-pinnate, the segments sharply serrulate or crenulate, ......................................................... *S. bibernatum*

8 Sterile blade mostly 3-pinnate (or more divided, those forms keyed above), the segments entire to obscurely serrulate or crenulate, .......................................................... *S. dissectum*

*Sceptridium bibernatum* (Savigny) Lyon, Southern Grapefern. Moist forests, clearings, old fields. August-October. MD, PA, s. IN, s. IL, and c. OK south to s. FL and e. TX. [= *Botrychium bibernatum* (Savigny) Underwood – RAB, C, FNA, K, S, W; = *B. dissectum* var. *tenuifolium* (Underwood) Farwell – F; = *B. dissectum* (Sprengel) Lyon – WH]

*Sceptridium dissectum* (Sprengel) Lyon, Cut-leaf Grape Fern, Dissected Grapefern. Moist forests, clearings, old fields. August-October. NS and QC west to ON and MI, south to Panhandle FL and e. TX; also in the West Indies. The two forms have caused much confusion. In our area, *forma obliquum* is much more common and widely distributed, often confused with *S. bibernatum*. *Forma dissectum* is fairly common in our area only in VA (rare in GA, NC, and SC), occurring primarily in the Mountains. The different distributions of the 2 forms suggest that further research is needed. [= *Botrychium dissectum* Sprengel – RAB, C, FNA, K, W, WV; = *B. dissectum* var. *dissectum* – F (also see *S. oneidense*); > *B. dissectum* var. *obliquum* (Muhlenberg ex Willdenow) Clute – G; > *B. dissectum* var. *dissectum* – G; > *B. dissectum* var. *dissectum* – S; > *B. obliquum* Muhlenberg ex Willdenow – S; < *B. dissectum* (Sprengel) Lyon – WH]

*Sceptridium jennanii* (Underwood) Lyon, Alabama Grapefern. Moist to dryish forests and disturbed areas. August-October. C. and sw. VA and w. KY south to Panhandle FL, s. AL, and e. LA; also in the West Indies. This species probably
arose as a hybrid between *B. biternatum* and *B. lunarioides* (Michaux) Swartz, followed by polyploidization, resulting in a fertile taxon functioning as a species. [= *Botrychium jennmani* Underwood – C, FNA, K, W, WH; = *B. alabamense* Maxon – RAB, S]

*Sceptridium lunarioides* (Michaux) Holub, Winter Grapefern. Old fields, pastures, young forests, granitic flatrocks, juniper-oak-blue ash woodlands over limestone. January-April. W. NC, e. TN, and s. SC south to n. FL, and west to e. TX and se. OK. Wagner (1992) proposes that *B. lunarioides* be treated in a new monotypic section, *Hiemobrychtium*, of *Botrychium*, subgenus *Sceptridium*. The species is hard to spot, and all the more difficult to find because of its phenology; the leaves appear in late fall and die by early spring. [= *Botrychium lunarioides* (Michaux) Swartz – RAB, FNA, K, WH; = *Holubiella lunarioides* (Michaux) Škoda; = *Botrypus lunarioides* Michaux]

*Sceptridium multifidum* (S.G. Gmelin) M. Nishida, Leather Grapefern. Grassy balds and high elevation meadows; moist forests. August-September. NL (Labrador) and AK south NJ, PA, OH (and in the mountains to VA and NC), IN, IL, IA, NE, CO, NM, and CA. [= *Botrychium multifidum* (S.G. Gmelin) Treviranus – C, FNA, K, W; > *B. multifidum* var. *multifidum* – F, G; > *B. multifidum* var. *intermedium* (D.C. Eaton) Farwell – F, G]

*Sceptridium oneidense* (Gilbert) Holub, Bluntlobe Grapefern. Moist or boggy forests, foodplain forests, bogs. July-October. Local in occurrence from NB, QC, and ON south to NC, TN, KY, IN, and WI. Recent studies by Warren Hauk suggest that *B. oneidense* may not be distinct from *B. dissectum*. [= *Botrychium oneidense* (Gilbert) House – RAB, C, FNA, K, W, WV; < *B. dissectum* var. *dissectum* – F (*forma oneidense* (Gilbert) Clute – embarrassingly transitional); = *B. multifidum* var. *oneidense* (Gilbert) Farwell – G]

**4. Botrychium** Swartz 1801 (Moonwort)

A genus of 25-30 species, nearly cosmopolitan, but primarily temperate and concentrated in North America and e. Asia. *Botrychium* as traditionally circumscribed to include *Botrypus* and *Sceptridium* is very heterogeneous (Hauk, Parks, & Chase 2003); I have here accepted the arguments of Hauk (1996), Hauk, Parks, & Chase (2003), and others recommending recognition of the anciently divergent and molecularly and morphologically distinctive segregates as genera. References: Wagner in Kramer 2003); I have here accepted the arguments of Hauk (1996), Hauk, Parks, & Chase (2003), and others recommending recognition of the anciently divergent and molecularly and morphologically distinctive segregates as genera. References: Wagner in Kramer

1 Sterile pinnae contracted at the base, thus cuneate or wedge-shaped; leaf blades pinnate to nearly simple, 1-6 cm long, 0.3-2 cm wide; pinna margins entire, the apices round. [section *Simplex*].................................................................*B. simplex* var. *simplex*

1 Sterile pinnae (or pinnules of 2-pinnate blades) not contracted at the base, thus oblong or elongate; leaf blades pinnate, pinnate-pinnatifid, or 2-pinnate, 1-8 cm long, 0.8-6 cm wide; pinna or pinnule margins entire, lobed, or incised, the pinna apices round, obtuse, or acute; [section *Lanceolatum*].

2 Sterile pinnae apices obtuse to round at the apex, their segments (and undivided pinnae) about as long as wide, round, obtuse, or truncate at the apex; leaf blade mostly short-petioled (rarely sessile), the petiole (0-) 1-3 cm long; leaf blade pinnate to pinnate-pinnatifid................. .................................................................*B. maticariaefolium*

2 Sterile pinnae acute at the apex, their segments (and undivided pinnae) at least twice as long as wide, mostly lanceolate, acute at the apex; leaf blade sessile, leaf blade pinnate-pinnatifid to 2-pinnate .................................................................*B. lanceolatum* var. *angustisegmentum*


*Botrychium maticariaefolium* (A. Braun ex Duwell) A. Braun ex W.D.J. Koch, Daisyleaf Moonwort. Dry to moist forests (often successional), old fields, grassy balds, northern hardwood forests. June-August. NL (Newfoundland) and AB south to w. NC, TN, KY, WV, OH, IL, WI, MN, and ND. [= FNA, K, W; = *B. maticariaefolium* – F, G, WV (orthographic variant); > *B. maticariaefolium* var. *maticariaefolium* – C]

*Botrychium simplex* E. Hitchcock var. *simplex*. Least Moonwort. Disturbed gravelly areas in spruce-fir forests, northern hardwoods forests, grassy balds. May-June. NL (Newfoundland) and BC south to NJ, VA, NC, MI, IN, WI, IA, SD, WV, CO, NM, UT, NV, and CA. Wagner & Wagner in FNA (1993b) discuss variation within *B. simplex*. Farrar & Wendel (1996) indicate that 3 varieties of *B. simplex* have strong genetic divergence, comparable to that usually distinguishing species. [= C, F, G; < *B. simplex* – FNA, K, W, WV]
F6. PSILOTACEAE Kanitz 1887 (Whiskfern Family) [in PSILOTALES]

A family of 2 genera and 4-12 species, pantropical and warm temperate. References: Lellinger (1985); Thieret in FNA (1993b); Kramer in Kramer & Green (1990)

**Psilotum** Swartz 1800 (Whiskfern)

A genus of 2-3 species, tropical and warm temperate. *Psilotum* lacks roots and true leaves. Other than the Australasian genus *Tmesipteris*, *Psilotum* has no close living relatives, and the 2 genera are usually considered to comprise a distinct class (Wagner 1977). The stem is chlorophyllose. Fungal cells interspersed in the outer layers of the rhizome aid in the absorption of nutrients. References: Lellinger (1985); Thieret in FNA (1993b); Kramer in Kramer & Green (1990).

**Identification notes:** The stiff, dichotomously-branched habit of *Psilotum* is unmistakable.

*Psilotum nudum* (Linnaeus) Palisot de Beauvois, Whiskfern. In moist bottomland forests, on soil, stumps, and tree bases, along building foundations (where introduced). April-September. S. SC south to s. FL, west to e. TX, disjunct (and apparently native) in ne. NC (Perry & Musselman 1994), rarely naturalized around buildings in c. NC; also in sw. United States and in the tropics of Central and South America, Africa, and Asia. [= RAB, FNA, K, S]

F8. OSMUNDACEAE Martinov 1820 (Royal Fern Family) [in OSMUNDALES]


1 Leaves hemidimorphic (juvenile leaves with only sterile pinnae, leaves bearing sporangia with sterile and fertile pinnae, the fertile pinnae either borne medially or terminally); photosynthetic (sterile) pinnae lacking tufts of hairs ................................................................. 2. Osmunda

2 Leaves dimorphic (each leaf either completely photosynthetic or completely fertile); photosynthetic (sterile) pinnae with tufts of reddish hairs near the junction with the rachis................................................................................................................................. 1. Osmundastrum

1. Osmundastrum C. Presl (Cinnamon Fern)

A monotypic genus, of the Americas and e. Asia. “When the rbcL trees, the fossil and morphological evidences are all taken into account, it can be concluded that the extant *Osmunda cinnamomea* has no closely related living species in Osmundaceae, and it has evolutionarily very static morphology with no significant modification for more than 200 million years. Thus we can call extant *Osmunda cinnamomea* a ‘living fossil’ “ (Yatabe, Kishima, & Murakami 1999); Metzgar et al. (2008) confirmed the opinion that cinnamon fern is an outlier and warrants generic status. References: Metzgar et al. (2008)=Z; Lellinger (1985); Whetstone & Atkinson in FNA (1993b); Kramer in Kramer & Green (1990); Yatabe, Nishida, & Murakami (1999).

**Identification notes:** Sterile plants of *Osmundastrum cinnamomeum* are sometimes confused with *Woodwardia virginica*, which also has rather coarse, pinnate-pinnatifid leaves and grows in similar wet, acid places. *Osmundastrum* is coarser (to 2 m tall, vs. to 1 m tall), has cinnamon tufts of tomentum present in the axis of the pinnae (vs. absent), has the rachis greenish and rather fleshy in texture (vs. brown and wiry), and bears fronds clumped or tufted from a massive, woody, ascending rhizome covered with old petiole bases (vs. fronds borne scattered along a thick, horizontal, creeping rhizome).

**Osmundastrum cinnamomeum** (Linnaeus) C. Presl, Cinnamon Fern. Bogs, peatlands, pocosins, wet savannas, floodplains, blackwater stream swamps, and other wetlands. March-May. NL (Labrador) west to MN, south to s. FL, c. TX; Mexico south through Central America to n. South America; West Indies; e. Asia. The species also occurs in e. Asia, where sometimes treated as a separate variety (but the combination is not available in *Osmundastrum*). The taxonomic significance of the densely glandular pubescent *Osmunda cinnamomea* var. *glandulosa* needs additional evaluation; it is reported from scattered locations in e. North America, including SC and VA. Because of its geographic incoherence it is here regarded as a form. [= Z; = Osmunda cinnamomea Linnaeus – RAB, FNA, G, S, W, WV; > Osmunda cinnamomea var. cinnamomea – C, F, K; > Osmunda cinnamomea Linnaeus var. glandulosa Waters – F, K]

2. Osmunda Linnaeus (Royal Fern, Cinnamon Fern, Interrupted Fern)

1 Leaves pinnate-pinnatifid, each pinna pinnatifid but not divided into distinct pinnules; spores borne on modified pinnae in the middle of the leaf blade; veins mostly 1-forked; [subgenus Claytonosorus]...................................................... 1. Hymenophyllum

2 Gametophytes only present, not in association with or in close proximity to filmy-fern sporophytes.

3 Gametophytes filamentous, no portion flattened and planar, forming felt-like mats ............................................................................................................... 4. Crepidomanes

4 Leaves stellate pubescent; rhizomes glabrous or with simple hairs; rhizomes densely covered with dark-colored hairs ............................................................................. 5. Didymoglossum

5 Rhizomes moderately stout, 0.8-1.5 mm in diameter, densely clad with dark-colored hairs; indusium ("involucre") tubular or funnelliform, sometimes slightly 2-lobed; receptacle long and whiplike, exerted from the mouth of the tubular (slightly bilobed) indusium ..................................................................................................................... 3. Vandenboschia

1. Hymenophyllum J.E. Smith 1793 (Filmy Fern)

As here broadly circumscribed, a genus of about 250-330 species, almost strictly tropical in distribution, but very rarely expending into humid north temperate regions. Sphaeroctinum C. Presl and other segregates are often recognized; these segregates may well be warranted. Iwatsuki in Kramer & Green (1990) takes a broad view of the genus, recognizing only Sphaeroctinum among the potential segregates. If this distinction is recognized, H. tunbrigense is in Hymenophyllum and H. tayloriae in Sphaeroctinum (the combination has not been made). References: Ebihara et al. (2006)=Z; Davison (1997); Raine, Farrar, & Sheffield (1991); Iwatsuki in Kramer & Green (1990); Morton (1968).

1 Sparophytes present.

2 Leaf blade with stellate hairs; [subgenus Sphaeroctinum] ............................................................. 2. Sphaeroctinum

3 Gemmae present; margin crenate, composed predominantly of cells with concave outer walls; archegonia and antheridia rare; plant forming sprawling, ribbon-like forms; branches filamentous to broad; proliferations abundant, arising marginally and centrally; [subgenus Sphaeroctinum] ................................................................................................................................. 1. Hymenophyllum

3 Gemmae absent; margin entire, composed predominantly of straight-sided cells; archegonia and antheridia common, often present on the same gametophyte; plant typically forming rosettes; branches always broad; proliferations few, always marginal; [subgenus Hymenophyllum] ........................................................................................................................ 2. Sphaeroctinum

Hymenophyllum tayloriae Farrar & Raine, Gorge Filmy Fern. Spray cliffs near waterfalls, permanently moist ceilings of grottoes in escarpment gorges with high rainfall. This species is endemic to the southern end of the Southern Appalachians (Transylvania, Jackson, and Macon counties, NC; Pickens and Oconee counties, SC; Rabun County, GA; Fentress, Scott, and Sevier counties, TN, and Lawrence, Franklin, and Lamar counties, AL). It was recently named (in honor of the first collector), following the demonstration that it represented a gametophyte distinct from the gametophytes of any (sporophytically) known species (Raine, Farrar, & Sheffield 1991), including H. tunbrigense, present in the close vicinity. Raine, Farrar, & Sheffield...
HYMENOPHYLLACEAE (F9)  

(1991) point out that "H. tayloriae is distinguished from the independent gametophytes of Vittaria appalachiana Farrar & Mickel by its 2-dimensional spathulate gemmae (those of V. appalachiana are uniseriate), rhizoid attachment only to marginal cells, yellow-green color, and glossy texture. Thallloid liverworts of similar size are generally more than one cell thick or have a distinct midrib, have notched apical meristems, and do not produce spathulate gemmae." An immature sporophyte, collected by Taylor in 1936, has stalked stellate hairs on the margins and midrib of the leaf and was the only sporophytic collection of the species until the recent discovery of additional juvenile sporophytes in AL (FNA 1993b). [= FNA, K, Z, = "a branching ribbon-like gametophyte with marginal rhizoids and small, ovate, plate-like gemmae several cells wide, of the genus Hymenophyllum" – RAB; = Sphaerocionium species 1]

Hymenophyllum tunbrigense (Linnaeus) J.E. Smith, Tunbridge Filmy Fern. Moist rock faces in an escarpment gorge with high rainfall. June-September. N. Mexico south through Central America to n. South America; SC; West Indies (Jamaica and Hispaniola); w. Europe; Africa; Australia and New Zealand. The occurrence of this filmy fern in the escarpment gorge of Eastatoe Creek and its tributaries (Pickens County, SC) is remarkable. Overall, H. tunbrigense is a "Gulf Stream plant," found in highly humid, climates in the West Indies, and the maritime west coast of the British Isles. H. tunbrigense somewhat resembles Chaconia flexuosa. This species may yet be found in NC in similarly rugged and humid escarpment gorges. It differs from T. boschianum in having the sporangia not extending beyond the deeply 2-lobed involucre (as opposed to having the sporangia exerted beyond the slightly bi-lobed, funnelform involucre). [= RAB, FNA, K, W, Z]

2. Didymoglossum Desvaux 1827


Didymoglossum petersii (A. Gray) Copeland, Dwarf Filmy Fern. On vertical faces of acidic rock outcrops in humid gorges, primarily of the Savannah River drainage, in the context of the very humid escarpment gorges on relatively dry rocks, not on rocks receiving substantial seepage or spray from waterfalls, also on outcrops of Altamaha Grit in the Coastal Plain, and on tree bark in swamps (in LA and MS). June-August. W. NC, nw. SC, sw and sc. TN, south to n. peninsular FL, c. AL, s. MS, and e. LA; disjunct in the Ozarks and Ouachitas of AR; Mexico (Chiapas, Veracruz, and Puebla) and Guatemala. This diminutive species is often overlooked, except by bryologists and hepaticologists; superficially, it does resemble a moss or liverwort more than a fern. It occurs on tree bark in some parts of its range. [= Z; = Trichomanes petersii A. Gray – RAB, FNA, K, S, W]

3. Vandenboschia Copeland 1938

A genus of 15-20 species, of the tropics and extending to north temperate areas of high humidity. References: Ebihara, Farrar, & Ito (2008)=Y; Ebihara et al. (2006)=Z; Ebihara et al. (2007); Iwatsuki in Kramer & Green (1990); Morton (1968); Dubuisson et al. (2003).

Vandenboschia boschiana (Sturm) Ebihara & K. Iwatsuki, Appalachian Filmy Fern. On rock outcrops, usually vertical or overhanging, usually in deeply shaded grottoes receiving seepage or spray from waterfalls. June-September. W. VA, s. OH, s. IN, s. IL south to w. NC and nw. SC, n. GA, n. AL, and ne. MS (Menapace, Davison, & Webb 1998); disjunct in the Ozarks of nw. AR; disjunct in Chiuhuahua, Mexico. See Belden et al. (2004) for more details on the first documented Virginia occurrence. [= Z; = Trichomanes boschianum Sturm – RAB, C, F, FNA, G, K, S, W, WV]

4. Crepidomanes C. Presl 1851

A genus of 30-40 species, tropical and extending to north temperate areas of high humidity; strictly Old World, except for our species. References: Ebihara, Farrar, & Ito (2008)=Y; Ebihara et al. (2006)=Z; Ebihara et al. (2007); Iwatsuki in Kramer & Green (1990); Morton (1968); Dubuisson et al. (2003).

Crepidomanes species 1, Grotto-felt, Appalachian Trichomanes, Weft Fern. On ceilings or back walls of grottoes, especially in humid gorges or near or behind waterfalls. Rather widespread in e. North America, from NH, VT, w. NY, OH, IN, and IL south to NC, nw. SC, n. GA, and n. AL. Crepidomanes species 1 cannot be morphologically distinguished from gametophytes of Vandenboschia boschiana or Didymoglossum petersii; the electrophoretic and phytogeographic evidence of Farrar (1992) leave little question, however, that it should be considered a distinct species. Although Farrar (1992) found that 30 of 30 populations of Trichomanes (s.l.) gametophytes "east of the Mississippi River that were not within or adjacent to sporophyte populations of T. boschianum or T. petersii" were "T. intricatum," the absence of sporophytes should be considered to
HYMENOPHYLLACEAE (F9)

provide only a presumptive or likely identification of gametophytes. Farrar (1992) also showed that independent gametophytes in AR were those of *Vandenboschia boschiana* and *Didymoglossum petersii*. Farrar (1992) points out the “intriguing possibility that somewhere in the Appalachian Mountains sporophytes of this species may yet exist.” Probably the most likely area in which to search for the sporophyte generation of *Crepidomanes species 1* is the escarpment gorge region of NC, SC, and GA near Highlands, NC, where topography, waterfalls, and the highest rainfall east of the Cascade Mountains combine to create microclimatic conditions that have favored the relict survival of numerous species of mosses, liverworts, and ferns. Any filmy-fern sporophyte which differs from known eastern North America species of Hymenophyllaceae should be investigated carefully. *Vittaria appalachiana* and *Hymenophyllum tayloriae* gametophytes differ from filamentous. Ebihara, Farrar, & Ito (2008) have recently reported that *Crepidomanes species 1* shares its chloroplast genome with the Asian triploid *Crepidomanes schmidtianum* var. *schmidtianum*; further studies are underway to determine the relationship of the two. (= *Trichomanes intricatum* Farrar – FNA, K; = "filamentous gametophyte, with spindle-shaped gemmae one cell wide but with the cells decreasing in size toward the apices, of the genus *Trichomanes*" – RAB; = *Vandenboschia species 1* – Z; ≈ *Crepidomanes schmidtianum* (Zenker ex Tasch.) K. Iwatsuki var. *schmidtianum* – Y]

F10. GLEICHENIACEAE C. Presl 1825 (Forking-fern Family) [in GLEICHENIALES]


*Dicranopteris* Bernhardi 1805 (Forking-fern)


* *Dicranopteris flexuosa* (Schrad) Underwood, Forked-fern. Wet pine flatwoods, moist disturbed areas; native in New World tropics. FL Panhandle (Bay and Franklin counties) and FL peninsula, s. AL (Mon Louis Island, Mobile County); West Indies; Mexico, Central America, and South America. [= FNA, K, S]

F13. LYGODIACEAE M. Roemer 1840 (Climbing Fern Family) [in SCHIZAEALES]

A family with a single genus and about 40 species, of tropical and temperate regions, particularly equatorial and south temperate. Sometimes included in the Schizaeaceae, but the relationship is remote and unclear. References: Nauman in FNA (1993b).

*Lygodium* Swartz 1800 (Climbing Fern)

A genus of about 40 species, mostly tropical, with a few temperate species.

1 Sterile pinnae pinnately divided into numerous serrate pinnules ............................................................................................................... *L. japonicum*

1 Sterile pinnae palmately lobed into 4-8 smooth to undulate lobes............................................................................................................... *L. palmatum*

* *Lygodium japonicum* (Thunberg) Swartz, Japanese Climbing Fern. Disturbed areas; native of Asia. June-September. The leaves (up to 30 m in length!) climbing into the canopy of trees in swamp forests and other wet habitats. (= RAB, FNA, K, S)

*Lygodium palmatum* (Bernhardi) Swartz, American Climbing Fern, Hartford Fern. Bogs, moist thickets, swamp forests, sandstone outcrops, roadside ditches and roadbanks, in strongly acid soils. July-September. NH, VT, NY and MI south to SC, n. Ga, and n. AL, widely scattered except in the Cumberland Plateau of KY, TN, and AL, where it is most common. Garrison (1992) discusses two forms of the species, "one with long appressed hairs scattered over the lower (abaxial) side of the sterile leaflets and the other relatively hair-free.” The two forms appear to be geographically differentiated, the pubescent form predominating south and west of Maryland, the glabrous form occurring primarily in the Northeast. Both forms are present in our area. Further research is needed to determine the taxonomic significance of this variation in pubescence. (= RAB, C, F, FNA, G, K, S, W, WV)

F14. SCHIZAEACEAE Kauffuss 1827 (Curly-grass Family) [in SCHIZAEALES]

A family of 3-4 genera and about 30 species (depending on circumscription). The Lygodiaceae is often combined with the Schizaeaceae. References: Wagner in FNA (1993b); Kramer in Kramer & Green (1990).
Schizaea J.E. Smith 1793 (Curly-grass Fern)


Schizaea pusilla Pursh, Curly-grass Fern. Moist, peaty oil in Coastal Plain bogs, often associated with Pseudolycodiella caroliniana, Drosera filiformis, and Chamaecyparis thyoides (though not in dense Chamaecyparis stands). May-July. In acid, boggy sites in DE, NJ, NY, NL (Newfoundland), NS, and NB; a similar or possibly identical plant is known from Peru. The leaves are filiform, 1-12 cm long. Spores of Schizaea have been identified in Pleistocene organic sediment from Singletary Lake (Bladen County, NC) and Rockyhock Bay (Chowan County, NC) (Whitehead 1963). Its native occurrence in our area as an extant species is plausible. See LeBlond & Weakley (2002) for further information on this species' occurrence in North Carolina. [= C, F, FNA, G, K]

F16. MARSILEACEAE Mirbel 1802 (Water-clover Family) [in SALVINIALES]


Identification notes: The raphe is the portion of the peduncle adnate to the sporocarp. The peduncle ends in a blunt tooth, the proximal tooth. Further up on the sporocarp is a second tooth, the distal tooth.

1 Leaves clover-like, the 4 cuneate, obovate or wedge-shaped leaflets borne at the summit of the petiole; sporocarps ovoid.......................... Marsilea
1 Leaves grass-like, linear, the leaf blade absent, the petiole narrowly winged; sporocarps spherical............................................................... Pilularia

Marsilea Linnaeus 1753 (Water-clover)


Identification notes: The raphe is the portion of the peduncle adnate to the sporocarp. The peduncle ends in a blunt tooth, the proximal tooth. Further up on the sporocarp is a second tooth, the distal tooth.

1 Leaves strongly bicolor (pale green towards the base of each of the 4 leaflets, darker green towards the tip); aquatic forms with a swollen air bladder just below the leaf................................................................. M. mutica
1 Leaves unicolored.
2 Roots present (1-3) between the nodes, as well as at the nodes.
  3 Distal tooth 0.3-0.8 mm long; sporocarps 3.5-5.0 mm long................................................................. M. minuta
  3 Distal tooth absent or < 0.2 mm long; sporocarps 4.5-6.0 mm long................................................................. M. quadrifolia
2 Roots present only at the nodes
  4 Distal tooth absent or a very low bump......................................................................................... M. macropoda
  4 Distal tooth 0.4-1.2 mm long, sharply acute to pointed, often hooked ...................................................... M. vestita

* Marsilea macropoda Engelmann ex A. Braun, Bigfooted Water-clover. [habitat]; native of s. TX and Mexico. Reported as introduced eastward in AL and c. and s. peninsular FL. [= FNA, K, Z]
* Marsilea minuta Linnaeus, Small Water-clover. Lakes and streams; native of the Old World. Known in North America from AL, FL, GA, and TN. [= FNA, Z; M. crenulata Desv.; M. crenata Presl]
* Marsilea mutica Mettenius, Nardoo, Australian Water-clover. Ditches, ponds; native of Australasia. Apparently spreading rapidly in VA. [= Z]
* Marsilea quadrifolia Linnaeus, European Water-clover. Shallow water of artificial impoundment; native of Europe. Not seen fertile in NC. Sold in garden stores as an aquatic to be grown in water gardens, and likely to be encountered more widely in the future. [= C, F, FNA, G, K]

Pilularia Linnaeus 1753 (Pillwort)


Identification notes: Pilularia lacks a leaf-blade, the 1-8 cm long petiole is narrowly winged, and looks a bit like an Isoetes or Juncus leaf. In vegetative condition, it may be recognized as a "fern" by the typical coiled ("fiddlehead") development of young leaves. The primary rhizome produces individual "fronds" at nodes, a short rhizome branch at each node also produces "fronds."

Pilularia americana A. Braun, American Pillwort. Vernal pools and seepage areas on granitic flatrocks, other ponds. This peculiar plant has a puzzling distribution, being known from several disjunct regions: WA to s. CA; NE and MO south to c. TX; SC, GA, TN, AL, and Mexico (Durango and Baja California Norte); similar plants, perhaps conspecific, occur in South America and Africa. The fragmented distribution may be at least partly explainable by the inconspicuous nature of the plant. First reported for SC in 1993 (J. Allison, pers. comm.). [= FNA, K, S]
F17. **SALVINIACEAE** Martinov 1820 (Floating Fern Family) [in SALVINIALES]

A family of 2 genera and about 16 species, all floating aquatics. *Azolla* is sometimes separated as a separate family, Azollaceae. References: Nagalingum, Nowak, & Pryer (2008); Nauman in FNA (1993b); Lumpkin in FNA (1993b); Schneller in Kramer & Green (1990).

1. Leaves < 1 mm long, reddish or green, without hairs on the upper surface. .................................................................................................... *Azolla*

1. Leaves 5-50 mm long, bright green, with obvious hairs on the upper surface. ..................................................................................... *Salvinia*

**Azolla** Lamarck 1783 (Mosquito Fern)

A small genus of about 6 species, floating aquatics, in tropical and warm temperate regions. Very un-fernlike, this floating aquatic looks superficially more like an aquatic liverwort. In some years and some places it occurs in great abundance, covering the surface of the water with a green or red mass of vegetation. *Azolla* has a symbiotic, nitrogen-fixing cyanobacterium, *Anabaena azollae* Strasburger. The nitrogen-fixing capabilities of *Azolla* have resulted in its use as a fertilizer, green manure, and livestock feed, much promoted in recent years, but used historically in Asian rice paddies for centuries (Lumpkin in FNA 1993b). References: Evrard & Van Hove (2004)=Z; Lumpkin in FNA (1993b).

1. Largest hairs on upper leaf lobe with 2 or more cells; megaspores densely covered with tangled filaments. ........................................ *A. caroliniana*

1. Largest hairs on upper leaf lobe with 1 cell; megaspores with raised angular bumps, visible through a sparse layer of filaments. ........... *A. filiculoides*


* Salvinia filiculoides* Lamarck. Freshwater lake; native of w. North America, south into Mexico, Central America, South America, e. Asia. This species is reported for e. GA from a freshwater lake on Sapelo Island, McIntosh Co. (Bates & Browne 1981), presumably as an accidental introduction. [= FNA, K; < *A. filiculoides* – Z]

Salvinia Séguier 1754 (Water Spangles)


1. Leaves 5–15 mm long; multicellular hairs of the upper leaf surface with 4 free, spreading branches (use 10× magnification). .. *S. minima*

1. Leaves to 50 mm long; multicellular hairs of the upper leaf surface with 4 branches joined at their tips, forming a cage-like structure (use 10× magnification). ................................................................. *S. molesta*

* Salvinia minima* Baker, Water Spangles. Quiet waters; probably introduced in our area from further south. [= FNA, K, Z; *S. auriculata* – S, misapplied]

* Salvinia molesta* D.S. Mitchell. Still waters of farm ponds, calcareous seepage ponds, and other situations; native of Brazil. *S. molesta* has been found at scattered sites in GA (Gwinnett and Lamar counties) (Carter, Baker, & Morris 2009), NC (Brunswick, Carteret, Craven, Cumberland, Duplin, Johnston, Jones, Lenoir, Mecklenburg, New Hanover, Onslow, Orange, Person, Pitt, Sampson, and Wake counties), SC (Colleton County), and VA (Shenandoah County), where it has been subjected to extermination efforts; it will likely be reintroduced (Anonymous 1999, D. Patterson, pers. comm.). This species is considered a noxious aquatic weed and has been reported from other southeastern states, such as TX and LA (Jacono 1999). Moran & Smith (1999) support the continued use of the name *S. molesta* for this species, as opposed to the ambiguous name *S. adnata* Desvaux. [= FNA, K, WH, Z; ? *S. adnata* Desvaux]

F30. **DENNSTAEDTIACEAE** Lotsy 1909 (Bracken Family) [in POLYPODIALES]

A family of about 16 genera and 370 species, of cosmopolitan distribution; the circumscription is very uncertain and controversial, however. References: Lellinger (1985); Cranfill in FNA (1993b); Kramer in Kramer & Green (1990).

1. Leaf blades broadly triangular in outline, about as broad as long, subcoriaceous; sori linear, confluent ........................................... *Pteridium*
DENNSTAEDTIACEAE (F30)

1 Leaf blades elongate in outline, at least 2× as long as broad, membranaceous; sori globular, separate
2 Leaves 2-pinnate–pinnatifid; indusium tubular or cuplike; leaves generally < 1 m long..............................................
3..............................Dennstaedtia
2 Leaves 3–4-pinnate–pinnatifid; indusium flap-like; leaves generally > 1 m long..............................................................Hypolepis

**Dennstaedtia** Bernhardi 1801 (Cuplet Fern)

A genus of about 45 species, of tropical to temperate distribution; *Dennstaedtia* is poorly known and of uncertain circumscription. Only *D. punctilobula* is temperate in distribution; anatomical evidence suggests that it is not closely related to tropical *Dennstaedtia*, and its separation from that genus may be warranted. References: Nauman & Evans in FNA (1993b); Kramer in Kramer & Green (1990).

**Identification notes:** *Dennstaedtia punctilobula* can be distinguished from other woodland ferns with deciduous fronds of similar size and shape (such as *Athyrium*, *Dryopteris*, and *Thelypteris*) by the following characteristics: leaves yellow-green or pale-green in color, with whitish-gray glandular trichomes, petioles silvery-pilose, leaves borne scattered (as clonal patches), sori tiny (< 0.5 mm in diameter).

* Dennstaedtia cicutaria (Sw.) T. Moore. Reported for AL by Kartesz (1999) on the basis of Dean’s (1969) mention of a plant of *D. rubiginosa* having been planted in Mobile. This report is rejected, as there is no evidence of naturalization. The species is native of tropical America. [= K; ? *D. rubiginosa* (Kaulfuss) T. Moore] [rejected; not keyed]


**Hypolepis** Bernhardi 1806 (Bramble Fern)


1 Stipe and rachis bearing numerous small prickles; [native, restricted to FL] ..............................................................H. repens
1 Stipe and rachis smooth, lacking prickles; [alien] ............................................................................................................H. tenuifolia

**Hypolepis repens** (Linnaeus) C. Presl, Creeping Bramble Fern. Swamps, wet hammocks. N. FL (Clay County) south to c. FL; West Indies; Mexico, Central America, South America. [= FNA, K, S, WH]


**Pteridium** Gleditsch ex Scopoli 1760 (Bracken)

A genus of 2–11 species, cosmopolitan in distribution. Bracken taxonomy remains provisional; the molecular work of Der et al. (2009) outlines a probable taxonomic structure for the genus. *Pteridium* is a notorious and nearly worldwide weed (though less consequential in our area than in many parts of the world), nearly impossible to eradicate because of its deeply subterranean rhizomes. Bracken fiddleheads are sometimes eaten, but they are poisonous and highly carcinogenic. Bracken is not favored by consequential in our area than in many parts of the world), nearly impossible to eradicate because of its deeply subterranean rhizomes. Bracken fiddleheads are sometimes eaten, but they are poisonous and highly carcinogenic. Bracken is not favored by consequential in our area than in many parts of the world), nearly impossible to eradicate because of its deeply subterranean rhizomes.

1 Leaf segment margins slightly to moderately pubescent; terminal (caudate) tip of the basalmost pinnule of the basal pinna (3-) avg. 12 (-28)% as long as the entire pinna; lower surface of rachis and costae shaggy pubescent; terminal segments of well-developed pinnules generally 2–4× as long as broad, about 3–8 mm wide.................................................P. aquilinum ssp. latiusculum
1 Leaf segment margins glabrous or sparsely pilose; terminal (caudate) tip of the basalmost pinnule of the basal pinna (16-) avg. 25 (-45)% as long as the entire pinna; lower surface of rachis and costae glabrous or sparsely pilose; terminal segments of well-developed pinnules generally 6–15× as long as broad, about 2–5 mm wide...................................................P. aquilinum ssp. pseudocaudatum

**Pteridium aquilinum** (Linnaeus) Kuhn ssp. latiusculum (Desvaux) Hultén, Eastern Bracken. Mainly in dry woodlands, forests, and heath balds, up to 1600 m in elevation. July-September. The species is nearly worldwide in distribution. NL (Newfoundland) west to MB, south to Panhandle FL, TX, and n. Mexico. The circumscription of ssp. *latiusculum* follows Thomson, Mickel, & Mehltreter (2008) in excluding Old World material included by many earlier authors. The relationship of the ‘*latiusculum*’ and ‘*pseudocaudatum*’ entities is discussed in detail by Speer & Hilu (1999) and Speer, Werth, & Hilu (1999).

**DENNSTAEDIACEAE** (F30)

*Pteridium aquilinum* (Linnaeus) Kuhn *ssp. pseudocaudatum* (Clute) Hultén, Tailed Bracken, Southern Bracken. Mainly in dry sandy woodlands, often locally abundant in sandhills and flatwoods. July-September. *Ssp. pseudocaudatum* is primarily distributed in the Southeastern Coastal Plain (where it is ubiquitous and abundant), but is reported north to MA, OH, IN, s. MI, and MO. [= *Z. = Pteridium aquilinum* (Linnaeus) Kuhn var. *pseudocaudatum* (Clute) Heller – RAB, C, F, FNA, G, K, W, WV; = *P. lattissiumum* (Desvaux) Hieronymus var. *pseudocaudatum* (Clute) Maxon – S]

**F31. PTERIDACEAE** E.D.M. Kirchner 1831 (Maidenhair Fern Family) [in POLYPODIALES]

A family of about 40 genera and about 1000 species. This family may be further subdivided, into families Adiantaceae (*Adiantum, Vittaria*), Sinopteridaceae (*Cheilanthes, Notholaena, Astrolepis, Pellaea*), Cryptogrammaceae (*Cryptogramma*), Pteridaceae (*Pteris*), and Parkeriaceae (*Acrostichum, Ceratopteris*). Here circumscribed to include Vittariaceae (see Smith et al. 2006). References: Lellinger (1985); Windham in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990); Kramer in Kramer & Green (1990); Crane (1997).

1 Gametophytes only present; [subfamily Vittarioideae].................................................................................................................. 10. Vittaria
2 Sporophytes present.
3 Sori round or oblong, distinct and separate along the pinnule margins; leaves bright-green, glabrous, herbaceous, delicate, and flexible; [subfamily Vittarioideae] ..................................................................................................................... 9. Adiantum
4 Plant aquatic or subaquatic, pale green, delicate .................................................................................................................. 3. Ceratopteris
5 Fertile pinnae with sori marginal; leaves < 0.5 m long; [subfamily Ceratopteridoideae]................................................................................................. 2. Acrostichum
6 Leaves essentially monomorphic.
7 Leaves 2-5-pinnate, the ultimate leaf-segments 1-4 (-8) mm long, more-or-less densely hairy (glabrous in *Cheilanthes alabamensis*) or covered on the undersurface with a whitish powder; [subfamily Cheilantheoidae] ................................................................................................. 5. Argyrochosma
8 Lower leaf surfaces pubescent (or glabrous in *Cheilanthes alabamensis*), never with conspicuous whitish powder. ................................................................. 6. Cheilanthes
9 Rachis brown-purple; [subfamily Cheilantheoidae] ................................................................................................. 8. Pellaea
10 Rachis green or tan; [subfamily Pteridoideae] ................................................................................................. 4. Pteris

**1. Cryptogramma** R. Brown 1823 (Parsley Fern)


*Cryptogramma stelleri* (S.G. Gmelin) Prantl in Engler, Slender Rock-brake. Limestone cliffs. NL (Newfoundland) and AK, south to c. PA, WV (Pendleton and Randolph counties), IL, IA, CO, UT, NV, and OR. [= FNA, C, F, G, K, WV]

**2. Acrostichum** Linnaeus 1753 (Leather Fern)

3. *Ceratopteris* Brongniart 1821 (Antler fern)

A genus of 3 species, widespread in tropical, subtropical, and warm temperate areas. References: Lloyd in FNA (1993b). Key based on FNA.

1 Sterile leaves simple, or palmately to pinnately lobed, or 1-4-pinnately divided, the pinnae (or veins) towards the base of the leaf opposite; petioles often inflated; sporangia with or without an annulus, the annulus with 0-10 (-40) indurated cells......................... *C. pteridoides*

1 Sterile leaves (1-) 2-3-pinnately divided, the pinnae towards the base of the leaf alternate; petioles usually not inflated; sporangia with an annulus, the annulus with 13-71 indurated cells.

2 Sporangia with 16 spores ....................................................................................................

2 Sporangia with 32 spores ....................................................................................................

* C. pteridoides (Hooker) Hieronymus. Ponds and lakes (natural and artificial). S. GA, FL, LA (including Florida parishes); West Indies; Central and South America; se. Asia. [= FNA, K, S, WH]

* C. richardii Brongniart. Lakes and ponds. Probably only introduced in the southeastern United States. West Indies; Central and South America; Africa. [= FNA, K]

* C. thalictroides (Linnaeus) Brongniart. Canals, swamps, ditches. Widespread in tropical and subtropical areas of America and Asia. Regarded by some authors as introduced in the se. United States. [= FNA, K; = *C. deltoidea* Benedict – S]

4. *Pteris* Linnaeus 1753 (Brake)

A genus of about 250-300 species, warm temperate and tropical. References: Nauman in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990).

1 Pinnae strictly simple, without lobes or pinnules; outline of leaf blade lanceolate, typically > 3× as long as wide......................... *P. vittata*

1 Pinnae (at least the basal ones) with 1-several lobes or pinnules; outline of leaf blade ovate to orbicular, typically nearly as wide as long

2 Pinnae of mature leaves not decurrent or only the terminal pinnae decurrent........................................................................

2 Pinnae of mature leaves decurrent in the upper half of the leaf onto the rachis........................................................................

* P. cretica Linnaeus, Common Cretan Brake. Limey rocks and soils. Pantropical, the original range unclear. Var. albolineata Hooker is sometimes recognized, seemingly differing only in the broad white central stripe on the pinnae (as opposed to solid green pinnae in var. *cretica*). [= Pycnodoria cretica – S; > *Pteris cretica* Linnaeus var. *cretica* – FNA, K; <]

* P. multifida Poiret, Spider Brake. Old walls with lime mortar; native of the Tropics. [= RAB, FNA, K; = Pycnodoria multifida (Poiret) Small – S]

* P. vittata Linnaeus, Ladder Brake. Old walls with lime mortar; native of e. Asia. [= RAB, FNA, K; = Pycnodoria vittata (Linnaeus) Small – S]

5. *Argyrochosma* (J. Smith) Windham 1987 (Powdery Cloak Fern)

A genus of about 20 species, of s. North America, Central America, South America, and the West Indies. Traditionally treated as a component of *Notholaena* (or sometimes *Pellaea*) (Tryon, Tryon, & Kramer in Kramer & Green 1990), but best recognized as a separate genus (Windham in FNA 1993b, Windham 1987, Gastony & Rollo 1998). Molecular studies show that this group is more closely related to *Pellaea* and *Astrolepis* than to *Notholaena*. References: Windham in FNA (1993b); Windham (1987); Tryon, Tryon, & Kramer in Kramer & Green (1990); Gastony & Rollo (1998).

* Argyrochosma dealbata (Pursh) Windham, Powdery Cloak Fern. Limestone cliffs. IL, MO, and KS south to AR and TX; disjunct in sc. KY. [= FNA, K; = *Notholaena dealbata* (Pursh) Kunze – C, F, G; = *Cheilanthes dealbata* Pursh; = Pellaeca dealbata (Pursh) Prantl]

6. *Cheilanthes* Swartz 1806 (Lipfern)

A genus of about 150 species, primarily in the Western Hemisphere. References: Lellinger (1985)=Z; Windham & Rabe in FNA (1995b); Tryon, Tryon, & Kramer in Kramer & Green (1990); Gastony & Rollo (1998). [also see *Argyrochosma* and *Astrolepis*]

1 Leaf surfaces glabrescent; ["*Cheilanthes alabamensis* group"].

2 Rhizomes short-creeping, usually 4-7 mm in diameter; pinnule midveins green on the upper surface for most of their length; spores 32 per sporangium................................................................................................................. *C. alabamensis*
2. Rhizomes long-creeping, usually 1-3 mm in diameter; pinnule midveins black on the upper surface for most of their length; spores 64 per sporangium. ............................................................... C. microphylla

1. Leaf surfaces pubescent (tomentose, villous, or lanose).

3. Petiole and rachis with a mixture of flattened scales (in C. tomentosa these very narrow and superficially mistaken for hairs) and jointed hairs (as seen at 10× magnification); plants tufted, without creeping rhizomes; margins of leaf segments under-rolled, modified into a scarious flap (false indusium) that covers the sori; [subgenus Physapteris].

4. Leaf blade nearly glabrous above, appearing dark green; scales 0.2-1.0 mm wide, lanceolate; tomentum on the leaf under-surface white, tan, or silver-gray............................................................... C. castanea

4. Leaf blade-brown (at maturity, whitish when young) ......................................................................................... C. castanea

4. Leaf blade-brown above, appearing whitish or gray-green; scales ca. 0.1 mm wide, linear, nearly hair-like; tomentum on the leaf under-surface white, tan, or silver-gray............................................................... C. castanea

3. Petiole and rachis with hairs only (as seen at 10× magnification); plants mat-forming (with leaves scattered along creeping rhizomes) or tufted (without creeping rhizomes); margins of leaf segments under-rolled but not modified into a scarious flap, the sori more or less exposed at maturity; [subgenus Cheilanthes].

5. Petiole and rachis glabrous to sparsely pubescent with rather straight hairs; leaves 3-pinnate, with 7-12 (-15) pairs of pinnae, the lower surface lanose (the hairs curly); leaf blades 2.5-10 (-15) cm long; ultimate segments 1-3 mm long, beadlike ........................................ C. feei

5. Petiole and rachis rather densely pubescent with long jointed hairs; leaves 2-pinnate-pinnatifid (rarely to 3-pinnate), with 12-20 pairs of pinnae, the lower surface tomentose (the hairs straight or bent); leaf blades (4-) 8-24 cm long; ultimate segments 3-5 mm long, elongate ............................................................... C. lanosa

Cheilanthes alabamensis (Buckley) Kunze, Alabama Lipfern. Dry outcrops of limestone. June-September. VA, w. NC, s. MO, and OK south and west to n. GA, AL, TX, NM, se. AZ, and Mexico (south to Oaxaca). Considering morphology and chromosome number (sharing x = 29 with Pellaea, in contrast to x = 30 in the rest of Cheilanthes), it has been suggested that C. alabamensis and close relatives could be placed equally well in Pellaea, as P. alabamensis (Buckley) Baker ex Hooker, as done by Cranfill (1980). Windham & Rabe in FNA (1993b) suggest that C. alabamensis is uncomfortably placed in either Cheilanthes and Pellaea and that "it may constitute a natural group worthy of consideration as a distinct genus." A molecular analysis suggests that C. alabamensis and close relatives form a monophyletic group sister to the rest of Cheilanthes; this could be the basis for status as a separate genus or for inclusion in Cheilanthes (but not for inclusion in Pellaea) (Gastony & Rollo 1998). Our plants are apparently apogamous triploids. [= RAB, C, F, FNA, G, K, S, W, Z; = Myriopteris sp.]

Cheilanthes castanea Maxon, Chestnut Lipfern. Dry outcrops of sedimentary or metamorphic rocks (including calcareous shales and siltstones). June-September. Sw. TX to s. AZ and south into Mexico, with scattered disjunct occurrences in c. OK, n. AR, e. WV, and c. and w. VA (to be expected elsewhere in our area). The ultimate segments of the pinnules are roundish and closely spaced, so that they overlap the adjacent segments of the pinnule and the segments of the adjacent pinnule. These characters do not match some descriptions (such as in Z). Whether or not C. castanea is distinct from or merely a form of C. eatonii is controversial. The complex of the 2 taxa includes apogamous triploids and sexual tetraploids. [= W, WV, Z; < C. eatonii Baker – C, FNA, K; = Myriopteris sp.]

Cheilanthes feei T. Moore, Slender Lipfern. Dry outcrops of calcareous sedimentary rocks (dolostone). June-September. WI, MN SD, MT, AB, and BC south to AR, TX, NM, AZ, s. CA, and n. Mexico (Chihuahua and Coahuila); disjunct eastward in KY and w. VA. The only known site in our area is on a dolostone cliff in Pulaski County, VA, where disjunct about 450 km east of a population in Bullitt County, KY, and an additional 200 km from other populations in IL (Wieboldt & Bentley 1982, Porter & Wieboldt 1991). The species is an apogamous triploid of unknown parentage. [= C, FNA, G, K, W, Z; = Myriopteris sp.]

Cheilanthes lanosa (Michaux) D.C. Eaton, Hairy Lipfern. Dry outcrops of felsic or intermediate metamorphic and igneous rocks. June-September. CT, NY, PA, s. IL, MO, and KS south to FL, AL, MS, LA, and e. TX, and disjunct in WI and MN. Much the commonest lip-fern in our area, a sexual diploid, and the most "eastern" of a predominantly western genus. [= RAB, C, FNA, G, K, S, W, WV, Z; = C. vestita (Sprengel) Swartz – F; = Myriopteris sp.]

Cheilanthes microphylla (Swartz) Swartz, Southern Lipfern. Shell hammocks, limestone outcrops. Ne. FL south through FL; West Indies; Mexico through Central America to s. America; West Indies. [= FNA, K, S, Z; = Myriopteris sp.]

Cheilanthes tomentosa Link, Woolly Lipfern. Dry outcrops of intermediate or calcareous metamorphic, igneous, or sedimentary rocks (including sandstone outcrops in the Coastal Plain of GA and SC). June-September. Primarily Appalachian, from PA south to KY, GA, and AL, also at scattered localities from AR, OK, and KS south and west to NM, AZ, and Mexico (south to Veracruz). The species is an apogamous triploid. [= RAB, C, FNA, G, K, W, S, Z; = C. lanosa – F, misapplied; = Myriopteris sp.]

7. Astrolepis D.M. Benham & Windham 1992 (Star-scaled Cloak Fern)

A genus of about 8 species, of s. North America, Central America, South America, and the West Indies. This group of species has traditionally been placed either in Notholaena or Cheilanthes, but is best recognized as a separate genus, more closely related
to *Argyrochosma, Pellaea, and Cheilanthes* than to *Notholaena* (Gastony & Rollo 1998) References: Benham & Windham in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990); Gastony & Rollo (1998).

1 Scales of the upper leaf surface dense and usually persistent; largest pinnae asymetrically lobed or entire; rare eastern disjunct known from AL. ............................................................................................................................................................................ *A. sinuata* ssp. *sinuata*

1 Scales of the upper leaf surface sparse and usually deciduous; largest pinnae usually symmetrically lobed; rare eastern disjunct known from GA. ............................................................................................................................................................................ *A. sinuata* ssp. *sinuata*

**Astrolepis integerima** (Hooker) D.M. Benham & Windham. Outcrops of Ketona dolostone. OK, NM, AZ, and NV south into Mexico; disjunct to c. AL (Bibb County); also disjunct in Hispaniola. This taxon is apparently an apogamous triploid derived from *Astrolepis coxisensis* (Goodding) D.M. Benham & Windham and an unknown taxon. [= FNA; = *Astrolepis ×integerima* – K; = *Cheilanthes integerima* (Hooker) Mickel; = *Notholaena integerima* (Hooker) Hevly; = *Pellaea* sp.]

**Astrolepis sinuata** (Lagasca ex Swartz) D.M. Benham & Windham ssp. *sinuata*, Wavy Cloak-fern. Granitic outcrops and boulders. OK, TX, NM, and AZ, south into Central and South America; West Indies; disjunct in GA. Its leaves are pinnate-pinnatifid, with 30-60 pairs of pinnae. [= FNA, K; < *Cheilanthes sinuata* (Lagasca ex Swartz) Domin; < *Notholaena sinuata* (Lagasca ex Swartz) Kaufuss; = *Pellaea* sp.]

8. **Pellaea** Link 1841 (Cliff-brake)

A genus of about 40 species, mostly in the Western Hemisphere. References: Gastony (1988); Gastony, Yatskievych, & Dixon (1992); Windham in FNA (1993b); Tryon, Tryon, & Kramer in Kramer & Green (1990); Gastony & Rollo (1998); Heafner (2001). Key based in part on Heafner (2001). [also see *Artyrochosma, Astrolepis, Cheilanthes*]

1 Petioles terete, glabrous or pubescent; rhizome scales uniformly orangish-brown, entire.
2 Petioles and rachises sparsely to densely pubescent, dull; pinnae long-stalked, those toward the base of the leaf on stalks 5-15 mm long; [of a variety of substrates, including non-calcareous] . ............................................................................................................................................................................ *P. atropurpurea* ssp. *glabella*
1 Petioles slightly grooved or flattened, glabrous; rhizome scales with a blackish median stripe and pale brown margins, obscurely toothed.
3 Ultimate segments thin in texture, not strongly rolled, acute to acuminate at the apex, but lacking a mucro or cusp .................................................................................. *P. viridis*
3 Ultimate segments leathery, strongly rolled, mucronate at the apex.
4 Leaves oblong to elliptic in outline; pinnae either ternate toward the base of the leaf and simple toward the tip of the leaf, or all simple; [known from outcrops in the upper Piedmont of SC] ................................................................................................................................................ *P. ternifolia* ssp. *arizonica*
4 Leaves usually narrowly triangular in outline; pinnae usually pinnate toward the base, becoming ternate to simple toward the tip; [known from outcrops in Piedmont of NC] ......................................................................................................................... *P. wrightiana*

**Pellaea atropurpurea** (Linnaeus) Link, Purple Cliff-brake. Outcrops of limestone and other rocks (usually either calcareous or mafic), rarely on masonry walls (Weiboldt 1995). May-September. This species is an apogamously-reproducing triploid, either an allopolyploid derived from the hybridization of a sexually-reproducing diploid species and sexually-reproducing tetraploid, or an autopolyploid of an undiscovered or extinct species. Gastony, Yatskievych, & Dixon (1992) provide convincing evidence that modern *P. glabella* is not one of the parental taxa, as indicated by Lellinger (1985). *P. atropurpurea* is widespread in e. North America, from VT, NY, MN, SD, SK, and AB south to FL, AL, TN, AR, TX, NM, AZ, Mexico, and Guatemala. [= RAB, C, F, FNA, K, S, W, WV; = *P. atropurpurea* var. *atropurpurea* – G; = *P. ×atropurpurea*]

**Pellaea glabella** Mettenius ex Kuhn ssp. *glabella*, Smooth Cliff-brake. Dry, exposed outcrops of calcareous rocks (limestone, dolostone), rarely on masonry walls (Weiboldt 1995). May-September. The diploid, sexually-reproducing *P. glabella* ssp. *missouriensis* (Gastony) Windham is (so far as is known) restricted to MO; the apogamously-reproducing autotetraploid derivative, ssp. *glabella*, is more widespread, ranging from VT, ONT, and MN, south to VA, TN, KY, AR, OK, and n. TX. Two additional taxa (both western) have been variously treated as additional subspecies of *P. glabella* or as two subspecies of *P. occidentalis* (E.E. Nelson) Rydberg. [= FNA, K; = *P. glabella* var. *glabella* – C; = *P. atropurpurea* var. *bushii* Mackenzie – G; < *P. glabella* – F, S, W, WV]

**Pellaea ternifolia** (Cavanilles) Link ssp. *arizonica* Windham, Arizona Cliff-brake. On granitic outcrops. A remarkable disjunct from sw. United States and Mexico (south to Oaxaca) to w. SC; see Heafner (2001) for additional information. When discovered, it was believed that this was a SC record for *P. wrightiana* (Platt & Townsend 1996), but Heafner (2001) has demonstrated that this actually represents *P. ternifolia* ssp. *arizonica*. [= FNA, K]

* Pellaea viridis* (Forsskål) Prantl, Green Cliff-brake. Outcrop of Altamaha Grit; native of Africa. This species is naturalized on an Altamaha Grit outcrop in Coffee County, GA (J. Allison, pers. comm.). Various infraspecific taxa have been recognized in the native range. [= K; = *Cheilanthes viridis* (Forsskål) Swartz]
**Pteridaceae (F31)**

*Pellaea wrightiana* Hooker, Wright's Cliff-brake. South-facing outcrops of Carolina slate or granitic rock with infrequent nutrient-rich seepage. May-September. OK west to se. CO and sw. UT, south to TX, AZ, and n. Mexico (Coahuila, Chihuahua, Sonora, Baja California Norte, and Baja California Sur), with a few, remarkable disjunct occurrences in c. NC. *P. wrightiana* is apparently a sexually-reproducing allotetraploid derivative of hybridization between *P. ternata* (Cavanilles) Link and *P. truncata* Goodding. [= RAB, FNA, K]

9. **Adiantum** Linnaeus 1753 (Maidenhair Fern)


1 Petiole and rachises roughly pubescent; [rare introduction]..............................................................................................................*A. hispidulum*
1 Petiole and rachises glabrous; [collectively common natives].
2 Leaves longer than broad, pinnately divided, with a main central axis, not fanlike; ultimate segments rhombic, about as long as broad to slightly longer than broad.......................................................................................................................*A. capillus-veneris*
2 Leaves broader than long, dichotomously divided at the summit of the petiole, the two main branches pedately branched, fanlike; ultimate segments oblong, > 2× as long as broad.
3 Ultimate segments at middle of penultimate divisions usually > 3.2× as long as broad, the apices with sharply denticulate, angular lobes, these lobes separated by deep sinuses 0.6-4 mm deep; segment stalks 0.2-0.9 (-1.3) mm long; [disjunct in n. MD and se. PA on serpentine, from a generally more northern and western distribution].........................................................*A. aleuticum*
3 Ultimate segments at middle of penultimate divisions usually < 3× as long as broad, the apices with rounded, crenulate, or crenate-denticulate lobes, these lobes separated by shallow sinuses 0.1-2.0 (-3.7) mm deep; segment stalks 0.5-1.5 (-1.7) mm long .......*A. pedatum*

*Adiantum aleuticum* (Ruprecht) Paris, Aleutian Maidenhair. Serpentine barrens. NL and QC south at scattered sites to se. PA and MD (Paris in FNA 1993b); also in scattered locations in w. North America, from s. AK south to s. CA, AZ, and Mexico (Chihuahua). [= FNA, K; = *A. pedatum* Linnaeus ssp. calderi/Cody – C; = *A. pedatum* Linnaeus var. aleuticum Ruprecht – F]

*Adiantum capillus-veneris* Linnaeus, Venus’-hair Fern, Southern Maidenhair. Moist calcareous substrates, in the Coastal Plain on "marl" (coquina limestone) (NC and SC), on calcareous clay bluffs (GA), and adventive on lime mortar of old buildings and walls (as in Wilmington and Fayetteville, NC); in the Mountains and Interior Low Plateau on limestone or other calcareous sedimentary rocks. June-July. Widespread in e. North America largely southern in distribution, from e. NC, w. VA, MO, CO, UT, and CO south; also disjunct in SD and BC, and in Mexico, the West Indies, tropical and warm temperate portions of Central and South America, Eurasia, and Africa. There is some question whether North American plants are conspecific with those in the Old World (Paris in FNA 1993b). [= RAB, C, F, FNA, G, K, S, W]

*


*Adiantum pedatum* Linnaeus, Northern Maidenhair. Moist forests and cliffs, especially over calcareous or mafic rocks, sometimes in seasonal seepage. June-August. NS and NB west to ON and MN, south to GA, AL, MS, LA, and OK. [= RAB, FNA, G, K, S, W, WV; = *A. pedatum* ssp. pedatum – C; = *A. pedatum* var. pedatum – F]

10. **Vittaria** J.E. Smith 1793 (Shoestring Fern)

A genus of about 50 species, tropics and subtropics. References: Farrar in FNA (1993b); Farrar & Mickel (1991); Kramer in Kramer & Green (1990). Key adapted from Farrar in FNA.

1 Sporophytes present, the leaves linear, 10-60 cm long and 1-3 mm wide ..............................................................................................................*V. lineata*
1 Gametophytes only present.
2 Gemmae with 2-12 body cells (with at least some present with 2-3 body cells); end cells of gemmae often swollen and larger than the medial cells; rhizoid primordia often absent on 1 or both end cells, seldom present on medial cells; sporophytes apparently not produced...
2 Gemmae with 4-16 body cells; end cells of gemmae equal or smaller than the medial cells; rhizoid primordia regularly present on the end cells, as well as on some medial cells; sporophytes frequently produced (and small sporophytes often present in largely gametophytic colonies) .......................................................................................................................*V. appalachiana*

**Vittaria appalachiana** Farrar & Mickel, Appalachian Shoestring Fern, "Appalachian Gametophyte." Shaded grotoes, undersides of overhanging rock outcrops, especially in moist gorges or on spray cliffs in the vicinity of waterfalls, usually on felsic metamorphic rocks, such as mica schist, mica gneiss, granite gneiss, or metaquartzite, or on sandstone. This reduced species consists of "a branched, ribbon-like thallus one cell in thickness, usually differentiated into basal and upright branches; basal branches attached to the substrate by numerous short, brown rhizoids emanating from marginal and interior cells; upright branches terminating in the production of gemmae" (Farrar & Mickel 1991). The species is often overlooked or mistaken for a
liverwort; it is most often collected by bryologists and hepaticologists, and was first noted in 1824 by von Schweinitz, who considered it a \textit{Jungermannia}. Southern and Central Appalachians, south of the glacial boundary, from se. PA, sw. NY, and ne. OH south through c. TN and c. KY to n. GA, n. AL, and n. MS (Menapace, Davison, & Webb 1998). Although this species has been known for some time (often referred to as the "Appalachian Gametophyte"), it was only recently named formally (Farrar & Mickel 1991). A range of evidence (morphologic, electrophoretic, and developmental) indicates that it is not the gametophyte of any known \textit{Vittaria} sporophyte; instead, it is a distinct taxon, reproducing vegetatively by gemmae, having lost the capability of producing sporophytes. For additional information, see Farrar (1974), Farrar (1978), Gastony (1977), Farrar, Parks, & McAlpin (1983), and Pittillo et al. (1975). [\text{= FNA; = "a branching, ribbon-like gametophyte, with diffuse rhizoids and linear-shaped gemmae only one cell wide, of the genus \textit{Vittaria}" – RAB; = "thalloid, irregularly shaped gametophytes of a species of \textit{Vittaria}" – C; < \textit{V. lineata} (Linnaeus) Smith – WV}]

\textit{Vittaria lineata} (Linnaeus) Smith, Shoestring Fern. Epiphyte on the bark of \textit{Sabal palmetto}, but the northernmost native site (in Lincoln County, GA) was on rock. Se. GA and formerly ec. GA south to s. FL; c. Mexico south through Central America to n. South America; West Indies; introduced in e. SC (Beaufort and Jasper counties) on landscaping plants. Sporophytic plants have pendant linear leaves, 1-3 mm wide and up to 60 cm long, hence the common name. [\text{= FNA, K, S}]

\textit{Cystopteris} Bernhardi 1806 (Bladder Fern, Brittle Fern)

A genus of about 20 species, sub-cosmopolitan in distribution, primarily of temperate regions but also in montane to alpine settings in tropical regions. References: Hufler, Moran, & Windham in FNA (1993b); Hufler, Windham, & Ranker (1990); Kramer et al. in Kramer & Green (1990).

\textbf{Identification notes:} See \textit{Woodia} for suggestions on distinguishing between \textit{Cystopteris} and \textit{Woodia}, similar ferns often confused. Hybrids frequently occur where two or more species of \textit{Cystopteris} grow in proximity. The following hybrids may be anticipated in our area: \textit{Cystopteris bulbifera \times tennesseensis}, \textit{Cystopteris bulbifera \times tenuis} [\textit{= C. \timesillinoensis} R.C. Moran], \textit{Cystopteris fragilis \times tenuis}, \textit{Cystopteris protrusa \times tennesseensis}, \textit{Cystopteris protrusa \times tenuis} [\textit{= C. \timeswagneri} R.C. Moran].

1 Lowest pair of pinnae the longest, thus the leaf widest at the base; bulblets often present on the rachis; indusia, rachises, and veins with stalked glands (these sometimes sparse in \textit{C. tennesseensis}).

2 Leaf blade 10-55 cm long, usually 2-3× as long as the reddish to tan petiole; bulblets usually present, smooth, green, 2-3 mm in diameter, usually on the rachis and the midrib; spores 20-27 μ long.........................................................\textit{C. bulbifera}

2 Leaf blade 6-25 cm long, usually about 1× as long as the dark brown petiole; bulblets present or absent, deformed and scaly, dark, < 1.5 mm in diameter, on the rachis only; spores 25-35 μ long.........................................................\textit{C. tennesseensis}

3 Lowest pair of pinnae shorter than the second or third pair, thus the leaf widest above the base; bulblets never present; indusia, rachises, and veins eglandular.

3 Leaf blade (2.5-) 3-4× as long as wide; pinnae usually perpendicular to the rachis (or even reflexed); margins of pinnae serrulate, the teeth sharp; basal pinnules sessile, truncate to rounded at the base; indusium up to 1 mm long, lanceolate; pinnae usually perpendicular to rachis; [on rock outcrops] ..................................................................................................................................................................................\textit{C. fragilis}

3 Leaf blade 2-2.5 (-3)× as long as wide; pinnae usually at an acute angle to the rachis, curving toward the blade apex; margins of pinnae crenulate, the teeth sharp; basal pinnules short-stalked or sessile, rounded to cuneate at the base; indusium about 0.5 mm long, ovate to round; pinnae usually at an acute angle to the rachis; [on rock outcrops or forest floor].

4 Rhizome long-creeping, the apex extending only 1-5 mm beyond the last of the widely-spaced petioles (especially as seen from late spring to summer); rhizome covered with scales and tan to golden hairs; spores 20-32 μ long; leaves membranaceous in texture; basal pinnules conspicuously stalked; petiole green to tan, darkened at base; lowermost pinnules of each pinna deeply cut; [typically on forest floor, less commonly on rocks]........................................................................................................................................................ \textit{C. protrusa}

4 Rhizome short-creeping, the apex extending only 1-5 mm beyond the last of the closely-spaced petioles; rhizome covered with scales, lacking hairs; spores 32-42 μ long; leaves thicker in texture; basal pinnules slightly stalked or merely cuneate to the base; petiole dark brown; lowermost pinnules of each pinna slightly lobed; [often on rocks, less commonly on forest floor].................................\textit{C. tenuis}

\textit{Cystopteris bulbifera} (Linnaeus) Bernhardi, Bulblet Fern, Bulblet Bladder Fern. Moist outcrops and talus of calcareous rocks, rarely up to 1500 m elevation. May-August. NL (Newfoundland) west to MN, south to NC, nw. SC (Oconee County), nw. GA, AL, and AR; also disjunct in UT, AZ, NM, and TX. This species is a diploid involved in the reticulate evolution of \textit{Cystopteris} in e. North America. It is one parent of \textit{C. tennesseensis}. Its genome can be symbolized BB. [\text{= RAB, C, F, FNA, G, K, S, W, WV}]
**Cystopteris fragilis** (Linnaeus) Bernhardii, Fragile Fern, Brittle Fern. Cliffs, ascending in our area to 1650 m. June-September. Circumboreal, in North America ranging from NL (Newfoundland) west to AK, south to MA, CT, NJ, montane NC, VA, KY, MO, OK, TX, NM, and AZ. This species is a fertile allotetraploid, presumed to be derived from hybridization between C. reevesiana Lellinger and an extinct or currently undiscovered second parent (*C. hemifragilis*); its genome can be symbolized HHRR (Paler & Barrington 1995). *C. fragilis* appears to be a complex needing further study; additional entities may be found to warrant taxonomic recognition (see FNA for discussion). [= FNA, K, W; = C. fragilis var. fragilis – C, F, G, S, < C. fragilis (also see C. tenuis) – WV]

**Cystopteris prostrusa** (Weatherby) Blasdell, Lowland Bladder Fern. Rich woods or on moss- and soil-covered talus in boulderfields, occasionally on ledges of rock outcrops. April–June. NY and ON west to MN, south to GA, Panhandle FL (Washington County) (Wunderlin & Hansen 2006), AL, MS, LA, AR, e. KS, and IA. This species is a diploid involved in the reticulate evolution of *Cystopteris* in e. North America. It is one parent of *C. tennesseensis* and *C. tenuis*. Its genome can be symbolized PP. [= RAB, C, FNA, K, W; = C. fragilis var. prostrusa Weatherby – F, G, S]

**Cystopteris tennesseensis** Shaver, Tennessee Bladder Fern. Moist to dry outcrops of calcareous rocks, including coquina limestone ("marl") in the outer Coastal Plain. April–June. PA, KY, IL, WI, and IA south to NC, nw. GA, n. AL, AR, and OK. This species is a fertile allotetraploid derived from hybridization between *C. bulbifera* and *C. prostrusa*. Its genome can be symbolized BBPP. Haufler, Windham, & Ranker (1990) consider this a "successfully fledged and vigorous young species," adapted to a hybrid niche not successfully utilized by either parent. [= RAB, C, FNA, K, W; = C. *tennesseensis – WV]

**Cystopteris tenuis** (Michaux) Desvaux, Mackay's Bladder Fern. Moist outcrops and cliffs of metamorphic and sedimentary rocks, occasionally in moist soils near rock outcrops or moist soil banks. May–August. NL (Newfoundland) west to MN and NE, south to VA, IL, and MO, and in the mountains to NC, TN, and n. GA. This species is a fertile allotetraploid derived from hybridization between *C. prostrusa* and an extinct or currently undiscovered second parent (*C. hemifragilis*); its genome can be symbolized HHPP (Paler & Barrington 1995). [= FNA, K, W; = C. fragilis var. mackayi Lawson – C, F, G; < C. fragilis – WV]

![Cystopteris bulbifera](image1)
![Cystopteris fragilis](image2)
![Cystopteris prostrusa](image3)
![Cystopteris tennesseensis](image4)
![Cystopteris tenuis](image5)

**Gymnocarpium** Newman 1851 (Oak Fern)

A genus of about 8 species, north temperate in distribution. References: Pryer in FNA (1993b); Pryer & Haufler (1993)=Z; Pryer (1992); Kramer et al. in Kramer & Green (1990). Key based on FNA.

1 Sessile basal basiscopic pinnule of the proximal pinnae with basal basiscopic pinnulet shorter than the adjacent pinnule; pinnules of second pair sessile, with basal pinnules shorter than the adjacent pinnule (or second basal pinnae rarely stalked); spores 27–31 µm in diameter.................. G. dryopteris

1 Sessile basal basiscopic pinnule of the proximal pinnae with basal basiscopic pinnulet more or less equal in length to the adjacent pinnule; pinnules of second pair usually sessile, with basal pinnules more or less equal in length to the adjacent pinnule; spores 34–39 µm in diameter.................. G. appalachianum

**Gymnocarpium appalachianum** Pryer & Haufler, Appalachian Oak Fern. Moist, rocky forests, at medium to high elevations. June-September. Endemic to the c. and s. Appalachians (known from ne. WV, nw. VA, sc. PA, and disjunct in nw. NC and OH). Electrophoretic and morphologic analyses show that it is one of the diploid parents of the widespread allotetraploid *G. dryopteris*. In NC, it is limited to a single site, below the north-facing summit cliffs on Bluff Mountain, Ashe County, where seepage results in extensive ice formations which frequently persist until June. Karyotype = AA. [= FNA, K, Z; < G. dryopteris (Linnaeus) Newman – C, G, W, WV; < Dryopteris disjuncta (Ledebour) C.V. Morton – F]


Triploids are known from the mountains of VA. Their identity is uncertain; based on geography they are presumably *G. appalachianum × dryopteris* (AAJ), but could be *G. brittonii* (Sarvela) Pryer & Haufler [= G. disjunctum × dryopteris = AJJ]. Triploids can be distinguished by the presence of malformed spores, irregular in shape and size, often intermixed with large round spores (vs. all spores reniform and relatively uniform in size and shape). [*G. brittonii* (Sarvela) Pryer & Haufler – K]
A family of at least two genera and more than 720 species, of nearly cosmopolitan distribution. Murakami et al. (1999) conducted a molecular phylogenetic analysis of the Aspleniaceae, which confirmed that *Camptosorus* should be included in *Asplenium*, but suggested that *Phyllitis* is better separated from *Asplenium*. A later and more comprehensive study shows *Phyllitis* and *Camptosorus* to be deeply embedded in *Asplenium* (Schneider et al. 2004), a conclusion followed here. References: Kramer & Viane in Kramer & Green (1990); Schneider et al. (2004).

*Aspleniaceae* Linnaeus 1753 (Spleenwort)

*Asplenium* is a large, nearly cosmopolitan genus of more than 720 species, with centers of diversity in the Appalachians, Central America mountains, Andes, and Himalayas. References: Wagner, Moran, & Werth in FNA (1993b); Moran (1982); Taylor, Mohlenbrock, & Burton (1976); Murakami et al. (1999); Kramer & Viane in Kramer & Green (1990).

**Identification notes:** Several of the more frequently encountered sterile hybrids are included in the key and treated fully below. Others may be recognized by intermediate morphology and usual co-occurrence with both parents.

1 Leaves simple, unlobed (sometimes with a few, irregular forkings); veins free or anastomosing-areolate.
2 Leaf blades 0-3 mm wide, linear, forked or with a few toothlike projections ........................................... *A. septentrionale*
2 Leaf blades 10-40 mm wide, lanceolate, lance-attenuate, or oblong.
3 Leaf apex acute or obtuse, not attenuate, not producing plantlets at the tip; veins free.
4 Longer indusia of each frond avg. 1.2 cm long; leaves avg. 2.3 (-3.4) dm long; [native in TN, AL, and elsewhere, in natural limestone sinkholes] ............................................................... *A. sopolendrium var. americanum*
4 Longer indusia of each frond avg. 1.7 cm long; leaves avg. 3 (-6) dm long; [rarely introduced in North America, typically in artificial settings, such as wells] ............................................................... *A. tutwilerae*
5 Rachis dull green throughout its length, or at least toward the tip; leaves pinnatifid to tripinnate, the outline of the leaf blade narrowly to broadly triangular, widest at the base (or slightly above the base in *A. abscissum*).
6 Petiole dark throughout its length (from base to first leaflet).
7 Leaves bipinnate at the base, pinnate-pinnatifid above; spores normal ........................................... *A. bradleyi*
7 Leaves pinnate at the base, pinnatifid above; spores abortive (or normal in *A. abscissum*).
8 Spores abortive ........................................................................................................ *A. xchenoides*
8 Spores normal; [endemic as far as known to Hale County, AL] ............................................................... *A. tutwilerae*
6 Petiole partially or entirely green (darkened or not at its base).
9 Leaves pinnatifid or pinnate through most or all of their lengths.
10 Leaves pinnatifid, sometimes fully pinnate at the base; spores normal ........................................... *A. pinnatifidum*
10 Leaves pinnate (sometimes pinnate-pinnatifid at the base in *A. xtrudellii*); spores abortive (or normal in *A. abscissum*).
11 Spores normal ................................................................................................................ *A. abscissum*
11 Spores abortive ................................................................................................................ *A. xtrudellii*
9 Leaves bipinnate to tripinnate.
12 Petiole darkened toward the base; pinnules toothed, lacerate, pinnatifid, or pinnate; leaves bipinnate to tripinnate, the leaf blades lanceolate-ovate to lanceolate-oblong; ultimate leaf segments sessile or nearly so; [of acidic rocks] ........................................... *A. montanum*
12 Petiole entirely green; pinnules toothed; leaves bipinnate, the leaf blades ovate-triangular; ultimate leaf segments mostly stalked; [of calcareous rocks] ............................................................... *A. ruta-muraria var. cryptolepis*
5 Rachis shiny black or dark brown throughout its length; leaves pinnate, the outline of the leaf blade linear, lanceolate, or oblong, with more-or-less parallel sides for much of its length.
13 Pinnae orbicular to obovate-oblong, 1-2× as long as wide, the base more-or-less symmetrical (if auriculate, only slightly so and on the side of the pinna toward the base of the leaf); old leaf rachises often with persistent projections left from the disarticulation of the pinnate.
14 Main pinnae deeply lobed into 3-many segments (the leaves therefore pinnate-pinnatifid); [of FL] .................................... *A. verecundum*
14 Main pinnae merely toothed (the leaves therefore pinnate); [widispersed in our area].
15 Sori 4-6 (-9) per pinna, up to 2 mm long; rhizome scales up to 3 mm long; petiole relatively thin, shiny, coppery or bronze; pinnae mostly alternate, suborbicular, spaced more distantly, thinner in texture, set at a fairly oblique angle to the rachis, often slightly auriculate on the side of the pinna toward the leaf base; spores mostly 29-36 μ long; stomatic guard cells mostly 38-43 μ long; [mostly of noncalcareaeous rocks] ............................................................... *A. trichomanes ssp. trichomanes*
15 Sori 4-9 (-12) per pinna, up to 3 mm long; rhizome scales up to 5 mm long; petiole relatively thicker, blackish-brown; pinnae mostly opposite, oblong, spaced more closely, thicker in texture, set at a nearly right angle to the rachis, rarely at all auriculate; spores mostly 34-43 μ long; stomatic guard cells mostly 41-49 μ long; [of calcareaeous rocks] ...............................................................
Asplenium abscissum Wildenow, Cutleaf Spleenwort. Limestone sinkhole. Mexico, Central America, and n. South America; West Indies; nc. and c. FL peninsula; s. FL; n. AL. This species is a diploid, with chromosome complement AA. Found in Jackson County, AL in 2009 (Barger, pers. comm. 2009). [= FNA, K, WH] [add synonymy: S]

Asplenium bradleyi D.C. Eaton, Bradley’s Spleenwort. Dry outcrops of felsic sedimentary or metasedimentary rocks, such as sandstone, quartzite, or metarhyolite, at low to moderate elevations. April-October. VT, NJ, c. PA, OH, s. IL, and MO south to c. NC, e. GA, AL, TN, and AR. Its chromosome complement can be symbolized MMPP. The sterile hybrid has also been found in NC; its chromosome complement is MP. [= RAB, C, F, FNA, G, K, S, W, WV; = A. ×bradleyi]

Asplenium ×ebenoides R.R. Scott (pro species) [A. platyneuron × rhizophyllum], Scott’s Spleenwort. Moist outcrops of calcareous sedimentary rocks, such as limestone, dolostone, and on coquina limestone (shell marl), at low elevations. May-October. VT, NJ, c. PA, OH, s. IL, and MO south to e. VA, w. NC, nw. GA, c. AL, TN, and AR. A. ×ebenoides is a sterile hybrid (chromosome complement symbolized PR). In AL, however, one population in Hale County has undergone chromosome doubling and is a fertile allotetraploid (PPRR), now treated as A. tutwilerae. Populations of this taxon, especially if consisting of many individuals, should be checked for fertile spores. [= WV; = Asplenium ×ebenoides (R.R. Scott) Wherry – F; = Asplenium ebenoides (R.R. Scott) Wherry – G; < Asplenium ×ebenoides – K; < Asplenium ebenoides R.R. Scott – FNA, S]

Asplenium heterochroum Kunze, Bicolored Spleenwort. Fairly moist outcrops of calcareous sedimentary rocks, such as coquina limestone ("marl"). Se. and nc. GA (Jones & Coile 1988) south to n. FL; West Indies; s. Mexico (Chiapas, Veracruz), Belize. Its chromosome complement can be symbolized HHHH. [= FNA, K, WH; < A. heterochroum Kunze – S]

Asplenium heteroresiliens W.H. Wagner, Marl Spleenwort, Carolina Spleenwort, Wagner’s Spleenwort, Morzent’s Spleenwort. Fairly moist outcrops of calcareous sedimentary rocks, such as coquina limestone ("marl"), along small blackwater streams or larger rivers, at low elevations, and rarely also on old ruins made of tabby (a cement made from lime, sand, and oyster shells). April-October. Rare and scattered from se. NC to se. GA, sw. GA, and n. FL, on the Coastal Plain. This species is an apogamous (producing viable spores asexually) allopolyploid derived from hybridization of the sexual tetraploid H. heterochroum Kunze (of Florida and the West Indies) and the apogamous triploid A. resiliens. Its chromosome complement can be symbolized EEEHHH. [= RAB; = A. ×heteroresiliens – FNA, K, WH; < A. heterochroum Kunze – S]

Asplenium monanthus Linnaeus, Single-sorus Spleenwort. Moist calcareous situations, in the mountains in moist grottos of calcareous to semi-calcareous metamorphic rocks (such as mylonite or marble) near waterfalls in humid escarpment gorges with high rainfall, on limestone talus in collapsed sinkhole mouth, or on moist Coastal Plain limestone outcrops. April-October. Scattered in highly humid (montane or maritime) parts of the tropics, subtropics, and warm temperate areas, known from se. and sw. North America, the West Indies (Hispaniola and Jamaica), n. South America, Central America, Mexico, South Africa, Hawaii, and the Azores, Madeira Islands, Madagascar, and the Philippines. In the continental United States, it is known from widely scattered sites with humid and calcareous microhabitats: humid escarpment gorges in Transylvania County, NC and Oconee County, SC; moist limestone outcrops in n. peninsular and Panhandle FL (Nelson 2000); limestone talus in the collapsed mouth of a sinkhole in Jackson County, AL; and the Huachuca Mountains, Cochise County, AZ. Given the variability of A. monanthus throughout is widespread and scattered distribution, and its complex of related and closely similar species, our material deserves additional study to verify its true identity. [= RAB, FNA, K, W, WH]
m), but in the Piedmont to as low as 150 m. May-October. Primarily Appalachian: s. VT, MA, NY, OH, and KY south to c. NC, n. GA and AL; absent from the Ozarkian highlands. *A. montanum* is one of the diploid progenitors of the reticulately evolved Appalachian *Asplenium* complex; its chromosome complement is symbolized MM. It is one parent of *A. bradleyi*, *A. pinnatifidum*, and *A. ×rudelli* (and of other sterile hybrids). [= RAB, C, F, FNA, G, K, S, W, WV]

*Asplenium pinnatifidum* Nuttall, Lobed Spleenwort. Fairly moist to very dry outcrops of felsic sedimentary or (mostly low-grade) metamorphic rocks, such as sandstone, phyllite, and schist, at low to moderate elevations. May-October. NJ, se. PA, wc. PA, s. OH, IN, IL, and MO south to w. NC, c. GA (Jones & Coile 1988), AL, n. MS, AR, and e. OK. This species is a fertile allotetraploid derived from hybridization of *A. montanum* and *A. rhizophyllum*; its chromosome complement is symbolized MMRR. [= RAB, C, F, FNA, S, W, WV; = *A. pinnatifidum* var. *pinnatifidum* – G; = *A. pinnatifidum* – K]

*Asplenium platyneuron* (Linnaeus) Britton, Sterns, & Poggenburg, Ebony Spleenwort. Moist to dry soils of forests, woodlands, old fields; also on outcrops, especially of calcareous rocks and in mesic crevices, at low to moderate elevations; common. April-October. QC, ON, se. MN, IA, and se. CO south to FL, TX, NM, and AZ (and varieties or relatives reported from Central and South America). This species is one of the diploid progenitors involved in the reticulately evolved Appalachian *Asplenium* complex. It is one parent of *A. bradleyi* and *A. ×ebenoides* (as well as other sterile hybrids). *A. platyneuron* in general, and var. *platyneuron* specifically, is by far the most common of our *Asplenium* species, and the only one found characteristically away from rock. *A. platyneuron* var. *incisum* does not seem to warrant taxonomic recognition. Strikingly large plants of the outer Atlantic Coastal Plain and Gulf Coastal Plain have been named var. *bacculum-rubrum* (Featherman) Fernald; they are probably not worthy of taxonomic recognition. The leaves are often coarsely serrate-incised to pinnatifid and the larger leaves to (30-) 40-70 (-100) cm tall, with 25-50 pairs of pinnae. (= RAB, C, F, G, K; < *A. platyneuron* var. *incisum* – F, G, K; > *A. platyneuron* var. *bacculum-rubrum* (Featherman) Fernald – F, G, K; > *A. platyneuron* var. *incisum* (Howe ex Peck) B.L. Robinson – F]

*Asplenium resiliens* Kunze, Blackstem Spleenwort. Moist to dry outcrops of calcareous sedimentary or metamorphic rocks, such as limestone, dolostone, coquina, or marble, sometimes at low to moderate elevations except on outcrops of calcareous materials in otherwise acidic rocks, rarely on mortar or concrete, mostly at low to moderate elevations, but remarkably on Grandfather Mountain at over 1800 m. April-October. Sc. PA, KY, s. IL, MO, se. KS, OK, TX, CO, and s. NV south to FL, TX, AZ, and Mexico; West Indies; Central America and South America. This species is a triploid (EEE), unable to produce viable spores by sexual means, but producing spores apogamously. It is a parent species of the rare *A. heteroresiliens*. [= RAB, C, F, FNA, G, K, S, W, WH, WV]

*Asplenium rhizophyllum* Linnaeus, Walking Fern. Moist outcrops of calcareous sedimentary, calcareous metamorphic, or mafic metamorphic rocks, such as limestone, dolostone, calcareous siltstone, amphibolite, mostly at low to moderate elevations, rarely to 1500 m or higher. May-October. S. QC, ON and se. MN south to c. GA, AL, MS, AR, OK, and IA. This species, sometimes placed in the genus *Camptosorus* because of its strikingly different morphology from (most) other *Asplenium*, is one of the diploid progenitors of the reticulately evolved Appalachian *Asplenium* complex. It is a parent of *A. pinnatifidum* and *A. ×ebenoides* (as well as other sterile hybrids), both of which have inherited a limited ability to produce plantlets at the attenuate leaf-tip. It is closely related to *Asplenium sibiricum* of c. Asia. [= RAB, C, FNA, K, W; = *Camptosorus rhizophyllus* (Linnaeus) Link – F, G, S, WV]

*Asplenium ruta-muraria* Linnaeus var. *cryptolepis* (Fernald) Wherry, American Wall-rue. Moist to dry outcrops of calcareous sedimentary or metamorphic rocks, such as limestone, dolostone, or marble, at low to moderate elevations. May-October. *A. ruta-muraria* is a circumboreal species of Europe, Asia, and North America; in North America it ranges as var. *cryptolepis* from VT, s. ON and n. MI south to n. NJ, w. NC, nw. GA (Jones & Coile 1988), n. AL, TN, and AR. Var. *ohionis* is very likely only a form. The relationship of North American *A. ruta-muraria* (here distinguished as var. *cryptolepis*), a tetraploid, to the diploid and tetraploid subspecies of *A. ruta-muraria* present in Europe and e. Asia is uncertain. Given the prevalence of allopolyploidy in *Asplenium* and slight morphologic differences between American and European material, I prefer not to assume its identity to the European plants. In Europe *A. ruta-muraria* is an abundant plant of masonry, such as the defensive walls of towns and cities; it is very rarely seen on walls in North America, presumably because they are not old enough. [= WV; < *A. ruta-muraria* – RAB, C, FNA, W; > *A. cryptolepis* Fernald var. *cryptolepis* – F, S; > *A. cryptolepis* Fernald var. *ohionis* Fernald – F, S; > *A. ruta-muraria* var. *ohionis* (Fernald) Wherry – G; > *A. ruta-muraria* var. *cryptolepis* – G, K; > *A. ruta-muraria* var. *lanceolatum* Christ – K]

*Asplenium scolopendrium* Linnaeus var. *americanaum* (Fernald) Kartesz & Gandhi, American Hart’s-tongue Fern. Humid sinkholes. E. TN and n. AL, and in other habitats farther north in c. NY, n. MI, and ON; also in the West Indies (Haiti) and s. Mexico (Chiapas, Nuevo León, Oaxaca). It is also reported as naturalized in MD by Reed (1953). [= FNA, K; = *Phyllitis scolopendrium* (Linnaeus) Newman var. *americanaum* Fernald – C, F, G; < *Phyllitis scolopendrium* – S]

Asplenium septentrionale (Linnaeus) Hoffmann, Forked Spleenwort. Acidic rocks. Western North America south into nw. Mexico (Baja California), Asia, Europe; disjunct in WV (Hardy and Monroe counties). This very inconspicuous species is likely to be found at additional locations. Its chromosome formula is SSSS. [= FNA, K, S, W, Z; = Asplenium pinnatifidum var. minitriquetrum (Hayne) Schwantes – S]

Asplenium trichomanes Linnaeus. July-September. QC, ON, and MN south to GA and LA (much more common in sedimentary rock areas of the Appalachians than in the primarily acid-soil Blue Ridge and Piedmont). Ssp. trichomanes is a diploid of uncertain origin, presumably autotetraploid, but perhaps the result of the hybridization of two ecologically differentiated diploid races of A. trichomanes. [= FNA, K, W; < A. trichomanes – C, F, G, S]

Asplenium trichomanes Linnaeus ssp. trichomanes, Maidenhair Spleenwort. Moist outcrops of slightly to strongly calcareous sedimentary or metamorphic rocks and moderately to strongly mafic metamorphic and igneous rocks, such as limestone, dolostone, mafic and intermediate gneisses and schists, amphibolite, most typically in strong shade, as under overhangs. May-October. A. trichomanes as a whole is a complex species, with diploid, tetraploid, and hexaploid elements, occurring in North America, Europe, Australia, New Zealand, and Asia. Ssp. trichomanes is known to occur in Europe and North America (at least); in North America, it ranges from NL (Newfoundland) to AK, south to NC, c. GA (Jones & Coile 1988), c. AL, AR, OK, w. TX, Chihuahua, se. AZ, and w. OR. Ssp. trichomanes is a diploid, probably involved in the origin of ssp. quadrivalens. [= FNA, K, W; < A. trichomanes – RAB, C, F, G, S, WH, WV]

Asplenium ×trudellii Wherry (pro species) [montanum × pinnatifidum], Trudell’s Spleenwort. Moist outcrops of felsic sedimentary or metamorphic rocks, such as sandstone, phyllite, schist, at low elevations. May-October. This taxon is a sterile triploid hybrid (MMR) of A. montanum and A. pinnatifidum. It is considerably more common than most other sterile Asplenium hybrids, sometimes occurring without one or either parents. There are some reports that it can sometimes produce fertile spores. [= F, FNA, K, WH; = Asplenium pinnatifidum Nuttall var. trudellii (Wherry) Chute – G; = Asplenium trudellii Wherry – S; = ×Asplenosorus trudellii (Wherry) Mickel]

Asplenium tutwilerae B.R. Keener & L.J. Davenport, Tutwiler’s Spleenwort. Crevices of calcareous conglomerate. So far as is known, A. tutwilerae, the fertile allotetraploid of A. ×ebenoides, is limited to a single population in Hale County, AL. Its chromosome formula is PPRR. See Keener & Davenport (2007). [= A. ×ebenoides – K; < Asplenium ebenoides R.R. Scott – FNA, S]


F34. DIPLAZIOPSISIDACEAE X.C. Zhang & Christenhusz 2011 (Glade Fern Family) [in POLYPODIALES]

A family of 3 genera. References:


Homalosorus pycnocarpos (Sprengel) Pichi-Sermolli, Glade Fern. Very nutrient-rich, loamy or seepy forests, over calcareous sedimentary (such as limestone or dolostone) or mafic metamorphic or igneous rocks (such as greenstone or amphibolite). July-September. QC, ON, and MN south to GA and LA (much more common in sedimentary rock areas of the Appalachians than in the primarily acid-soil Blue Ridge and Piedmont). [= S, W, Z; = Diplazium pycnocarpos (Sprengel) M. Broun – FNA, K; = Athyrium pycnocarpon Sprengel – RAB, C, F, G, WH; = Diplaziosis pycnocarpa (Sprengel) M.G. Price]

F35. THELYPTERIDACEAE Pichi Sermolli 1970 (Marsh Fern Family) [in POLYPODIALES]

A family of 6-30 genera (generic circumscription especially controversial and problematic) and about 900 species. References: Smith in FNA (1993b); Smith & Cranfill (2002); Lellinger (1985); Mickel (1979); Smith in Kramer & Green (1990).

1 Leaf blades 7-25 (-30) cm long, triangular, < 2× as long as wide; rachis with adnate wings between the pinnae; sori without indusia; midribs of pinnae lacking an adaxial groove.................................................................................................................... Phlegopteris

1 Leaf blades (15-) 20-100 cm long, lanceolate, oblolly-lanceolate, or triangular, > 2× as long as wide; rachis without adnate wings between the pinnae; sori with reniform indusia; midribs of pinnae with an adaxial groove (adaxial groove lacking in Macrothelypteris).
THELYPTERIDACEAE (F28) 49

2 Midribs of the pinnae lacking an adaxial groove; leaf bipinnate to tripinnate .......................................................... Macrothelypteris
2 Midribs of the pinnae with an adaxial groove; leaf pinnate to pinnate-pinnatifid .......................................................... Thelypteris

Macrothelypteris (H. Itô) Ching 1963 (Maiden Fern)

* Macrothelypteris torresiana (Gauchaud-Beaupré) Ching, Mariana Maiden Fern. Disturbed areas, and increasingly invasive in natural habitats (especially in the southern parts of our area); native of the Asian and African tropics. Leonard (1972) discusses the history of this species in the southeastern United States. [= FNA, K, WH; = Dryopteris setigera Blume – S, misapplied; = Thelypteris torresiana (Gauchaud-Beaupré) Alston]

Phegopteris (C. Presl) Fée 1852 (Beech Fern)
1 Rachis wings absent between the two basal pinna pairs; rachis bearing on its lower surface numerous tan to brown, lanceolate scales (these mostly 6-12 cells wide at the base) and acicular hairs 0.3-1.0 mm long.................................................................P. connectilis
1 Rachis wings present between the two basal pinna pairs; rachis bearing on its lower surface relatively few, white to pale tan, narrowly lanceolate scales (these mostly 3-5 cells wide at the base) and hairs 0.1-0.25 mm long.................................................................P. hexagonoptera

Phegopteris connectilis (Michaux) Watt, Northern Beech Fern. Moist cliffs where wet by spray from waterfalls (at medium elevations), also on high elevation cliffs wet by seepage and in spruce-fir forests, northwards in cool ravines and on swamp borders. April-August. A circumboreal species, at its southern limit in North America in MD, WV, OH, IL, IA, MT, and OR; disjunct southwards in w. NC and e. TN, and in CO. Most of the occurrences in NC are at waterfalls in the escarpment gorges of Transylvania, Macon, and Jackson counties, near Highlands. The species is a triploid, reproducing apogamously. [= FNA, K, WV; = Thelypteris phegopteris (Linnaeus) Slosson – RAB, C, G, W; = Dryopteris phegopteris (Linnaeus) C. Christensen – F; = Phegopteris phegopteris (Linnaeus) Keyserling – S]

Phegopteris hexagonoptera (Michaux) Fée, Broad Beech Fern. Mesic to submesic forests. April-August. Widespread in eastern North America, from QC west to ON, WI, and MN, south to Panhandle FL and e. TX. [= FNA, K, S, WH, WV; = Thelypteris hexagonoptera (Michaux) Weatherby – RAB, C, G, W; = Dryopteris hexagonoptera (Michaux) C. Christensen – F]

Thelypteris Schmidel 1763 (Maiden Fern, Shield Fern, Marsh Fern)
A genus of about 875 species, cosmopolitan, perhaps warranting separation into various segregates. Thelypteris is a large and rather heterogeneous group, even with the removal of Phegopteris and Macrothelypteris. Our species fall into several subgenera, sometimes treated as genera: subgenus or genus Thelypteris (Th. palustris var. pubescens), subgenus or genus Parathelypteris (Th. noveboracensis, Th. similata), subgenus Cyclosorus or genus Christella (Th. dentata, Th. hispidula var. versicolor, Th. interrupta, Th. kunthii, Th. ovata var. ovata), and subgenus or genus Stegnogramma (Th. burki). The appropriate names, should the additional segregate genera be adopted, are listed in synonymy. References: Smith (1981); Smith in Kramer & Green (1990). [also see Macrothelypteris and Phegopteris]
1 Sori elongate; sporangia with hairs 0.1-0.2 mm long; [endemic to nc. AL]; [subgenus or genus Stegnogramma] .......................................................... T. burki
1 Sori round or slightly longer than wide; sporangia glabrous; [collectively widespread]
2 Leaves 5-15 (-20) cm wide; rhizome scales 1-4 mm long, lanceolate to ovate, glabrous, pale brown to golden brown, flexible and very thin.
3 Leaf blade broadest near the middle, gradually reduced to the base, the petiole < 1/3 the length of the blade; [of upland and wetland habitats]; [subgenus or genus Parathelypteris] .......................................................................................................................... T. noveboracensis
3 Leaf blade broadest near the base, the pinnate stopping abruptly, the petiole 2/3 to fully as long as the blade; [of wetland habitats]
4 Undersurface of blades without glands; lateral veins of sterile lobes forked once between the pinnule midvein and the margin; lower surface of costae with tan, ovate scales; lobes of fertile leaves revolute; indusia ciliate (rarely glabrous); [subgenus or genus Thelypteris] .......................................................................................................................... T. palustris var. pubescens
4 Undersurface of blades with minute, sessile, globular, golden to reddish glands; lateral veins of sterile lobes simple, not forked between the pinnule midvein and the margin; lower surface of costae lacking scales; lobes of fertile leaves plane to slightly revolute; indusia with minute glands along the margins; [subgenus or genus Parathelypteris] .......................................................................................................................... T. similata
2 Leaves (6-) 10-35 cm wide; rhizome scales 2-6 mm long, linear-lanceolate, usually minutely pilose, yellowish-brown to brown, stiff and rather thick; [subgenus Cyclosorus or genus Christella]
5 Basal veins from adjacent lobes of the pinna uniting below the sinus (between the sinus and the costa), with a united vein continuing to the sinus.
Lower surface of costae with tan scales; upper surface of costae glabrous or sparsely pubescent with hairs < 0.2 mm long; rhizomes long-creeping ..................................................  T. interrupta

Lower surface of costae lacking scales; upper surface of costae moderately to densely hairy with hairs > 0.3 mm long; rhizomes short-creeping.

 Rachises and petioles usually purplish; costae densely short-hairy on the lower surface, the hairs 0.1–0.2 mm long (about half as long as the costa width); widest point of the leaf usually 3–5 pairs of pinnae up from the base ...........................................  T. dentata

 Rachises and petioles usually tan; costae sparsely hairy on the lower surface, the hairs variable in length, most of them > 0.3 mm long and at least some > 0.5 mm long (the longer as long or longer than the costa width); widest point of the leaf usually 1–3 pairs of pinnae up from the base .................................................................  T. hispida var. versicolor

Basal veins from adjacent lobes of the pinna not meeting at all, or reaching the sinus at the same point, thus without a united vein to the sinus.

Upper surface of the costae and costules glabrous above (rarely minutely hairy), the hairs never > 0.2 mm long, eglandular ..................  T. ovata var. ovata

Upper surface of the costae and costules with at least a few stout hairs > 0.3 mm long; upper leaf surface pubescent to nearly glabrous, also glandular with stipitate glands.

Lowermost 1–2 pairs of pinnae distinctly shorter than the pair above (ca. ¼ as long); basal veins from adjacent lobes of the pinna always meeting .................................................................  T. hispida var. versicolor

Lowermost pair of pinnae equal to or very slightly shorter than the next pair above; basal veins from adjacent lobes of the pinna not meeting at all, or reaching the sinus at the same point .................................................................  T. kunthii

**Thelypteris burksiorum** J.E. Watkins & D.R. Farrar. Moist sandstone grottoes. A narrow endemic of nc. AL. Watkins & Farrar (2002, 2005) present evidence for its recognition as a species distinct from *Thelypteris pilosa* and discuss its likely evolution as an ancient relictual taxon. The appropriate combination for its recognition at the species level in *Stegnogramma* has not been made. (= *Thelypteris pilosa* (M. Martens & Galeotti) Crawford var. *alabamensis* Crawford – FNA, K; = *Stegnogramma pilosa* (M. Martens & Galeotti) K. Iwatsuki var. *alabamensis* (Crawford) K. Iwatsuki; = *Stegnogramma species 1*]

* Thelypteris dentata (Forsskål) E. P. St. John, Downy Maiden Fern, Soft Fern. Disturbed areas; native of tropical and subtropical Asia and Africa. [= FNA, K, S, WH; = *Christella dentata* (Forsskål) Brownsey & Jermy]

**Thelypteris hispida** (Decaisne) C.F. Reed var. versicolor (R. St. John) Lellinger, Hairy Maiden Fern. Moist forests, limesinks, and on soil in disturbed areas. E. SC south to s. FL west to e. TX. Other varieties occur in the West Indies, in tropical New and Old World. [= FNA, K, WH; = T. versicolor R. St. John – S; < *Christella hispida* (Decaisne) Holtum; = T. quadrangularis (Fée) Schelpe var. versicolor (R. St. John) A.R. Smith]


**Thelypteris kunthii** (Desvaux) C.V. Morton, Kunth's Maiden Fern, Southern Shield Fern. Coquina limestone (“marl”) outcrops, calcareous bluffs and sinkhole slopes, also adventive on and around coquina limestone (marl) riprap around small bridges and ditches and in suburban forests. May–August. Se. NC south to s. FL and west to c. TX; Mexico south through Central America into n. South America; West Indies. [= RAB, FNA, K, WH; < *T. normalis* (C. Christensen) Moxley – S; < *Christella normalis* (C. Christensen) Holtum]

**Thelypteris noveboracensis** (Linnaeus) Nieuwland, New York Fern. Mesic forests, bottomland forests, bogs, submese forests. May–August. NL (Newfoundland) and WI south to GA, AL, and AR. Distinctive in the leaves tapering about equally to both tip and base. [= RAB, C, FNA, G, K, S, W, WV; = *Dryopteris noveboracensis* (Linnaeus) A. Gray – F; = *Parathelypteris noveboracensis* (Linnaeus) Ching]

**Thelypteris ovata** R. P. St. John var. ovata, Oval Maiden Fern. On coquina limestone (“marl”) or in disturbed, calcareous areas. S. SC south to s. FL, west to s. AL; and in the Bahamas. Var. *lindheimeri* (C. Christensen) A.R. Smith occurs in TX, Mexico, Belize, Guatemala, and Jamaica. [= FNA, K; > *T. ovata* var. ovata – S, in a narrower sense; > *T. ovata* var. harperi (C. Christensen) R. P. St. John – S; < *T. ovata* – WH; = *Christella ovata* (R.P. St. John) Löve & Löve]

**Thelypteris palustris** Schott var. pubescens (Lawson) Fernald, Marsh Fern. Bogs, marshes (including freshwater tidal marshes), and bottomland forests. June–September. The species is circumboreal, occurring in n. Europe, n. Asia, and n. North America. Var. *pubescens* is the American variety, ranging from NL (Newfoundland) and MB south to s. FL and c. TX; c. Mexico (Michoacán, Distritio Federal), Bermuda, Cuba. [= C, FNA, G, K, S, W, WV; < *T. palustris* – RAB; = *Dryopteris thelypteris* (Linnaeus) Swartz var. *pubescens* (Lawson) A.R. Prince ex Weatherby – F; < *T. thelypteris* (Linnaeus) Nieuwland – S]

**Thelypteris simulata** (Davenport) Nieuwland, Bog Fern, Massachusetts Fern. In NC and WV in acid peat bogs at about 1000 meters in elevation, in DE, NJ, and VA in acid seepage swamps in the Coastal Plain. July–September. Northeastern, ranging from NS south to ne. VA (Accomack, New Kent, Northampton and Westmoreland counties) and n. WV (Tucker and Preston counties), and disjunct in NC (Alleghany and Avery counties) and WI. Discovered in NC in the 1980’s. Presently known in NC only from two sites. [= C, FNA, G, S, W, WV; = *Dryopteris simulata* Davenport – F; = *Parathelypteris simulata* (Davenport) Holtum]
L1. Lycopodiaceae

F36. Woodsiaceae Horter 1949 (Woodsia Family) [in POLYPODIALES]

A family of about 15 genera and 700 species, cosmopolitan in distribution, but concentrated in temperate and montane areas. References: Smith in FNA (1993b); Smith et al. (2006); Lellinger (1985); Kramer et al. in Kramer & Green (1990).

1 Sori round, indusia present or absent, if present cuplike or lateral (but not attached along a long side).
2 Leaves 2-pinnate to 3-pinnate (the pinnae at least 1-pinnate); sori elongate, 2-3× as long as wide, the larger sori generally curved and extending across the veins (except Diplazium esculentum).
3 Veins free, simple or forked..............................................................[see Athyrium in ATHYRIACEAE]
3 Veins anastomosing.................................................................[see Diplazium in ATHYRIACEAE]
2 Leaves 1-pinnate to 1-pinnate-pinnatifid (the pinnae entire or pinnatifid); sori elongate, 2.5-6× as long as wide, even the larger sori generally straight and not extending across the veins.
3 Leaves 1-pinnate-pinnatifid, the pinnae pinnatifid ......................................................................................[see Deparia in ATHYRIACEAE]
3 Leaves 1-pinnate, the pinnae entire...........................................................[see Homalosorus in DIPLOAZIOPSIDACEAE]
1 Sori round, indusia present or absent, if present cuplike or lateral (but not attached along a long side).
4 Leaf blades broadly triangular in outline, ca. 1× as long as wide; rhizome ca. 1 mm in diameter; indusia absent; [native species of mountain peaks of n. NC and VA]. ............................................................[see Gymnocarpium in CYSTOPTERIDACEAE]
4 Leaf blades lanceolate, oblone, or ovate in outline, 2× or more as long as wide; rhizome more than 2 mm in diameter.
5 Indusium attached under one side of the sorus, hoodlike or pocketlike, arching over the sorus; petioles glabrous or sparsely beset with scales, the petiole bases not persistent ..........................................................[see Cystopteris in CYSTOPTERIDACEAE]
5 Indusium attached under the sorus, cuplike (divided into 3-6 lanceolate to ovate lobes which surround the sorus from below) or of minute numerous septate hairs, which extend out from under the sorus on all sides; petioles often densely beset with scales, the petiole bases persistent .......................................................... Woodsia

Woodsia R. Brown 1810 (Woodsia, Cliff Fern)

A genus of about 30 species, of temperate and cool-temperate regions, widespread in the Northern Hemisphere, in montane tropical South America, and south temperate in Africa and South America. References: Windham in FNA (1993b); Kramer et al. in Kramer & Green (1990).

Identification notes: Woodsia species and Cystopteris species are all small ferns with thin-textured leaves, occurring primarily on or near rock outcrops; they frequently occur together or in proximity to one another and are often confused. Woodsia has the indusium divided into a series of scale-like or hair-like structures, attached below the costae; Cystopteris has an undivided indusium, pocket-like or hood-like, attached around one side of the sorus. Woodsia has persistent dark petiole bases; in Cystopteris the petiole bases are deciduous. Woodsia has the final veinlets not reaching the margin; Cystopteris veins do reach the margin.

1 Petioles with a distinct joint about 1-3 cm above the base, the petiole bases of former leaves forming a fairly even stubble; leaf blade lacking glands (though bearing both long sepalate hairs and pale linear scales); indusium of numerous filamentous segments. .................. W. ilvensis
1 Petioles lacking a joint, the petiole bases of former leaves disintegrating irregularly and forming an uneven stubble; leaf blade with stalked glands, at least below on the costa, costules, and veins (and also bearing nonglandular hairs and/or linear scales); indusium of 3-6 lanceolate segments.
2 Rachis with flattened, septate, white hairs and elongate stipitate glands; leaf blade with flattened, septate, white hairs and elongate stipitate glands ............................................................................ W. appalachiana
2 Rachis with scattered scales; leaf blade with sparse to dense stipitate glands ............................................................................. W. obtusa ssp. obtusa

Woodsia appalachiana T.M.C. Taylor, Appalachian Woodsia, Appalachian Cliff Fern, Mountain Woodsia. On cliffs of sandstone, shale, granite, granitic gneiss, and hornblende gneiss. June-September. Endemic to the Southern and Central Appalachians of VA, WV, NC, nw. GA, TN, and the Ozarks of AR. This species is similar to W. scopulina of the western mountains of AK south to CO and CA. The eastern plants have been variously treated as a full species, a subspecies or variety of W. scopulina, or as indistinguishable from W. scopulina (see synonymy). It now appears that W. appalachiana may be a rather cryptic but distinct element of a reticulate complex also involving W. scopulina ssp. scopulina (of the Rocky Mountains) and W. scopulina ssp. laurentiana. Windham (primarily of the Rocky Mountains but also disjunct eastward in ON and QC). Windham in FNA (1993b) treats these three entities as subspecies, and suggests that ssp. laurentiana is the allotetraploid derivative of hybridization of the eastern and western diploids. If this is indeed so, each of the 3 entities should be recognized at the species level. [= F, K; < W. scopulina D.C. Eaton – RAB, C, S, W; WV; = W. scopulina ssp. appalachiana (T.M.C. Taylor) Windham – FNA; = W. scopulina var. appalachiana (T.M.C. Taylor) Morton – G]


F38. ONOCLEACEAE  Pichi Sermolli 1970 (Sensitive Fern Family) [in POLYPODIALES]

A family of 4 genera and 5 species, of north temperate regions. The family as here circumscribed is monophyletic and sister to Blechnaceae (Smith et al. 2006). Christenhusz, Zhang, & Schneider (2011) prefer to combine the 5 species in the family into a single genus (Onoclea). References: Christenhusz, Zhang, & Schneider (2011); Smith et al. (2006)

1. Sterile leaves pinnate-pinnatifid, 6-25 dm tall, broadest toward the tip; fertile leaves 1-pinnate; veins free; rhizomes of 2 types, the slender, creeping rhizomes leafless, giving rise at intervals to extremely stout, vertical rhizomes which bear a cluster of many leaves ........... Matteuccia

Matteuccia Todaro 1866 (Ostrich Fern)

A monotypic genus, north temperate in distribution. Two other species formerly included in Matteuccia (or sometimes in Onoclea) are either better treated in the genus Pentarhizidium Hayata (Gastony & Ungerer 1997), or else the genera Pentarhizidium, Matteuccia, and Onocleopsis should be united into Onoclea (Christenhusz, Zhang, & Schneider 2011). References: Johnson in FNA (1993b); Kramer et al. in Kramer & Green (1990).

Matteuccia struthiopteris (Linnaeus) Todaro var. pensylvanica (Willdenow) C.V. Morton, Ostrich Fern. Alluvial forests and calcareous wetlands. The species is circumboreal; the North American var. pensylvanica ranges from NL (Newfoundland) west to AK, south to VA (Smyth and Craig cos.), MO, SD, and BC. The North American var. pensylvanica is separated from the Eurasian var. struthiopteris on the basis of its concolorous rhizome scales (vs. bicolorous scales) and less truncate pinna lobes. Matteuccia stores starch in its persistent petiole bases. [= FNA, G; < M. struthiopteris – C, K; = Pteretis pensylvanica (Willdenow) Fernald – F; = M. pensylvanica (Willdenow) Raymond – WV; = Onoclea struthiopteris (Linnaeus) Roth var. pensylvanica (Willdenow) B. Boivin]

Onoclea Linnaeus 1753 (Sensitive Fern)


Onoclea sensibilis Linnaeus var. sensibilis, Sensitive Fern, Bead Fern. Marshes, swamps, wet disturbed places. May-June. The species ranges from NL (Newfoundland) west to MN and CO, south to FL, TX, and CO; also in e. Asia. Var. sensibilis is North American; var. interrupta is Asian. The recognition of two varieties is supported by molecular evidence. Alternatively, species status is sometimes given (Gastony & Ungerer 1997). The specific epithet and common name refer to the fact that the fronds wither at the first touch of frost, not that they respond to touch. The peculiar fertile leaves (with their brown, beadlike, fertile pinnules) are collected for use in dried arrangements. The expanded, persistent petiole bases store starch. [< O. sensibilis – RAB, C, F, FNA, G, K, S, W, WV; = O. sensibilis – Z]

F39. BLECHNACEAE  (C. Presl) Copeland 1947 (Deer Fern Family) [in POLYPODIALES]


1. Veins of sterile leaves free; sori continuous .......................................................... Blechnum

Blechnum Linnaeus 1753 (Deer Fern)


1. Leaf blades usually < 5 dm long; leaves pinnate-pinnatifid in all or part; margins entire (to sparingly and irregularly serrulate) .......................................................... B. appendiculatum

B. appendiculatum

1. Leaf blades usually > 5 dm long; leaves pinnate throughout; margins serrulate ......................................................... B. serrulatum

B. serrulatum
**Blechnum appendiculatum** Willdenow, Hembali Fern. Moist forests. S. GA south to s. FL; West Indies; Central America, South America. Collected once in LA, on the west bank of the Mississippi River in bottomland hardwoods in Iberville Parish, LA. [= Z; = B. occidentale Linnaeus var. minor Hooker – FNA; < B. occidentale – K1, K2, S]

**Blechnum serrulatum** L.C. Richard, Swamp Fern, Marsh Fern. Vacant lots, bottomlands. Ne. FL south to FL peninsula; Mexico, Central America, South America; West Indies; Malesia and Australia. Introduced and established in e. SC (Beaufort and Jasper counties) via landscaping plants brought in from FL (P. McMillan, pers. comm. 2005). [= FNA, K1, K2, S, Z]

**Woodwardia** J.E. Smith 1793 (Chain Fern)


**Identification notes:** In sterile leaf, *Woodwardia areolata* is sometimes confused with *Onoclea*, but *W. areolata* has the pinnae generally alternate (vs. tending to be opposite), the pinnae generally acute or acuminate (vs. obtuse), and the pinna margin finely serrulate (vs. entire).

1 Sterile leaves pinnatifid, the pinnae 7-10 pairs per leaf, basally not distinct from one another, the rachis therefore winged by leaf tissue throughout its length, the pinnae merely finely serrulate .............................................................. *W. serrulata*

1 Sterile leaves pinnate-pinnatifid, the pinnae 15-20 pairs per leaf, fully distinct, the rachis therefore not winged by leaf tissue, the pinnae areolata (Linnaeus) K. Presl – S, WV

**Woodwardia areolata** (Linnaeus) T. Moore, Netted Chain Fern. Moist to wet, acid, organic soils, such as bogs, blackwater bottomlands, pocosins. May-September. NS west to MI and MO, south to s. FL and e. TX, primarily on the Coastal Plain. See Cranfill (1983) for a discussion of the geography and ecology of *W. areolata*. [= RAB, C, F, FNA, G, K, W, WH; = Lorinseria areolata (Linnaeus) K. Presl – S, WV]

**Woodwardia virginica** (Linnaeus) J.E. Smith, Virginia Chain Fern. Moist to wet, acid, organic soils, such as bogs, blackwater bottomlands, pocosins, sometimes in standing water, as in periodically flooded coastal plain depression ponds. June-September. NS west to MI and IL, south to s. FL and TX, and in Bermuda, primarily on the Coastal Plain. Sometimes confused when sterile with *Osmunda cinnamomeum* (which see for discussion). [= RAB, C, F, FNA, G, K, W, WH; = Anchistea virginica (Linnaeus) K. Presl – S]

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**F40. ATHYRIACEAE** Alston 1956 (Lady Fern Family) [in POLYPODIALES]

References: Christenhusz, Zhang, & Schneider (2011).

1 Leaves 2-pinnate to 3-pinnate (the pinnae at least 1-pinnate); sori elongate, 2-3× as long as wide, the larger sori generally curved and extending across the veins (except Diplazium esculentum).

2 Veins free, simple or forked ............................................................................................................................ *Athyrium *

2 Veins anastomosing ..................................................................................................................................................................... *Diplazium *

1 Leaves 1-pinnate to 1-pinnate-pinnatifid (the pinnae entire or pinnatifid); sori elongate, 2.5-6× as long as wide, even the larger sori generally straight and not extending across the veins.

3 Leaves 1-pinnate-pinnatifid, the pinnae pinnatifid .................................................................................................................. *Deparia *

3 Leaves 1-pinnate, the pinnae entire .............................................................................................................................. [see Homalosorus in DIPLAZIOPSIDACEAE]

**Athyrium** Roth 1799 (Lady Fern)

A genus of about 180 species, cosmopolitan in distribution, but concentrated in e. and se. Asia. Kelloff et al. (2002) and Kellof & Werth (1998) support recognition of two taxa at either specific or infraspecific levels, based on morphology, allozymes, and spores. References: Kato in FNA (1993b); Kramer et al. in Kramer & Green (1990); Kelloff et al. (2002). [also see Deparia and Homalosorus]

**Identification notes:** *Athyrium* and *Deparia* superficially resemble *Dryopteris*, and they often grow together. *Athyrium* and *Deparia* have linear, flap-like sori (vs. rounded, reniform sori). Sterile individuals can be distinguished by the number of vascular bundles in the petiole (easily determined by breaking off a leaf and counting the vascular bundles, which will appear as thread-like, but flattened, strands). *Athyrium* and *Deparia* have 2, *Dryopteris* has 4-7.

1 Leaves variegated, silvery gray and gray-green; [alien] .................................................................................................................... *A. niponicum *

1 Leaves not variegated, bright green; [native, sometimes cultivated]
ATHYRIACEAE (F40)

1 Leaf blade widest near middle (the fourth or fifth pair of pinnae from the base the largest); margins of indusium toothed or ciliate (not glandular); rachis glandular; spores yellow or brown, finely papillose; petiole scales persistent, up to 1 cm long and 1.5 mm wide. A. angustum

1 Leaf blade widest near base (the second or third pair of pinnae from the base the largest); margins of indusium ciliate and glandular-ciliate; rachis eglandular; spores brown or dark brown, reticulate-wrinkled; petiole scales early deciduous, up to 5 mm long and 1 mm wide. A. asplenioides

Athyrium angustum (Willdenow) K. Presl, Northern Lady Fern. Moist forests, rock outcrops on grassy balds at high elevations. June-September. The occurrence of this northern species is not fully documented in NC or VA; it was found in the 1980's by Murray Evans on Hump Mountain, on or near the TN-NC border. NL (Newfoundland) and n. QC west to SK, south to w. NC, e. TN, OH, MO, and NE. Reported for VA by Kartesz (1999). [= S, WV; = A. filix-femina (Linnaeus) Roth ex Mertens var. michauxii (Sprengel) Fairw. – C, F, G; = A. filix-femina var. angustum (Willdenow) G. Lawson – FNA; = A. filix-femina ssp. angustum (Willdenow) Clausen – K, W]


* Athyrium niponicum (Mettenius) Hance, Japanese Painted Fern. Suburban woodlands, lawns; commonly planted as an ornamental, rarely naturalizing, native of Japan. This common suburban ornamental (forma picta) spreads locally from plantings; it seems only a matter of time before it begins to naturalize more widely

Deparia Hooker & Greville 1829

A genus of about 40-50 species, primarily in tropical to warm temperate Asia and Africa. References: Kato in FNA (1993b); Kramer et al. in Kramer & Green (1990).

Identification notes: Unlike Athyrium, Deparia has the costal groove not continuous with the rachis groove. In addition, Deparia has multicellular hairs on the leaf blades.

1 Leaf blade narrowed to base; petiole bases swollen, with 2 rows of teeth; [plant a common native species of moist forests]; [section Lunathyrium] ................................................................. D. acrostichoides

1 Leaves widest at the base; petiole bases not markedly swollen, lacking teeth; [plant an exotic species, rarely introduced and naturalized]; [section Athyriopsis] ............................................................................................................ D. petersonii

Deparia acrostichoides (Swartz) M. Kato, Silvery Spleenwort. Moist forests, cove forests. June-September. NS west to MN, south to NC, SC, n. GA, n. AL, and AR. D. acrostichoides is the only species native to the New World; it has several very closely related species in e. Asia (in section Lunathyrium). It stores starch in the swollen, persistent petiole bases. [= FNA, W; = Athyrium thelypteroides (Michaux) Desvaux – RAB, C, F, G, WV; = Diplazium acrostichoides (Swartz) Butters – S]

* Deparia petersonii (Kunze) M. Kato. Swamp forests, disturbed areas; native to se. Asia. Introduced and naturalized in the Southeast, including in c. and s. GA, AL, s. MS, and FL. [= FNA; = Deparia petersonii – K, orthographic variant; = Deparia japonica (Thunberg) M. Kato, misapplied; = Diplazium japonicum (Thunberg) Beddome, misapplied]

Diplazium Swartz 1800 (Twin-sorus Fern)

A genus of about 400 species, primarily tropical and north temperate in distribution. References: Kato in FNA (1993b); Kramer et al. in Kramer & Green (1990).

1 Leaves 2-pinnate; veins anastomosing ............................................................................................................ D. esculentum

1 Leaves 1-pinnate; veins free .......................................................................................................................... [see Homalosorus pygrocarpus in DIPLAZIOPSIDACEAE]

* Diplazium esculentum (Retzius) Swartz, Vegetable Fern. Moist disturbed areas; native of the Old World tropics. [= FNA, K]

F42. DRYOPTERIDACEAE Ching 1965 (Wood-fern Family) [in POLYPODIALES]

A family of about 40-45 genera and 1700 species, cosmopolitan in distribution, but concentrated in temperate and montane areas. Here circumscribed (following Smith et al. 2006) to exclude Onocleaceae and Woodsiaceae. References: Smith in FNA (1993b); Smith et al. (2006); Lellinger (1985); Kramer et al. in Kramer & Green (1990).
1 Leaf blades pentagonal in outline, ca. 1× as long as wide, the terminal pinna by far the largest; [introduced species, naturalized in moist ravines in SC].................................................................................................................................Arachniodes

1 Leaf blades lanceolate, oblone, or ovate in outline, 1.5× or more as long as wide.
2 Leaves 1-pinnate-pinnatifid to more divided, the pinnae pinnatifid or themselves fully divided, generally lacking a prominent basal lobe, light green to dark green, herbaceous to subcoriaceous; indusia reniform (Dryopteris) or peltate (Rumohra).
3 Indusia reniform; leaf blade (at least of larger leaves on mature plants) usually > 40 cm long.................................................................Dryopteris
3 Indusia peltate; leaf blade < 40 cm long .................................................................................................................................Rumohra

2 Leaves 1-pinnate, the pinnae toothed and each with a slight to prominent lobe near the base on the side toward the leaf tip, dark green, subcoriaceous to coriaceous; indusia peltate.
4 Veins anastomosing, rejoining to form a netlike pattern; pinnae 4-25 pairs per leaf; [non-native, rarely naturalized] ...............Cyrtomium
4 Veins branching dichotomously, free, not rejoining to form a netlike pattern; pinnae 25-50 pairs on larger leaves; [plant a common native species] .........................................................................................................................Polystichum

Arachniodes Blume 1828 (East Indian Holly Fern)

A genus of about 50-60 species, of tropical and warm temperate regions, and especially of Asia and America. References: Smith in FNA (1993b); Kramer et al. in Kramer & Green (1990).

* Arachniodes simplicior (Makeino) Ohwi, Simpler East Indian Holly Fern. Moist banks in forested creek ravine; native of Japan and China. Gordon (1981) discusses this interesting introduced population, apparently established for several decades at the time of its discovery, and likely originating from spores. [= FNA, K]

Cyrtomium K. Presl 1836 (Net-veined Holly Fern)

A genus of about 15 species, of temperate regions of Africa, Asia, and the Pacific Islands. Perhaps better treated as a portion of Polystichum; at the least, Cyrtomium is closely related to Polystichum. Both species in our area are apogamous tripliods. References: Yatskievych in FNA (1993b); MacDougal (1976); Kramer et al. in Kramer & Green (1990).

1 Leaf coriaceous, the upper surface dark green and shiny; pinnae 4-10 (-12) pairs per leaf, 1.5-3 cm wide, the margins coarsely toothed or undulate ......................................................................................................................................................................C. falcatum
1 Leaf less coriaceous, the upper surface pale green and dull; pinnae (8-) 10-25 pairs per leaf, 1-2 cm wide, the margins finely denticulate. ..............................................................C. fortunei var. fortunei

* Cyrtomium falcatum (Linnaeus f.) K. Presl, Asian Net-veined Holly Fern. Ditches, disturbed swamps, moist ravines, old mortar of brick walls; native of e. Asia. [= FNA, K, S; = Polystichum falcatum Linnaeus f.]
* Cyrtomium fortunei J. Smith var. fortunei, Fortune's Net-veined Holly Fern. Roadside banks, old mortar of brick walls; native of se. China. Two other varieties are recognized; neither appears to be naturalized in North America. Reported for Polk County, TN (D. Estes, pers. comm., 2010). [= FNA; < C. fortunei – K]

Dryopteris Adanson 1763 (Wood-fern, Shield-fern)


Identification notes: Dryopteris and Athyrium are often confused when not fertile; they can be easily distinguished by breaking off a leaf and counting vascular bundles (which will appear as thread-like strands). Dryopteris has 5 and Athyrium has 2. Many Dryopteris species will hybridize with one another to form sterile hybrids. Whenever two or more Dryopteris species are found growing together, there is a good chance that hybrids are present. Hybrids generally show intermediacy between the two parents, and have abortive sporangia or spores.

1 Leaves bipinnate-pinnatifid to trippinnate-pinnatifid (or to quadripinnate in the lower pinnae).
2 Leaves evergreen, the blades appearing more-or-less parallel-sided and minutely glandular-pubescent, especially on the indusium, rachis, and pinnae midribs; first basal-pointed pinnule of the basal pinna shorter than or equal to the next outermost basal-pointed pinnule; first basal-pointed pinnule of the basal pinna usually < 2× as long as the first tip-pointed pinnule of the basal pinna ...................... D. intermedia
2 Leaves deciduous, the blades appearing more or less triangular and lacking gland-tipped hairs (except occasionally on the indusium); first basal-pointed pinnule of the basal pinna longer than the next outermost basal-pointed pinnule; first basal-pointed pinnule of the basal pinna > 2× as long as the first tip-pointed pinnule of the basal pinna.
3 Leaf blade ca. 1× as long as the petiole; indusium occasionally glandular; first basal-pointed pinnule of the basal pinna 2.5-5× as long as the first tip-pointed pinnule of the basal pinna .................................................................................................................................D. campyloptera
3 Leaf blade 2× as long as the petiole; indusium glabrous; first basal-pointed pinnule of the basal pinna ca. 2× as long as the first tip-pointed pinnule of the basal pinna .................................................................................................................................D. carthusiana

1 Leaves pinnate-pinnatifid to bipinnate (or to tripinnate in the lower pinnae).
4 Sori marginal; leaves evergreen, gray-green, leathery in texture ...............................................................................................................................D. marginalis
4 Sori medial or submedial; leaves evergreen or deciduous, dark- to bright-green, thin to stiff in texture.
5 Leaves dimorphic, the deciduous, fertile leaves erect, 2-3× as long as the spreading, evergreen, sterile leaves, which form a winter "rosette"; fertile leaves linear-lanceolate in outline, generally 4-8× as long as wide; pinnae mostly 1.5-3× as long as wide, triangular; scales at base of petiole tan.
6 Fertile pinnae nearly in plane of the blade (like a closed Venetian blind); fertile leaves 12-20 cm wide .......................... *Dryopteris celsa*
6 Fertile pinnae usually twisted out of the plane of the leaf axes, often nearly to 90° (like an open Venetian blind); fertile leaves 8-12 cm wide .......................................................................................... *Dryopteris cristata*
5 Leaves not dimorphic, or only slightly so, deciduous (*D. goldiana*), evergreen (*D. ludoviciana*), or else with usually deciduous fertile and semi-evergreen sterile fronds (*D. celsa*); fertile leaves lanceolate to ovate in outline; generally 1.5-4× as long as wide; pinnae mostly 3-5× as long as wide; scales at base of petiole dark brown with tan margins.
5 Leaves evergreen, fertile only toward the tip, the fertile pinnae and segments narrower than the sterile and more widely spaced; scales at the petiole base light brown, not shiny .......................................................................................... *Dryopteris celsa*
7 Leaves deciduous or semi-evergreen, fertile throughout or nearly so, the fertile pinnae and segments not differentiated from sterile ones; scales at petiole base medium to dark brown, shiny or not.
8 Costa with bullate (blistered-appearing) scales abundant, usually dark; [rarely naturalized alien] ......................... *Dryopteris erythrosora*
8 Costa lacking bullate scales; [native, sometimes also cultivated] ........................................................................... *Dryopteris celsa*
9 Leaves deciduous with sori subterminal, touching the costule at maturity; leaf blade ovate to narrowly ovate, usually 1.5-3× as long as wide; abruptly tapering at the apex; scales at the petiole base dark brown, nearly black, with a narrow pale margin .............. *Dryopteris celsa*

*Dryopteris campyloptera* Clarkson, Mountain Wood-fern. Spruce-fir forests, northern hardwood forests. July-September. NL (Newfoundland) and n. QC to extreme n. PA, and from extreme s. PA south through e. WV and w. VA to e. TN and w. NC. This species is a fertile allotetraploid derived from hybridization of *D. intermedia* and the northern and western *D. expansa* (K. Presl) Fraser-Jenkins & Jermy, which does not (now) reach our area. The chromosome complement is symbolized EEII. [= RAB, C, K, S, W, WV; = *D. spinulosa* (O.F. Mueller) Watt var. *americana* (Fischer ex Kunze) Fernald – F; = *D. austriaca* (Jacquin) Woynar ex Schinz & Thellung var. austriaca – G]

*Dryopteris carthusiana* (Villars) H.P. Fuchs, Spinulose Wood-fern, Toothed Wood-fern. Acidic, organic-rich bogs, swamps, less frequently in moist rocky rich forests, and sloping rock outcrops. June-September. Irregularly circumboreal, in North America ranging from n. QC west to YT, south to NC, SC, ne. GA, TN, AR, NE, w. MT, and WA. This species is a fertile allotetraploid derived from hybridization of *D. intermedia* and "*D. semicristata*", a hypothetical species which may now exist. Its chromosome complement is symbolized IISS. [= C, F, K, W; = *D. spinulosa* (O.F. Mueller) Watt – RAB, S, WV; = *D. spinulosa* var. *spinulosa* – F; = *D. austriaca* (Jacquin) Woynar ex Schinz & Thellung var. *spinulosa* (O.F. Mueller) Fiori – G]


*Dryopteris clintoniana* (D.C. Eaton) Dowell, Clinton's Wood-fern, Broad Swamp Fern. Acid seepages, swampy forests, red maple swamps. NB, QC, and ON, south to DE, DC, MD (Somerset Co.), n. VA (Arlington and Fairfax counties), PA, OH, IN, and IL. This species is a fertile allohexaploid derived from hybridization of *D. cristata* and *D. goldiana*; its chromosome complement is symbolized GGLSS. [= FNA, C, G, K; = *D. cristata* (Linnaeus) A. Gray var. *clintoniana* (D.C. Eaton) Underwood – F]

*Dryopteris cristata* (Linnaeus) A. Gray, Crested Wood-fern. Bogs, swamp forests. July-September. Circumboreal, in North America from NL (Newfoundland) to s. SK and se. BC, south to NC, TN, OH, IN, n. IL, IA, NE, and ID; disjunct in c. GA, AL, and LA. This species is a fertile allotetraploid derived from hybridization of *D. ludoviciana* and "*D. semicristata*", a hypothetical species which may now exist. Its chromosome complement is symbolized LLSS. It has also served as a "parent species" of *D. clintoniana*, a fertile allohexaploid derived from *D. cristata × goldiana*. Thus, its genome constitutes two thirds of the genome of *D. clintoniana*. [= RAB, C, F, G, K, S, W, WV; = *D. cristata* var. cristata – F]

* *Dryopteris erythrosora* (D.C. Eaton) Kuntze, Autumn Fern, Japanese Red Shield-fern. Suburban woodlands; native of Japan, Korea, and China. Also recently reported as naturalizing in AR (Simpson, Crank, & Peck 2008).

*Dryopteris goldiana* (Hooker ex Goldie) A. Gray, Goldie's Wood-fern. Boulderfield forests, rich cove forests, seepage swamps, especially over calcareous sediments or mafic metamorphic or igneous rocks. June-September. NB west to s. ON and MN, south to nw. SC, n. GA, n. AL, TN, KY, IL, and IA. This species is one of the diploid "parent species" of the e. North American reticulately-evolved *Dryopteris* complex. Its genome (symbolized GG) forms half of the genome of the tetraploid *D. celsa*, and one third of the hexaploid *D. clintoniana*, which does not occur as far south as our area. [= RAB, C, F, FNA, K, S, W, WV; = *D. goldiana* ssp. *goldiana* – G]

*Dryopteris intermedia* (Muhlenberg ex Willdenow) A. Gray, Fancy Fern, Evergreen Wood-fern. Cove forests, other moist, rocky forests, over a variety of substrates. June-September. NL (Newfoundland) west to MN, south to n. GA and AR. This species is one of the diploid "parent species" of the e. North American reticulately-evolved *Dryopteris* complex. Its genome (symbolized II) forms half of the genome of the tetraploids *D. campyloptera* and *D. carthusiana*. [= RAB, C, FNA, K, S, W, WV; =
**Dryopteridaceae** (F42)


Dryopteris ludoviciana* (Kunze) Small, Southern Wood-fern. Blackwater swamp forests. June-September. A Southeastern Coastal Plain species: e. NC south to s. FL, west to s. AL, s. MS (Sorrie & Leonard 1999), and e. LA; disjunct in the West Gulf Coastal Plain of LA and AR, and possibly disjunct in sc. KY, the report old and somewhat uncertain. This species is one of the diploid "parent species" of the e. North American reticulately-evolved *Dryopteris* complex. Its genome (symbolized LL) forms half of the genome of the tetraploids *D. cristata* and *D. celsa*, as well as contributing one third of the genome of *D. clintoniana* indirectly (via its daughter species *D. cristata*). [= RAB, FNA, K, S]

Dryopteris marginalis* (Linnaeus) A. Gray, Marginal Wood-fern. Rock outcrops, boulderfield forests, other rocky forests. June-September. NL (Newfoundland) west to s. ON and MI, south to SC, c. GA, AL, TN, AR, and e. OK. *D. marginalis* has not participated in the reticulate evolution of *Dryopteris* in e. North America; it does, however, form sterile hybrids with some other species. [= RAB, C, F, FNA, G, K, S, W, WV]

*Polystichum* Roth 1799 (Holly Fern)


1 Leaves 1-pinnate; [common, native] ................................................................. *P. acrostichoides*
1 Leaves 2-pinnate; [rare, alien] ..................................................................... *P. polyblepharum*

Polystichum acrostichoides* (Michaux) Schott, Christmas Fern. Moist to dry forests and woodlands, especially slopes, ravines, and small stream bottomlands. June-September. NS west to MN, south to s. FL and e. TX; also in ne. Mexico (Nuevo León and Tamaulipas). One of the most familiar ferns in e. North America. Var. *lonchitoides* Brooks, allegedly endemic to WV, is of dubious taxonomic value. [= RAB, C, F, FNA, G, S, W, WV; > *P. acrostichoides* var. *acrostichoides* – K; > *P. acrostichoides* var. *lonchitoides* Brook – K]

* Polystichum polyblepharum* (Roemer ex Kunze) K. Presl, JapaneseTassel-fern. Moist ravines; native of e. Asia. Reported for AL as *P. braunii* (Spenner) Fée. {not yet keyed}

**Rumohra** Raddi 1819 (Leatherleaf Fern)

A genus of about 7 species, perennials, mainly tropical and Southern Hemisphere. References: Kramer et al. in Kramer & Green (1990).


**F44. Nephrolepidaceae** Pichi Sermolli 1975 (Sword Fern Family) [in POLYPODIALES]


*Nephrolepis* Schott 1834 (Sword Fern)

A genus of about 15-30 species, widespread in tropical and subtropical areas.
LYCOPODIACEAE

58

1 Pinnae 2.5-23 cm long; midleaf pinnae with veins densely pubescent on the upper surface; pinnae not distinctly auricled at base .................................................................................................................................................................................................................. N. biserrata

1 Pinnae 1-7.3 cm long; midleaf pinnae with veins glabrous on the upper surface; pinnae auricled at base on the side towards the leaf tip.

2 Scales on the upper surface of the rachis bicolored (pale but distinctly darker at the base); pinnae attachments spaced 5-12 mm apart; rhizomes bearing spherical tubers (not always present) ......................................................................................................................... N. cordifolia

2 Scales on the upper surface of the rachis concolored (pale to reddish brown throughout); pinnae attachments spaced 7-21 mm apart; rhizomes not bearing tubers ............................................................................................................................................................................................................... N. exaltata

* Nephrolepis biserrata (Schott) Schott, Giant Sword Fern. Disturbed suburban areas; native of the tropics and subtropics of both hemispheres. [= FNA, K, ? N. falcata (Cavannilles) C. Christensen]

* Nephrolepis cordifolia (Linnaeus) K. Presl, Narrow Sword Fern. Moist places; probably not native in FL. Pampropical, the original distribution obscure. [= FNA, K, S]

Nephrolepis exaltata (Linnaeus) Schott, Boston Fern. Epiphytic or terrestrial in a range of open to shaded moist habitats; in our area perhaps only introduced. Panhandle and ne. FL south to s. FL; West Indies; Central and South America; widely introduced elsewhere. [= FNA, S; > N. exaltata ssp. exaltata – K]

F48. POLYPODIACEAE Berchtold & J.C. Presl 1820 (Polypody Family) [in POLYPODIALES]

A family of about 35-40 genera and 500-700 species, cosmopolitan, especially tropical. Here circumscribed to include Grammitidaceae (including Micropylodium). References: Smith in FNA (1993b); Smith et al. (2006); Hennipman, Veldhoen, & Kramer in Kramer & Green (1990); Parris in Kramer & Green (1990).

1 Plants dwarf, the leave blades <5 cm long; [occurring only in habitats where the air is constantly humid and the substrate saturated, as in grottoes behind waterfalls]

1 Plants larger, the leave blades 7-90 cm long; [occurring in moist to dry habitats].

1 Pinnae 2.5-23 cm long; midleaf pinnae with veins densely pubescent on the upper surface; pinnae not distinctly auricled at base .......................................................... Micropolypodium

2 Pinnae 1-7.3 cm long; midleaf pinnae with veins glabrous on the upper surface; pinnae auricled at base on the side towards the leaf tip.

2 Leaf blade densely scaly on the lower surface; rhizome 1-2 mm in diameter; leaf segment margins entire ......................................................... Pleopeltis

2 Leaf blade scaleless on the lower surface; rhizome 3-15 (-30) mm in diameter; leaf segment margins denticulate (Polyodium) or entire (Plebodium, Pecluma).

3 Leaves pinnatifid, even the larger with < 25 pairs of segments, each 1.5-5 (-8) mm wide; [of ne. FL southward] .......................................................................... Pecluma

3 Leaves pinnatifid, even the larger with >25 pairs of segments, each 1-10 cm wide; ............................................................................................................ Phlebodium

4 Ventricle highly reticulate, with 3-4 rows of areoles between the midvein and the margin; leaf blade 10-50 cm wide ................................................................................................................................................................................. Polypodium

4 Ventricle free or with a row of areoles between the midvein and the margin; leaf blade <9 cm wide ...... ..........................................................................................................................................................................................................

Micropolypodium Hayata (Dwarf Polypody)

A genus of about 30 species, mainly of tropical America and e. and se. Asia. Mircropolyodium has traditionally been considered a part of a broadly circumscribed Grammitis, but has been re-circumscribed at the generic level by Smith (1992). Smith in FNA (1993b) states that our species “probably warrants generic status under the name Micropolypodium Hayata, a primarily neotropical genus with representatives in eastern Asia (Malaysia, China, Sikkim, Taiwan, and Japan).” References: Smith in FNA (1993b); Massey et al. (1983); Smith (1992) = Z.

Micropolypodium nimbatum (Jenman) A.R. Smith, Dwarf Polypody. On ceiling of grotto in spray cliff of waterfall in humid gorge. Sporophytes (juvenile only) have been found at only a single site in North America, in Macon County, NC. Gametophytes (and/or sporophytes) may be present at other spray cliffs in the escarpment gorges of sw. NC or adjacent SC and GA. Other than this disjunct temperate-zone occurrence, the species is known from Cuba, Jamaica, and Hispaniola. See Moran (1998) for an interesting discussion and overview of independent fern gametophytes in e. North America. [= Z = Grammitis nimbata (Jenman) Proctor – RAB, FNA, K]

Pecluma M.G. Price (Rockcap Fern)


1 Veins 1-forked; segments at base of blade abruptly reduced in size; [usually epiphytic] ................................................................................................................................................................................. P. plumula

1 Veins 2-4 forked; segments at base of blade gradually reduced to auricles; [usually terrestrial] ................................................................................................................. P. pilodon var. caespitosa

Pecluma plumula (Humboldt & Bonpland ex Willdenow) M.G. Price. Epiphytic on tree branches, less commonly on limestone, in hammocks and swamps. Ne. FL (Duval County) south to s. FL; West Indies, Mexico, Central America, and n. South America. [= FNA, K, Z; = Polypodium plumula Humboldt & Bonpland ex Willdenow – S]

Pecluma pilodon (Kunze) M.G. Price var. bourgeanae (E. Fournier) A.R. Smith. Terrestrial or on logs or tree bases in hammocks and swamps. Ne. FL (Duval County) south to s. FL; West Indies; Mexico and Central America. [= Z = Pecluma pilodon (Kunze) M.G. Price var. caespitosa (Jenman) Lelliger – FNA; = Polypodium pilodon (Kunze) M.G. Price ssp. caespitosum (Jenman) Windham – K; = Polypodium pectinatum Linnaeus – S]
Phlebodium (R. Brown) J. Smith 1841 (Golden Polypody)

A genus of 2-4 species, of tropical and subtropical regions of the Western Hemisphere. References: Nauman in FNA (1993b); Hennipman, Veldhoen, & Kramer in Kramer & Green (1990).

Phlebodium aureum (Linnaeus) J. Smith, Goldfoot Fern, Golden Polypody. Epiphytic on the old leaf bases of Sabal palmetto and in crotches and crevices of other trees, particularly Quercus virginiana, and rarely terrestrial on calcareous soils or masonry. E. SC (Beaufort, Jasper, and Charleston counties), e. GA (Camden, Chatham, and Glynn counties), south to s. FL, west to Panhandle FL (Wakulla County) (Kunzer et al. 2009). Found in Cape Romain National Wildlife Refuge (Charleston County, SC) in the late 1970s by Steve Bowling, where apparently native (S. Bowling, pers. comm. 2007); also introduced and apparently established in SC (Beaufort, Jasper, Charleston counties) via planting of palmettos from further south (P. McMillan, pers. comm. 2005). [= FNA, K, S; = Polypodium aureum Linnaeus]

Pleopeltis Humboldt & Bonpland ex Willdenow 1810 (Shielded-Sorus Polypody)


Pleopeltis polypodioides (Linnaeus) E.G. Andrews & Windham ssp. michauxiana (Weatherby) E.G. Andrews & Windham, Resurrection Fern, Scaly Polypody. On tree limbs and trunks (especially when leaning) and on rocks. June-October. Ssp. michauxiana ranges from se. MD, IL, MO, and se. KS, south to s. FL and TX; also in Mexico and Guatemala; recent studies suggest that it warrants specific status. Ssp. polypodioides ranges in the West Indies, Central America and South America. Four additional subspecies are tropical in Central America, South America, and Africa. [= FNA, K; < Polypodium polypodioides (Linnaeus) Watt – RAB; = Polypodium polypodioides (Linnaeus) Watt var. michauxianus Weatherby – C, F, G, W, WV; < Marginaria polypodioides (Linnaeus) Tidestrøm – S]

Polypodium Linnaeus 1753 (Polypody)


Identification notes: The two species are somewhat cryptic, and the relatively frequent triploid backcross makes field identification still more problematic. Individuals not identified to species may be referred to as "Polypodium virginianum complex."

[Note: three leads]

1 Leaf blade averaging 5.8 cm wide (range of 3.2-8.2 cm), widest at the base, thus the blade elongate- deltoid in outline; rhizome scales averaging 1.1 mm wide, mostly golden brown throughout; paraphyses (sporangiasters) usually > 40 per sorus (range of 25-120); leaves mostly lobed to apex, without an attenuate, unlobed tip ................................................................. P. appalachianum

1 Leaf blade averaging 4.5 cm wide (range of 3.0-5.8 cm); blade widest near the middle, thus the blade oblong to narrowly lanceolate in outline; rhizome scales averaging 1.5 mm wide, mostly brown, with a dark central stripe; paraphyses (sporangiasters) usually < 40 per sorus (range of 7-69); leaves mostly with an attenuate, unlobed tip ........................................................................................................................................... P. virginianum

1 Characters intermediate; spores abortive ................................................................. P. ×incognitum

Polypodium appalachianum Haufler & Windham [P. virginianum complex], Appalachian Rockcap Fern. Moist rocks at low to high elevations, especially in ravines, on north-facing outcrops, and in other moist sites. June-October. NL (Newfoundland) west to e. ON, south to n. GA and n. AL; nearly restricted to the Appalachian Mountains. Its chromosome complement can be symbolized as AA. It is one parent of P. virginianum. [= FNA, K, Z; < P. virginianum – RAB, C, F, S, W, WV; < P. vulgare Linnaeus var. virginianum (Linnaeus) Eaton – G]

Polypodium ×incognitum Cusick is the triploid hybrid [P. appalachianum × virginianum]. It is rather frequent; there is some evidence that it may reproduce successfully via apogamous spores. It is best recognized by the spores, which are irregular in size and shape. Morphologically, it tends to intermediacy between the two parents, but can closely resemble either. Its chromosome complement can be symbolized AAS. [Not mapped]

Polypodium virginianum Linnaeus [P. virginianum complex], Common Rockcap Fern. Moist rocks. June-October. Haufler and Windham (1991) indicate that the tetraploid cytotype (P. virginianum) of the P. virginianum complex is an allotetraploid derivative of the sterile hybrid of the diploid occurring in our area (P. appalachianum) and another diploid with a
boreal distribution (*P. sibiricum* Siplivinsky). Electrophoretic evidence supports this finding (Bryan & Soltis 1987, Haufler, Windham, & Rabe 1995). Thus, *Polypodium* in our area is another classic example of the reticulate evolution of pteridophytes, and the cytotypes must be treated as species and given names. Unfortunately, the two species are somewhat cryptic, and the relatively frequent triploid backcross makes field identification still more problematic. Individuals not identified to species may be referred to as "*Polypodium virginianum* complex." The chromosome complement of *P. virginianum* can be symbolized as AASS. [= FNA, K, Z; < *P. virginianum* – RAB, C, F, S, W, WV (also see *P. appalachianum*); < *P. vulgare* Linnaeus var. *virginianum* (Linnaeus) Eaton – G (also see *P. appalachianum*)]
GYMNOSPERMS

SECTION 3: ACROGYMNOSPERMAE (EXTANT GYMNOSPERMS)

The gymnosperms are a possibly artificial grouping of about 16 families, about 86 genera, and about 850 species. References: Kramer & Green (1990). The folk taxonomy of conifers in our area is an interesting, tangled story. The town of Spruce Pine, NC is apparently named for *Tsuga canadensis*. Spruce Pinnacle in Buncombe County, NC and Tamarack Post Office in Watauga County, NC and Tamarack Ridge in Highland County, VA are named for the abundance of *Picea rubens*. The generally used common name for *Juniperus* is "cedar," and *Chamaecyparis* is called "juniper."

G2. ZAMIACEAE Reichenbach 1837 (Sago-palm Family) [in CYCADALES]

A family of about 9-11 genera and 100-185 species, of tropical and warm temperate North America, Central America, South America, Africa, and Australia. References: Landry in FNA (1993b); Johnson & Wilson in Kramer & Green (1990); Jones (1993).

*Zamia* Linnaeus


*Zamia floridana* Alphonse de Candolle var. *umbrosa* (Small) D.B. Ward, Coontie. Maritime forests, pinelands. Se. GA (Camden and Glynn counties) south to FL. *Zamia floridana* var. *floridana* is more widespread in the FL Peninsula. Ward (2001), Landry in FNA (1993b), and Stevenson (1991) conclude that North American *Zamia* belongs to one of several *Zamia* species in the Western Indies. Ward (2001, 2009) concludes that *Z. floridana* is the correct name for this taxon, and that varietal status is warranted for the "*umbrosa*" entity. [= Y; < *Zamia integrifolia* Linnaeus f. in Aiton – FNA, Z; < *Z. pumila* Linnaeus – K, misapplied; = *Z. umbrosa* Small – S; < *Z. floridana* Alphonse de Candolle]

G3. GINKGOACEAE Engler in Engler & Prantl 1897 (Ginkgo Family) [in GINKGOALES]


*Ginkgo* Linnaeus 1771 (Ginkgo, Maidenhair Tree)

A monotypic genus, a tree, native of China. *Ginkgo* is famous as a "living fossil," known from fossils nearly 200 million years old which are nearly identical to modern plants; it may be extinct as a native plant. References: Whetstone in FNA (1993b); Page in Kramer & Green (1990).

*G. biloba* Linnaeus, Ginkgo, Maidenhair Tree. Frequently planted, rarely escaped to suburban woodlands and yards; native to se. China. As pointed out by Whetstone in FNA (1993b), *Ginkgo* is only weakly naturalized. [= C, FNA, K]

G7. PINACEAE Sprengel ex F. Rudolphi 1830 (Pine Family) [in PINALES]


1 Leaves borne in fascicles of 2-5 (basally bound by a scarious sheath) or on short shoots in clusters of many leaves in apparent whorls.  
2 Leaves borne in fascicles of 2-5 (basally bound by a scarious sheath); [subfamily *Pinioideae*]. .................................................................................................................................................................................................................................................................................................................................................................................................................................................................................*Pinus*
3 Leaves evergreen; cones 6-12 cm long ..........................................................................................................................................................................................................................................................................................................................................................................................................................................................*Cedrus*
4 Leaves deciduous; cones 1-2 cm long ..........................................................................................................................................................................................................................................................................................................................................................................................*Larix*
1 Leaves alternate; [subfamily *Abietoideae*].
4 Leaves 4-angled in cross-section .................................................................................................................................................................................................................................................................................................................................................................................................................................................................................*Picea*
5 Leaves distinctly flattened (2-sided) in cross-section.  
5 Leaves attached directly to twig; cones 4-15 cm long, erect ......................................................................................................................................................................................................................................................................................................................................................................................................................................................................................*Abies*
5 Leaves jointed, on short, persistent base; cones 1-3.8 cm long, pendant ......................................................................................................................................................................................................................................................................................................................................................................................................................................................................................*Tsuga*

*Abies* P. Miller 1754 (Fir) 
(by Alan S. Weakley and Derick B. Poindexter)

A genus of about 40-50 species, trees, of temperate regions of the Northern Hemisphere, south to Central America. Our 2 native species and other non-natives are grown as ornamentals, especially in the mountains. References: Hunt in FNA (1993b); Liu (1971)=Y; Page in Kramer & Green (1990).
1 Cones 3.5-8 cm long; [native, also planted]; [section Balsameae].
2 Bracts of the mature cones shorter than the scales or slightly exerted beyond the scales; stomatal rows (4-) 7 (-8) on each side of the midvein on the lower leaf surface (visible at 10× magnification); [plant of the Central Appalachians and north, native from Page and Madison counties, VA, northward] ...................................................................................................................................................... A. balsamea
2 Bracts of the mature cones longer than the scales and reflexed; stomatal rows (8-) 10 (-12) on each side of the midvein on the lower leaf surface (visible at 10× magnification); [plant of the Southern Appalachians, native from Grayson and Smyth counties, VA, southward] ..... ...................................................................................................................................................... A. fraseri

1 Cones 10-15 cm long; [alien, persistent from horticultural use and sparingly naturalized].
3 Juvenile-form leaves of young plants with rounded-retuse apices; leaf resin canals 2, marginal; cone bracts exerted and reflexed with elongate apical cusps; [section Abies] .................................................................................................................................................................................... A. alba
3 Juvenile-form leaves of young plants with spinose-bifid apices; leaf resin canals 2, median (and usually with up to 2 additional marginal canals); cone bracts exerted and erect with abrupt, short apical cusps; [section Momi] ........................................................................................................................................ A. firma

* Abies alba P. Miller, European Fir, Silver Fir. Naturalized in Highlands, NC (Macon Co.), from plantings made by Thomas G. Harbison in the late 1800's (J.D. Pittillo, pers. comm.). May; October. [= Y]
Abies balsamea (Linnaeus) P. Miller, Balsam Fir, Northern Balsam. High elevation forests and cliffs. April-May. NL (Newfoundland) and NL (Labrador) west to n. AB, south to NY, PA, MI, WI, and IA, and (disjunct) in the mountains to n. VA (known in our area as a native only from Page and Madison counties, VA). There has been considerable debate over the taxonomic status of some, especially southern, populations of A. balsamea, which show some transition in characters toward A. fraseri, and have been variously treated as A. intermedia Fulling, A. balsamea var. phanerolepis Fernald, or A. ×phanerolepis (Fernald) Liu. Variation in e. North American Abies is somewhat clinal, with the greatest geographical and morphological discontinuity between n. VA and s. VA. It seems best, therefore, to recognize A. fraseri as a species and A. balsamea as a species (which includes the clinal var. phanerolepis). The balsam woolly adelgid, an alien pest, is afflicting this species in Shenandoah National Park. [= C, FNA, K, W, Y, Z; > A. balsamea var. balsamea – F, G; > A. balsamea var. phanerolepis Fernald – F, G, WV; > A. ×phanerolepis (Fernald) Liu – Y; > A. intermedia Fulling]
* Abies firma Siebold & Zuccarini, Momi Fir. Naturalized from horticultural plantings near homesites. See Pointdexter (2010b) for detailed information on the naturalization of this fir in our area and its recognition.
Abies fraseri (Pursh) Poir, Fraser Fir, She Balsam, Southern Balsam. High elevation forests, from about 1500-2037 m. May-June; September-November. Southern Appalachian endemic, from Grayson and Smyth counties, VA (notably, Mount Rogers) south to e. TN and sw. NC; naturalizing on Brasstown Bald in GA, where planted. This species is threatened as a native species by a virulent alien pest, the balsam woolly adelgid, and environmental damage caused by pollution. Populations on Mt. Rogers and, to a lesser extent, Roan and Grandfather mountains, appear to be relatively healthy. A. fraseri is closely related to the northern Balsam Fir, A. balsamea, and may be a relatively recent derivative of it. During the 1970's and 1980's, the cultivation of Fraser Fir Christmas trees became an important part of the economy of the North Carolina mountains (especially Alleghany, Ashe, Avery, Mitchell, and Watauga counties). Most Christmas tree plantations are at 1000-1500 m in elevation; below 1000 m, Fraser Fir is very susceptible to a fungal root rot (Phytophthora), above 1500 m it grows too slowly to be profitable and is often "flagged" by winds, ruining its shape for commercial purposes. [= RAB, C, F, FNA, G, K, S, W, WV, Y, Z]

Cedrus Trew 1757 (Cedar)


* Cedrus deodara (Roxburgh ex D. Don) G. Don, Deodar Cedar. Frequently planted, rarely escaped to suburban woodlands. [= K]

Larix P. Miller 1754 (Larch)

A genus of about 10 species, trees, of cold temperate and boreal regions of the Northern Hemisphere. References: Parker in FNA (1993b); Page in Kramer & Green (1990).

1 Leaves 2.5-3 cm long; cones 2.3-5 cm long, with > 30 pubescent scales; twigs pubescent; [alien species rarely planted] ............... L. decidua
1 Leaves 1-2.5 cm long; cones 1.2-2 cm long, with 10-20 glabrous scales; twigs glabrous; [native species rarely south to MD and WV], ............... .......................................................................................................................................................... L. laricina

* Larix decidua P. Miller, European Larch. Forests; native of Europe. Planted as an ornamental and experimentally as a forest tree, persisting and sometimes escaping in the high mountains of NC. [= F, K]
**PINACEAE (G7)**

**Larix laricina** (Du Roi) K. Koch, Eastern Larch, Eastern Tamarack. Bogs and swamps. NL (Newfoundland), NL (Labrador), Keewatin, and AK, south to MD (Garrett County, WV (Preston County and Randolph counties), OH, IN, IL, MN, and British Columbia. [= FNA, C, F, G, K, WV]

**Picea** A. Dietrich 1824 (Spruce)


1 Cones 10-16 cm long; upper branches spreading to ascending, the lower drooping; outer bud scales without hairlike projections; [plant an alien, but widely planted as an ornamental and sometimes as an experimental timber plantation tree] .................................................. *P. abies*

2 Cones 2.5-4.5 cm long; upper branches ascending, the lower spreading; outer bud scales prolonged into minute hairlike projections; [plant native] .................................................................................................................. *P. rubens*

* Picea abies* (Linnæus) H. Karsten, Norway Spruce. Persisting and escaping from forestry plantations at moderate or high elevations, notably in e. WV, Great Smoky Mountains National Park (Kephart Prong), Mount Mitchell State Park, and the Biltmore Estate; native of n. Europe. [= FNA, K, WV]

**Picea rubens** Sargent, Red Spruce, He Balsam. Common to dominant in spruce and spruce-fir forests at high elevations, scattered in northern hardwood forests, heath balds, boulderfield forests, ridges, and rarely coves, also in bogs or swampy forests at lower elevations (down to about 1000 m), ranging in moisture tolerance from dry ridges (though these are often fog-bathed) to saturated peats, and sometimes planted and naturalized. May-June; October. NS and NB south (interruptedly) to w. NC and e. TN. *Picea mariana* (P. Miller) Britton, Sterns, & Poggenburg, Black Spruce, ranges south to s. PA and n. NJ, and has also been reported from bogs in our area: for NC (Small 1933) and for VA (Fernald 1950). These reports are apparently based on misidentifications of short-leaved, bog-inhabiting populations of *P. rubens*. Hardin (1971b) discusses the existence of these southern populations of *P. rubens* growing in bogs (notably Long Hope Valley, Ashe and Watauga counties, NC and Pineola Bog, Avery County, NC) with shorter than normal leaves (8-10 mm long vs. 12-15 mm long). He suggests that “this may be ecotypic, but one wonders whether the short leaves and bog habitat might reflect a few Black Spruce genes that have persisted since the Pleistocene.” Further study with modern electrophoretic and molecular techniques is warranted. [= RAB, C, F, FNA, G, K, W, WV; > *P. rubens* – S; > *P. australis* Small – S]

**Pinus** Linnaeus 1753 (Pine)

A genus of about 110 species, trees, of the Northern Hemisphere, south to Central America. The State Tree of North Carolina is the “Pine,” the species left artfully and politically ambiguous. References: Kral in FNA (1993b); Duncan & Duncan (1988); Gernandt et al. (2005); Price, Liston, & Strauss (1998); Richardson (1998); Page in Kramer & Green (1990).

**Identification notes**: Young saplings generally have shorter needles than larger saplings and mature trees; measurements in the key are those of mature trees. Seedlings have needles single, rather than fascicled.

1 Needles 5 in each bundle; each needle with 1 vascular bundle; [subgenus Strobus, section Strobus] ........................................................................................................ *P. strobus*

2 Needles 2-3 (-4) in each bundle; each needle with 2 vascular bundles; [subgenus Pinus]  ........................................................................................................ *P. palustris*

3 Needles in bundles of 3, or 2 and 3, or 3 and 4 (predominantly or at least substantially in 3’s); [subgenus Pinus, section Trifoliae, subsection Australes]  ........................................................................................................ *P. banksiana*

4 Needles in bundles of 2 and 3.

5 Needles 3-7 cm long; prickles on cones 1-3 mm long, slender (< 1 mm wide at base of prickle)  ........................................................................................................ *P. pungens*

6 Needles 17-30 cm long; cones (6) 12-15 cm long  .................................................................................. *P. elliottii var. elliottii*

7 Needles 5-12 cm long; cones 4-7 cm long  .................................................................................. *P. echinata*

8 Needles in bundles of 3 (rarely with a few 2’s), or 3 and 4.

9 Cones distinctly longer than broad when open or closed, 5-13 cm long; needles mostly (10-) 12-23 (-28) cm long, 0.7-1.5 mm wide; buds not resinous (or only slightly so); trunks not producing adventitious sprouts (epicormic sprouting)  .................................................................................. *P. taeda*

10 Cones about as broad as long, 3-6 cm long; needles (4-) 7-16 (-20) cm long, 1.5-2.0 mm wide; buds resinous; trunks commonly producing adventitious sprouts (epicormic sprouting), especially in response to fire.

11 Needles (10-) 16-20 (-21) cm long, persisting 3-4 years; cones serotinous; [trees of pocosins, savannas, and other wetlands of the Coastal Plain]  .................................................................................. *P. serotina*

12 Needles 4-7 (-10) (-15) cm long, persisting only 2 years; cones opening at maturity, not serotinous; [trees of ridges, slopes, bottomlands, and bogs of the Mountains and Piedmont]  .................................................................................. *P. rigida*

3 Needles in bundles of 2 only.

9 Needles slender to somewhat stout, 0.5-1.2 mm wide.

10 Needles 10-17 cm long; branches brittle; spring shoots usually with several nodes (several whorls of branches)  .................................................................................. *P. resinosa*

11 Needles 2-3 cm long, generally twisted; cones either opening at maturity, not serotinous, the scales bearing prominent, slender prickles 2-5 mm long, or serotinous and unarmed; [subgenus Pinus, section Trifoliae, subsection Contortae]

12 Needles 2-3.5 cm long, not twisted, curved; cones serotinous, unarmed; leaf sheaths < 2.5 mm long  .................................................................. *P. banksiana*
12 Needles 2-8 cm long, generally twisted, straight; cones opening at maturity, not serotinous, the scales bearing prominent, slender prickles 2-5 mm long; leaf sheaths > 2.5 mm long..............................................P. virginiana
11 Needles 5-13 cm long, twisted or not; cones opening at maturity or serotinous, the scales bearing prominent, short, stout prickles or minute, decussate prickles, and also with a faint to conspicuous horizontal ridge.
13 Anthers yellow; bark tight, closely ridged, not sloughing off, reminiscent of a hardwood; [native trees of mesic to fairly wet, fertile soils]; [subgenus Pinus, section Trifoliae, subsection Australes]..............................................P. glabra
13 Anthers yellow; bark tight, closely ridged, not sloughing off, reminiscent of a hardwood; [native trees of mesic to fairly wet, fertile soils]; [subgenus Pinus, section Trifoliae, subsection Australes]..............................................P. glabra
13 Anthers yellow; bark tight, closely ridged, not sloughing off, reminiscent of a hardwood; [native trees of mesic to fairly wet, fertile soils]; [subgenus Pinus, section Trifoliae, subsection Australes]..............................................P. glabra
9 Needles stout, 1.3-2.5 mm wide.
14 Needles 15-25 cm long; cones 8-22 cm long; [trees naturalized on barrier islands]; [subgenus Pinus, section Pinaster]..............................................................................................................P. pinastris
14 Needles 3-16 cm long; cones 3-9 cm long; [collectively widespread.
15 Needles 7-16 cm long; cones 4-6 cm long, each scale bearing a small depressed mucro; [introduced tree].
16 Buds light brown, resinous; [introduced tree, often planted inland].................................................................................P. nigra
16 Buds white, not resinous; [introduced tree, usually planted only on Coastal Plain barrier islands]; [subgenus Pinus, section Pinus, subsection Pinus].................................................................P. thunbergiana
15 Needles 3-6 (-8) cm long; cones either 6-9 cm long with each scale bearing a stout, woody spine, or 3-6 cm long and unarmed; [native tree of the Mountains and upper Piedmont or introduced trees south to MD and WV].
17 Cones 6-9 cm long with each scale bearing a stout, woody spine; [native tree of the Mountains and upper Piedmont]; [subgenus Pinus, section Pinaster].................................................................P. pungens
17 Cones 3-6 cm long, unarmed; [introduced trees south to MD and WV].
18 Needles 2-3.5 cm long; cone appressed upwards against the stem, strongly asymmetrical; leaf sheaths < 2.5 mm long; [subgenus Pinus, section Trifoliae, subsection Contortae]..................................................................................P. banksiana
18 Needles 3-7 cm long; cone reflexed downwards against the stem; leaf sheaths > 2.5 mm long; [subgenus Pinus, section Pinus, subsection Pinus].........................................................................................P. sylvestris var. sylvestris

Auxiliary Key to common pines of the Piedmont

1 Needles 12-25 cm long, predominantly in bundles of 3; winter buds > 1 cm long; cones 6-15 cm long, falling soon after releasing seed; bark plates thick, without crater-like blisters..................................................P. taeda
1 Needles 2-13 cm long, predominantly in bundles of 2; winter buds < 1 cm long; cones 3-7 cm long, persisting on trees for several years after releasing seed; bark plates thin, with or without crater-like blisters.
2 Needles 7-13 cm long, not twisted, or slightly so, in bundles of 2 (usually with some in bundles of 3), rather slender, < 1.0 mm wide; bark plates mostly > 4 cm wide, with crater-like blisters ca. 1 mm in diameter; winter buds not very resinous; 3-4 year-old twigs rough and flaking ..................................................................P. echinata
2 Needles 2-8 cm long, typically twisted, in bundles of 2, rather stout, often 1.0-1.2 mm wide; bark plates mostly about 2 cm wide, without crater-like blisters; winter buds very resinous; 3-4 year-old twigs smoothish to rough, but not flaking ......................................................P. virginiana


Pinus echinata P. Miller, Shortleaf Pine, Rosemary Pine, Yellow Pine. Dry rocky ridges and slopes, sandhills, old fields, forests, generally in rather xeric sites, but also occurring in mesic to even wet sites. March-April; September-October. Widespread in se. North America, north to s. NY, s. PA, s. OH, s. IL, s. MO, and e. OK, perhaps reaching its greatest importance in dry, sandstone landscapes, such as the Cumberland Plateau of WV, KY, TN, and AL, and the Ozarks and Ouachitas of AR, MO, and OK. [= RAB, C, F, FNA, G, K, S, WH, WV, Z]

Pinus elliottii Engelmann var. elliottii. Slash Pine. Native in wet pine flatwoods and maritime forests in GA and SC, extensively planted in GA, SC, and NC in silvicultural plantations on a wide variety of soils, many of them unsuitable for its successful growth. January-February; October-November. P. elliottii var. elliottii ranges from s. SC south to c. peninsular FL, west to e. LA; var. densa Little & Dorman is restricted to c. and s. peninsular FL. P. elliottii var. densa is perhaps better treated as a full species, P. densa (Little & Dorman) de Laubenfels & Silba. P. elliottii var. elliottii has been extensively planted throughout the Coastal Plain of GA, NC, and SC, where it now occupies tens of thousands of hectares. Superficially, P. elliottii resembles both P. palustris and P. taeda, with cone size and needle length intermediate. P. elliottii var. elliottii is sometimes difficult to tell from P. taeda; additional helpful characteristics are the seed cones on 1.5-3 cm long stalks (vs. essentially sessile), seed cones reddish-brown and glossy, appearing varnished (vs. brown and dull), needles thicker and a dark glossy green (vs. thinner and a yellowish green); bark prominently flaking off and revealing reddish patches (vs. not notably flaking off and not

P. banksiana

Cedrus deodora

Larix decidua

Larix laricina

Picea abies

Picea rubens

Pinus banksiana

**Pinus glabra** Walter, Spruce Pine, Walter’s Pine. Bottomland forests, rich, moist soils. March-April; September-October. SC south to n. FL and west to se. LA. This pine is unusual in growing in moist (even infrequently flooded), fertile habitats, usually mixed with bottomland hardwoods, and apparently rather shade tolerant, sometimes growing as an understory tree. [= RAB, FNA, K, S, WH, Z]

* **Pinus nigra** Arnold, Austrian Pine. Disturbed areas; native of Europe. [= C, F, FNA, G, K]

**Pinus palustris** P. Miller, Longleaf Pine, Southern Pine. Formerly throughout the Coastal Plain, Sandhills, and lower Piedmont, on a wide variety of soils (sandy, loamy, clayey, or peaty), from very dry to very wet conditions, in savannas, woodlands, and forests affected by relatively frequent natural (lightning caused) fires (likely augmented by native Americans), now reduced to less than a tenth of its former abundance by a variety of forces, including turpentining, timbering, free-range hogs, fire suppression, and "site conversion" by foresters to other trees, now extremely rare in VA and north of the Neuse River in NC, still occurring in some abundance in the outer Coastal Plain from Carteret County, NC south into GA, in the Bladen Lakes area of Bladen and Cumberland counties, and in the Sandhills of Harnett, Hoke, Scotland, Richmond, Moore, Anson, and Montgomery counties, NC and south into GA. March-April; September-October. A Southeastern Coastal Plain endemic: se. VA south to FL and west to se. TX; it extends slightly into the Piedmont in most states where it occurs, and further into the Piedmont and low mountains in GA and AL. "The species has been heavily exploited for timber and turpentine production, and it has been estimated that by 1930 only ten percent of its original volume of timber remained" (Price 1989); certainly much less now remains. Longleaf Pine is featured in the official NC State Toast ("Here’s to the land of the longleaf Pine…") and the highest honor that the Governor of North Carolina can bestow on an individual for service to the state is to appoint him or her to the honorary Order of the Longleaf Pine. A hybrid with P. taeda, P. × sondereggerti H.H. Chapman, occurs. [= RAB, C, FNA, K, WH; = P. australis Michaux f. – F, G, S]

[Pic: Pinus clausa

* **Pinus pinaster** Aiton, Maritime Pine, Cluster Pine. Planted and naturalized on barrier islands; native of Mediterranean Europe. *P. pinaster* is reported by Brown (1959) to be "introduced from Mediterranean region and planted on sand-flats in vicinity of Corolla, Currituck Banks, Bodie and Hatteras Island 1936-1940.... Now producing seeds and becoming naturalized near Cape Hatteras Lighthouse. More resistant to salt spray than native pines" (Brown 1959). Graetz (1973) discusses its use on the Outer Banks and concludes that it is "not as well adapted to inclement beach conditions as Japanese black pine." *P. pinaster* is conspicuous just south of Nags Head on NC Highway 12 (Dare County, NC), further south at Bodie Island Lighthouse (Dare County, NC), on Ocracoke Island (Hyde County, NC), and elsewhere. [= K]

**Pinus pungens** Lambert, Table Mountain Pine, Burr Pine, Hickory Pine. Dry ridges, cliffs, shale barrens, usually requiring fire for its reproduction, occurring at least up to 1550 m. May; September-October. A Central and Southern Appalachian endemic: n. NJ, through se. PA, w. MD, WV, w. VA, w. NC, and c. TN to nw. SC and ne. GA. [= RAB, C, F, FNA, G, K, S, W, WV, Z]

**Pinus resinosa** Aiton, Red Pine. High elevation forests, in pine plantations, and persisting after silvicultural planting. This species is native as far south as WV (Pendleton and Hardcy counties) and PA (Luzerne, Wyoming, Tioga, and Centre counties). In WV, it is much more common as a plantation tree than as a native. [= C, F, FNA, G, K, WH]

**Pinus rigida** P. Miller, Pitch Pine. Primarily on dry ridges, more or less requiring fire for its reproduction, less commonly in peat soils of mountain bogs (and then often at elevations of 800-1000 m) and also scattered through a variety of forest types. May; September-October. S. Canada and s. ME south to n. GA. It is abundant near sea level in the Pine Barrens of NJ, but in NC is limited to the mountains and upper Piedmont; it is replaced in Coastal Plain fire-maintained wetland communities by the related *Pinus serotina*. [= RAB, C, F, FNA, G, K, S, W, WV, Z; = P. rigida ssp. rigida]

**Pinus serotina** Michaux, Pocosin Pine, Pond Pine, Marsh Pine. Peaty soils of pocosins, swamps of small blackwater streams. April; August (or at any time of year in response to fire). A Southeastern Coastal Plain endemic: s. NJ south to n. FL and se. AL, restricted to the Coastal Plain. A remarkable tree, well-adapted to fire by its serotinous cones and its ability to resprout needles from the branches, trunk ("epicormic sprouting"), or roots following fire. Extensive areas of peatland in the outer Coastal Plain are dominated by *P. serotina*, sometimes codominant with *Gordonia lasianthus*. Following fires which destroy all branches but do not kill the trees, epicormic sprouting results in entire forests of odd-looking cylindrical pines, the trunk thickly beset with needles, the outline of the tree a narrow cylinder 10-20 meters tall and less than 1 meter in diameter from base to summit. *P. serotina* is clearly a southern relative of *P. rigida*. It normally occurs in fire-maintained wetlands associated with ("downhill" from) *P. palustris*. On deep peats, *P. serotina* is stunted and of very irregular form; on mineral or shallower organic soils it can reach large size. Even when well-developed, the trunk is typically twisted and gnarled, helping to distinguish it from *P. taeda*. [= RAB, C, F, FNA, K, S, WH, Z; = P. rigida P. Miller ssp. serotina (Michaux) Clausen]

**Pinus strobus** Linnaeus, Eastern White Pine. Moist to dry forests, bottomlands, dry, rocky ridges in humid gorges. April; August-September. Widespread in ne. North America, south to VA, w. and (rarely) c. NC, nw. SC, n. GA, e. TN, KY, IN, n. IL, e. IA, and MN. *P. strobus* was probably the tallest tree in e. North America, reaching heights of 60-70 meters. It was a very important timber tree historically. In NC a notable relict and disjunct stand of *P. strobus* occurs on bluffs of the Deep River in
the eastern Piedmont of Chatham County; in VA *P. strobus* is widely but irregularly distributed in the lower Piedmont. 

*Pinus sylvestris* Linnaeus var. *sylvestris*, Scots Pine. Cultivated and sometimes escaped; native of Europe. Introduced and at least weakly naturalized south to MD (Kartesz 1999) and e. WV (Morton et al. 2004). [= FNA; < *P. sylvestris* – C, F, G, K]

*Pinus taeda* Linnaeus, Loblolly Pine, Old Field Pine. Forests, fields, pine plantations, much more abundant and widespread than formerly, occurring further west than as a native. March-April; October-November. Native from s. NJ, DE, and e. MD south to n. peninsular FL, west to e. TX and se. OK, primarily on the Coastal Plain, but inland to s. TN; this distribution now expanded by forestry plantation. Northward. See *P. elliottii* for additional characters to distinguish these two species. [= RAB, C, F, FNA, G, K, S, W, WH, Z]

*Pinus thunbergiana* Franco, Japanese Black Pine. Planted and persisting, sometimes appearing native, on barrier islands, native of Japan. Growing in maritime situations in its native land, this tree's strong resistance to salt spray is the reason for its horticultural use in our area. Following moderate storm events on the coast, *P. thunbergiana*'s needles remain green and undamaged, even when needles of *P. taeda*, native to such situations, are salt-killed. [= K: =? *P. thunbergii* Parlins]

*Pinus virginiana* P. Miller, Virginia Pine, Scrub Pine, Jersey Pine. Dry forests and woodlands, especially on slopes and ridges, also common in certain areas as a weedy successional tree on nearly any kind of site. March-May; September-November. Primarily a Central and Southern Appalachian endemic: s. NY, NJ, and PA, south through VA, WV, s. OH, s. IL, KY, TN, and NC to nw. SC, n. GA, n. AL, and ne. MS. A small, scrubby pine, occurring in very dense, monospecific stands in the upper Piedmont as a result of secondary succession of old fields. [= RAB, C, F, FNA, G, K, S, W, WV, Z]

Tsuga Carrière 1847 (Hemlock)


1 Most of the leaves 8-13 mm long, those originating from the sides and lower surface of the twig spreading more or less distichously in a horizontal plane, normally sized, those borne on the upper surface of the twig more or less appressed, dwarf, mostly 1/6 to 1/2 as long as the adjacent lateral leaves, 1-3 (-6) mm long, the whitened undersurface (consisting of rows of stomata) exposed upward; leaf margins minutely serrulate; leaf apices obtuse to rounded; seed cones 12-25 mm long, the ovuliferous scales ascending, even at maturity .............. *Tsuga canadensis*

1 Most of the leaves 10-18 mm long, those originating from the sides and lower surface of the twig spreading more or less distichously in a horizontal plane, normally sized, those borne on the upper surface of the twig not appressed, spreading at a 60-90 degree angle from the twig, mostly 3/4 to fully as long as the adjacent lateral leaves, 8-15 mm long, the whitened undersurface (consisting of rows of stomata) not exposed upward; leaf margins entire; leaf apices minutely retuse (notched), truncate, or rounded; seed cones 20-38 mm long, the ovuliferous scales spreading at a right angle to the axis at maturity .............................................. *Tsuga caroliniana*
**PINACEAE (G7)**

A family of about 29 genera and about 130 species. Recent studies indicate that the separation of the Taxodiaceae from the Cupressaceae is not warranted, and they are here combined (Gadek et al. 2000; Brunsfeld et al. 1994). The subfamilial classification used here follows Gadek et al. (2000). References: Farjon (2005); Hart & Price (1990); Hardin (1971b); Watson & Eckenwalder in FNA (1993b); Page in Kramer & Green (1990).

1. Leaves alternate.
2. Leaves deciduous, flexible, < 2 cm long, parallel-sided, the apex short-acuminate; [subfamily *Cunninghamiioideae*]  

1. *Cunninghania* R. Brown 1826 (China-fir)


* Cunninghamia lanceolata* (Lambert) Hooker, China-fir. Suburban woodlands; commonly planted horticulturally, rarely naturalizing, native of China. A variety of forms are seen, some with dark-green, others with glaucous-blue foliage. [= K, Z; C. sinensis R. Brown]

2. *Taxodium* L.C. Richard 1810 (Bald-cypress)

A genus of 3 species, trees, of e. North America and Mexico. There has been much debate over whether the two taxa of *Taxodium* in our area should be treated as species or varieties, and if as varieties, the proper nomenclature. I agree with Godfrey (1988), in his preference "to recognize two species ... because it is my perception that the vast majority of trees (populations) are thus distinguishable." True intermediates appear to be non-existent, though the "mimicry" of the two species creates "pseudo-intermediates" that can cause difficulties in identification. Occasionally, the two species can be seen growing together, in "hybrid habitats," as at the junction of Lake Waccamaw and the Waccamaw River (Columbus County, NC); a few recognizable intermediates can be seen. See Lickey & Walker (2002) for a contrary argument supporting varietal status. Neufeld (1986) discusses the different architecture and ecophysiology of the two species. The only other species in the genus is *Taxodium distichum* var. *mexicanum* Gordon. *Taxodium ascendens* is most closely related to *Glyptostrobus* and *Cryptomeria*. References: Godfrey (1988)=Z; Duncan and Duncan (1988); Lickey & Walker (2002)=Y; Watson in FNA (1993b); Page in Kramer & Green (1990); Tsumura et al. (1999). Key adapted from Z.

1. Larger knees short, rarely > 4 dm tall, usually columnar or broad and mound-like, with thick, compact bark on top; leafy branchlets ascending from the twigs, secondly erect (the base often curving, the apical portion of the branchlet borne in a vertical plane), except on juvenile trees (which mimic *T. distichum*); leaves subulate, spirally arranged, not spreading laterally and featherlike (except on juvenile trees), ascending or appressed; leaves mostly 3-10 mm long (to 15 mm long on juvenile trees); bark thick (1-2.5 cm thick), furrowed, dark-brown, not exfoliating; [trees of isolated depressions (clay-based Carolina bays, depression ponds), wet savannas, pocosins and other wet peaty habitats, and, less commonly, blackwater swamps and natural lakes]  

1. *Taxodium ascendens*
3. **Thuja** Linnaeus 1753 (Arborvitaes)


**Thuja occidentalis** Linnaeus, American Arborvitae, Northern White Cedar, Flat Cedar. Dry limestone, dolostone, and calcareous sandstone cliffs, talus, and boulderfields, rarely in our area in calcareous swamps, also planted and persisting around old homesites and cemeteries (mainly in the Mountains). March-April; October. Se. VA (recently confirmed, J. Townsend, pers. comm. 2009) south to s. FL, west to e. LA; it is surely one of the most scenic trees of eastern North America. [= RAB, G, K, S, WH, Z; < *T. distichum* – F; = *T. distichum* var. *nuttans* (Aiton) Sweet]

**Thuja plicata** (D. Don) C. & S. Sarg, Pacific Yew. Forests of the coast of W. WA and B.C., west to e. CA; also planted and persisting around old homesites and cemeteries. March-April; October. B.C. south to s. OR, s. WA, and s. OR; in the Cascades south to SNW.

**Thuja plicata** var. **plicata** (D. Don) C. & S. Sarg, Ponderosa Yew. Same as above. March-April; October. B.C. south to s. OR, s. WA, and s. OR; in the Cascades south to SNW.

4. **Chamaecyparis** Spach 1841 (White Cedar)


**Chamaecyparis thyoides** (Linnaeus Britton, Sterns, & Poggenburg, Atlantic White Cedar, Juniper. Peat dome and streamhead pocosins, blackwater stream swamps, hillside seepages, in highly acidic, peaty or sandy soils. March-April; October-November. S. ME south to n. FL and west to s. MS. From NJ south it is strictly a tree of the Coastal Plain; northward it is often found in kettle-hole bogs. In SC and GA, *C. thyoides* is absent in the outer Coastal Plain, occurring primarily in the fall-line Sandhills. A prized timber tree, now much reduced in abundance, formerly used for cabinetry, boat-building, shingles, and other uses. The wood is valuable enough (and resistant enough to rot) to have been mined from bogs in NJ. NC has some of the largest remaining stands of Atlantic White Cedar, in areas of very difficult access, such as the interiors of major peat-domes and large peat-filled Carolina bays. The species is generally known as "juniper" in our area. [= RAB, C, F, FNA, G, K, S; > *Cupressus thyoides* Linnaeus]

5. **Juniperus** Linnaeus 1753 (Red Cedar, Juniper, Savin)

A genus of about 60 species, trees and shrubs, of temperate, boreal, and subtropical regions of the Northern Hemisphere. Various species of *Juniperus*, especially creeping species, are frequently used in landscaping. Molecular studies suggest that section *Juniperus* (*J. communis* var. *depressa* in our area) and section *Sabina* (*J. virginiana* in our area) are quite divergent (Adams & Demeke 1993). Small's (1933) recognition of the genus *Sabina* may prove to be warranted; some modern authors accept it (especially Europeans) and recent molecular evidence provides some support. References: Adams (2006b; 2006c)=Z; Adams in FNA (1993b); Adams (1986); Adams & Demeke (1993); Adams (1995, 2006a); Page in Kramer & Green (1990).

1 Leaves flat-acicular, 5-20 mm long, never scale-like, with a white line on the upper surface; leaves borne in whorls of 3, spreading at 45-90 degrees from the twig; female cone ("berry") axillary, maturing in 2-3 years; [section *Juniperus*] ............................ *J. communis* var. *depressa*

1 Leaves primarily scale-like, ca. 1-2 mm long, though acicular and 2-10 mm long on young trees and some lower branches of larger trees, without a white line on the upper surface (though generally somewhat glaucous); leaves of mature twigs borne in opposite pairs of 2, decussate (thus 4-ranked), appressed to the twig (leaves of immature twigs sometimes in whorls of 3, spreading at 10-45 degrees from the twig); female cones ("berries") terminal on short branches, maturing the first year; [section *Sabina*].
2 Female cones ("berries") 3-4 mm long; terminal twigs 0.75-0.90 mm wide (including the scale-like leaves); scale leaves 1.20-1.45 mm long, obtuse to acute; trees generally with rounded or flattened crowns, the lower branches often drooping. .....

*Juniperus communis* Linnaeus var. *depressa* Pursh, Ground Juniper, Mountain Juniper, Common Juniper. In thin soil around rock outcrops on mountain summits and Piedmont monadnocks and rocky bluffs (in GA and NC); high elevation old fields (in VA), xeric Coastal Plain sandhills (in SC and VA). March-April; fleshy cone maturing in second or third year. This species is circumpolar, widespread in n. North America, n. Europe, and n. Asia. Adams (2008a, 2008b, 2008c) recognizes 5 varieties in North America, all eastern North American plants belonging to var. *depressa*. In North America *J. communis* is primarily northern and montane, occurring nearly throughout Canada and AK, south in the Appalachians to n. GA, south in the Rocky Mountains to NM, AZ, and CA. Its berry is the juniper berry used as a spice, as well as the main flavoring of gin. It is sometimes planted as a landscaping plant. In e. North America, it is rare and scattered south of PA, MI, and WI, ranging south to se. VA south to c. peninsular FL, west to e. LA (Florida Parishes). Many individuals may be the basis of reports of var. *communis* from our area. Additional problems about the status of *Juniperus communis* in our area remain unresolved; variation in growth form, morphologic characters, and habitat suggest the possibility of the presence of several native taxa. See Coker & Totten (1945) for additional discussion. [= RAB, C, F, FNA, G, K, W, Z; < *J. sibirica* Burgsdorf – S; < *J. communis* – WV]

**Juniperus virginiana** Linnaeus var. *silicicola* (Small) E. Murray, Southern Red Cedar, Coastal Red Cedar. Maritime forests and scrub, hammocks, coastal shell middens and natural shell deposits, brackish marshes, and other sandy or peaty, circumneutral situations. January-February; October-November. Se. VA south to e. peninsular FL, west to e. LA (Florida Parishes). Many recent authors have treated this taxon as a species, but Adams (1986) and Adams in FNA (1993b) consider varietal status more appropriate; Adams (1995) suggests that the two may have diverged as recently as the Pleistocene. The two varieties are said to intergrade in GA, and in other areas the characters used to separate them seem variable or imperfectly correlated. Large individuals can be as much as a meter in diameter. [= FNA, K, Z; = *J. silicicola* (Small) L.H. Bailey – RAB; = Sabina silicicola Small – S = *J. virginiana* ssp. *silicicola* (Small) J. Silba; < *J. virginiana* – WH]

**Juniperus virginiana** Linnaeus var. *virginiana*, Eastern Red Cedar. In a wide variety of forests, pastures, old fields, roadsides, and fencerows, primarily upland, occurring most abundantly on circumneutral soils (including shrink-swell clays), derived from mafic or calcareous rocks. January-March; October-November. Var. *virginiana* ranges throughout e. United States. The wood is much used for fence posts and the traditional southern cedar chest (which takes advantage of the aromatic and moth-deterrent properties of cedar wood). [= C, F, FNA, G, K, Z; = *J. virginiana* – RAB, W, WV; = Sabina virginiana (Linnaeus) Antoine – S; < *J. virginiana* – WH; = *J. virginiana* ssp. *virginiana*]

6. **Platycladus** Spach 1842 (Chinese Arborvitae)


* *Platycladus orientalis* (Linnaeus) Franco, Oriental Arborvitae, Tree-of-life. Commonly planted, especially in graveyards, and rarely persisting and spreading to pastures, fields, and roadsides; native of Asia. [= FNA, K; = *Biota orientalis* (Linnaeus) Endlicher – S; = *Thuja orientalis* Linnaeus]

**G12a. CEPHALOTAXACEAE** Neger 1907 (Plum-yew Family) [in CUPRESSALES]


**Cephalotaxus** Siebold and Zuccarini ex Endlicher 1842 (Plum-yew)

* *Cephalotaxus harringtonia* (Knight ex J. Forbes) K. Koch, Plum-yew. Suburban woodlands; uncommonly grown horticulturally, rarely naturalizing in the vicinity of plantings (as in Chapel Hill, Orange County, NC, and Grottoes, Augusta County, VA), native of Asia. [= Z]
The genus consists of about 8 (or more) very closely related species, trees and shrubs, of temperate regions of the Northern Hemisphere. The species have been termed "discouragingly similar" by Hils in FNA (1993b). In e. North America, *T. canadensis* occurs in ne. North America, and *T. floridana* Chapman is endemic to Panhandle FL. *T. brevifolia* Nuttall, Pacific Yew, of BC and AB south to MT, ID, OR, and CA, has recently been widely publicized as the source of an anti-cancer drug, present in all species of the genus. *T. baccata* Linnaeus is native to Europe, and 3-4 additional species occur in Japan and e. mainland Asia (Price 1990). References: Hils in FNA (1993b); Spjut (2007a, 2007b)=Y; Farjon (1998)=Z; Page in Kramer & Green (1990).

1 Bud scales blunt, only slightly keeled. ....................................................................................................................................................*T. baccata*

1 Bud scales often acute, keeled.

2 Leaf undersurfaces with cuticular papillae along the stomatal bands; shrubs or small trees to 10 m tall; [of Panhandle FL]........*T. floridana*

2 Leaf undersurfaces usually lacking cuticular papillae along the stomatal bands; shrubs to 2 m tall (or trees in *T. cuspidata*); [of w. NC and VA northward, or naturalized from plantings].

3 Stomata in (4-)5-9 (-11) rows on each side of midvein; [native of ne. N. America, south to w. NC and VA]. .........................*T. canadensis*

3 Stomata in (7-)9-14 (-17) rows on each side of midvein; [alien] ......................................................................................................................*T. cuspidata*
SECTION 4: MAGNOLIIDS AND PRIMITIVE ANGIOSPERMS

3. CABOMBACEAE A. Richard 1828 (Water-shield Family) [in NYMPHAEALES]

A family of 2 genera and about 6 species, aquatic herbs, nearly cosmopolitan. This family is closely related to the Nymphaeaceae and may be best combined with it (Angiosperm Phylogeny Group 2003). References: Wiersema in FNA (1997); Williamson & Schneider in Kubitzki, Rohwer, & Bittrich (1993); Les et al. (1999).

1 Plants with all leaves floating and peltate; plants coated with a layer of transparent, mucilaginous jelly; floating peltate leaves 3.5-11 cm long, 2-6.5 cm wide; [subfamily Hydroptilidae] ......................................................................................................................................................... Brasenia

Brasenia Schreber 1789 (Water-shield)

A monotypic genus, an aquatic herb, widely distributed in tropical and temperate regions of the Old and New World. References: Williamson & Schneider in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: The elliptic, peltate, floating leaves and mucilaginous petioles make Brasenia unmistakable.

Brasenia schreberi J.F. Gmelin, Water-shield, Purple Wen-dock. Lakes, ponds, sluggish streams, floodplain oxbow ponds. June-October. NS west to MN, south to s. FL and TX; also from BC south to CA; also in tropical America and the Old World. [= RAB, C, F, FNA, G, GW, K, S, W]

Cabomba Aublet 1775 (Fanwort)

A genus of about 5 species, aquatic herbs, tropical and temperate regions of America. References: Williamson & Schneider in Kubitzki, Rohwer, & Bittrich (1993).

Identification notes: Cabomba is sometimes mistaken for other, superficially somewhat similar aquatics, such as Ceratophyllum (Ceratophyllaceae), Utricularia (Lentibulariaceae), and Myriophyllum (Haloragaceae). Cabomba has the leaves opposite (rather than whorled), dichotomously divided (like Ceratophyllum), but the divisions lacking the marginal denticles of Ceratophyllum, and on a 1-3 cm long petiole (vs. sessile or on a petiole 0.2 mm long). Utricularia has the leaves sometimes dichotomously divided, but the divisions are usually irregular, the leaves are alternate (in most species), and bladder traps are present. Myriophyllum has the leaves pectinately rather than dichotomously divided.

Cabomba caroliniana A. Gray, Fanwort. Millponds, lakes, slow-moving streams. May-September. NJ west to OH, s. MI, and MO, south to FL and TX; sporadically introduced elsewhere from aquarium "throw-outs." C. caroliniana var. pulcherrima R.M. Harper, with purplish flowers and vegetative parts, occurs in the southeastern Coastal Plain; it needs further evaluation. GW imply that the purple pigmentation may be merely an environmental response to warm waters, and is not correlated with morphologic characters. [= RAB, C, F, FNA, G, GW, S; > C. caroliniana var. caroliniana – K; > C. caroliniana var. pulcherrima R.M. Harper – K; > C. pulcherrima (R.M. Harper) Fassett]

4. NYMPHAEACEAE R.A. Salisbury 1805 (Water-lily Family) [in NYMPHAEALES]

A family of 6 genera and about 75 species, aquatic herbs, cosmopolitan. References: Wiersema & Hellquist in FNA (1997); Schneider & Williamson in Kubitzki, Rohwer, & Bittrich (1993); Les et al. (1999).

1 Flowers nearly spherical, 2-5 cm in diameter; sepals 6 (in our species), petaloid, green to yellow, incurved; petals many, inconspicuous, scalelike or staminodial; leaves often of 2 types, the submersed leaves (when present) thinner in texture than the floating or emersed leaves; floating or emersed leaves having 60-90% of their surface area with vasculature derived from the midrib; rhizome with triwinged leaf scars; [subfamily Nymphaceseae] ......................................................................................................................................................... Nuphar

Nuphar J.E. Smith 1809 (Spatterdock, Yellow Pondlily)

A genus of about 16 species, aquatic herbs, of north temperate areas. Beal (1956) recognized 8 taxa of Nuphar in North America, which he treated as subspecies of the European N. lutea. Voss's (1985) statement (about the genus in Michigan) "our plants are quite easily distinguished ... and they are treated here as closely related species" applies equally (or better!) in our area. Recent treatments (see references) recognize multiple species. References: Beal (1956)=Z, Wiersema & Hellquist in FNA (1997); Padgett (1999)=Y; Padgett (2007)=X, Schneider & Williamson in Kubitzki, Rohwer, & Bittrich (1993). Key based in large part on FNA.
**NUPHAR LUTEUM** (Linnaeus) Sibthorp & J.E. Smith ssp. macrophyllum (Small) E.O. Beal – RAB, GW, W, Z; = Nuphar rubrodiscum (Small) Standley; = Nuphar lutea (Timm) E.O. Beal – K; = Nuphar lutea (Timm) E.O. Beal – Z

**NUPHAR MICROPHYLLA** (Persoon) Fernald. Lakes and ponds. June-September. NS, QC, and MB south to s. NJ, se. PA, MI, IL, and MN. [= C, FNA, X, Y; = Nuphar microphyllum – F, G; < Nuphar lutea ssp. pulmilla (Timm) E.O. Beal – K; < Nuphar pulmilla Timm; = Nuphar luteum ssp. pulmilla (Timm) E.O. Beal – Z]

**NUPHAR ORBICULATA** (Small) Standley. Quiet waters in blackwater swamps. May-October. A Southeastern Coastal Plain endemic: e. GA south to Panhandle FL and s. AL. [= FNA; = Nuphar lutea ssp. orbiculata (Small) E.O. Beal – K; > Nymphaea orbiculata Small – S; > Nymphaea bowbymica (Miller & Standley) Standley – S; = Nuphar advena (Aiton) Aiton f. ssp. orbiculata (Small) D. Padgett – X, Y; = Nuphar luteum ssp. orbiculatum (Small) E.O. Beal – Z]

**NUPHAR RUBRODISCA** Morong. Lakes and ponds. June-September. NB, QC, and ON south to NJ, PA, MI, and MN. [= FNA; = Nuphar × rubrodiscum Morong – C, X; = Nuphar × rubrodiscum Morong – F; = Nuphar rubrodiscum – G; = Nuphar lutea J.E. Smith ssp. rubrodiscum (Morong) Hellquist & Wiersema – K]

**NUPHAR SAGITTIFOLIA** (Walter) Pursh, Narrowleaf Pondlily, Bonnets. Blackwater streams, rivers, and lakes, in swift, sluggish, or stagnant water, extending downstream into freshwater tidal areas. April-October. Endemic to our area: e. VA south to ne. SC, very conspicuous and locally abundant on shallow bars along rivers such as the Northeast Cape Fear, Black, and Waccamaw, and forming dense colonies in Lake Waccamaw. Apparent hybrids with *N. advena* have been named *Nuphar ×interfluitans* Fernald. The submersed leaves have somewhat the texture and appearance of a thin leaf lettuce or the marine alga *Ulva*. This species appears to be closely related to *N. ulvacea* (Miller & Standley) Standley of blackwater rivers of Panhandle FL, another phytogeographic connection between se. NC and Panhandle FL. DePoe & Beal (1969) and Beal & Southall (1977) argue that this taxon and *N. advena* intergrade clinally, with *N. advena* inland and *N. sagittifolia* in the outer Coastal Plain, and that the two taxa are maintained by water temperatures. This ignores the fact that the two taxa often occur in close proximity to one another in both the inner and outer Coastal Plain. The frequency of so-called intermediates has also been exaggerated; few populations will present any difficulties in identification. I prefer to treat these taxa as species, with rare hybridization or introgression. Molecular data suggest that *N. sagittifolia* is more closely related to the boreal *N. variegate* than to *N. advena* (Padgett 2007). [= C, FNA, X; = Nuphar luteum (Linnaeus) Sibthorp & J.E. Smith ssp. sagittifolium (Walter) E.O. Beal – RAB, GW, Z; = Nuphar sagittifolium – F, G, orthographic variant; = Nuphar lutea J.E. Smith ssp. sagittifolia (Walter) E.O. Beal – K; = Nymphaea sagittifolia Walter – S]

NYMPHAEEACEAE

*Nuphar variegata* Durand in G.W. Clinton. Lakes and ponds. Widespread in ne. North America, south to DE, NJ, PA, OH, IN, IL, IA, and NE. May - September. [= C, FNA, X; = Nuphar variegatum – F, G; = Nuphar lutea ssp. variegata (Durand) E.O. Beal – K; = Nuphar luteum ssp. variegatum (Durand) E.O. Beal – Z]

*Nymphaea* Linnaeus 1753 (Waterlily)


1 Leaf margins sinuate-dentate ..........................................................N. capensis var. zanzibariensis
1 Leaf margins entire.
2 Petals blue ..................................................................................................N. elegans
2 Petals yellow or white (to pink).
3 Petals yellow; plants not producing stolons.
4 Petiole solid-colored; leaf length/width ratio (length measured from petiole attachment to tip of leaf, along midvein) (0.44-) avg. 0.56 (-0.71); two leaf lobes with rounded lobe tips; lower leaf surface reddish-purple ..........................................................N. odorata ssp. odorata
4 Petiole striped; leaf length/width ratio (-0.55-) 0.63 (-0.73); leaf lobes with pointed tips; lower leaf surface green.

* Nymphaea capensis* Thunberg var. zanzibariensis (Caspar) Conard, Cape Blue Waterlily. Ponds and canals; native of Africa. April-August. [= K, WH]

*Nymphaea elegans* Hooker, Tropical Blue Waterlily. Ponds, ditches, cypress swamps. April-August. FL west to TX, south into Mexico; Bahamas. [= K, WH]

*Nymphaea mexicana* Zuccarini, Banana Waterlily, Yellow Waterlily. Sluggish or stagnant waters; scattered in occurrence and possibly introduced from further south, but the introduction agents may well be wild ducks, such as canvasbacks. June-September. Ne. NC south to s. FL, west to TX, also in sw. United States and Mexico. [= RAB, FNA, K, Z; = Castalia flava (Leitner) Greene – S]

*Nymphaea odorata* W.T. Aiton ssp. odorata, White Waterlily. Ponds, sluggish waters. June-September. NL (Newfoundland) west to MB, south to FL and TX; also scattered in the w. United States. *N. odorata* is polymorphic, leading to the naming of numerous species, subspecies, and varieties (see synonymy for a few of the named entities). Wiesema in FNA (1997) recognize ssp. odorata (all of our plants) and ssp. tuberosa (Paine) Wiesema & Hellquist, more western and northern, but approaching our area (see below). Other named entities warrant further evaluation. *N. odorata* var. gigantea [= Castalia lekophylla Small] occurs on the Coastal Plain, and is considered to differ from *N. odorata* in its larger leaves (1.5-6 dm in diameter vs. 0.5-2.5 dm), larger flowers (mostly > 15 cm wide vs. mostly < 10 cm), and leaves upturned at the margins (vs. flat). *N. odorata* var. minor [= Castalia minor (Sims) Nyar] is considered to differ from *N. odorata* in its generally smaller size, leaves 5-11 cm in diameter, flowers mostly < 8 cm wide (vs. mostly > 9 cm wide); it may be merely a dwarfed form of extremely nutrient-limited waters of the Coastal Plain. [= FNA, K, Z; < N. odorata – RAB, WV; > < N. odorata var. odorata – C; > N. odorata var. odorata – F, G; > N. odorata var. gigantea Tricker – C, F, G; > N. odorata Schiv. stenopetalata Fernald – F; > Castalia odorata (W.T. Aiton) Wood – S; > Castalia minor (Sims) Nyar – S; > Castalia lekophylla Small – S]


7a. ILLICIACEAE A.C. Smith 1947 (Star-anise Family) [in AUSTROBAILEYALES]


*Ilicium* Linnaeus 1759 (Star-anise)

A genus of about 42 species, shrubs and trees, of temperate and subtropical se. Asia and se. North America (se. United States, Cuba, Haiti, and e. Mexico). References: Morris et al. (2007) studied the evolution of the genus and revised its sectional taxonomy; New World and Old World taxa form separate clades, treated as separate sections, our species being in section *Cymbostemon*. Vincent in FNA (1997); Morris et al. (2007); Keng in Kubitzki, Rohwer, & Bittrich (1993); Stone & Freeman (1968).
ILLICIACEAE

Illicium floridanum Ellis, Florida Star-anise. Acid ravines and small stream swamps. Sw. GA west to e. LA. Sparingly naturalized north of its native range from plantings, as along Black Creek, at Kalmia Gardens, Hartsville, Darlington County, SC (D. Hope, pers.comm. 2008). [= FNA, GW, K, S, WH]

Illicium parviflorum Michaux ex Ventenat, Swamp Star-anise, Yellow Anise-tree, Ocala Anise-tree. Cultivated and persistent; native of central peninsular FL. April-June. This species occurs in swampy forests, evergreen hammocks, and bayheads and is endemic to scattered localities in central FL; it is in the horticultural trade and has been introduced in various places, including sw. and se. GA and sc. SC (Aiken County) (H. Shealy and R. McCartney, pers.comm. 2008). [= FNA, K, S, WH]

7b. SCHISANDRACEAE Blume 1830 (Star-vine Family) [in AUSTROBAILEYALES]

A family of 2 genera and about 40-60 species, woody vines, of e. Asia and e. North America (only our single species). The family is most closely related to the Illiciaceae, Austrobaileyaceae, and Trimeniaceae. In APG III (2009), Schisandraceae is included in Illiciaceae, but the differences seem sufficient to keep them separate. References: Saunders (2001); Keng in Kubitzki, Rohwer, & Bittrich (1993).

Schisandra Michaux 1803 (Star-vine)


Schisandra glabra (Brickell) Rehder, Star-vine, Climbing-magnolia, Magnolia-vine. Rich slopes adjacent to bottomland forests, mesic "islands" surrounded by bottomlands, moist hammocks. May-June; July-August. Ne. NC (Martin County), sc. NC (Gaston County), n. GA, w. TN, e. and se. KY, and e. AR south to the FL Panhandle and LA; Mexico (Sierra Madre Oriental, Hidalgo). [= RAB, K, WH, Y, Z; = Schizandra coccinea Michaux – S, orthographic variant; = S. coccinea Michaux – W]

11. SAURURACEAE E. Meyer 1827 (Lizard's-tail Family) [in PIPERALES]

A family of 4 genera and 6 species, perennial herbs, of temperate e. and se. Asia (Saururus, Gymnotheca, Houttuynia), w. North America (Anemopsis), and e. North America (Saururus). One other member of the family occurs in North America: Anemopsis californica Hooker & Arnott, primarily of the sw. United States. References: Buddell & Thieret in FNA (1997); Wood (1971); Cheng-Yih & Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Meng et al. (2003).

Houttuynia Thunberg

{genus info}

* Houttuynia cordata Thunberg. Disturbed areas; moist suburban forests; native of e. Asia.

Saururus Linnaeus 1753 (Lizard's-tail, Water-dragon)


Saururus cernuus Linnaeus, Lizard's-tail, Water-dragon. Swamps, overthrow pools in stream floodplains, ditches, usually where water ponds seasonally or periodically. May-July; August-September. CT, s. QC, s. ON, and MI south to s. FL and e. TX. In swamps of the Coastal Plain, Saururus often is dominant in large patches. The elongate inflorescence, drooping at the tip, is distinctive, attractive, and the fanciful inspiration for the genus name, the specific epithet, and the common names. Thien et al. (1994) studied the reproductive biology of Saururus cernuus, and found that pollination was both by wind and by insects. [= RAB, C, F, FNA, G, GW, K, S, W, WH, WV]
ANGIOSPERMS

12. PIPERACEAE C.A. Agardh 1824 (Pepper Family) [in PIPERALES]

A family of about 5-8 genera and 3000 species, shrubs, herbs, trees, and vines, of tropical and subtropical areas. References: Tebbs in Kubitzki, Rohwer, & Bittrich (1993).

**Peperomia** Ruiz & Pavón 1794 (Peperomia)


1 Leaves opposite or whorled; stems pubescent ................................................................. P. humilis
1 Leaves alternate; stems glabrous .................................................................................. P. pellucida


* **Peperomia pellucida** (Linnaeus) Kunth, Pepper-elder, Man-to-man. Disturbed areas; introduced. P. pellucida has been collected escaped from cultivation in FL, LA, and GA (in the vicinity of Savannah). Boufford (1982) describes the species as showing "weedy tendencies" in the southeastern United States, where "first collected in 1957," and states that "it will be interesting to see if this plant will continue to expand its range". [= FNA, K, Z]

15. ARISTOLOCHIACEAE A. L. de Jussieu 1789 (Birthwort Family) [in PIPERALES]

A family of about 6-12 genera and 600 species, vines, shrubs, and herbs, of tropical, subtropical, and warm temperate regions. References: Barringer & Whittemore in FNA (1997); Ohi-Toma et al. (2006); Neinhuis et al. (2005); Huber in Kubitzki, Rohwer, & Bittrich (1993).

1 Acaulescent herb; calyx tube straight, radially symmetrical; stamens 12; [subfamily Asaroideae].
2 Leaves deciduous, pubescent, paired ........................................................................ Asarum
2 Leaves evergreen, glabrous, not paired ...................................................................... Hexastylis
3 Woody, twining vine; leaves 8-35 cm wide; [subtribe Isotrematinae] Isotrema
3 Low, erect or ascending herb; leaves 0.7-6.5 cm wide.
4 Leaf blade as wide as long, or wider than long; leaf venation palmate; [subtribe Aristolochiinae] Aristolochia
4 Leaf blade narrower than long; leaf venation pinnate; [subtribe Isotrematinae] Endodeca

**Aristolochia** Linnaeus 1753 (Birthwort)

A genus of about 300 species, herbs and vines, once Endodeca, Isotrema, and Pararistolochia are excluded (Huber in Kubitzki 1993). Recent work has clarified that Aristolochia s.l. comprises 4 main clades, each of which is distinctive molecularly, morphologically, and in karyotype. These can be (as here) recognized as genera, or alternatively as four subgenera, grouped into two genera (Aristolochia including Pararistolochia, and Isotrema including Endodeca), as suggested by Ohi-Toma et al. (2006). References: Barringer in FNA (1997); Ohi-Toma et al. (2006); Kelly & González (2003); Huber in Kubitzki, Rohwer, & Bittrich (1993). [also see Endodeca and Isotrema]

1 Plant an herb; flowers yellowish, < 2 cm across .............................................................. A. clematitis
1 Plant a woody vine; flowers brownish-purple and white, ca. 10 cm across .................. A. elegans

* **Aristolochia clematitis** Linnaeus, Birthwort. Disturbed areas; native of Europe. Naturalized in se. PA (Rhoads & Klein 1993) and MD (Barringer in FNA 1997). [= C, FNA, K]

* **Aristolochia elegans** Mast., Elegant Dutchman’s-pipe, Calico Flower. Disturbed areas; native of Brazil. [? A. littoralis Parodi – WH]

Houttuynia cordata  Saururus cernuus  Peperomia humilis  Peperomia pellucida  Aristolochia clematitis  Aristolochia elegans

**Asarum** Linnaeus 1753 (Wild Ginger)

ARISTOLOCHIACEAE

1. Calyx lobes 5-10 (-12) mm long, strongly reflexed, often more-or-less appressed back against the calyx tube, acute or acuminate, the tubular tips 0-4 mm long. .................................................. A. reflexum

2. Calyx lobes 10-35 mm long, spreading to ascending from the base, acuminate to caudate, the tubular tips 4-10 mm long. ................................................................. A. acuminatum


Asarum canadense Linnaeus, Common Wild Ginger. Mt (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Cp (DE, NC, SC, VA, WV): rich deciduous forests in circumneutral soils; common (uncommon in Piedmont of NC and SC, uncommon in VA Coastal Plain, rare in Coastal Plain in DE, NC, and SC). April-May. NB and QC west to MN, south to NC, AL, and n. LA. Taxa recognized at varietal or specific level in the past have recently often been ignored, but have some merit; they deserve further attention. [= S; < A. canadense var. canadense – C, G; < A. canadense – RAB, FNA, K, W; > A. canadense var. ambiguum (Bicknell) Farwell – F; > A. canadense var. canadense – F] [not yet mapped]

Asarum reflexum Bicknell. Mt (NC, VA?, WV?): rich deciduous forests in circumneutral soils; rare? April-May. CT west to s. MB, south to w. NC, KY, and MO. [= S = A. canadense Linnaeus var. reflexum (Bicknell) B.L. Robinson – C, F, G; < A. canadense – RAB, FNA, K, W; = A. reflexum Bicknell – S] [not yet mapped]

Endocera Rafinesque 1828 (Turpentine-root)

A genre of 2 (or more?) species, of eastern and sc. North America. This genus is morphologically distinctive within Aristolochia (in the broad sense), and forms a clade with Isotrema distinctive from Aristolochia s.s. (Ohi-Toma et al. 2006). References: Barringer in FNA (1997); Ohi-Toma et al. (2006); Kelly & González (2003); Neinhuis et al. (2005); Huber in Kubitzki, Rohwer, & Bittrich (1993).

Endocera serpentaria (Linnaeus) Rafinesque, Turpentine-root, Virginia Snakeroot. Dry to mesic forests, perhaps more restricted to mesic situations over acidic substrate, ranging into drier situations over calcareous or mafic substrates. May-June; June-July. CT and NY west to IL, MI, and MO, south to c. peninsular FL and TX. The tremendous variation in this species needs further study. Plants with sparingly pubescent, thin-textured, linear to lanceolate leaves have been called Aristolochia convolvulacea. These may represent merely morphologic extremes of a polymorphic complex; alternatively, some taxonomic recognition of such plants as distinct from A. serpentaria may be warranted. [= Aristolochia serpentaria Linnaeus – RAB, C, FNA, G, K, W, WH; > A. serpentaria var. hastata (Nuttall) Duchartre – F; > A. serpentaria var. serpentaria – F; > A. hastata Nuttall – S; > A. convolvulacea Small – S; > A. serpentaria – S]

Hexastylis Rafinesque 1825 (Heartleaf)

A genus of 10 species, herbs, of se. North America, very possibly best expanded to include Asian taxa treated in Heterotropa and Asiasarum. Barringer (1993) and Kelly (1997, 1998) have recently employed a broad definition of Asarum, including Hexastylis. Over the last half-century various students of the group (emphasizing a range of fields of evidence) have arrayed themselves for and against the recognition of Hexastylis as a genus distinct from Asarum. A cladistic analysis (Kelly 1997, 1998) showed distinctive clades which could be interpreted as evidence for the recognition of Hexastylis (including the Asian Heterotropa), though the author preferred to recognize 2 subgenera. I choose here to follow the more traditional (at least in our area) separation of Hexastylis from Asarum, until and unless stronger evidence is presented for their combination. Electrophotoec and morphologic studies currently in progress validate the species / varietal level taxonomy presented, insofar as results are available (R. Wyatt, pers. comm.). A difficult genus, Hexastylis is made more frustrating by the fact that nearly all diagnostic features relate to the shape and size of the fleshy and brittle calyx – characters which are difficult to describe and are largely lost when specimens are pressed. The difficulty of identifying herbarium specimens has sometimes been (apparently) used as a justification for reducing (often drastically, as in C) the number of taxa recognized. To those familiar with this genus in the field, however, the taxa here recognized form geographically distinctive populations. Size and (to a lesser degree) shape of individual flowers show considerable variation and can be altered by environmental factors; individual flowers or plants can be difficult to identify if taken out of context. Populations, however, are usually readily identifiable. References: Whitemore & Gaddy in FNA (1997); Gaddy (1987a)=Z; Blomquist (1957)=Y; Barringer (1993)=X; Gaddy (1987b); Gaddy in Wofford (1989); Sugawara (1987); Huber in Kubitzki, Rohwer, & Bittrich (1993). Key adapted from FNA, Gaddy in Wofford (1989), and Gaddy (1987a).

Identification notes: The photograph (Figure 1) in Gaddy (1987a) of the flowers of all species other than H. arifolia and H. speciosa is highly recommended as an aid to identification. The calyx tube orifice is measured on the inside – the diameter of the opening. The width of calyx lobes is measured from sinus tip to sinus tip.

1. Style extension bifid to stigma; leaves triangular to ovate-sagittate or subhastate, portions of the sides of nearly all leaves straight or concave; leaves mottled, the paler areas between the veins

2. Calyx abruptly contracted near the middle, the lower portion narrowly cuplike, abruptly expanded into a much broader upper half; calyx tube with internal raised reticulations; calyx lobes spreading; [endemic near Montgomery, AL] ................................................................. H. speciosa

3. Calyx lobes erect, 2-4 mm long, 2-4 mm wide at base; [of the Mountains westward] ................................................................. H. arifolia var. ruthii
1 Style extension notched or divided at the apex, not bifid to the stigma; leaves rounded, with cordate base, all portions of the sides of the leaves convex; leaves mottled or unnotched, if mottled, the paler areas along the veins.

5 Inner surface of calyx lobes pilose with whitish hairs; plant rhizomatous, the rhizomes long-creeping

3 Calyx lobes spreading, 2.5-8 mm long, 3-9 mm wide at base; [of the Coastal Plain, Piedmont, and eastern Mountains].

4 Calyx tube 13-18 mm long, 6-10 mm wide; [of the Coastal Plain, Piedmont, and Mountains of s. VA, NC, SC, GA, and westward through AL and MS to se. LA].

4 Calyx tube 20-25 mm long, 10-12 mm wide; [of the lower Gulf Coastal Plain, of sw. GA, FL Panhandle, s. AL, s. MS, and se. LA].


Asarum arifolium (Michaux) Small var. callifolia (Small) Blomquist. Mesic forests. March-May. Sw. GA and Panhandle FL (?) west to se. LA, in the lower East Gulf Coastal Plain. [= FNA, K, Y, Z; = H. callifolia (Small) Small – S; = Asarum callifolium Small; < Asarum arifolium Michaux – WH; = Asarum arifolium Michaux var. callifolia (Small) Barringer – X]

Asarum arifolium (Michaux) Small var. ruthii (Ashe) Blomquist, Appalachian Little Brown Jug. Upland forests, ultramafic outcrop barrens, calcareous forests. March-June. A Southern Appalachian endemic: sw. VA, se. KY, w. NC, e. TN, n. AL, and n. GA. Perhaps warranting species status. At the Buck Creek olivine barren (Clay County, NC) this species carpets several hundred hectares, in association with Packera paupercula var. appalachiana, Thalictrum macrostylum, and Sporobolus heterolepis; various morphological differences, especially the rhizomatous habit, suggest that it may represent an undescribed taxon. [= C, FNA, K, W, Y, Z; < H. arifolia – RAB; = Asarum ruthii Ashe – F; = H. ruthii (Ashe) Small – G, S; = Asarum arifolium Michaux var. ruthii (Ashe) Barringer – X]

Endoedea serpentaria

Hexastylis arifolia (Michaux) Small var. ruthii, Appalachian Heartleaf. On acidic soils in deciduous forests with Kalmia latifolia and Rhododendron maximum. May-June. Endemic to the Cumberland Plateau of TN (Chester, Wofford, & Kral 1997) and KY, with a few disjunct populations in the Blue Ridge of NC and in the Ridge and Valley of sw. VA (Washington County) (J. Townsend, pers.comm. 2006). [= RAB, FNA, K, W, Y, Z; < H. virginica – C; < Asarum contractum (Blomquist) Barringer – X (also see H. rhombiformis); = Asarum contractum (Blomquist) Barringer]


Hexastylis lewisii (Fernald) Blomquist & Oosting, Lewis's Heartleaf. Upland forests (pine or oak), pocosin ecosystems. April-May. Endemic to the Piedmont of VA and the Piedmont and Coastal Plain of NC. [= RAB, FNA, K, Y, Z; < H. shuttleworthii – C; = Asarum lewisii Fernald – F]
**Isotrema** Rafinesque 1819 (Dutchman's-pipe)

A genus of about 50 species, of temperate and tropical Asia, se. North America, and Central America. References: Barringer in FNA (1997); Oh-i-Toma et al. (2006); Kelly & González (2003); Huber in Kubitzki, Rohwer, & Bittrich (1993).

1 Plant nearly glabrous; leaves abruptly pointed; calyx purple or brown; [of the Mountains] ..........................I. macrophyllum

1 Plant soft pubescent; leaves blunt; calyx yellow, with a purple mouth; [largely of west or south of the Appalachians, also locally spread from cultivation] ..........................I. tomentosum

17. MAGNOLIACEAE A.L. de Jussieu 1789 (Magnolia Family) [in MAGNOLIALES]

A family of about 7 genera and 223 species, trees and shrubs, tropical and warm temperate, of e. and se. Asia, and from e. North America south through West Indies and Central America to Brazil. References: Hardin (1972); Hardin & Jones (1989)=Z; Meyer in FNA (1997); Figlar & Nooteboom (2004); Frodin & Govaerts (1996); Nooteboom in Kubitzki, Rohwer, & Bittrich (1993); Kim et al. (2001).

A genus of 2 species, trees, relictually distributed, with 

- Magnolia
- Liriodendron

Liriodendron Linnaeus (Tulip-tree)


1 Leaves about as broad as long, (2-) 4 (-8)-lobed; fruit a 2-seeded, indehiscent samara; [subfamily Magnolioideae]............... Magnolia

2 Leaves longer than broad, not lobed (in some species the leaves auriculate-cordate basally); fruit a cone-like aggregate, each follicle dehiscing to reveal the scarlet seed, at first connected to the follicle by a thread-like strand; [subfamily Liriodendroideae]............... Liriodendron

Magnolia Linnaeus 1753 (Magnolia, Cucumber-tree)

A genus of about 130 species, trees and shrubs, of e. Asia (Himalayas and Sri Lanka to Japan and w. Malaysia) and America (e. North America to West Indies, Central America, and South America). Molecular phylogenetics show Magnolia virginiana and M. grandiflora as closely related in a New World primarily subtropical clade, M. macrophylla in a clade with its close relatives, M. fraseri and M. pyramidata together, M. acuminata as basal in a clade that is otherwise Asian (equivalent to subgenus Yulania), and M. tripetala grouped in another clade that is otherwise Asian (Azuma et al. 2001). The sections used follow Figlar & Nooteboom (2004). References: Tobe (1998)=Y; Spongberg (1998)=X; Frodin & Govaerts (1996)=V; Palmarola-Bejerano, Romanov, & Bobrov (2008)=U; Azuma, Thien, & Kawano (1999); Azuma et al. (2001); Figlar & Nooteboom (2004); Nooteboom in Kubitzki, Rohwer, & Bittrich (1993); Kim et al. (2001); Hunt (1998).

1 Leaves cuneate to rounded (subcordate) at base.

2 Leaves glaucous and finely appressed-pubescent beneath; buds and twigs pubescent; [subgenus Magnolia, section Macrophylla].

3 Conelike aggregate fruit (follicetum) 2.5-6.5 cm long, 1.5-4 cm in diameter; leaf blade 17-56 cm long; stamens 170-350; pistils 20-50; small tree (to 12 m tall); [of Panhandle FL]......................................................... M. pyramidata

4 Staminodium and petals absent; leaf blade 7-15 cm long; 1-2 large achenes; [of Piedmont, and Coastal Plain (especially brownwater rivers and mesic habitats in the Coastal Plain is surprising to people used to North America, south to Panhandle FL. An important timber tree in the Southern Appalachians. [= Z; M. pyramidata]]

3 Conelike aggregate fruit (follicetum) 5-8 cm long, 5-7 cm in diameter; leaf blade 50-110 cm long; stamens (300-) 350-580; pistils 50-80; medium to large tree (to 32 m tall); [widespread, but not of Panhandle FL]......................................................... M. virginiana

2 Leaves green and glabrous beneath; buds and twigs glabrous; [subgenus Magnolia, section Auriculata].

4 Staminodium and petals absent; leaf blade 7-15 cm long; 1-2 large achenes; [of Piedmont, and Coastal Plain (especially brownwater rivers and mesic habitats in the Coastal Plain is surprising to people used to North America, south to Panhandle FL. An important timber tree in the Southern Appalachians. [= Z; M. pyramidata]]

1 Leaves cuneate to rounded (subcordate) at base.

2 Leaves longer than broad, not lobed (in some species the leaves auriculate-cordate basally); fruit a cone-like aggregate, each follicle dehiscing to reveal the scarlet seed, at first connected to the follicle by a thread-like strand; [subfamily Liriodendroideae]............... Liriodendron

1 Leaves about as broad as long, (2-) 4 (-8)-lobed; fruit a 2-seeded, indehiscent samara; [subfamily Magnolioideae]............... Magnolia
5 Leaves evergreen, coriaceous in texture, glossy dark green above as if varnished, rusty tomentose or green beneath; [subgenus Magnolia, section Magnolia] .................................................................................................................................................. M. grandiflora

5 Leaves variably evergreen to deciduous, herbaceous or subcoriaceous in texture, medium green above with a slightly glossy or dull finish; glaucous or green beneath.

6 Leaves evergreen to deciduous, aromatic when fresh, 8-20 cm long, elliptic, strongly glaucous beneath; [subgenus Magnolia, section Magnolia] .................................................................................................................................................. M. grandiflora

7 Leaves evergreen; previous year's stems densely pubescent; mature leaves with pubescent midveins; flowers opening near sundown (2-5 hours later than var. virginiana); medium to large tree, to >20 m tall; [of the Gulf Coast and inland, north and east to s. SC (e. NC?)]. .................................................................................................................................................. M. virginiana var. australis

7 Leaves evergreen to deciduous (at least tardily); previous year's stems glabrous; mature leaves with few hairs along the midvein below; flowers opening mid-afternoon; shrub to multi-stemmed small tree, to 10 m (rarely to 15 m) tall; [of the Atlantic Coastal Plain and inland, south and west to s. SC and w. NC]. .................................................................................................................................................. M. virginiana var. virginiana

6 Leaf base cuneate-attenuate; leaf blade ovate or oblongate (broader toward the tip); buds either glabrous or sericeous.

9 Leaf blades 15-50 cm long; buds glabrous; [native]; [subgenus Magnolia, section Yulania, subsection Tulipastrum].. .................................................................................................................................................. M. tripetala

8 Leaf base rounded to subcordate (often cuneate to widely cuneate in M. acuminata var. subcordata); leaves 10-30 cm long, broader near the middle or toward the base; borne scattered along the twig; pubescent; [subgenus Yulania, section Yulania, subsection Tulipastrum]

Magnolia acuminata (Linnaeus) Linnaeus var. acuminata, Cucumber-tree, Cucumber Magnolia. Mesic to subseric forests, especially by means strictly) over mafic or calcareous rocks, up to at least 1550m (where growing with Betula alleghaniensis, Abies firser, Picea rubens, and Sorbus americana), ultramafic outcrop barren (where codominant with Pinus rigida and Quercus alba). April-June; July-August. S. ME, MY, c. IN, s. MO, and e. OK, south to c. GA, Panhandle FL, s. AL, s. MS, and w. LA. The recognition of two varieties is uncertain (see discussion below). [= C, F, G, V, W, X, Y; < M. acuminata – RAB, FNA, K, W, Z; = Tulipastrum acuminatum (Linnaeus) Small - S; = Tulipastrum acuminatum (Linnaeus) D.L. Fu var. 1] Magnolia ashei Weatherby, Ashe’s Magnolia. Moist to wet hammocks. Endemic to FL Panhandle. [= FNA, K, Z; = M. macrophylla Michaux var. ashei (Weatherby) D.L. Johnson - WH; = M. macrophylla ssp. ashei (Weatherby) Spongberg – V, Y] Magnolia fraseri Walter, Fraser Magnolia, Earleaf Umbrella-tree. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA): mesic forests; common (uncommon in upper Piedmont only, uncommon in WV). April-May; July-August. A Southern Appalachian endemic: KY and w. VA south through w. NC and e. TN to nw. SC, n. GA, and ne. AL. [= RAB, C, F, FNA, G, K, S, W, Z; = M. fraseri var. fraseri – V, X; = M. fraseri ssp. fraseri – Y] Magnolia grandiﬂora Linnaeus, Southern Magnolia, Bull Bay. Maritime forests, mesic Coastal Plain bluffs and flats, bottomlands, now also widely naturalized, spreading from cultivation into wet to mesic forests. April-June; September-October. The pre-Columbian range was apparently from sc. NC south to c. peninsula FL, west to c. TX, largely on the Coastal Plain, now somewhat expanded northwards and inland by naturalization from centuries of horticultural planting. Curtis (1860) states that "the northern limit of this tree is in Brunswick County, south of the Cape Fear; but it flourishes in cultivation through all the lower part of the State. " This is, of course, the classic "southern magnolia," along with live oak (Quercus virginiana), and bald-cypress (Taxodium distichum), one of the totem trees of the Deep South. [= RAB, C, FNA, GW, K, S, V, Y; Z; Magnolia s.s.] Magnolia kobus DC., Kobus Magnolia, Kobushi Magnolia. Suburban woodlands; native of Japan. [add to synonymy]
Magnolia pygmaea Bartram, Pyramid Magnolia. Mesic hammocks, mesic forests, especially of bluffs and ravines. April-May; August. A Southeastern Coastal Plain endemic; c. SC south to Panhandle FL, west to e. TX. Sometimes treated as a variety or subspecies of M. fraseri, to which it is clearly closely related, but the distributional and morphological differences are discrete and specific status seems warranted. [= RAB, FNA, K, S, WH, Z; = M. fraseri Walter var. pygmaea (Bartram) Pampinini – V, X; = M. fraseri Walter ssp. pygmaea (Bartram) E. Murray – Y]

Magnolia tripetala (Linnaeus) Linnaeus, Umbrella Magnolia, Umbrella-tree. Mesic forests, ravines. April-May; July-October. Centered in the Southern Appalachians, but avoiding higher elevations, and therefore occurring primarily "around" the Blue Ridge; ranging from sc. and sw. PA, s. OH, s. IN south to SC, GA, Panhandle FL (Tobe 2007), AL, and MS; also disjunct in the Ouachita Mountains of c. AR and e. OK. [= RAB, C, F, FNA, G, K, S, V, W, WH, WV, X, Y, Z; = Houpoëa sp. 1]

Magnolia virginiana Linnaeus var. australis Sargent, Southern Sweet Bay. Pocosins, bay forests, and swamps in the Coastal Plain, streamhead pocosins, swamps, and sandhill seeps in the Sandhills, bogs and peaty swamps in the Piedmont and Mountains. April-July; July-October. S. SC (se. NC?!) south to s. FL, and west to e. TX, rarely extending into adjacent, more interior provinces; disjunct in nw. Cuba. Magnolia virginiana was recently discovered in Cuba, the single population named as ssp. oviedoana A. Palmarola, M.S. Romanov, & A.V. Bobrov (Palmarola-Bejarano, Romanov, & Bobrov 2008), but based on molecular results of Azuma et al. (2011), it seems better to consider this population as part of M. virginiana var. australis. Morphological, molecular, and chemical studies have shown strong variation in M. virginiana in North America, but the patterns are not clear based on the limited current studies (Azuma, Thien, & Kawano 1999). Based on the studies of Azuma et al. (2011), Azuma, Thien, & Kawano (1999), Tobe (1998), and McDaniel (1966), the recognition of two varieties seems clearly warranted, with a strong genetic break occurring in SC (a secondary and less strong genetic break separates West Gulf Coastal Plain populations from more eastern populations) (Azuma et al. 2011). Additional study is needed to understand the exact distributions of the two taxa in the area of contact (SC and adjacent GA and NC), whether species status is warranted, as suggested by Azuma et al. (2011), and the correlation between morphological traits and genetic variation. [= F, Y; < M. virginiana – RAB, C, FNA, G, GW, K, S, V, W, WH, X, Z; = M. virginiana ssp. australis (Sargent) A.E. Murray – U]

Magnolia virginiana Linnaeus var. virginiana, Northern Sweet Bay. Pocosins, bay forests, and swamps in the Coastal Plain, streamhead pocosins, swamps, and sandhill seeps in the Sandhills, bogs and peaty swamps in the Piedmont. April-July; July-October. Se. MA south to w. NC, s. SC, and e. GA. [= F, Y; < M. virginiana – RAB, C, FNA, G, GW, K, S, V, W, WH, X, Z; = M. virginiana var. virginiana – U]

21. ANNONACEAE A.L. de Jussieu 1789 (Custard-apple Family) [in MAGNOLIALES]

Asimina Adanson 1763 (Pawpaw)


Identification notes: Hybrids are known between some of the pineland species, notably A. angustifolia × incana [= A. ×nashii Kral], and should be expected where two species are present.

1 Leaves herbaceous in texture, obovate, >6 cm wide, acute-acuminate at the apex; peduncles with bracts; flowers reddish-maroon; [shrubs and trees]; [collectively widespread in our area].

2 Flowering peduncles 3-8 mm long, the hairs tan to rusty; leaves 6-15 (-20) cm long; sepals 4-7 mm long; outer petals 10-13 mm long; fruit 15-25 mm long; plant a shrub to 15 m tall; [widespread in our area] .................................................. A. parviflora

2 Flowering peduncles (10-) 15-20 (-25) mm long, the hairs dark reddish-brown; leaves 15-35 cm long; sepals 8-12 mm long; outer petals 15-25 mm long; fruit (3-) 7-15 cm long; plant a tree to 15 m tall; [widespread in our area] .................................................. A. reticulata

1 Leaves coriaceous in texture, linear to oval, blunt at the tip (or acute-acuminate); peduncles lacking bracts; flowers maroon, pale pink, yellow, cream, or white; [shrubs to 1.75 m tall]; [of e. GA, very rarely e. SC, and southward].

3 Flowers borne on growth of the previous year, appearing before or with leaf expansion; leaves 1.5-4× as long as broad, 4-10 cm long, 1-6 cm long; flowers with a sweet odor.

4 Newly emergent leaf blades densely tomentose on both surfaces with pale blonde or tan pubescence; outer petals white to yellowish, inner petals yellowish with a deep yellow corrugated zone; [of dry pinelands] .................................................. A. incana

4 Newly emergent leaf blades densely tomentose on the lower surface with the hairs near the midrib reddish, the upper surface sparingly pubescent; outer petals white, inner petals white, yellowish, or pink, with a maroon or purple corrugated zone; [of wet pinelands] ........... .................................................. A. reticulata
3. Flowers borne on growth of the current year, appearing after leaf expansion; leaves 3-15× as long as wide, 4-20 cm long, 0.5-4 cm wide; flowers with a sweet or fetid odor.

5. Flowers terminal; pubescence of new growth, petiole, lower leaf surface and peduncle dense, tomentose, and bright red. \[= Asimina incana \]

5. Flowers axillary; pubescence sparser and/or tan to rusty red.

6. Outer petals maroon or red, 1.5-3 cm long; leaves erect and secund, 4-11 cm long, 1-4 cm wide, averaging 3-5× as long as wide; leaf tips obtuse, rounded, or rounded-emarginate (rarely somewhat acute); shrubs to 3 (-5) dm tall. \[= Asimina pygmaea \]

6. Outer petals yellowish-white or pale pink, 3-10 cm long; leaves erect and secund, or not, 5-15 (-20) cm long, 0.5-3 cm wide, averaging 6-15× as long as wide; leaf tips acute or obtuse; shrubs 10-17.5 dm tall.

7. Leaves widest at or shortly above the middle, mostly 10-15× as long as wide; leaf margins revolute; outer petals white; new growth pubescent, becoming glabrous with age. \[= Asimina floridana \]

7. Leaves widest near the tip, mostly 6-12× as long as wide; leaf margins slightly revolute; outer petals white or pink; new growth glabrous or very sparsely pubescent, becoming glabrous with age. \[= Asimina angustifolia \]

Asimina angustifolia Rafinesque, Slimleaf Pawpaw. Dry pinelands. Se. GA south to c. peninsular FL, west to about the Suwannee River in the e. Panhandle of FL. [= A. longifolia var. longifolia – FNA, X, Z; < Asimina angustifolia – K, WH, Y; < Pityothamnus angustifolius (Rafinesque) Small – S]


Asimina parviflora (Michaux) Dunal, Small-flowered Pawpaw, Small-fruited Pawpaw. Sandy or rocky, dry to fairly moist forests. April-May; July-September. Se. GA south to c. peninsular FL, west to se. TX, primarily on the Coastal Plain, but inland to sw. SC, n. GA, sc. TN, and n. MS. [= RAB, C, F, G, FNA, K, S, W, WH, X, Y, Z]

Asimina pygmea (W. Bartram) Dunal, Dwarf Pawpaw. Pine flatwoods, wet savannas. Se. GA south to c. peninsular FL. It is a dwarf shrub 2-3 dm tall of pine flatwoods, occupying wetter sites than the other "pineland pawpaws." [= FNA, GW, X, Z; = A. pygmea – K, WH, Y, orthographic variant; = Pityothamnus pygmeus (W. Bartram) Small – S]


Asimina triloba (Linnaeus) Dunal, Common Pawpaw, Indian-banana. Alluvial forests, other moist, nutrient-rich forests. March-May; August-October. NJ, w. NY, and s. ON west to s. MI and e. NE, south to Panhandle FL, s. LA, and ne. TX. [= RAB, C, F, G, K, S, W, WH, X, Y, Z]

22. CALYCANTHACEAE Lindley 1819 (Sweet-shrub Family) [in LAURALES]

A family of 4 genera and about 8 species, shrubs and trees, of temperate e. China, temperate e. North America, temperate w. North America, and tropical ne. Australia. References: Nicely (1965); Wood (1958); Li et al. (2004); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Calycanthus Linnaeus 1759 (Sweet-shrub)

A genus of 2-4 species, 1 or 2 of e. North America, 1 of w. North America, and 1 of China (the latter sometimes segregated as a separate genus, Sinocalycanthus). References: Johnson in FNA (1997); Kartesz in Kubitzki, Rohwer, & Bittrich (1993); Nicely (1965)=Z; Ferry & Ferry (1987)=Y.

1. Tepals pale yellowish-green; seeds ca. 6 mm in diameter, with short, curved hairs. \[= C. brokianus \]

1. Tepals reddish brown; seeds ca. 10 mm in diameter, with long, straighter hairs. \[= C. floridus \]

Calycanthus brokianus Ferry & Ferry, Brock’s Sweet-shrub. Moist slopes. Endemic to mesic hardwood forests in GA. Its taxonomic validity is uncertain and controversial. [= C. brokiana – K, Y, orthographic variant; < C. floridus Linnaeus var. floridus – FNA]

Calycanthus floridus Linnaeus, Sweet-shrub, Strawberry-shrub, Carolina Allspice, Sweet Bubby-bush. Forested slopes and streambanks. April-May; August-September. PA, WV, and KY, south to GA, mw. FL, AL, and s. MS. Two varieties have

**28. LAURACEAE** A.L. de Jussieu 1789 (Laurel Family) [in LAURALES]

A family of about 50 genera and 2500-3500 species, trees and shrubs, of tropical, subtropical, and (rarely) warm temperate regions. *Laurus nobilis* Linnaeus, Laurel, Bay, native to the Mediterranean region of Europe and the bay leaf of commerce; planted as an ornamental and spice, especially in warmer parts of our area, but is not known to escape in our area. References: van der Werff in FNA (1997); van der Werff & Richter (1996); Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves evergreen; flowers perfect; [tribe Perseeae].

2 Leaves glabrous, bright green, with yellow callusities in the principal vein axils; crushed leaves with the odor of camphor .................................................. *Cinnamomum* Persea

2 Leaves pubescent to glabrate, dark green, without yellow callusities in the principal vein axils; crushed leaves with the odor of bay.................................................. *Cinnamomum*

1 Leaves deciduous; flowers imperfect; [tribe Laureae].

3 Some of the leaves with 1-2 (-5) rounded lobes; small to medium trees.............................................................................................. *Lindera*

3 None of the leaves lobed; medium to large shrubs.

4 Leaves 4-16 cm long, 2-6 cm wide, obovate, ovate, or broadly elliptic .............................................................................................. *Lindera*

4 Leaves 1.2-4 cm long, 0.5-1.5 (-1.9) cm wide, narrowly elliptic .............................................................................................. *Litsea*

**Cinnamomum** Schaeff 1760 (Cinnamon)

A genus of about 350 species, trees and shrubs, of e. and se. Asia, Oceania, and tropical America. References: Rohwer in Kubitzki, Rohwer, & Bittrich (1993); van der Werff in FNA (1997).

* Cinnamomum *camphora* (Linnaeus) J. Presl, Camphor tree. Disturbed areas, suburban woodlands, increasingly in natural forests; native of e. Asia. April-May. A serious invasive, especially southward. Reported as escaped and apparently naturalized in South Carolina by Hill & Horn (1997). In NC, reported for Moore County. [= FNA, K, WH; = Camphora *camphora* (Linnaeus) Karsten – S]

**Lindera** Thunberg 1783 (Spicebush, Benzoin)


1 Leaves typically with a thick, subcoriaceous texture (though sometimes thinner in texture if growing in shade), 4-8 cm long, 2-3.5 cm wide, narrowly obovate to oblanceolate, pubescent and strongly whitened below; leaves and bark aromatic, the odor lemony ................. *L. subcoriacea*

1 Leaves with a thin, membranous texture, 6-16 cm long, 2-6 cm wide, obovate, elliptic, or ovate, glabrous to pubescent below, but not strongly whitened; leaves and bark strongly aromatic, the odor spicy or like sassafras.

2 Leaf base cuneate; leaves widely obovate, plane (not rugose), with a short-acuminate apex, glabrous above, borne horizontally, spicy-fragnent when crushed; shrubs not colonial, often multi-stemmed from base, short to tall (to 5 m tall) ................................................. *L. benzoin*

2 Leaf base widely cuneate to rounded; leaves narrowly ovate, reticulate-rugose, with an acute apex, pubescent above, drooping, fragrant when crushed with an odor like sassafras; shrubs colonial, short (to 2 m tall) ................................................. *L. melissifolia*

**Lindera benzoin** (Linnaeus) Blume, Northern Spicebush. Rich alluvial forests, mesic forests on slopes with circumneutral soils, bottomlands, swamps. March-April; August-September. ME, s. ON, and MI, south to Panhandle FL and e. TX; disjunct in Edwards Plateau of c. TX. Where occurring on upland slopes, *L. benzoin* is an excellent indicator of base-rich soils, generally derived from calcareous sedimentary rocks or mafic metamorphic or igneous rocks. Some floristic treatments recognize two varieties based on whether the leaves and young twigs are pubescent (var. *pubescens*) or not (var. *benzoin*), but the varieties so recognized overlap broadly in distribution; it seems best to regard this as mere variation within the species. [= FNA, GW, RAB, W,
Lauraceae

84

Lindera melissifolia (Walter) Blume, Southern Spicebush, Pondberry. Wet flats and depressions, generally with pocosin shrubs. March-April; August-September. This species is southern in range, with a very scattered distribution in se. and c. NC, e. SC, e. & sw. GA, nw. FL, sw. AL (?), nw. MS, se. MO-AR, and se. AR-LA (recent collections unknown from FL and LA). It is nearly extirpated in NC, currently known only from three populations, in Sampson, Bladen, and Cumberland counties. A historic record from Orange County, NC (in the lower Piedmont), collected by Elisha Mitchell in 1820 and 1822, appears to be bonafide (McVaugh, McVaugh, & Ayers 1996). [= FNA, K, WH, Z; = L. melissaefolia – RAB, F, GW, orthographic variant; = Benzoin melissaefolium (Walter) Nees – S]

Lindera subcoriacea B.E. Wofford, Bog Spicebush. Peaty seepage bogs in headwaters of blackwater streams, in the sandhills and immediately adjacent Piedmont, with other pocosin shrubs. March-April; July-August. The overall range of this newly described species is still poorly known; it appears to be a Southeastern Coastal Plain endemic, ranging from se. VA (perhaps s. NJ) south to FL and west to LA. Occurring in our area primarily in a scattering of small populations in the fall line Sandhills of NC and SC, with an outlier or two in "Piedmont pocosins" just west of the Sandhills. Distinctive characteristics of sun-grown plants include the rounded apex of the leaf, the leaf strongly whitened beneath and borne in an ascending to even appressed position in relation to the twigs, and a typically fastigiate or virgate branching pattern, with multiple stems or branches ascending vertically and nearly parallel to one another. Shade plants have a different form. [= FNA, K, Z; = L. benzoin – WH]

Litsea Lamarc 1792 (Pondspice)

A genus of about 400 species, trees and shrubs, of warm temperate and tropical areas, especially se. Asia and Australia. The genus is very heterogeneous and probably needs division into more natural groups. References: van der Werff in FNA (1997); Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

Litsea aestivalis (Linnaeus) Fernald, Pondspice. Margins of limesink ponds and Carolina bays, less commonly in wet depressions and wet stringers dominated by shrubs. March-April; May-June. A Southeastern Coastal Plain endemic: e. MD (Wicomico County) and se. VA (York and Isle of Wight counties) south to n. FL (and allegedly also in LA, based on an old and poorly labeled specimen). The fine, zigzag twigs are distinctive. It grows to 6 m tall, characteristically forming a rounded bush. [= RAB, F, FNA, GW, K, WH]

Persea P. Miller 1754 (Bay)

A genus of about 150-200 species, trees and shrubs, of Asia and America. The avocado is a member of this genus, Persea americana P. Miller. References: Wofford in FNA (1997); Godfrey (1988); Clewell (1985); Rohwer in Kubitzki, Rohwer, & Bittrich (1993).

1 Twigs densely rusty-pubescent; lower surfaces of leaves with longer, rusty, often crooked hairs, not appressed, especially evident along the midrib and principal veins; peduncles 4-7 cm long; leaves tending to be larger and more acute .......................................................
P. borbonia

Persea borbonia (Linnaeus) Sprengel, Red Bay. Dunes, maritime forests, in dry sandy soils on barrier islands, known only north to Carteret County, NC. May-June; September-October. E. NC (Carteret County) south to FL and west to se. TX; reports of the species north of NC are based on the inclusion of P. palustris in a broadly defined P. borbonia, or are simply in error, based on less hairy plants of P. palustris. This species is rare north of Florida and becoming rarer with the destruction of most maritime and near coastal upland forests for the construction of vacation homes and tourist accommodations. [= FNA, G, GW, K, WH; = P. borbonia – RAB, F (also see P. palustris). = Tamala borbonia (Linnaeus) Rafinesque – S; = P. borbonia var. borbonia]

Persea palustris (Rafinesque) Sargent, Swamp Bay. Swamps, pocosins, bay forests, maritime forests, generally in wet peaty soils, but also in fairly dry, sandy soils in maritime forests. May-June; September-October. A Southeastern Coastal Plain endemic: DE, e. MD, and se. VA south to FL and west to se. TX; also in the Bahamas. Though variable in amount of hairs on the leaves, the hairs of P. palustris are always of a distinctly different character than those of P. borbonia. [= C, FNA, G, GW, K, WH; = P. borbonia – RAB, F; = Tamala pubescens (Pursh) Small – S; = P. borbonia var. pubescens (Pursh) Little]

Sassafras Presl 1825 (Sassafras)

A genus of 3 species, trees, of temperate e. Asia (2 species) and e. North America (1 species). References: van der Werff in FNA (1997); Rohwer in Kubitzki, Rohwer, & Bittrich (1993).
**Sassafras albidum** (Nuttall) Nees, Sassafras. A wide variety of forests, old fields, disturbed areas, fencerows. March-April; June-July. S. ME, s. ON, MI, and s. WI, south to c. peninsular FL, s. AL, s. MS, and se. TX. The original source of "root beer." [= RAB, C, FNA, G, K, W, WH; > S. albidum var. molle (Rafinesque) Fernald – F, WV; > S. albidum var. albidum – F, WV]
### SECTION 5: MONOCOTYLEDONAE (MONOCOTS)

#### 29. ACORACEAE Martinov 1820 (Calamus Family) [in ACORALES]

The family consists only of *Acorus*. Although traditionally treated as part of the Araceae, a wide variety of morphological, anatomical, and embryological evidence supports the segregation of the Acoraceae (Grayum 1987), a segregation additionally supported by molecular studies (Duvall et al. 1993, Chase et al. 1993). The spathe in *Acorus* is not morphologically equivalent to the spathe of the Araceae. References: Thompson in FNA (2000); Bogner & Mayo in Kubitzki (1998b).

*Acorus* Linnaeus 1753 (Calamus, Sweetflag)


1. Midvein of the leaves not well-developed, about equally as prominent as 1-5 well-developed lateral veins; mature fruits produced; vegetative leaves (0.3-) avg. 0.8 (-1.3) cm wide ...............................................................[A. americanus]

1. *Acorus americanus* (Rafinesque) Rafinesque, American Calamus, Sweetflag. Marshes, wet meadows, other wet areas, limey seeps. May–June. Widespread in ne. North America. This species is apparently a fertile diploid. Because this species has not generally been recognized in floras, its distribution is poorly known; additional distributional records should be expected and sought. [= FNA, K; < *A. calamus* Linnaeus – RAB, C, F, G, GW; < *A. americanus* – W]

* Acorus calamus* Linnaeus, European Calamus, Sweetflag. Marshes, wet meadows, other wet areas; native of Eurasia, now widespread in e. North America. May–June. The aromatic rhizome and leaves have been used medicinally and candied as a confection. Populations of *A. calamus* in our area are apparently sterile triploids introduced from Europe, though diploid and tetraploid populations of *A. calamus* are known from Asia. [= FNA, K;  < *A. calamus* Linnaeus – RAB, C, F, G, GW (also see *A. americanus*); < *A. americanus* – W]

#### 30. ARACEAE A.L de Jussieu 1789 (Arum Family) [in ALISMATALES]

A family of about 100-110 genera and about 3000-4000 species, herbs and reduced aquatic herbs, cosmopolitan, but mostly tropical and subtropical. The Lemnaceae is phylogenetically embedded in the Araceae, and is here included in it as subfamily Lemnoideae (Angiosperm Phylogeny Group 1998, 2003; Keating 2004). References: Thompson in FNA (2000); Cusimano et al. (2011); Mayo, Bogner, & Boyce in Kubitzki (1998b); Keating (2004); Serviss, McDaniel, & Bryson (2000); Landolt in FNA (2000); Landolt (1986); Landolt in Kubitzki (1999b); Les & Crawford (1999); Bown (2000).

1. Plant a floating aquatic (or stranded), the individual leaves <2 cm long; [subfamily Lemnoideae].

2. Fruits solitary; fronds with 1 or more nerves; reproductive pouche 1, terminal.

3. Fruits thick, globose, < 2 cm long. .........................................................[6. Wolffia]

4. Fruits flat, elongate and curved, 4-14 mm long. .........................................................[7. Wolffiella]

5. Roots (1-) 2-7 (-12) per frond; fronds with (3-) 5-7 nerves; fronds 1.5-3× as long as wide; all of the roots perforating the scalelike leaflet. ...............................................................[4. Lemma]

6. Roots (1-) 2-21 per frond; fronds with (3-) 5-21 nerves. ...............................................................[5. Landoltia]

7. Leaves simple.

8. Bulblets lacking at the petiole; spadix free from the spathe; [native, common in our area] .........................................................[13. Arisaema]

9. Bulblets present at base and summit of the petiole; spadix fused to the spadix; [alien, rare] .........................................................[14. Pinellia]


11. Leaves not peltate, either cuneate, rounded, cordate, or hastate.

12. Spatha absent or obscure; leaf blade 2-5× as long as wide, cuneate at the base, lanceolate or narrowly elliptic; leaf venation parallel; [subfamily Oronitioideae, tribe Oronitieae] ...............................................................[1. Oronitium]

13. Spatha present, surrounding the spadix, at least at its base; leaf blade 1-2.5× as long as wide, either hastate at the base (Arum, Pellandra, and Xanthosoma), or rounded (Symlocarpus), or cordate (Calla), broadly ovate in outline.

14. Spatha white; leaves cordate; plants from elongate rhizomes; [MD northward]; [subfamily Calloideae] .........................................................[8. Calla]

15. Spatha green or white; leaves hastate or rounded at base; plants from fibrous roots, a short thick rhizome, tuber, or a corm; [collectively widespread].

16. Leaves ovate, rounded or suborbicular at the base; spathe purple, or purple flecked with white; [subfamily Oronitioideae, tribe Symlocarpaeae] ...............................................................[2. Symlocarpus]

17. Leaves hastate at the base (somewhat arrowhead-shaped); spathe green or white; [subfamily Aroideae].
ARACEAE

13 Larger leaf blades > 5 dm long; longer petioles 10-20 dm long; [subfamily Aroideae, tribe Caladieae] ...... 9. Xanthosoma
13 Larger leaf blades < 5 dm long; longer petioles < 7 dm long.
14 Plant from a horizontal tuber; leaves variegated; [alien, of moist soils]; [subfamily Aroideae, tribe Areae] ........ 15. Arum
14 Plant from fibrous roots; leaves not variegated; [native, of wetlands]; [subfamily Aroideae, tribe Peltandreae] ........

...........................................................................................................................................................................
10. Peltandra

I. Orontium Linnaeus 1753 (Golden Club)


Orontium aquaticum Linnaeus, Golden Club, Bog Torches, Never-wet. Generally in peaty and stagnant water, such as beaver ponds, blackwater streams, swamps, pools in low pocosins, streambeds in the Piedmont, bogs and swamps in the mountains. March-April. MA and c. NY south to s. FL and west to LA, north in the inland to w. NC, KY, and WV, primarily but by no means strictly Coastal Plain. Fresh leaves are unwettable, silvery-glistening when forced under water. [= RAB, C, F, FNA, G, GW, K, S, W, WH, WV]

2. Symplocarpus R.A. Salisbury ex Nuttall 1818 (Skunk Cabbage)


3. Spirodela Schleiden 1839


4. Lemna Linnaeus 1753 (Duckweed)


1 Margin of fronds denticulate in the distal portion; fronds narrowed basally to an elongated, persistent, green stalk, the fronds therefore cohering in long, often branched chains of 3-50 fronds; fronds submerged (except when flowering or fruiting); [section Hydrophylla] ...

...................................................................................................................................................................................................................
L. trisulca

1 Margin of fronds entire; fronds rounded basally, with a very small white stipe soon decaying, the fronds therefore cohering in simple clusters of 2-5; fronds normally floating.

2 Fronds with (0-) 1 nerve; anthocyanin absent in fronds (fronds green); [section Uninerves].

3 Fronds 1-2× as long as wide; nerve indistinct to fairly prominent, reaching at most 2/3 of the distance from node to apex (nerve about as long as or shorter than the aerenchymatous portion of the frond); fruit 0.6-1.0 mm long.................................L. minuta

3 Fronds 1.3-3× as long as wide; nerve mostly prominent, reaching at least 3/4 of the distance from node to apex (nerve longer than the aerenchymatous portion of the frond); fruit 1.0-1.35 mm long.................................................................L. valdiviana

2 Fronds with 3-5 (-7) nerves; anthocyanin absent or present in fronds (fronds green or red).

4 Root sheath winged at the base; root tip sharply pointed; roots not longer than 3 cm long; anthocyanin absent in fronds; [section Alatae].

5 Seeds with 8-26 prominent ribs, brownish, falling from the fruit when ripe; fronds with only 1 papilla above the node, which is smaller than the papule at the apex; wing of the root sheath 1-2.5× as long as wide..............................L. aequinoctialis

5 Seeds with 35-70 obscure ribs, whitish, remaining in the fruit when ripe; fronds very often with 2-3 papilla above the node, which are larger than the papule at the apex; wing of the root sheath 2-3× as long as wide ..............................................L. perpusilla

**Lemma minor** Linnaeus, Common Duckweed. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. Widespread in the Northern Hemisphere; scattered in the Southern Hemisphere, where perhaps in part introduced. [= FNA, K, WH, Y, Z; < L. minor – RAB, C, F, G, W, WV (also see L. obscura)]

**Lemma minuta** Kunth, Least Duckweed. Quiet waters, seeptages. Widespread in North America, Central America, and South America; more local in Europe and Japan. [= C, FNA, K, WH; = L. valdiviana Philippi var. abbreviata Hegelmann – F; = L. minuscula Herter – Y, Z]

**Lemma obscura** (Austin) Daubs, Little Duckweed. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. NY west to MN and NE, south to s. FL, TX, Mexico, and the Bahamas. [= FNA, K, WH, Y, Z; < L. minor – RAB, C, F]

**Lemma perpusilla** Torrey, Tiny Duckweed. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. QC west to MN, south to NC, TN, and TX. [= RAB, C, F, FNA, G, K, W, Y, Z]


**5. Landoltia** D.H. Les & D.J. Crawford (Duckmeat)


**6. Wolffia** Horkel ex Schleiden 1844 (Watermeal, Mud-mary, Rootless-duckweed)


1 Fronds globose to ovoid, 1-1.5× as deep as wide; thallus not brownish punctate above
2 Fronds 1.0-1.3× as long as wide, 0.4-1.2 mm wide ................................................................. *W. columbiana*
3 Fronds 1.3-2.0× as long as wide, 0.3-0.5 mm wide ................................................................. *W. globoa*
4 Root sheath not winged at the base; root tip mostly rounded; roots often longer than 3 cm long; anthocyanin present or absent in fronds; [section *Lemma*].
6 Plants forming small, olive-brown rootless turions, 0.8-1.6 mm in diameter, which sink to the bottom ..................... *L. turionifera*
7 Plants without distinct turions.
8 Fronds not reddish on the lower surface (or if so only slightly so and much less so than on the upper surface); greatest spacing of veins near the middle of the frond or towards its base .............................................................................................. *L. minor*
9 Fronds reddish on the lower surface (and more intensely so than on the upper surface); greatest spacing between the veins near the middle of the frond or its tip.
10 Fronds gibbous; fronds with very distinct papillae above the node and near the apex on the upper surface, but not between the node and the apex; seeds with 10-16 distinct ribs ......................................................................................... *L. obscura*
11 Fronds flat; fronds with mostly distinct papillae on the midline on the upper surface; seeds with 3-60 indistinct ribs ....................... ................................................................................................................................. *L. turionifera*


* Wolffia globosa (Roxburgh) den Hartog & Plas, Asian Watermeal. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; native of Asia. [= FNA]

7. Wolffiella Hegelmann 1895


1 Fronds (4-) 6-15 (-20)× as long as wide; angle of pouch 25-50° ........................................................................................................... W. gladiata
2 Fronds 1.5-8× as long as wide; angle of pouch 45-90° .......................................................................................................................... W. oblonga

Wolffiella gladiata (Hegelmaier) Hegelmaier, Mud-midgets. Ponds, ditches, beaver-ponds millponds. April-June. MA and n. IL (s. WI?) south to s. FL and TX; Mexico. [= FNA, K, WH, Y, Z; > Wolffiella floridana (Donnell-Smith) C. Thompson – RAB, C, F, G, GW, S; > W. gladiata – GW]

Wolffiella oblonga (Philippi) Hegelmaier. Quiet waters. N. peninsular FL, MS (?), LA, TX, south to Mexico, Central America, South America; West Indies. [= FNA, GW, K, WH]

8. Calla Linnaeus 1753 (Calla)


Calla palustris Linnaeus, Wild Calla, Water-arum. Swamps. A circumpolar species of seepage swamps, ranging south in North America to sw. PA, w. MD, n. IL, c. MN, and BC. [= C, F, FNA, G, K]

9. Xanthosoma Schott 1832

A genus of about 60 species, herbs, of tropical Central and South America. References: Mayo, Bogner, & Boyce in Kubitzki (1998b); Serviss, McDaniel, & Bryson (2000)=Z.

* Xanthosoma sagittifolium (Linnaeus) Schott, Elephant-ear. Ditches; native of tropical America. It can be seen in ditches adjacent to ornamental plantings; it is uncertain whether it can be considered naturalized in the more northern parts of our area. It is superficially similar to Colocasia, differing in its non-peltate leaves. [= K, WH, Z; = Xanthosoma sagittifolium – GW, orthographic error]

10. Peltandra Rafinesque 1819 (Arrow-arum)

**Identification notes:** *Peltandra* is often confused in vegetative condition with *Pontederia* and *Sagittaria*, superficially similar emergent aquatics with hasitate or sagittate leaves. *Peltandra* leaves have pinnate venation, a prominent midvein, a prominent vein running parallel to the leaf margin, and the hasitate lobes with rounded to acute apices. *Pontederia* leaves have parallel venation, lack a prominent midvein and a prominent vein parallel to the leaf margin, and have hastate lobes with broadly rounded apices. The leaves of sagittate species of *Sagittaria* have parallel venation, a prominent midrib, a vein at 90 degrees to the midrib at the junction of the main blade and each of the hastate lobes that forks, with at least one fork directed apically and at least one fork directed into the basal lobe, lack a prominent vein parallel to the margin, and have hastate-sagittate lobes with acuminate apices.

1 Spathe green at base, bright white above (the white portion merely a margin), flared open and therefore only loosely surrounding the spadix, succulent below, the white portion thin and herbaceous, the margins generally nearly entire and plane; fruits red; distal portion of leaf blade lacking broad, coarse veins similar to the midvein (all the veins alike and fine) .......................................................................................................................... *P. sagittifolia*

1 Spathe green (rarely with a narrow cream-colored or whitish margin up to 1.7 cm wide), tightly surrounding the spadix, thick and succulent throughout, the margins crisped; fruits green to dark purplish-green; distal portion of leaf blade often with several broad, coarse veins similar to the midvein, the remainder of the veins fine (sometimes the distal portion of the leaf with fine veins only) ........................................................................................................... *P. virginica*

*Peltandra sagittifolia* (Michaux) Morong, Spoonflower, White Arrow-arum. Pocosins of the outer Coastal Plain, sphagnum swamps. July-August. A Southeastern Coastal Plain endemic: e. NC south to c. peninsular FL and west to se. LA. The reduction of *P. sagittifolia* to a subspecies of *P. virginica* (Blackwell & Blackwell 1974) was based on confusion of true *P. sagittifolia* with forms of *P. virginica*. The two species are distinct. [= FNA, GW, K, WH; = *P. sagittaeolia* (Michaux) Morong – RAB (an orthographic variant); = *P. glauca* (Elliott) Fey – S; = *P. virginica* ssp. luteospadix (Fernald) Blackwell & Blackwell – Z]

*Peltandra virginica* (Linnaeus) Schott, Green Arrow-arum, Tuckahoe. Marshes, bogs, beaver ponds, pocosins, other stagnant, aquatic situations. May-June. ME, s. QC, and n. MI south to s. FL and e. TX. [= RAB, C, FNA, G, GW, K, S, W, WH; = *P. virginica* – F; = *P. luteospadix* Fernald – F; = *P. virginica* ssp. virginica – Z]

**11. Pistia**

Linnaeus 1753 (Water Lettuce)


*Pistia stratiotes* Linnaeus, Water Lettuce. Stagnant or slow-moving waters of rivers, sometimes cultivated in ponds, where it persists for a while (presumably eventually eliminated by cold winters). This floating aquatic, pantropicaly distributed, appeared in the Waccamaw River of SC (downstream from NC) in 1990 and 1991, apparently successfully overwintering (Nelson 1993). Further south it is variously and paradoxically considered as native and a noxious water-weed. Its occurrence as a naturalized component of GA’s flora is undocumented; it is at least present as a cultivated plant in water gardens and presumably escapes. The original distribution is unclear. [= FNA, GW, K, S, WH]

**12. Colocasia**

Schott 1832 (Elephant’s-ear, Taro, Dasheen)


* *Colocasia esculenta* (Linnaeus) Schott, Elephant’s-ear, Taro, Dasheen. Ditches, shores, bottomland hardwood forests; native of the Tropics. Frequently planted for its “tropical” appearance, becoming naturalized, for instance at Lake Waccamaw, Columbus County, NC, where it grows scattered along much of the shoreline, spread by fragments of rhizome. In our area, it is generally infertile. In the Tropics, *Colocasia* is a food crop cultivated for its rhizomes and shoots. The rhizomes are the source of “poi,” a starchy staple of the Hawaiian Islands. See Serviss, McDaniel, & Bryson (2000) for a discussion of various varieties cultivated in the southeastern United States, their identification, and their weediness. [= FNA, GW, K, WH; = *C. antiquorum* Schott – S; > *C. esculenta* var. antiquorum (Schott) Hubb. & Rehder – Z; = *C. esculenta* var. esculenta – Z]

**13. Arisaema**

Martius 1831 (Jack-in-the-pulpit, Indian-turnip)

A genus of about 150-170 species, of Asia, e. North America, e. Africa, and Arabia. Some of the taxa here recognized as subspecies of *A. triphyllum* might better be considered as species with relatively subtle morphological distinctions. They are broadly sympatric, and sometimes occur together in mixed populations with little sign of introgression or hybridization. *Ssp. triphyllum* is tetraploid and does not produce fertile seed when crossed with the other (diploid) subspecies (Treiber 1980). References: Thompson in FNA (2000); Huttleston (1981)=Z; Treiber (1980)=Y; Huttleston (1949)=X; Gusman & Gusman (2002)=Q; Renner, Zhang, & Murata (2004); Mayo, Bogner, & Boyce in Kubitzki (1998b). Key based on the references.

1 Leaf with (5-) 7-15 leaflets, arranged pedately on a semicircular axis; spadix 9-20 cm long, attenuate, long-exserted from the spathe; [section *Tortuosa*] ................................. *A. dracontium*

1 Leaf with 3-5 leaflets, arranged palmately; spadix 3.5-8 cm long, clavate or cylindrical and blunt, included in the spathe; [section *Pedatisecta*].

2 Leaves glaucous beneath at maturity; spathe flange 2-9 mm broad; spathe hood green, or green with purple stripes; sterile spadix (appendix) clavate or cylindrical.
3 Lateral leaflets (of primary leaf if more than one) 2-parted or 2-lobed (rarely unlobed); sterile spadix 1-3 mm in diameter, cylindrical, curved outward; spathe hood green ................................................................. *A. triphyllum ssp. quinatum*

3 Lateral leaflets (of primary leaf if more than one) undivided (rarely lobed); sterile spadix 4-10 mm in diameter, clavate, straight; spathe hood green, or green striped with purple ................................................................. *A. triphyllum ssp. tripheyllum*

2 Leaves green beneath at maturity (very rarely glaucous); spathe flange 1-3 mm broad; spathe hood green with white stripes, green with purple stripes, solid green, or solid purple; sterile spadix (appendix) cylindrical.

4 Spathe tube not fluted (rarely weakly fluted); spathe hood solid green or solid purple ......................................................... *A. triphyllum ssp. pusillum*

4 Spathe tube strongly fluted; spathe hood green with white or purple stripes ................................................................. *A. triphyllum ssp. stewardsonii*


*Arisaema triphyllum* (Linnaeus) Schott ssp. quinatum (Nuttall) Hultlestone, Southern Jack-in-the-pulpit, Preacher John. Mesic forests. March–April. Sc. NC, sw. NC, se. TN south to Panhandle FL and e. TX. This taxon is of uncertain validity; Treiber lumps it with ssp. pusillum, while Hultlestone recognizes it as a full species (Hultlestone 1949) or as a subspecies (Hultlestone 1981). This taxon is diploid (2n=28). [= K, Z; < A. triphyllum – RAB, FNA, W; = A. quinatum (Nuttall) Schott – GW, S, WH, X; < A. triphyllum ssp. pusillum – Q, Y; ? A. polymorphum Buckley]

*Arisaema triphyllum* (Linnaeus) Schott ssp. stewardsonii (Britton) Hultlestone, Bog Jack-in-the-pulpit. Bogs and peaty swamps. April-May. NS west to MN, south to w. NC, e. TN, and n. IN (Treiber 1980). This subspecies is the most northern, and also has the most distinctive habitat, being restricted to distinctly wet, peaty sites. This taxon is diploid (2n=28). [= K, Q, X, Y, Z; < A. triphyllum – RAB, FNA, GW, W; = A. triphyllum var. stewardsonii (Britton) G.T. Stevens – C, G; = A. stewardsonii Britton – F]


14. **Pinellia** Tenore 1839 (Pinellia)


* Pinellia ternata (Thunberg) Makino ex Breitenbach, Pinellia. Suburban woodlands; native of Japan. Introduced from Japan and rarely naturalized, at least in the northern portion of our area, as in DC, se. PA, NJ, and s. NY. [= C, F, FNA, G, K]

15. **Arum** Linnaeus 1753 (Arum)


* Arum italicum Linnaeus *ssp. italicum*. Arum. Suburban woodlands; native of Europe and n. Africa, weakly naturalizing from horticultural use. It has a large (>10 cm long) white spathe. Reported for Fairfax County, VA (Steuary 2010). [= Z; < *A. italicum* – FNA]
A family of 5 genera and about 30 species, of disjunct distribution in north temperate and subarctic areas, and in the Guayana Shield and northern Andes areas of n. South America. Reveal & Zomlefer (1998) place the Tofieldiaceae in the monotypic order Tofieldiales, only distantly related to the Liliaceae. Tamura in Kubitzki (1998a) treats this group as subfamily Tofieldioideae of the Nartheciaceae. References: Zomlefer (1997c, 1999); Tamura in Kubitzki (1998a).

1 Inflorescence 1-flowered; tepals yellow; seeds yellowish; [ endemic to Panhandle FL ] ............................................................... Harterocallis
1 Inflorescence a raceme or thryse; tepals white to pale cream (fading to yellowish on dried specimens); seeds brown; [ collectively widespread].
2 Bracts of the inflorescence large, spathelike, acuminate-aristate at the tip; tepals 9–17 mm long; stamens (6–) 9 (-12). ......................... Pleea
2 Bracts of the inflorescence minute; tepals 2.5–5 mm long; stamens 6.
3 Inflorescence a raceme (the flower pedicels attached to the scape singly); scape smooth; flowering (late August-) late September-October ................................................................. Tofieldia
3 Inflorescence a thryse (flower pedicels attached to the scape in groups of 3–7); scape scurfy-scarbrous; flowering June-August ... Triantha

Harterocallis McDaniel 1968 (Harper's Beauty)


Pleea Michaux 1803 (Rush-featherling)

Pleea tenuifolia Michaux, Rush-featherling. Locally abundant in wet savannas, pocosin margins, usually in peaty soil, locally abundant in a few counties in se. NC, rare inland (very rarely as far as Cumberland County, NC). September-October; October-November. A Southeastern Coastal Plain endemic: se. NC and ne. SC south to sw. GA, n. FL and s. AL, but apparently absent from s. SC and ne. GA. When in flower in wet savannas and powerline rights-of-way in Brunswick County, Pleea visually dominates areas up to hundreds of hectares. In sterile condition, it is recognizable by its leathery equitant leaves, bright red at their bases. [= RAB, FNA, GW, K, S, WH; = Tofieldia tenuifolia (Michaux) Utech – Z]

Tofieldia Hudson 1778 (Bog Asphodel)
A genus of about 7-8 species, of temperate to subarctic North America and Eurasia. There is controversy about the circumscription of Tofieldia.relative to the related genera Pleea and Triantha (here recognized, but sometimes subsumed into Tofieldia). Some believe that Tofieldia, Triantha, and Pleea should be treated together in a broadly circumscribed Tofieldia (Utech 1978, Zomlefer 1997c); others that all three should be treated separately (Ambrose 1980; Packer 1993; Cruden 1991). Packer in FNA (2002a) has recently recognized Triantha, Pleea, and Tofieldia as separate genera, a conclusion followed here in part because of the ancient, relictual nature of these units. References: Zomlefer (1997c)=Z; Packer (1993); Ambrose (1980); Utech (1978); Hitchcock (1944)=Y; Tamura in Kubitzki (1998a); Packer in FNA (2002a); Cruden (1991).

Identification notes: In sterile condition, Tofieldia glabra can be distinguished from Iris verna by its minutely upwardly-scarbrous margins (Iris has smooth margins).

Tofieldia glabra Nuttall, Carolina Bog Asphodel, White Asphodel. Savanna-pocosin ecotones, wet savannas, seepage bogs. (Late August-) late September-October; October-November. Endemic to the Coastal Plain (including Sandhills) of NC and northern SC; reports from GA are dubious. [= RAB, FNA, GW, K, S, Z]

Triantha (Nuttall) Baker (Bog Asphodel)
1 Perianth equal to or longer than the capsule; seeds with tails 1/2 or less as long as the body .......................................................... Tr. racemosa
1 Perianth shorter than the capsule; seeds with at least 1 tail equal to or longer than the body .......................................................... Tr. glutinosa

Triantha glutinosa (Michaux) Baker, Northern Bog Asphodel, Sticky Bog Asphodel. Bogs and seeps, especially over mafic or calcareous rocks. July-August; September-October. NL (Newfoundland) west to BC, south to w. NC, ne. GA (Jones & Coile 1988), WV, OH, n. IN, WI, MT, and OR. [= FNA, K, S, = Tofieldia racemosa var. glutinosa (Michaux) Ahles – RAB; = Tofieldia glutinosa (Michaux) Persoon – F, G, GW, W, WV; = Tofieldia glutinosa ssp. glutinosa – Y, Z; = Tofieldia glutinosa var. glutinosa – C]

Triantha racemosa (Walter) Small, Southern Bog Asphodel, Coastal Plain Bog Asphodel. Savannas, savanna-pocosin ecotones, seepage bogs, sinkhole ponds (dolines) in the mountains of VA. June-early August; late September-October. NJ south

**1** Pistils in a single whorl, borne on a flat receptacle; stamens 6; inflorescence compound, many of the primary nodes bearing whorled branches which in turn bear whorled branches or whorled flowers ................................................................. *Alisma*

**1** Pistils spiraled in several to many whorls, borne on a globose receptacle; stamens 6-many; inflorescence racemose (or in some species of both *Echinodorus* and *Sagittaria* somewhat compound, with the lowermost node or two bearing branches which in turn bear whorled flowers).

2 Achenes turgid, with ribs or ridges; flower whorls subtended by 3 bracts and additional bracteoles .................................................. *Echinodorus*

2 Achenes flattened, with winged margins and often also with irregular corky ornamentations on the faces; flower whorls subtended by 3 bracts, with no additional bracteoles .................................................................. *Sagittaria*

**Alisma** Linnaeus 1753 (Water-plantain)


1 Leaf blades 2.7-5× as long as wide (or even narrower on submerged leaves), tapering at the base; petals pink, 2.3-3.7 mm long; achene with a dorsal ridge flanked by two dorsal grooves ................................................................. *A. gramineum*

1 Leaf blades 1.3-2.5 (2.7)× as long as wide, rounded to subcordate at the base; petals white, either 1.8-2.5 mm or 3.8-4.5 mm long; achene with a single dorsal groove.

2 Petals 1.8-2.5 mm long, 1.4-2.0 mm wide .................................................................. *A. subcordatum*

2 Petals 3.8-4.5 mm long, 3.0-3.9 mm wide .................................................................. *A. triviale*

**Alisma gramineum** Lejeune, Grassleaf Water-plantain. In seasonally flooded areas in impoundments. June-August. This species is circumboreal, ranging in North America south to e. VA, NY, WI, MO, NM, and CA. The occurrence of this species in our area may be the result of dispersal by waterfowl; first reported for our area by Wieboldt et al. (1998). [= C, F, FNA, K; < *A. plantago-aquatica* Linnaeus var. *americanum* J.A. Schultes – G]


**Alisma triviale** Pursh, Northern Water-plantain. Marshes and swamps. NL (Newfoundland) west to AK, south to s. NJ, s. PA, OH, IN, AR, OK, NM, AZ, CA, and n. Mexico (and according to Fernald to MD and WV). [= C, F, FNA, K, WV; < *A. plantago-aquatica* Linnaeus var. *americanum* J.A. Schultes – G]

**Echinodorus** L.C. Richard ex Engelmann 1848 (Burhead)


1 Leaf blades 1-3 cm long, 0.2-2 cm wide; achenes 10-20 per head; stamens 6 or 9; petals 1-3 mm long; scape 5-10 cm tall, erect; [subgenus *Helanthium*] .................................................................................. *E. tenellus*

1 Leaf blades 5-20 cm long, 3-15 cm wide; achenes 40 or more per head; stamens ca. 21; petals 6-12 mm long, scapes 20-120 cm tall, erect or arching/reclining; [subgenus *Echinodorus*].

2 Scapes arching and rooting down at maturity; veins of the sepals papillose-roughened ........................................ *E. cordifolius* ssp. *cordifolius*

2 Scapes rigidly erect at maturity; veins of the sepals smooth.

3 Stamens 9-15; plants to 70 cm tall .................................................................. *E. berteroi*

3 Stamens 21; plants to 200 cm tall .................................................................. *E. floridanus*


**Echinodorus cordifolius** (Linnaeus) Grisebach; Creeping Burhead. Swamps, ditches, wet thickets, especially on base-rich substrates, such as over calcareous or mafic rocks. June-November. MD south to c. peninsular FL, west

**Identification notes**: Portions of this key (and treatment) are provisional. The taxonomy and best characters to use in the linear-leaved species is particularly problematic.

### 1. Leaf blades sagittate or cordate (at least some of the leaves on a plant with sagittate or cordate basal lobes; some species are keyed both here and below).

<table>
<thead>
<tr>
<th>1</th>
<th>Leaf blades pubescent; [subgenus <em>Sagittaria</em>]</th>
<th><img src="image_url" alt="Species Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Leaf blades glabrous.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sepals appressed in fruit; lower flowers perfect, the stamens either functional or not; stamen filaments roughened with minute scales (except glabrous in <em>S. spatulata</em>); [subgenus <em>Lophotocarpus</em>].</td>
<td></td>
</tr>
</tbody>
</table>

### 2. Leaf blades pubescent; [subgenus *Sagittaria*]

| 4 | Leaves primarily phyllodial, lanceolate or spatulate (sagittate leaves rare in the population and few on a given plant); flowers in 1-2 (-3) whorls; stamen filaments glabrous (use 10×); [native, of tidal marshes] | ![Species Image](image_url) |
| 5 | Leaves primarily sagittate (phyllodial leaves rare in the population and few on a given plant); flowers in 3-12 whorls; stamen filaments roughened with minute scales (use 10×); [either introduced aliens, sometimes in tidal marshes, or native, found in inland alkaline sites]. |

### 3. Sepals appressed in fruit; lower flowers perfect, the stamens either functional or not; stamen filaments mostly fewer than 15.......

| 6 | Leaves sagittate basally, emersed; stalks of the pistillate flowers not notably stout, ascending in fruit; stamens mostly fewer than 15 ....... |
| 7 | Beak of the achene lateral (at a right angle to the achene); bracts of the inflorescence 2-14 mm long, boat-shaped, obtuse or broadly acute. |

### 4. Lowermost (pistillate) flowers sessile or on short pedicels (to 5 mm or rarely 10 mm long), the pedicels of the lowermost flowers notably shorter than those in whorls above; inflorescence normally not bent; stamen filaments glabrous. |

| 8 | Lowermost (pistillate) flowers sessile or on short pedicels (to 5 mm or rarely 10 mm long), the pedicels of the lowermost flowers notably shorter than those in whorls above; inflorescence normally not bent at the lowest whorl of flowers; stamen filaments minutely roughened with minute scales | ![Species Image](image_url) |

### 5. Beak of the achene terminal (extending along the long axis of the achene); bracts of the inflorescence 1.4-2.3 cm in diameter, mostly of other habitats, commenctively widespread.

| 9 | Bracts of the inflorescence thick and herbaceous, 5-25 mm long, rounded at the tip; flowers in 2-4 whorls; achenes with facial resin-ducts; [of acidic, blackwater habitats of the Coastal Plain] | ![Species Image](image_url) |
| 10 | Bracts of the inflorescence papery and tan, 7-40 mm long, acuminate at the tip; flowers in 5-12 whorls; achenes without resin-ducts; [primarily of other habitats, commenctively widespread] |

| 11 | Petiole corrugated but not wing-angled in cross-section; inflorescence often branched at the base; fruiting heads 1.2-1.7 cm in diameter, orange, globe-like-depressed. |
| 12 | Petiole sharply 5-wing-angled in cross-section; inflorescence unbranched; fruiting heads 1.0-1.5 cm in diameter, globular. | ![Species Image](image_url) |

### 6. Beak of the achene lateral (at a right angle to the achene); bracts of the inflorescence 2-14 mm long, boat-shaped, obtuse or broadly acute.

| 7 | Beak of the achene terminal (extending along the long axis of the achene); bracts of the inflorescence 5-40 mm long, either blunt or acuminate, not boat-shaped. |
| 8 | Bracts of the inflorescence papery and tan, 7-40 mm long, acuminate at the tip; flowers in 5-12 whorls; achenes without resin-ducts; [primarily of other habitats, commenctively widespread] |

| 9 | Petiole sharply 5-wing-angled in cross-section; inflorescence unbranched; fruiting heads 1.0-1.5 cm in diameter, globular. |
| 10 | Petiole corrugated but not wing-angled in cross-section; inflorescence often branched at the base; fruiting heads 1.2-1.7 cm in diameter, orange, globe-like-depressed. | ![Species Image](image_url) |

### 7. Beak of the achene terminal (extending along the long axis of the achene); bracts of the inflorescence 2-14 mm long, boat-shaped, obtuse or broadly acute.

| 8 | Bracts of the inflorescence papery and tan, 7-40 mm long, acuminate at the tip; flowers in 5-12 whorls; achenes without resin-ducts; [primarily of other habitats, commenctively widespread] |
| 9 | Petiole sharply 5-wing-angled in cross-section; inflorescence unbranched; fruiting heads 1.0-1.5 cm in diameter, globular. |

| 10 | Petiole corrugated but not wing-angled in cross-section; inflorescence often branched at the base; fruiting heads 1.2-1.7 cm in diameter, orange, globe-like-depressed. | ![Species Image](image_url) |

### 8. Lowermost (pistillate) flowers sessile or on short pedicels (to 5 mm or rarely 10 mm long), the pedicels of the lowermost flowers notably shorter than those in whorls above; inflorescence normally not bent; stamen filaments glabrous. |

| 9 | Lowermost (pistillate) flowers sessile or on short pedicels (to 5 mm or rarely 10 mm long), the pedicels of the lowermost flowers notably shorter than those in whorls above; inflorescence normally not bent at the lowest whorl of flowers; stamen filaments minutely roughened with minute scales. |
| 10 | Lowermost (pistillate) flowers sessile or on short pedicels (to 5 mm or rarely 10 mm long), the pedicels of the lowermost flowers notably shorter than those in whorls above; inflorescence normally not bent at the lowest whorl of flowers; stamen filaments minutely roughened with minute scales. | ![Species Image](image_url) |

### 9. Bracts of the inflorescence papery and tan, 7-40 mm long, acuminate at the tip; flowers in 5-12 whorls; achenes without resin-ducts; [primarily of other habitats, commenctively widespread].

| 10 | Petiole sharply 5-wing-angled in cross-section; inflorescence unbranched; fruiting heads 1.0-1.5 cm in diameter, globular. |
| 11 | Petiole corrugated but not wing-angled in cross-section; inflorescence often branched at the base; fruiting heads 1.2-1.7 cm in diameter, orange, globe-like-depressed. |

| 12 | Petiole sharply 5-wing-angled in cross-section; inflorescence unbranched; fruiting heads 1.0-1.5 cm in diameter, globular. |
| 13 | Petiole corrugated but not wing-angled in cross-section; inflorescence often branched at the base; fruiting heads 1.2-1.7 cm in diameter, orange, globe-like-depressed. | ![Species Image](image_url) |
ALISMATEACE

13 Leaves primarily phyllodial, lanceolate or spatulate (sagittate leaves rare in the population and few on a given plant); flowers in 1-2 (-3) whorls; stamen filaments glabrous (use 10× magnification); [of tidal marshes] .............................................................. S. spatulata

12 Sepals reflexed or at least widely spreading or, in lowest flowers, sometimes partially connate; [subgenus Sagittaria].

14 Plant generally with erect, emersed leaves with well-developed blades with firm texture, the blades lanceolate, elliptic, or ovate, 2-8 cm wide; stamen filaments roughened with minute scales .......................................................... S. platyphylla

10 Plants with all leaves phyllodial, if expanded at the summit, the expanded blade of weak texture, floating.

15 Leaves 2-10 (+30) cm long, 3-8 mm wide (sometimes with dilated tip to 20 mm wide); [of tidal, fresh to brackish waters] .............................. S. subalata

16 Leaves 30-300 (or more) cm long, either 1-3 or 7-14 mm wide; [of nontidal waters].

17 Leaves very variable from population to population, in swiftly flowing black water typically about 100 cm long and 1-3 mm wide, in more stagnant water (or when emersed by dropping water levels, typically with lax petioles and floating blades, the blades lanceolate, or elliptic, the base cuneate, rounded, or cordate; [of blackwater streams and ponds, MA south to FL, west to k AL] ................................. S. filiformis

18 Leaves 100-300 (or more) cm long, 7-14 mm wide; [of springs and spring-runs, endemic to FL] ......................................................... S. kurziana

11 Stalks of the pistillate flowers ascending or spreading in fruit, not notably stout; stamen filaments roughened with minute scales (except glabrous in S. engelmanniana and S. papillosa).

19 Stamen filaments linear, less than the anther, changing little in diameter from near base to near summit.

18 Leaves all phyllodial, without flattened blades; bracts of the inflorescence strongly papillose; [of s. MS westwards] .............. S. papillosa

17 Leaves with flattened blades; bracts of the inflorescence smooth, papillos, or longitudinally striate; [collectively widespread].

19 Bract of the inflorescence firm in texture, smooth; stamen filaments glabrous; [of estuarine areas and associated nontidal wetlands] ........... S. engelmanniana

20 Bracts of the inflorescence either papilllose or longitudinally striate-ribbed; stamen filaments roughened with minute scales; [of estuarine areas and associated nontidal wetlands].

23 Phyllodia of emersed flowering plants elongate (1/2-1× as long as scape), slender, emersed or laxly ascending and submersed in water; phyllodia of stranded flowering plants elongate (1/3-1× as long as scape, but may be shorter), relatively stiff; [of se. AL] ........................................................................................................ S. isoetiformis

24 Plants with corms and/or stolons, lacking coarse rhizomes.

25 Blades of emersed leaves lanceolate, narrowly spatulate, > 5 mm wide; [of Mountain and upper Piedmont bogs, swamp forests, and adjacent ditches] ................................................................. S. fasciculata

26 Achenes 1.5-2.0 (-2.5) mm long; achene faces with 3 or more keels and 2 or more resin ducts; inflorescence bracts connate for > 50% of length; [of se. NC and southward] ...................................................................................... S. isoetiformis

27 Abaxial wing of fruit entire; [plants collectively widespread].

28 Larger phyllodes 0.8-2.5 cm wide, the apices blunt (rarely acute); longer pistillate pedicels 2-5 (-6.5) cm long; median resin duct of mature achene linear, about as wide as the posterior duct (or ducts absent) ................................................................. S. weatherbiana

29 Inflorescence branched at the base (in at least some plants of a population); bracts of the inflorescence only slightly connate, the free tips narrowly triangular, 6-15 mm long ....................................................................... S. grassinea

25 Blades of emersed leaves linear (< 3 mm wide, rarely to 4 mm) or phyllodial; [coastal plain depression ponds and impoundments]

26 Achenes 1.5-2.0 (-2.5) mm long; achene faces with 3 or more keels and 2 or more resin ducts; inflorescence bracts connate for > 50% of length; [of se. NC and southward] ...................................................................................... S. isoetiformis

27 Abaxial wing of fruit scalloped or toothed; [plants of n. AL and nw. GA] ......................................................... S. secundifolia

28 Larger phyllodes 0.8-2.5 cm wide, the apices blunt (rarely acute); longer pistillate pedicels 2-5 (-6.5) cm long; median resin duct of mature achene linear, about as wide as the posterior duct (or ducts absent) ................................................................. S. weatherbiana

29 Inflorescence branched at the base (in at least some plants of a population); bracts of the inflorescence only slightly connate, the free tips narrowly triangular, 6-15 mm long ....................................................................... S. grassinea


Sagittaria chapmanii (J.G. Smith) C. Mohr. Chapman's Arrowhead. Limesink (doline) ponds with drawdown hydrology, mucky ditches. May-September. Se. NC south to s. FL, west to LA, AR, and TX (Sorrie & LeBlond 2008). First reported for SC by Nelson & Kely (1997), and for AR, LA, and TX by Sorrie & LeBlond (2008). Analyses of allozyme variation in the S. grassinea complex revealed great differentiation between S. grassinea, S. chapmanii, and S. platyphylla; S. grassinea and S. platyphylla appeared to be more closely related to one another than either was to S. chapmanii (Hauber & Legé 1999).
Therefore, it seems best to treat these three taxa at equal rank and at the species level. [= S; = S. graminea Michaux ssp. chapmanii (J.G. Smith) R.R. Haynes & C.B. Hellquist – FNA; = S. graminea Michaux var. chapmanii J.G. Smith – GW, K, WH, Y; = S. graminea Michaux var. chapmanii J.G. Smith – Z, orthographic variant]

**Sagittaria engelmanniana** J.G. Smith. Blackwater streambanks, sphagnum bogs, pocosins, beaver ponds. June-October. MA and NY south to n. FL and s. MS, primarily on the Coastal Plain. [= RAB, C, F, FNA, K, W, X; = S. engelmanniana ssp. engelmanniana – G, GW, Z]

**Sagittaria fascicularis** E.O. Beal, Bunched Arrowhead. Bogs, ditches adjacent to drained bogs, wooded seepage areas. May-July. Endemic to a several-county area in sw. NC and nw. SC, where most of its former habitat has been drained. [= RAB, FNA, GW, K, W, Y; = S. macrocarpa J.G. Smith – S, misapplied; < S. graminea Michaux var. macrocarpa (J.G. Smith) Bogin – Z, mostly misapplied]

**Sagittaria filiformis** J.G. Smith. Swiftly flowing water of blackwater rivers and streams, blackwater lake shores. May-September. As conceived here, probably ranging from MA south to FL and s. AL. The forms growing in swiftly flowing black water are remarkable and unlikely to be recognized as a Sagittaria unless in flower, with linear leaves over 100 cm long and only 1-3 mm wide, with 5-7 parallel ribbed veins, resembling S. kurziana. The proper taxonomic treatment and associated nomenclature to apply to these plants remains unclear (see synonymy). [= FNA, K; = S. subulata (Linnaeus) Buchenau var. graccilla (S. Watson) J.G. Smith – RAB, F, G, Z; = S. stagnorum Small – GW; < S. subulata – C, in part; > S. filiformis – S; > S. lorata (Chapman) Small – S; > S. stagnorum – S]

**Sagittaria graminea** Michaux. Marshes, ponds, tidal areas. May-November. NL (Newfoundland) and NL (Labrador) west to MN and SD, south to s. FL and c. TX; West Indies. [= S. graminea Michaux var. graminea – RAB, C, G, GW, K, WH, Y; > S. graminea – F; > S. eatonii J.G. Smith – F; = S. graminea ssp. graminea – FNA; > S. graminea – S; > S. cycloptera (J.G. Smith) C. Mohr – S; < S. graminea – W; < S. graminea var. graminea – Z (also see S. isoetiformis); = S. graminea – WV]

**Sagittaria isoetiformis** J.G. Smith. Pineland ponds, clay-based Carolina bays, other seasonally flooded depressions. June-September. Se. NC south to s. peninsular FL, west to s. MS (Sorrie & Leonard 1999). See Godfrey & Adams (1964) for additional discussion of this species. [= FNA, GW, K, S, Y; < S. teres – RAB, S, misapplied; < S. graminea Michaux var. graminea – Z]

**Sagittaria kurziana** Glück, Spring-tape. Spring-runs. Panhandle and n. peninsular FL. [= GW, K, S, WH; = S. subulata (Linnaeus) Buchenau var. kurziana (Glück) Bogin – Z]

**Sagittaria lancifolia** Linnaeus var. lancifolia. Marshes, swamps. May-June. E. SC south to s. FL, west to FL Panhandle; West Indies; n. South America. [= C; = S. lancifolia – RAB; = S. lancifolia ssp. lancifolia – FNA, GW, K, WH, Z; > S. angustifolia Lindley – S; > S. lancifolia – S, in a narrow sense]

**Sagittaria lancifolia** Linnaeus var. media Micheli. Freshwater to brackish tidal marshes, ditches. June-October. S. DE south to ne. FL, FL Panhandle, west to TX; scattered in Central America. If recognized as a species, this taxon is S. falcata. [= C; = S. falcata Pursh – RAB, F, G, S; = S. lancifolia ssp. media (Micheli) Bogin – FNA, GW, K, WH, Z]

**Sagittaria latifolia** Willdenow var. latifolia. July-October. Marshes, swamps, farm ponds, ditches, bogs. June-September, NS west to BC, south to tropical America (rare in the Appalachian region). In addition to the pubescence difference, var. latifolia and var. pubescens can be separated by the presence (var. latifolia) or absence (var. pubescens) of resin-ducts on the achene-faces. [= C, G, GW, W, Z; > S. latifolia var. latifolia – RAB, F; > S. latifolia var. obtusa (Engelmann) Wieand – RAB, F; > S. planipes Fernald – F; < S. latifolia – FNA, K, WH; > S. latifolia – S; > S. ornithorhyncha Small – S; > S. viscosa C. Mohr – S; = S. latifolia – WV]

**Sagittaria macrocarpa** J.G. Smith. Beaverponds, old millponds. Apparently endemic to the Coastal Plain of the Carolinas; potentially to be expected in e. GA. See Sorrie, Keener, & Edwards (2007) for detailed discussion. [< S. graminea Michaux var. macrocarpa (J.G. Smith) Bogin – Z, misapplied]

* **Sagittaria montevidensis** Chamisso & Schlechtendahl. Disturbed areas, marshes; native of South America. July. Most of the collections from the southeastern United States are old collections around major seaports, suggesting that this plant was introduced on the ballast of sailing ships. [= RAB, K, S, WH; = S. montevidensis ssp. montevidensis – FNA, GW, Z]
**ALISMATACEAE**

*Sagittaria praecox* Buchenau. Nipple-duct Arrowhead. Bogs, swamps, ditches, depressions. C. AR and se. OK south to s. LA and c. TX; rarely disjunct east of the Mississippi in se. LA and s. MS. [= FNA, GW, K] [add synonymy]


*Sagittaria spatulata* (J.G. Smith) Buchenau. Tidal marshes. May-September. NB south to e. NC along the coast. [= C, G; > Lophocarpus spongiosus (Engelmann) J.G. Smith – F; > S. calycina var. spongiosa Engelmann – K, WH; > S. monteviendensis Chamisso & Schlechtendahl ssp. spongiosa (Engelmann) Bogin – FNA, Z]

*Sagittaria subulata* (Linnaeus) Buchenau. Tidal marshes and mud flats. May-September. MA and NY south to n. peninsular FL and AL. [= FNA, GW, K, S, WH; > S. subulata var. subulata – RAB, G, Z; > S. subulata – C (also see S. stagnorum); > S. subulata var. subulata – F; > S. subulata var. natans (Michaux) J.G. Smith – F]

*Sagittaria teres* S. Watson. Ponds. MA south to s. NJ. [= C, F, FNA, G, K; > S. graminea Michaux var. teres (S. Watson) Bogin – Z]

*Sagittaria weatherbiana* Fernald. Fresh to brackish marshes, streambanks, pineland pools. April-June. Se. VA south to Panhandle FL. Isozyme studies by Hauber & Legé (1999) provide evidence that this taxon should be given species status; its genetic identity with var. *graminea* is low, and comparable to the difference between *S. graminea* (in the narrow sense) and *S. platyphylla.* [= F; > S. graminea Michaux var. weatherbiana (Fernald) Bogin – RAB, C, G, GW, K, WH, Y, Z; > S. graminea Michaux ssp. weatherbiana (Fernald) R.R. Haynes & C.B. Hellquist – FNA]

### 34. HYDROCHARITACEAE


1. Leaves basal, either elongate with parallel sides, or petiolate with a leaf blade.
2. Leaves differentiated into petiole and blade, the blade ovate to orbicular ................................................................. Limnobium
3. Leaves straplike, elongate, linear, the sides parallel and not differentiated into petiole and blade.
4. Leaves to 35 cm long; [saltwater].............................................................................................................................................. Thalassia
5. Leaves usually > 40 cm long; [freshwater]................................................................................................................................. Vallisneria
6. Leaves at or near the summit of the stem. Leaves at only 2-3 closely spaced nodes at the summit of the stem, appearing verticillate or whorled; leaves to 10 cm long; [saltwater].......................... Halophila
7. Leaves at many nodes along the stem, opposite or in whorls of 2-8, < 4 cm long; [freshwater]...
8. Leaves opposite or in whorls of 3-4 (no whorls with > 4 leaves).
9. Leaves slightly narrowed or straight-sided to base, sessile; perianth absent............................................................. Elodea
10. Leaves broadened and sheathing at base, narrowing upwards via “shoulders”; perianth absent.................................................... Najas
11. Leaves in whorls of (3-4) 8 (some or most whorls with 4 or more leaves).
12. Leaves mostly 2-3 cm long, finely toothed with slender, weak teeth on the margins and rarely also the midrib beneath; fresh leaves not noticeably rough to the touch; leaf whorls generally crowded on all stems; petals white, 9-11 mm long.............................................. Egeria
13. Leaves mostly 1-2 cm long, toothed with stout, sharp teeth on the margins and also on conical bases along the midrib beneath; fresh leaves noticeably rough to the touch; leaf whorls crowded on terminal portions of stems, remote on older stems; petals translucent, 2-5 mm long ........................................................................................................ Hydrilla
**Egeria** Planchon 1849 (South American Waterweed)


* **Egeria densa** Planchon, Brazilian Waterweed, "Elodea," "Anacharis." Ponds and stagnant water of streams or rivers; native of South America. May-November. This is the "Elodea" or "Anacharis" of the aquarium trade. [= RAB, FNA, GW, K, W, WH; = *Elodea densa* (Planchon) Caspary – F; = *Anacharis densa* (Planchon) Victorin – G; = *Philotria densa* (Planchon) Small & St. John – S]

**Elodea** Michaux 1803 (Waterweed)


1 Well-developed leaves (1-) avg. 2 (-5) mm wide, mostly 2-5x as long as wide; staminate spathe 4-8 (-15) mm long, the flower at anthesis on an elongated, very slender, flexuous stalk; sepals of pistillate flowers 2-4.5 mm long ................................................................. *E. canadensis*

1 Well-developed leaves (0.3-) avg. 1.3 (-2) mm wide, mostly 5-10x as long as wide; staminate spathe 2-3 mm long, the flower at anthesis separating from the spathe (and plant) at maturity; sepals of pistillate flowers 1-1.5 mm long ............................................................................ *E. nuttallii*

**Elodea canadensis** Michaux, Common Waterweed. Rivers, lakes, ponds, stagnant waters of streams. July-September. QC west to SK, south to NC, Panhandle FL, OK, NM, and CA. [= RAB, C, F, FNA, GW, K, W, WH; = *Anacharis canadensis* (Michaux) Planchon – G; = *Philotria canadensis* (Michaux) Britton – S (also see *E. nuttallii*)]


**Halophila** Thouars 1806 (Seagrass)

A genus of about 10 species, seagrasses, of tropical and warm temperate waters of the Caribbean Sea and the Indian/Pacific oceans.

**Halophila engelmannii** Ascherson ex Neumayer, Engelmann’s Seagrass. Estuarine waters. S. FL, west along Gulf Coast (MS, LA) to TX; Bahamas; West Indies. [= K, WH]

**Hydrilla** L.C. Richard 1814 (Hydrilla)


**Limnobium** L.C. Richard 1814 (Frog's-bit)


**Limnobium spongia** (Bosc) L.C. Richard ex Steudel, American Frog's-bit, Spongeplant. Swamps, marshes, ponds, pools. June-September. DE and MD south to s. FL, west to e. TX, north in the interior in the Mississippi Embayment to s. MO and s. IL; disjunct around the Great Lakes (as in n. IN and w. NY); also in tropical America. Often free-floating, the leaves with prominently large cells below. [= RAB, C, F, FNA, G, GW, K, S, WH]

**Najas** Linnaeus 1753 (Naiad, Bushy-pondweed, Water-nymph)

Identification notes: Counts of leaf-teeth do not include the broadened, sheathing base of the leaf. Seeds are necessary for the identification of most species.

1 Plants dioecious; lower side of the midvein of the leaves prickly; [subgenus *Najas*] ................................................................. *N. marina*

1 Plants monocious; lower side of the midvein of the leaves smooth; [subgenus *Caulinia*].

2 Leaf-teeth multicellular, evident at 10× magnification, 7-15 per side; leaves becoming recurved late in the season; seed-coat pitted, the areoles distinctly wider than long, in ca. 12-18 ladder-like rows ........................................................... *N. minor*

2 Leaf-teeth unicellular, not evident at 10× magnification, > 20 per side (except 13-17 per side in *N. gracillima*); leaves spreading to ascending; seed-coat smooth or pitted, if present the areoles longer than wide or about as long as wide.

3 Seeds smooth, glossy, obovate, broadest above the middle; anthers 1-locular ................................................................. *N. flexilis*

3 Seeds pitted, dull, cylindric, fusiform, or elliptic, broadest at the middle; anthers 1- or 4-locular.

4 Style offset from the apex of the seed; anthers unilocular .................................................................................. *N. gracillima*

4 Style at the apex of the seed; anthers 4-locular ............................................................................. *N. guadalupensis var. guadalupensis*


*Najas flexilis* (Willdenow) Rostkovius & Schmidt, Northern Naiad. Lakes and rivers. July-August. NL (Newfoundland) west to ON, south to VA, MD, MO, and NE; also in the west from AB and SK south to OR and UT. [= C, F, FNA, G, K, S, W, WV, Z; = *Najas flexilis* – S, orthographic variant]

*Najas gracillima* (A. Braun ex Engelmann) Magnus, Slender Naiad, Bushy Naiad. Ponds and lakes. July-October. NS west to MN, south to NC, AL, and MO; disjunct in CA (where likely alien). Haynes (1979) reports that this species cannot tolerate pollution and is apparently declining in abundance. [= RAB, C, F, FNA, G, K, W, WV, Z]


*Najas marina* Linnaeus, Holly-leaf Naiad. Brackish or calcareous waters. [= C, F, FNA, G, K; = *Najas marina* – S, orthographic variant]


*Thalassia* Banks & Solander ex Koenig (Turtlegrass)

A genus of 2 species, seagrasses, of tropical and warm temperate waters of the Caribbean Sea and the Indian/Pacific oceans.

*Thalassia testudinum* Banks & Solander ex Koenig, Turtlegrass. Seagrass beds in estuarine waters. January-December. E. coast of c. peninsular FL to s. FL, north along the west coast of FL to the Panhandle, and in MS, LA, and TX. [= K, WH]

*Vallisneria* Linnaeus 1753 (Water-celery, Eelgrass)


1 Sepals 2-3 mm long; leaves 5-6 (-10) mm wide; leaves lacking red-purple longitudinal stripes .................................................. *V. americana*

1 Sepals 4-5.5 mm long; leaves 15-20 mm wide; leaves with red or purple longitudinal stripes .................................................. *V. neotropicalis*

*Vallisneria americana* Michaux, Vallisneria, Water-celery, Tapegrass, Eelgrass. Lakes, rivers, estuaries, sounds. July-October. NS and QC west to ND, south to FL, TX, NM, AZ; south into tropical America {or is this all or partly *V.*}
HYDROCHARITACEAE

Vallisneria neotropicalis Marie-Victorin, Large Water-celery, Large Eelgrass. Spring runs; other aquatic habitats. FL Panhandle, s. FL; Cuba. The distinctiveness of this taxon has been defended by Les et al (2008) on morphological and molecular grounds. [= Y, Z; < V. americana – FNA, GW, K, WH; ? V. americana var. americana – C; > V. americana – S; > V. spiralis Linnaeus – S]

35. SCHEUCHZERIACEAE F. Rudolphi 1830 (Scheuchzeria Family) [in ALISMATALES]


Scheuchzeria Linnaeus (Scheuchzeria, Pod-grass)


Scheuchzeria palustris Linnaeus var. americana Fernald, Pod-grass. Sphagnum bogs. NL (Labrador) and AK south to s. NJ, e. WV (Cranberry Glades, Pocahontas County), sc. PA (Rhoads & Klein 1993), IN, IL, IA, WA, WY, and CA. [= F; < S. palustris – C, FNA, G, WV; = S. palustris ssp. americana (Fernald) Hultén – K; = S. americana (Fernald) G.N. Jones]

37. JUNCAGINACEAE L.C. Richard 1808 (Arrowgrass Family) [in ALISMATALES]


Triglochin Linnaeus 1753 (Arrowgrass)


1 Pistils 6, all fertile; fruits 2-4.5 mm long; central axis between the carpels not winged; [of NJ northward] ......................... T. maritima
1 Pistils 6, 3 fertile and 3 sterile; fruits 1.2-2 mm long; central axis between the carpels broadly winged; [of DE and MD southward] ...... T. striata

Triglochin striata Ruiz & Pavón, Southern Arrowgrass. Brackish to nearly freshwater marshes. May-October. The species has an extensive range, occurring in tropical Central and South America, Africa, and Australia; in North America, it ranges from MD and DE south to s. FL and west to LA, and also on the west coast in CA and OR. [= F, FNA, G, WH; = T. striatum – RAB, C, GW, S, Z, orthographic variant]

38. ZOSTERACEAE Dumortier 1829 (Eelgrass Family) [in ALISMATALES]


Zostera Linnaeus 1753 (Eelgrass)


Zostera marin a Linnaeus var. stenophylla Ascherson & Graebner, Eelgrass. Estuarine waters. February-March. The species occurs in Eurasia and North America. Var. stenophylla is North American, and ranges south along the Atlantic coast to NC and allegedly to FL (though reports from that state are apparently not substantiated and may be based on misidentification of other aquatics). [= F, G, Y; < Z. marina – RAB, C, FNA, K, S, Z]
A family of 6-7 genera and about 100 species (if circumscribed, as here, to include Zannichellia), aquatic herbs, nearly cosmopolitan. Here circumscribed following recent molecular studies to include Zannichellia (Lindqvist et al. 2006; Angiosperm Phylogeny Group 2003, 2009). References: Haynes & Hellquist in FNA (2000); Haynes (1978); Les & Haynes (1996); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b); Wiegleb & Kaplan (1998)=Z; Lindqvist et al. (2006). [including ZANNICHELLIACEAE]

1 Leaves opposite lobes .......................................................... Zannichellia
1 Leaves alternate.

2 Stipules not adnate, or adnate to the blade < ½ the length of the stipule; peduncle stiff, the flowering spike elevated above the water’s surface; submerged leaves translucent, flat; floating leaves present or absent ................................................................. Potamogeton
2 Stipules adnate to the blade for at least 2/3 the length of the stipule; peduncle flexible, the flowering spike submerged; submerged leaves opaque, channeled, stiff; floating leaves absent .................................................................................. Stuckenia

Potamogeton Linnaeus 1753 (Pondweed)


1 Stipular sheaths of submerged leaves adnate with leaf blade base, the tip usually projecting as a ligule .............................................. Key A
1 Stipular sheaths of submerged leaves free from the leaf blade base, or with only a few adnate, the ligule not obvious.

2 Submersed leaves broadly linear-oblong to lanceolate to elliptic or nearly orbicular, 10-58 mm wide (occasional stranded forms lack submersed leaves) ........................................................................................................... Key B
2 Submersed leaves linear, thread-like or ribbon-like, 0.1-10 mm wide ........................................................................................................ Key C

Key A

1 Leaves stiffish, conspicuously 2-ranked, auriculate-lobed to rounded at the junction with the stipule, with 20-60 fine veins .......... P. robbinsii
1 Leaves lax, not conspicuously 2-ranked, lacking basal lobes, with fewer than 20 veins.

2 Tips of submersed leaves acute; fruit 1-2 mm wide, the lateral keel with acute tips, beak minute ............................................................. P. diversifolius
2 Tips of submersed leaves obtuse; fruit 1.3-2.4 mm wide, the lateral keel with blunt tips, beak lacking .......................................................... P. spirillus
2 Tips of submersed leaves acute to long-tapering; floating leaves acute at apex.

4 Submersed leaves 0.1-0.6 mm wide, without obvious lacunae; floating leaves 3-7 veined ......................................................... P. bicupulatus
4 Submersed leaves 0.2-1 (-2) mm wide, with abundant lacunae; floating leaves 9-23 veined ......................................................... P. tennesseensis

Key B

1 Leaf margins conspicuously serrate; stem flattened; fruit beak 2-3 mm long; turions commonly formed, hard .................................. P. crispus
1 Leaf margins entire; stem terete; fruit beak < 1 mm long; turions rarely formed.

2 Submersed leaves clasping the stem; floating leaves absent.
3 Leaves orbicular to ovate, often lanceolate in soft water, 1-6 cm long, with 3-25 delicate veins; stipules deteriorating and deciduous, absent on lower portions of stem .................................................................................................................................................................................................. P. perfoliatus
3 Leaves ovate-lanceolate to narrowly lanceolate, 1.6-13 cm long, with 3-35 coarse veins; stipules disintegrating to persistent fibers, even on lower portions of stem .................................................................................................................................................................................................. P. richardsonii
2 Submersed leaves petioled or sessile, not clasping the stem; floating leaves absent or present.
4 Submersed leaves 19-49 veined, distinctly arculate ......................................................................................................................... P. amplifolius
4 Submersed leaves with fewer than 29 veins, not arculate.
5 Stems conspicuously black-spotted; submersed leaves crisped along the margin; floating leaves 15-21 veined ......................... P. pulcher
5 Stems inconspicuously spotted or lacking spots; submersed leaves flat along the margin; floating leaves 7-29 veined.
6 Submersed leaves with petioles 1-13 cm long.
7 Larger submersed leaves acute at the apex with a sharp awl-like tip; fruit gray-green to olive-green, with well-developed lateral ridges ......................................................... P. illinoensis
7 Larger submersed leaves acute at the apex but lacking a sharp awl-like tip; fruit red to reddish-brown, with maricate lateral ridges .................................................................................................................................................................................................. P. nodosus
6 Submersed leaves sessile.
8 Fruit reddish-brown, with obsolete or rounded keel; submersed leaves with (3-) 5-9 veins ................................. P. gramineus
1 Fruit with a prominent keel 0.2-1.2 mm broad; floating leaves present; lacunae prominent in submersed leaves.
2 Submersed leaves 3-13 veined; stipules of submersed leaves not adnate to the leaf base; floating leaves rounded at apex... *Potamogeton epihydrus*
2 Submersed leaves 1-3 (-7) veined; stipules of at least some submersed leaves adnate to the leaf base; floating leaves acute at apex...
   ..................................................................................................................................................................................................
   ..................................................................................................................................................................................................
1 Fruit with a keel < 0.2 mm broad; floating leaves absent or present; lacunae present in some species, but generally not prominent.
3 Floating leaves present, at least in some plants of the population.
4 Petiole junction with leaf distinctly pale in color; floating leaves ovate, oblong-ovate, cordate at base, rarely tapering... *Potamogeton natans*
4 Petiole junction with leaf lacking pale color; floating leaves elliptical, ovate-elliptical, or oblong-elliptical.
5 Floating leaves 7-12 mm wide, tapering at both ends; fruit apparently not produced... *Potamogeton variipes*
5 Floating leaves 10-20 (-30) mm wide, obtuse, round or tapering at the base; fruit often produced... *Potamogeton floridanus*
3 Floating leaves absent from all plants in the population.
6 Rhizomes obvious; peduncle 5-25 cm long; leaves thread-like, 0.1-0.5 mm wide... *Potamogeton confoveroides*
6 Rhizomes absent or not apparent; peduncle 0.3-7 cm long, often curved; leaves usually not thread-like, 0.1-5 mm wide.
7 Nodal glands absent.
8 Leaves 15-35 veined, > 2 mm wide; stem conspicuously flattened; peduncles terminal, usually straight... *Potamogeton strictifolius*
8 Leaves 3-5 veined, usually < 2 mm wide; stem terete; peduncles usually axillary, recurved.
9 Leaves acute, 3-5 (-7) veined, 0.3-1.5 (-2.3) mm wide; fruits 1-keeled, 1.4-2.3 (-2.7) mm long... *Potamogeton foliosus var. foliosus*
9 Leaves usually bristle-tipped, occasionally aciculate to blunt, 3 veined, 1-2.2 (-4) mm wide; fruits 3-keeled, 2.3-4 mm long...
   ..................................................................................................................................................................................................
   ..................................................................................................................................................................................................
8 Leaves 15-35 veined, > 2 mm wide; stem conspicuously flattened; peduncles terminal, usually straight... *Potamogeton strictifolius*
8 Leaves 3-5 veined, usually < 2 mm wide; stem terete; peduncles usually axillary, recurved.
9 Leaves acute, 3-5 (-7) veined, 0.3-1.5 (-2.3) mm wide; fruits 1-keeled, 1.4-2.3 (-2.7) mm long... *Potamogeton foliosus var. foliosus*
9 Leaves usually bristle-tipped, occasionally aciculate to blunt, 3 veined, 1-2.2 (-4) mm wide; fruits 3-keeled, 2.3-4 mm long...
   ..................................................................................................................................................................................................
   ..................................................................................................................................................................................................

Potamogeton amplifolius

Potamogeton bicupulatus
Fernald. Quiet waters. July-September. ME west to WI, south to VA (Augusta County) and se. TN. [= FNA, F, K, Z; = P. diversifolius Rafinesque var. trichophyllus Morong – C, GW]

Potamogeton confoveroides
Reichenbach, Alga Pondweed, Conferva Pondweed, Tuckerman's Pondweed. Acidic blackwater pools and streams. April-September. NL (Newfoundland) west to ON, south to NJ and PA; disjunct in se. NC and ne. SC (fall-line sandhills). [= RAB, C, F, FNA, G, K, Z]

* Potamogeton crispus

Potamogeton diversifolius

Potamogeton epihydrus
Rafinesque, Ribbonleaf Pondweed. Ponds. June-September. NL (Newfoundland) west to AK, south to GA, w. Panhandle FL, s. MS (Sorrie & Leonard 1999), LA, CO, and CA. [= RAB, C, FNA, K, S, W, WH, WV; > P. epihydrus var. epihydrus – F, G; > P. epihydrus var. natansii (Chamisso & Schlechtendahl) Fernald – F, G; < P. epihydrus – Z (also see P. tennesseensis)]

Potamogeton floridanus
Small, Florida Pondweed. Blackwater rivers. Apparently endemic to blackwater rivers of the Panhandle of FL. Considering the under-collection of Potamogeton, it should be sought elsewhere. [= FNA, S, WH; < P. natans – Z]

Potamogeton foliosus
**Potamogeton gramineus** Linnaeus, Variable Pondweed. Estuarine waters. Greenland and AK, south to sc. PA (Rhoads & Klein 1993), NJ, WV (Kartesz 1999), n. VA, MI, WI, CO, UT, and CA. Reported for VA (Fairfax County); specimen identification needing confirmation. [= C, FNA, G, K, WV, Z; > P. gramineus var. maximus Morong – F]


**Potamogeton illinoensis** Morong, Illinois Pondweed. Calcareous waters of streams, lakes, and ponds. May-September. QC west to NT and s. BC, south to s. FL, TX, Mexico, and CA. [= RAB, C, F, FNA, G, K, WV, Z; = P. angustifolius Berchtold & K. Presl – S; > P. heterophyllus Schreber – S; > P. lucens Linnaeus – S, misapplied]

**Potamogeton natans** Linnaeus, Floating Pondweed. Lakes and slow streams. June-September. NL (Newfoundland) west to AK, south to e. WV, w. NC, KS, NM, AZ, and CA. [= RAB, C, F, FNA, G, K, S, W; < P. natans – Z (also see P. floridanus)]

**Potamogeton nodosus** Poiret, Longleaf Pondweed, American Pondweed. Ponds, streams. May-September. ME and QC west to BC, south to Panhandle FL, TX, Mexico, and CA. [= RAB, C, F, FNA, G, GW, K, S, WV, Z; ? P. fluitans Roth – S; > P. oblongifolium Forster, proposed for nomenclatural rejection (Reveal et al. 2003)]

**Potamogeton oakesianus** J.W. Robbins, Oakes Pondweed. Lakes and streams. NL (Newfoundland) west to MN, south to VA, n. WV, and n. IL; apparently disjunct in MT, and BC, and possibly in s. AL (Sorrie, pers. comm.). [= C, F, FNA, G, K, W, Z]

**Potamogeton perfoliatus** Linnaeus, Perfoliate Pondweed, Redhead Grass. Ponds. June-October. NL (Newfoundland), NL (Labrador) west to MI, south to ne. NC, and n. OH; apparently disjunct in w. FL, c. peninsular FL, s. AL, and se. LA, and in SD. [= FNA, G, K, S, Z; > P. perfoliatus var. bupleuroides (Fernald) Farwell – RAB, F, GW, WH; > P. bupleuroides Fernald]

**Potamogeton pulcher** Tuckerman, Spotted Pondweed. Ponds, pools, ditches, streams. June-September. NS west to WI, south to n. peninsular FL and e. TX. [= RAB, C, F, FNA, G, GW, K, S, WH, WV, Z; = P. rotundifolium Forster, proposed for nomenclatural rejection (Reveal et al. 2003)]

**Potamogeton pusillus** Linnaeus var. pusillus. Acid and alkaline waters. May-September. NS west to AK, south to FL and Mexico. [= P. bertholdii Fieber – RAB; > P. pusillus var. pusillus – F; > P. pusillus var. minor (Bivona-Bernardi) Fernald & Schubert – F; = P. pusillus ssp. pusillus – FNA, K; < P. pusillus var. pusillus – C; < P. pusillus – G, GW, S, WH, Z; = P. pusillus – WV]


**Potamogeton richardsonii** (Bennett) Rydberg, Richardson Pondweed. Slow-moving, calcareous waters. NL (Labrador) west to AK, south to DE, MD, PA, n. OH, n. IN, n. IL, IA, NE, NM, AZ, and CA. [= C, F, FNA, G, K, Z]

**Potamogeton robbinsii** Oakes, Fern Pondweed. Muddy waters. August-September. NS and PE west to Keewatin and AK, south to n. VA, n. IL, s. MN, CO, UT, and CA; disjunct in s. AL. [= C, F, FNA, G, K, Z]

**Potamogeton spirillus** Tuckerman, Northern Snailseed Pondweed. Millponds, other quiet waters. May-September. NL (Newfoundland) west to MB, south to e. VA, n. OH, n. IA, and se. NE. [= C, F, FNA, G, K, WV, Z]

**Potamogeton strictifolius** A. Bennett, Straightleaf Pondweed. Calcareous waters. July-September. NL (Newfoundland) west to YT, south to w. VA, n. IL, WI, and n. UT. [= C, FNA, G, K, W, Z; > P. strictifolius var. strictifolius – F; > P. strictifolius var. rutiloides Fernald – F; > P. longiligulatus Fernald – F]

**Potamogeton ephryus**

**Potamogeton floridanus**

**Potamogeton foliosus** var. foliosus

**Potamogeton gramineus**

**Potamogeton lillii**

**Potamogeton illinoensis**
**POTAMOGETONACEAE**

*Potamogeton tennesseensis* Fernald, Tennessee Pondweed. Quiet or flowing water. Late May-September. PA and OH south to w. VA, and se. TN. [= F, FNA, K, W, WV; < *P. epihydrus* – Z]


**Stuckenia** C. Börner 1912 (Sago-pondweed)


**Zannichellia** Linnaeus 1753 (Horned Pondweed)


**Identification notes:** *Zannichellia* is sometimes confused with other aquatics, such as *Ruppia* and narrow-leaved *Potamogeton*. *Potamogeton* has at least some leaves alternate; *Zannichellia* and *Ruppia* are opposite-leaved. *Zannichellia* lacks the abruptly broadened sheath of *Najas*. Also, the seeds are flattened in *Zannichellia*, and toothed down one side; *Najas* has a cylindric or elliptic fruit. *Zannichellia* has longer leaves (3-10 cm long) than *Najas* (< 4 cm long).

*Zannichellia palustris* Linnaeus, Horned Pondweed. Fresh or brackish water. February-October. The species occurs throughout much of the world. [= RAB, C, FNA, G, GW, K, S, W, WV, Z; > *Z. palustris* var. major (Hartman) W.D.J. Koch – F; > Z. palustris var. palustris – F]

41. **RUPPIACEAE** Horaninow ex Hutchinson 1934 (Wigeon-grass Family) [in ALISMATALES]


**Ruppia** Linnaeus (Wigeon-grass)


**Identification notes:** Separable from superficially similar species of *Potamogeton* by the stipules adnate their entire length (vs. separate at least at the tip in *Potamogeton*).


42. **CYMODOCEACEAE** N. Taylor 1909 (Manatee-grass Family) [in ALISMATALES]

A family of about 5 genera and 16 species, estuarine aquatics, of tropical and subtropical (rarely temperate) waters. References: Kuo & McComb in Kubitzki (1998b); Haynes in FNA (2000); Green & Short (2003).

1 Leaves flat above the sheath; leaf tips 3-toothed; female plants with flowers with 1 pistil.......................................................... **Halodule**

1 Leaves terete or subterete above the sheath; leaf tips acicular; female plants with flowers with 1-2 pistils.............................................. **Syringodium**

**Halodule** Endlicher 1841 (Shoal-grass)
A genus of about 6 species, of tropical and subtropical regions of both hemispheres. References: Haynes in FNA (2000); McRoy & Helfferich (1977); Kuo & McComb in Kubitzki (1998b); Green & Short (2003)=Z.

**Halodule wrightii** Ascherson, Shoal-grass. Submerged in estuarine waters up to about 2 m deep, especially in Core and Pamlico sounds (North Carolina). E. NC (reported with unknown documentation from SC, not known from GA); FL west to TX, and south along shores of the Gulf of Mexico and Caribbean; also on the Pacific coast of Panama and Nicaragua. Haynes in FNA (2000) concludes that *H. beaudettei* is not taxonomically distinct from *H. wrightii* (the older name). Seagrasses (an informal group including species such as *Halodule wrightii*, *Zostera marina*, and *Ruppia maritima* in our area) are very important components of estuarine ecosystems, providing a large proportion of the primary productivity in such systems and providing shelter and nursery grounds for fish, shrimp, and other invertebrates. An estimated 80,000 hectares of seagrass beds are found in Pamlico and Core sounds, NC, most of that area having *Halodule* as the co-dominant or dominant species (Ferguson, Rivera, & Wood 1989). There is concern about the destruction of seagrass beds by pollution, dredging of waterways, and mechanical disturbance by fishing boats (Koch & Orth 2003; Green & Short 2003). [= FNA, S, WH, Z; > *H. beaudettei* (den Hartog) den Hartog – RAB, GW, K]

**Syringodium** F.T. Kützing in R.F. Hohenacker 1860 (Manatee-grass)


**Syringodium filiforme** F.T. Kützing in R.F. Hohenacker, Manatee-grass. Estuarine waters. Panhandle FL, peninsular FL, westward along the Gulf Coast, and in the West Indies. Syringodium is occasionally cast ashore in Georgia and the Carolinas following hurricanes, but there is no evidence that it grows in our area. [= FNA, WH, Z; = *Cymodocea filiformis* (F.T. Kützing in R.F. Hohenacker) Correll – GW, K; = *Cymodocea manatorum* Ascherson – S]

### 44. NARTHECIACEAE

E.M. Fries 1846 (Bog-aspodel Family) [in DIOSCOREALES]


**Aletris** Linnaeus 1753 (Colic-root, Stargrass)


1 Perianth white to creamy-white (rarely pinkish).
2 Perianth 6-10 mm long, cylindric at anthesis, 2-3× as long as broad, the perianth lobes narrowly deltoid (longer than broad); fruiting perianth markedly constricted above the middle .......................................................... *A. farinosa*..........
3 Perianth short-cylindric or campanulate at anthesis, 1-2× as long as broad, the perianth lobes not spreading; [flowering May-July] ..............

2 Perianth 4-6 mm long, campanulate at anthesis, ca. 1× as long as broad, the perianth lobes broadly deltoid (about as long as broad); fruiting perianth somewhat narrowed above the base .................................................................................................................. *A. obovata*..........
1 Perianth golden yellow (often faded in dried specimens).
3 Perianth short-cylindric or campanulate at anthesis, 1-2× as long as broad, the perianth lobes not spreading; [flowering May-July] ..............

3 Perianth long-cylindric at anthesis, 2.5-4× as long as broad, the perianth lobes spreading somewhat; [flowering March-May] ............. *A. lutea*

**Aletris aurea** Walter, Golden Colic-root. Pine savannas, seepage bogs, pine flatwoods. Mid May-July; August. S. MD south to ne. FL, Panhandle FL, west to e. TX and se. OK. Flowering several weeks later than *A. farinosa* when growing together. [= RAB, C, F, FNA, G, GW, K, S, WH, X, Y, Z]

**Aletris farinosa** Linnaeus, Northern White Colic-root, Mealy Colic-root, Stargrass. Pine savannas, pine flatwoods, seepage bogs, upland woodlands, roadbanks. Late April-early June; July-August. S. ME, s. ON, and se. MN south to s. GA, FL (Wunderlin 1998), LA, and TX, the only species of the genus not restricted (or nearly so) to the Coastal Plain. [= RAB, C, F, FNA, G, GW, K, S, WH, X, Z]

**Aletris lutea** Small, Yellow Colic-root. Pine savannas. E. GA (in immediate proximity to the SC border) south to s. FL, and west to e. LA (Weigant 2002); disjunct in w. LA (Sorrie & LeBlond 2008). The report by F of *A. lutea* Small as far north as se. VA is in error. A specimen collected in se. NC has recently been annotated as *A. lutea*, but it appears to be *A. farinosa*. [= FNA, GW, K, S, WH, X, Y, Z]

**Aletris obovata** Nash ex Small, Southern White Colic-root. Pine savannas. May-early June; August. Se. SC south to c. peninsular FL, west to e. Panhandle FL. Reported for MS (Kartesz 1999), but the report rejected (likely based on a misidentified specimen). [= RAB, FNA, GW, K, S, WH, X, Y, Z]
**Lophiola** Ker-Gawler 1814 (Golden Crest)


*Lophiola aurea* Ker-Gawler, Golden Crest. Wet savannas, bogs, marshes, ditches adjacent to these natural habitats. Late May-June; August-September. FL Panhandle and sw. GA west to e. LA; se. NC; n. DE (at least formerly) and s. NJ; disjunct in NS. Only a few populations remain in NC. [= C, FNA, K, S, Z; > *L. americana* (Pursh) Wood – RAB, F (the NJ-DE material), G, GW; > *L. septentrionalis* Fernald – F (the Nova Scotian material)]

**Narthecium** Hudson 1762 (Asphodel)

A genus of about 8 species, many narrow disjuncts, collectively with a very fragmented distribution in the temperate Northern Hemisphere. References: Small (1924)=Z; Zomlefer (1997b)=Y; Utech in FNA (2002a); Tamura in Kubitzki (1998a); Schumacher (1947)=X; Sorrie & Weakley (in prep.)=Q.

1 Tepals 4-6 mm long; capsule 10-14 mm long; pedicels stout, about as long as the subtending bracts; [Coastal Plain seeps and savannas]..........
2 Tepals 6-9 mm long; capsule 8-10 mm long; pedicels slender, distinctly longer than the subtending bracts; [Mountain bogs]...........

*Narthecium americanum* Ker-Gawler, Yellow Asphodel. Wet seepages or savannas. June-July; August-September. S. NJ and DE (where believed extirpated); disjunct in c. SC (where apparently extirpated, though still worth seeking in mucky seepages of the Sandhills of SC and NC). [= C, F, G, Q, X; < *Narthecium americanum* – RAB, FNA, GW, K, W, Y (also see *N. montanum*); = *Abama americana* (Ker-Gawler) Morong – S, Z]

*Narthecium montanum* (Small) C.H. Grey, Appalachian Yellow Asphodel. Bogs (apparently extinct). With the drainage of the bogs of East Flat Rock, Henderson County, this species was apparently extirpated. It is still possible that it will be relocated, in bogs in Henderson or Transylvania counties, NC. Small (1924, 1933) considered the NC mountain population a distinct species, based on its longer, more slender pedicels, larger sepals, petals, and stamens, and smaller capsules. Schumacher (1947), in the most thorough worldwide assessment of *Narthecium*, agreed, and Sorrie & Weakley (in prep.) concur, based on an herbarium analysis of the characters of all taxa in the genus. The morphological distinctions (and geographic disjunction) between *N. montanum* and *N. americanum* are as great or greater as those between most species recognized worldwide in the genus. [= F, Q, X; < *Narthecium americanum* – RAB, FNA, GW, K, W, Y; = *Abama montana* Small – S, Z]

**45. BURMANNIACEAE** Blume 1827 (Burmanna Family) [in DIOSCOREALES]


1 Floral tube terete; ovary 1-locular.................................................................................................................................................................*Apteria*
2 Floral tube 3-angled or 3-winged; ovary 3-locular..............................................................................................................................................*Burmannia*

**Apteria** Nuttall (Nodding Nixie)


*Apteria aphylla* (Nuttall) Barnhart ex Small, Nodding Nixie. Wet hammocks, bay swamps, other acid swamps, mesic forests. E. GA west to e. TX, south to c. South America, and in the West Indies. [= FNA, GW, K, S, WH]

**Burmannia** Linnaeus (Burmannia)
A genus of about 63 species, autotrophic or mycotrophic herbs, pantropical (to warm temperate). References: Lewis in FNA (2002a); Maas-van de Kamer in Kubitzki (1998a).

**Identification notes:** Both species of _Burmannia_ are very small and easy to overlook; they occasionally occur together.

1. Floral tube 3-winged, violet; flowers in a spicate cyme (solitary in depauperate individuals)................................................................. _B. biflora_
2. Floral tube obtusely 3-angled, greenish to creamy white; flowers in a capitulate cluster (solitary in depauperate individuals).............. _B. capitata_

**Burmannia biflora** Linnaeus, Violet Burmannia. Savannas, bogs, shores of Coastal Plain depression ponds. August-November. Se. VA south to FL, west to e. TX. [= RAB, C, F, FNA, G, GW, K, S, WH]

**Burmannia capitata** (J.F. Gmelin) von Martius, White Burmannia. Savannas, bogs, shores of Coastal Plain depression ponds. July-November. E. NC south to s. FL, west to e. TX and se. OK; West Indies, Central America, and South America. [= RAB, FNA, GW, K, S, WH]

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**46. DIOSCOREACEAE** R. Brown 1810 (Yam Family) [in DIOCOREALES]

A family of about 3-20 genera and 600-880 species, of tropical and warm temperate regions. References: Raz in FNA (2002a); Huber in Kubitzki (1998a).

**Dioscorea** Linnaeus 1753 (Yam)

A genus of about 575-850 species, vines, of tropical and warm temperate regions of the Old World and New World. Huber in Kubitzki (1998a) advocates the division of the large and unwieldy _Dioscorea_ into separate genera. _Dioscorea_ (broadly defined) has a wide variety of economic uses, especially in the tropics, where it is most diverse. Various species are cultivated for their edible tubers (yams, not to be mistaken for sweet potatoes, _Ipomoea batatas_, often referred to colloquially as "yams" in the southern United States), especially in Africa. Oral contraceptives were developed from extracts of _Dioscorea_. Many other uses are described in Al-Shehbaz & Schubert (1989). References: Raz in FNA (2002a); Al-Shehbaz & Schubert (1989)=Y; Ward (1977c)=Z; Huber in Kubitzki (1998a).

1. Leaves cordate-ovate, the sides of the leaves continuously convex; aerial tubers never present; perennial from rhizomes < 1.5 cm in diameter; [native species, usually of forests and woodlands]; [section Macropoda]
2. Stamine inflorescences usually of 1 large and 1-2 smaller secondary panicles in each axil (of upper stem leaves); filaments inwardly curved, ca. 0.4 mm long; anther lobes connate; tepals oblong; [of SC south]................................................................................................. _D. floridana_
3. Leaves halberd-shaped or sagittate, the sides with a concave portion ( _D. polystachya_ or continuously convex ( _D. alata, D. bulbifera_); aerial tubers often present in the leaf axils; perennial from large, vertically-oriented tubers; [non-native species, usually in disturbed areas, especially in bottomlands]; [section Enantiothylum]
4. Leaf margins sagittate, the sides continuously convex..................................................................................................................... _D. alata_
5. Stems terete.
6. Leaf margins halberd-shaped, the sides with a concave portion ............................................................................................... _D. bulbifera_
7. Leaf margins halberd-shaped, the sides with a concave portion ............................................................................................... _D. polystachya_

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**Dioscorea floridana** Bartlett, Florida Wild Yam. Mesic to dry forests, swampy forests. June-July; August-November. SC south to n. FL, on the Coastal Plain. _D. floridana_ is "the most distinctive of North American species" (Al-Shehbaz & Schubert 1989). [= FNA, K, S, WH, Y, Z; > D. villosa Linnaeus var. floridana (Bartlett) Ahles – RAB; > Merione sp. 1]


**Dioscorea villosa** Linnaeus, Wild Yam. Moist forests and woodlands. April-June; September-November. NI, NY, s. ON, WI, MN, and IA south to n. FL and LA. Various specific and infraspecific taxa are here combined. Ward (1977c) states that "a recent study at Duke University by Shu-fun Au, unfinished due to the death of its author, tentatively recognized _D. hirticaulis_ and _D. floridana_ but combined all other entities without distinction under _D. villosa_." Further study is needed. Al-Shehbaz & Schubert (1989) indicate that the lectotype of _D. villosa_ has pubescent stems; nomenclatural changes are apparently needed, if varietal status of the 2 varieties of _D. villosa_ proves warranted. [= FNA, K, WH; > D. villosa var. villosa – RAB, C; > Dioscorea villosa

### 49. STEMONACEAE Engler 1887 (Stemona Family) [in PANDANALES]


*Croomia* Torrey 1840 (Croomia)


*Croomia pauciflora* (Nuttall) Torrey, Croomia. Moist bluff forests, often with beech and basswood. April-May. Wc. GA and n. AL south to Panhandle FL (Gadsden & Liberty counties; Wunderlin & Hansen 2008), and allegedly se. GA (Whetstone in FNA 2002, Jones & Coile 1988) and s. LA. [= FNA, K, S, WH, Z]

### 53a. TRILLIACEAE Lindley 1846 (Trillium Family) [in LILIALES]


*Trillium* Linnaeus 1753 (Trillium, Toadshade, Wake-robin)

A genus of about 50 species, of e. North America, w. North America, and e. Asia (especially se. North America). The genus *Trillium* in our area is difficult and complex. *Trillium* is now usually separated from the Liliaceae (along with Eurasian genera such as *Paris*) into the Trilliaceae (Zomlefer 1996, Kato et al. 1995, Kawano & Kato 1995, and others) or less drastically as part of the Melanthiaceae (Chase et al. 2000; Tamura et al. 2004). The traditional division of the genus into two well-marked subgenera, subgenus *Trillium*, the pedicellate trilliums, and subgenus *Phyllantherum*, the sessile-flowered trilliums, has been partly supported by molecular and morphological phylogenetic studies (Kawano & Kato 1995, Kato et al. 1995). These studies support the monophyly of subgenus *Phyllantherum*, but suggest that subgenus *Trillium* consists of several groups which are only rather distantly related (Kawano & Kato 1995, Kazempour Osaloo et al. 1999; Farmer & Schilling 2002). Most species are slow-growing perennials; seedlings, juveniles, and depauperate or "tired" plants are one-leaved ("monilliums"), recognizable by the similar color, texture and venation of the single leaf to the three leaves of mature plants. In some species, such as *T. pusillum*, individual plants remain in the single-leaf stage for long periods of time, and populations may consist largely of juvenile plants. References: Patrick (1986)=Z; Patrick (2007)=V; Freeman (1975)=Y; Case & Case 1997=X; Patrick in Wofford (1989); Case in FNA (2002a); Mitchell (1990); Kato et al. (1995); Kawano & Kato (1995); Tamura in Kubitzki (1998a); Zomlefer (1996); Farmer & Schilling (2002). Key adapted from Patrick (1986, 2007), unpublished keys of J.D. Freeman and S. Farmer, and other sources.

**Identification notes:** Teratological forms are frequent in some species, as, for instance, leaves, sepalis, and stamens in 2's or 4's, petals sepaloid, or sepals petaloid, and so forth. What are called "leaves" in *Trillium* are actually interpreted as bracts by some.

1 Leaves mottled with 2-3 different shades of green (very rarely the mottling not apparent); flower sessile; [subgenus *Phyllantherum*] ....... **Key A**
2 Leaves solid green; flower on a pedicel (the pedicel sometimes very short or essentially absent in some varieties of *T. pusillum*); [subgenus *Trillium*].
3 Petals relatively thick in texture, straight-margined, maroon or white, rarely yellow or green (if white, turning brown with age); stigmas thicker at base, tapering gradually toward tip, distinct; ovary purple-black, maroon, pink, or white, 6-angled; [*Erectum group*] ............. **Key B**
4 Petals relatively delicate in texture, wavy-margined, white to deep pink (if white, generally fading to pink with age); stigmas thin, uniform in thickness from base to apex, somewhat fused at the base into a short style; ovary greenish-white to white, 3- or 6-angled or-lobed............

**Key A** – trilliums with sessile flowers and mottled leaves (subgenus *Phyllantherum*)

1 Scape more-or-less decumbent in a gentle S-shape, the leaves lying on the ground, or nearly so; flower fragrance putrid; [*T. sessile* group].
2 Anther dehiscence extrorse (toward the outside of the flower); stamens about 0.25× as long as the petals; upper stem puberulent; petals 4-10 cm long; filaments 2-5 mm long.................................................................T. decumbens
3 Anther dehiscence introrse (toward the inside of the flower); stamens about 0.5× as long as the petals; upper stem glabrous; petals 2.5-5.5 cm long; filaments 1-2 mm long..................................................................................................................T. relicium

1 Sepals erect, straight, the leaves borne well above the ground (the leaf tips sometimes nearly touching the ground); flower fragrance various.
3 Sepals abruptly deflexed between and below the leaves, distinctly descending below the approximately horizontal plane of the leaves; filaments about as long or incurved anthers; [T. recurvatum group].

4 Anther connectives slightly incurved; filaments short, < ½ the anther length; [endemic to Kershaw and Richland counties in the inner Coastal Plain of SC]..................................................................................................................T. oostingii
4 Anther connectives strongly incurved; filaments long, > ½ the anther length; [primarily west of the Blue Ridge and south into the Gulf Coastal Plain, very rarely disjunct to the Mountains or upper Piedmont].

5 Leaves sessile or subsessile, borne in a descending or drooping manner (similar to the sepals); petals usually 4-7× as long as wide, strongly clawed..................................................................................................................T. lancifolium
5 Leaves distinctly petiolate, borne in an ascending manner (strongly contrasting in position with the strongly deflexed petals); petals usually ca. 2× as long as wide, attenuate to weakly clawed ..................................................................................T. recurvatum

3 Sepals erect, or spreading, usually borne at or above the approximately horizontal plane of the leaves; filaments much shorter than the upright anthers.

6 Petals spreading to horizontal, with 1-2 spiral twists (looking something like an airplane propeller); anther dehiscence extrorse (toward the outside of the flower); [T. sessile group].
6 Petals spreading to slightly spreading, not spirally twisted; anther dehiscence introrse (toward the inside of the flower), or latrose (toward the side).
7 Petals broadly spatulate, clawed, broadly rounded (though sometimes with an apiculus) at the tip; petals pale lemon-yellow (the claws greenish or maroon); flower fragrance clove-like; [of the Savannah River drainage, from sw. NC southeastward along the GA-SC border]; [T. sessile group].
8 Stigmas as long as the ovary or shorter; stamens < 0.5× as long as the petals; anther connectives prominently prolonged into a beak 1.0-5.0 mm long (beyond the anther sacs); [T. sessile group].
8 Stigmas as long as the ovary or shorter; stamens < 0.5× as long as the petals; anthers blunt, the connectives extended < 1.0 mm beyond the anther sacs.

9 Ovary elliptoid; leaves acute, the margins of the outer 1/3 more or less straight; leaf blade mottled with 3 or more shades of green, the palest shade forming a very conspicuous pale silvery-green streak along the midvein; [of the Coastal Plain and full-line area of GA, AL, and FL Panhandle]; [T. sessile group].
9 Ovary ovoid; leaves acute to acuminate, the margins of the outer 1/3 convex; leaf blade mottled with 2-3 shades of green, paler shades sometimes prominent along the midvein, but not as above; [collectively widespread in our area]; [T. maculatum group].
11 Petals < 4× as long as wide, elliptic-oblancoate to oblanceolate; [of inland provinces, rarely in the Coastal Plain].
12 Flower fragrance fruity-spicy, like green apples or Calycanthus (rarely musky); petals maroon, bronze, green, yellow; portions of ovary and stamens purplish during anthesis ..................................................................................................................T. cuneatum
12 Flower fragrance lemon-like; petals greenish-yellow darkening to yellow; ovary and stamens greenish-white during anthesis ..................................................................................................................T. luteum
11 Petals > 4.5× as long as wide, narrowly oblongate-spatulate to linear-oblancoate; [of the Coastal Plain, rarely further inland].
13 Ovary 3-angled at base of stigmas (rarely hexagonal); petals 7-17 mm wide, narrowly spatulate (appearing clawed); outer whorl of stamens broader, anther dehiscence introrse; flower fragrance faintly spicy-fragrant, banana-like; [of AL, n. FL, GA, and e. SC]. .................................................................................................................................T. maculatum
13 Ovary 6-angled; petals 3-8 mm wide, linear-oblancoate, narrowly elliptic, to linear-lanceolate (weakly or not clawed); flower fragrance putrid, like rotting meat; [of MS and LA].
14 Petals 3-5 mm wide; anther dehiscence introrse; anther connective extending 1-1.5 mm beyond the anther sacs............................T. foetidissimum
14 Petals 4-8 mm wide; anther dehiscence latrose; anther connective scarcely extending beyond the anther sacs............................T. ludovicianum

Key B – trilliums with unstalked leaves and pedicellar flowers, of the Erectum Group

1 Flowers held below the leaves (the pedicel declined below a horizontal plane).
2 Stamens far exceeding the pistil, filaments as long as the ovary or longer, at least partly maroon, the anther sacs yellow to maroon; ovary small, globose, 3-12 mm long, dark purplish black; flower fragrance pungent, rose-like; pedicel long, 3-13 cm long; petals strongly overlapping, usually white or whitish).............T. vacapi
2 Stamens at most 1.5× longer than the pistil, filaments shorter than the ovary, white (less commonly purplish), the anther sacs lavender to vivid purple (or albino); ovary white to pink or dull red, large, ovoid, 10-17 mm long; flower fragrance various; pedicel short to long, 1.5-12 cm long; petals not strongly overlapping, usually white (rarely maroon).
3 Pedicels short, 1.5-3 cm long.
4 Anthers 7.5 mm long or less, about as long as the filaments or shorter; petals narrowly elliptic to obovate, often scarcely larger than the sepals, delicate, occasionally margined in pink or green; [of damp forests of n. VA and northwards].........................T. cernuum
4 Anthers > 7.0 mm long or more, longer than the filaments; petals ovate to elliptic, much broader than the sepals; [of mesic forests of n. NC southwards] ..................................................................................T. rugelii
3 Pedicels long, 4-12 cm long.
TRILLIACEAE

1 Flowers held at or above the level of the leaves (the pedicel nearly horizontal, inclined above the horizontal, or erect).

2 Petals white to deep pink, lacking a red blaze; anther sacs yellow, dehiscence introrse; fruit a white to greenish-white, fleshy, irregularly

3 Sepals narrower than the petals, acute; anthers white to greenish-white between the anther sacs; leaves obtuse, acute, or acuminate; pedicel somewhat angled from the vertical.

4 Ovary obscurely 3-lobed; leaves < 5 cm long, blue-green, obtuse ..................................................................................................

5 Stamens far exceeding ovary height; filaments ca. ½ the length of the anthers; pollen creamy, yellow, or pale grayish purple; anthers and filaments also variable in color, mostly white, occasionally purplish; anthers mostly longer than the ovary and not appressed against it.......................................................T. species 2

6 Ovary globose, widest near the middle, black to purplish black; petals white, maroon, yellowish, or otherwise.

7 Stamens about as long as the ovary or slightly longer; filaments short, ca. 1/3 the length of the anthers; pollen creamy to pale yellow; filaments and anthers white, the anthers at least in part somewhat appressed against the ovary.................................................................T. species 2

8 Petals lanceolate to narrowly ovate or elliptic, spreading from base in the same plane as the sepals, rarely > 2× as broad as the sepals; sepals 0.5-0.8× as long as the pedicel. weakly sulcate-tipped (keeled and upturned near apex); flower fragrance unpleasant, musty..........

9 Sepals 0.2-0.4× as long as the pedicel; leaves broadly obovate; stamens 0.9-1.6× pistil height; flowers relatively small, petals only slightly longer than the sepals; sepals suffused with purple; petals usually maroon (rarely white); flower fragrance fungoid, like fresh mushrooms; [of sw. VA and nw. NC in our area] .............................................................................................................. T. sutchatum

Key C – trilliums with unmottled leaves and pedicellate flowers, of various affinities

1 Petals white with triangular red blaze (rarely entirely white or pinkish); anther sacs lavender to white, dehiscence extrorse; fruit a red berry; leaves long-acuminate; [of acidic sites in the Mountains, generally strongly associated with either Pinus, Tsuga, Picea, Rhododendron, or other heaths] .......................................................T. undulatum

2 Pedicel inclined above the leaves (rarely erect); sepals arcuate-recurved; anthers irregularly twisted outward; pollen egg-yolk yellow..........

3 Sepals about as broad as the petals or broader, obtuse; anthers purplish-green between anther sacs; pedicel erect through fruiting; [Trillium pusillum complex].

4 Ovary obscurely 3-lobed; leaves < 5 cm long, blue-green, obtuse ..................................................T. nivale

5 Stamens far exceeding ovary height; filaments ca. ½ the length of the anthers; pollen creamy, yellow, or pale grayish purple; anthers and filaments also variable in color, mostly white, occasionally purplish; anthers mostly longer than the ovary and not appressed against it.......................................................T. species 2

6 Ovary flask-shaped, broadest near the base, usually white to pinkish (sometimes darker); petals usually white to creamy white (maroon forma occasional)

7 Stamens about as long as the ovary or slightly longer; filaments short, ca. 1/3 the length of the anthers or shorter; pollen creamy to pale yellow; filaments and anthers white, the anthers at least in part somewhat appressed against the ovary.................................................................T. species 2

8 Petals white to deep pink, lacking a red blaze; anther sacs yellow, dehiscence introrse; fruit a white to greenish-white, fleshy, irregularly
dehiscent capsule; leaves obtuse to acute (somewhat acuminate in T. grandiflorum); [of less distinctly acidic sites, collectively widespread in our area].

2 Pedicel declined below the leaves (rarely erect); sepals arcuate-recurved; anthers irregularly twisted outward; pollen egg-yolk yellow..........

3 Sepals narrower than the petals, acute; anthers white to greenish-white between the anther sacs; leaves obtuse, acute, or acuminate; pedicel somewhat angled from the vertical.

4 Ovary sharply 6-angled (-winged); leaves > 5 cm long, green, acute to acuminate.

5 Petals obovate, tightly rolled at base, abruptly flared near the apex; leaves broadly elliptic, acuminate; style minute, < 1.0 mm long

3 Sepals about as broad as the petals or broader, obtuse; leaves obtuse; anthers purplish-green between anther sacs; pedicel erect through
fruiting; [Trillium pusillum complex].

6 Leaves with stomates on the upper surface, appearing farinose; [of n. GA] .............................................................................................................. T. pusillum var. 2 “georgianum”

7 Pedicels 10-56 mm long.

8 Pedicels (0-) 0.5-1 mm long; leaves (1.5-) 2-0.4 (-2.9) × as long as broad; leaves (14-) 15-20 (-22.5) mm wide; filaments (4.5-) 4.6-5.8 (-8) mm long; [of upland woods of Mountain of w. VA and e. WV] ..................................................T. pusillum var. monticulum

9 Anters (3.2-) 4.5-6 (-7) mm long; Stamens (5.7-) 8.4-10.9 (-12.5) mm long; Stigmas (1-) 2.1-3 (-5) mm long; Leaves elliptic; [of the outer Coastal Plain of e. MD, e. VA, and ne. NC] ...............................................T. pusillum var. 5 “palustris”

10 Pedicels (0.5-) 1.2-1.7 (-7) mm long; stamens (5.7-) 6.9-2 (-13.2) mm long; stigmas (1-) 1.2-2.5 (-4.7) mm long; leaves ovate; [of the upper Coastal Plain and Piedmont of ne. NC, se. VA, and Mountains of sw. VA].

11 Leaves horizontal to declining; sepals 0.9-1.1× as long as the petals.

12 Leaves narrower, (1.9-) 3-4.1 (-5.6)× as long as wide; pedicels (23-) 25-33 (-56) mm long; [of calcareous savannas and the swamps]

13 Leaves ovate, acute; Sepals (14-) 22-30 (-41) mm long, (4-) 6-11 (-17) mm wide, (2-) 3-4.3 (-5.6)× as long as wide; [generally of upland rocky slopes] ..................................................T. pusillum var. ozarkanum
**Trillium catesbaei** Elliott, Catesby’s Trillium, Bashful Trillium, Rosy Wake-robin. Bottomland forests, mesic slopes, cove forests. Late March–early June; July–August. NC. NC south to sw. GA and se. AL, north in the interior to n. AL and se. TN, centered in the Piedmont from NC to GA, but extending into the Mountains and Coastal Plain. This species is morphologically and genetically complex and may include several semi-cryptic taxa. Petals white to pink. [= RAB, FNA, K, S, V, W, X, Z]

**Trillium cernuum** Linnaeus, Northern Nodding Trillium. Moist rich woods, seepage edges, damp forests with *Fraxinus nigra* and *Ulmus americana*. Late April–May. NL (Newfoundland), Hudson Bay area, and se. SK south to n. VA, ne. WV, n. IN, n. IL, n. IA, and SD. Petals white, pink, maroon, or green. [= FNA, K, W, WV, X, Z; < *T. cernuum* – RAB, F, S (apparently also including *T. rugelii*); > *T. cernuum* var. cernuum – C, G; > < *T. cernuum* var. macranthum A.J. Eames & Wieggand – C, G]

**Trillium cuneatum** Rafinesque, Sweet Betsy, Purple Toadshade, Large Toadshade, Wedge-petal Trillium, Bloody Butcher. In rich soils of cove forests, moist slopes, and bottomlands, usually over mafic or calcareous rocks, locally abundant. Mid March–April; late May–June. Centered in the Southern Appalachians (but is more abundant in adjacent physiographic provinces), extending north to the Highland Rim of KY, west to the Interior Low Plateau of TN, south to the Coastal Plain of MS and AL, and east to the Piedmont of GA, SC, and NC. Petals maroon, yellow, green, or various intermediate shades. [= C, FNA, K, V, W, X, Y, Z; < *T. cuneatum* var. cuneatum – RAB; > *T. cuneatum* – F; > < *T. viride* Beck – F, misapplied with respect to NC material; < *T. viride* var. *luteum* (Muhlenberg) Gleason – G, misapplied (also see *T. luteum*); > *T. hugeri* Small – S; > < *T. underwoodii* – S, misapplied]

**Trillium decipiens** J.D. Freeman, Chattahoochee Trillium, Deceptive Trillium. Moist forests. Late January–early April. FL Panhandle (Jackson and Walton counties) and sc. AL east to ec. GA, and in Abbeville Co. SC (L.L. Gaddy, pers. comm. 2009). It is similar to *T. underwoodii*. [= FNA, K, V, WH, X, Y, Z]

**Trillium decumbens** Harbison, Decumbent Trillium. Moist forests. Mid-March–April. Se. TN (Chester et al. 1993) south and west to nw. GA and nc. AL, and disjunct in Houston County, in central GA Coastal Plain; it should be sought in extreme sw. NC, an extremely "under-botanized" area. [= FNA, K, S, X, Y, Z]

**Trillium discolor** Wray ex Hooker, Pale Yellow Trillium, Pale Trillium, Small Yellow Toadshade. Rich cove and bluff forests, restricted to the Savannah River drainage; rare. Late March–early May; June–July. Endemic to the Savannah River drainage of nw. SC, ne. GA, and sw. NC, occurring in the Blue Ridge and Piedmont. In NC it is restricted to a few sites along the Whitewater and Thompson Rivers. Petals pale yellow, with maroon or greenish claws. [= RAB, FNA, K, S, V, W, X, Y, Z]

**Trillium erectum** Linnaeus, Red Trillium, Purple Trillium, Stinking Willie, Stinking Benjamin, Wake-robin. Wooded slopes, usually at middle to high elevations. April–early June; July–August. NB, QC, and MI south to w. NC, nw. SC, n. GA, e. TN, IN, and sc. WI. Petals maroon, white, yellow, green, or various intermediate shades. [= C, K, V, W, X, Z; < *T. erectum* var. erectum – RAB, WV (also see *T. sulcatum*); < *T. erectum* – F, G, S (also see *T. sulcatum*); > *T. erectum* var. erectum – FNA; > *T. erectum* var. album (Michaux) Pursh – FNA]

**Trillium flexipes** Rafinesque, Bent White Trillium. Moist coves over mafic or calcareous rocks. April. E. PA, s. ON and s. MN south to w. NC, nw. GA, n. AL, n. MS, mostly west of the Blue Ridge, but scattered in the Blue Ridge of NC, and disjunct east of the Blue Ridge in DE, PA, and MD. Petals white or maroon. [= C, FNA, K, V, W, X, Z; < *T. erectum* var. vaseyi – RAB; = *T. gleasonii* Fernald – G; > *T. declinatum* (A. Gray) Gleason – S, misapplied; = *T. erectum* var. declinatum – WV]

**Trillium foetidissimum** J.D. Freeman, Stinking Wake-robin. Bluffs, ravines, bottomlands. Late February–early April. MS west to LA. [= FNA, K, X, Y, Z; < *T. ludovicianum* Harbison – S]

**Trillium grandiflorum** (Michaux) Salisbury, Large-flowered Trillium, White Trillium, Great White Trillium. Rich coves and mesic slopes, also less typically on ridges over "rich" rock types. April–May; July–August. S. QC, s. ON, MI, and MN, south to NJ, c. NC, nw. SC, n. GA, n. AL, s. IL, and IA. Petals white to pink. [= RAB, C, F, FNA, G, K, S, V, W, WV, X, Z]

**Trillium lancifolium** Rafinesque, Lanceleaf Trillium, Narrowleaf Trillium. Rich forests over marble, limestone, and other calcareous substrates, floodplain forests. Late March–April. Se. TN south through w. GA and AL to Panhandle FL and se. AL. Petals purple, green, or greenish-purple. Material previously referred to this species from Kershaw County, SC represents the newly described *T. oostingii*. [= FNA, K, V, WH, X, Y, Z; = *T. lancifolium* (S. Watson) Boykin ex Small – RAB, S]

**Trillium ludovicianum** Harbison, Louisiana Wake-robin. Floodplains, streambanks, ravine forests. Early March–April. MS west to LA. Reports of this species for AL are based on specimens of *Trillium species 3*. [= FNA, K, X, Y, Z; < *T. ludovicianum* – S]
**Trillium luteum** (Muhlenberg) Harbison, Yellow Trillium, Yellow Toadshade, Wax Trillium, Lemon-scented Trillium. Moist coves over mafic or calcareous rocks, locally abundant in the vicinity of the Great Smokies. Mid March-April; late May-June. Nearly endemic to the Southern Appalachians: w. NC, e. TN, nw. GA, and se. KY, allegedly disjunct in c. AL (planted and naturalized in Frederick County, VA). Petals yellow. [= C, F, FNA, K, V, W, X, Y, Z; = T. cuneatum var. luteum (Muhlenberg) Ahles – RAB; < T. viride Beck var. luteum (Muhlenberg) Gleason – G (also see T. cuneatum); < T. sessile – S, misapplied]

**Trillium maculatum** Rafinesque, Mottled Trillium, Spotted Trillium. Rich forests and floodplains, over calcareous materials such as coquina limestone ("marl") or on shell middens. Early February-mid April. S. SC south to n. FL, west to sc. AL. Petals maroon or yellow. [= FNA, K, V, WH, X, Y, Z; < T. viride – RAB, misapplied; < T. sessile – S, misapplied]

**Trillium nivale** Riddell, Snow Trillium, Dwarf White Trillium. Rocky, calcareous forests. Early March-early April. MA, sw. PA, MI, W, s. MN, and e. SD south to n. VA, KY, s. IN, s. IL, s. MO, and se. NE. Petals white to pink. [= C, F, FNA, G, K, WV, X, Z]

**Trillium oostingii** Gaddy, Wateree River Trillium. Rich bottomland forests. Somewhat similar to *T. lancifolium* and *T. recurvatum*. So far as is known, endemic to Kershaw and Richland counties, SC, along the Wateree River. With clawed, bicolored petals (the claw maroon and the blade green) and green sepals reflexed somewhat (in the same plane as the drooping leaves). See Gaddy (2008) for additional information. [previously misidentified as *T. lancifolium*]

**Trillium persistens** Duncan, Persistent Trillium. Acidic forests with hemlocks and heaths. April. Endemic to a short stretch of the Tallulah-Tugaloo river system in nw. SC and ne. GA. Petals white to pink. [= FNA, K, V, W, X, Z]

**Trillium pusillum** Michaux var. monticulum Bodkin & Reveal. Dry to dry-mesic forests and woodlands, moist forests along small mountain streams. Endemic to nw. VA, e. WV, and w. MD. NC. Var. monticulum Bodkin & Reveal has been controversial; see Cabe (1995) and Cabe & Werth (1995) for additional discussion of variation within *T. pusillum* in Virginia and elsewhere. Petals white to pink. [= T. pusillum – Z; < *T. pusillum* var. virginianum – C, K; < *T. pusillum* var. pusillum – FNA; = *T. pusillum* var. monticola Bodkin & Reveal – X, orthographic error; = *T. monticola* in prep.]

**Trillium pusillum** Michaux var. ozarkanum (Palmer & Steyermark) Steyermark. Dry to dry-mesic slopes, in NC under *Quercus coccinea* and *Kalmia latifolia*. Centered in the Ozarks of sw. MO, nw. AR, and e. OK; disjunct eastward at scattered localities in sc. KY, nc. TN, sw. NC, and s. MS. Petals white to pink. [= K, X; < *T. pusillum* – RAB, G, S, Z; < *T. pusillum* var. pusillum – FNA; = *T. ozarkanum* Palmer & Steyermark]

**Trillium pusillum** Michaux var. pusillum. Carolina Least Trillium, Carolina Dwarf Trillium. Ecotones of calcareous savannas and swamp forests in the lower Coastal Plain. Late March-May; June-July. Endemic to the outer Coastal Plain of e. NC and e. SC. *T. pusillum* is somewhat reminiscent of a tiny *T. grandiflorum*. The *T. pusillum* complex has a wide but very fragmented range, involving most of the Southeastern states. In addition to the taxa treated here, the complex includes *T. texanum* Buckley (of e. TX). The *T. pusillum* complex is currently undergoing study by Susan Farmer (Univ. of Tennessee); preliminary analysis shows that the published varieties are "good" and that the recognition of additional taxa is warranted. Petals white to pink. [= X; < *T. pusillum* var. pusillum – C, F, FNA, K; < *T. pusillum* – RAB, G, S, Z; = *T. pusillum* (sensu stricto)]

**Trillium pusillum** Michaux var. virginianum Fernald, Virginia Least Trillium, Virginia Dwarf Trillium. Bottomland forests along small streams in the upper Coastal Plain, bottomland forests, also mesic beech islands in swamp forests. Late March-May; June-July. Var. *virginianum* occurs in the Coastal Plain of se. VA. Petals white to pink. [= F, FNA, X; < *T. pusillum* – RAB, G, S, Z; < *T. pusillum* var. virginianum – C, K (also see var. monticulum); = *T. virginianum* (Fernald) C.F. Reed]
**TRILLIACEAE**

**Trillium pusillum** Michaux var. 1, Alabama Least Trillium. Swamps and floodplains. C. TN south to n. AL. Petals white to pink. Under study by Susan Farmer. [<* T. pusillum var. pusillum* – C, F, FNA, K; <* T. pusillum* – G, S, Z; = *T. pusillum var. alabamicum* – X (nomen nudum); = *T. alabamicum* in prep.]

**Trillium pusillum** Michaux var. 2, Georgia Least Trillium. Hardwood flatwoods. Endemic to n. GA. Apparently most closely related to *Trillium texanum*. Petals white to pink. Under study by Susan Farmer. [<* T. pusillum* – V; = *T. georgianum* in prep.]

**Trillium pusillum** Michaux var. 3, Aiken Least Trillium. Seepage bogs. Endemic to sc. SC. Petals white to pink. Under study by Susan Farmer. [<* T. pusillum*; = *T. telmacola* in prep.]

**Trillium pusillum** Michaux var. 4, Carolina Least Trillium. Swampy forests, bottomland forests along small streams in the upper Coastal Plain. E. NC (upper Coastal Plain and adjacent Piedmont), moist mafic areas in Grayson Co. VA. The Grayson County site is within a kilometer of the Alleghany County, NC border, and the plant may be found to also occur in nw. NC. Petals white to pink. Under study by Susan Farmer. [<* T. pusillum*; = *T. carolinianum* in prep.]

**Trillium pusillum** Michaux var. 5, Dismal Swamp Least Trillium. Swampy forests. E. MD south to ne. NC. Petals white to pink. Under study by Susan Farmer. [<* T. pusillum*; = *T. palustris* in prep.]

**Trillium recurvatum** Beck, Prairie Trillium, Prairie Wake-robin. Rich soils of cove over calcareous rock. W. OH west to s. MI, s. WI, and e. IA, south to c. TN, c. AL, c. MS, n. LA, and e. TX; disjunct in the Cumberland Plateau of e. TN, e. KY, and the Blue Ridge and w. Piedmont of NC. The two known NC occurrences (Catawba and Madison counties) appear to be native. Petals maroon or yellow. [= C, F, FNA, G, K, S, X, Y, Z]

**Trillium reliquum** J.D. Freeman, Relict Trillium. Rich forests on bluffs and ravine slopes. Mid March-late April. Known from two disjunct areas, along the Savannah River in the vicinity of Augusta, on the border of SC (Aiken County) and GA (Richmond counties), and along the Chattohootechee River in sw. GA (Clay and Early counties). [= FNA, K, V, X, Y, Z]


**Trillium sessile** Linnaeus, Sessile Trillium, Sessile Toadshade, Toad Trillium. Rich forests, in NC limited to very rich soils of natural levees and lower slopes along the Roanoke River. March-April. Primarily a species of the northern Midwest, *T. sessile* ranges from MD, w. PA, w. NY, s. MI, n. IL and n. MO, south to e. VA, ne. NC, c. TN, n. AL, and n. AR. The easternmost occurrences are disjunct populations east of the Blue Ridge, in MD, VA, and along the Roanoke River in ne. NC. Petals maroon or green. [= C, F, FNA, G, K, W, WV, X, Y, Z]

**Trillium simile** Gleason, Sweet White Trillium. Very rich soils of slopes and coves over mafic or calcareous rocks, often also in or near seepage. Late March-early May; June-July. A Southern Appalachian endemic: Blue Ridge of w. NC, nw. SC, e. TN, and n. GA. Petals white or very rarely maroon. [= FNA, K, S, V, W, X, Z; <* T. erectum* var. vaseyi – RAB]

**Trillium species 2** Amicalola Trillium. Rich forests. Under study by Tom Patrick and Susan Farmer. Also recently found in SC. [“Amicalola Trillium” – V]


**Trillium staminaeum** Harbison, Twisted Trillium. Floodplains, slopes, especially over limestone. Late March-mid May. C. TN (Chester et al. 1993) south to c. AL and e. MS. [= FNA, K, S, X, Y, Z]

**Trillium sulcatum** T. Patrick, Southern Red Trillium, Barksdale’s Trillium. Coves and moist slopes. April-May. Primarily a species of the sedimentary rock Appalachians, *T. sulcatum* ranges from s. WV, sw. VA, and e. KY south to nw. NC (where it enters the Blue Ridge), w. TN, mw. GA, and ne. AL. This species seems quite distinctive for its small, generally maroon flowers (with strongly sulcate sepals purplish as well), borne on very long pedicels. Petals maroon or white. [= C, FNA, K, V, W, X, Z; <* T. erectum var. erectum* – RAB, WV; <* T. erectum* – F, G, S]

**Trillium underwoodii** Small, Underwood’s Trillium. Moist forests. Late February-mid April. N. FL north to wc. GA and c. and s. AL. The only erect trillium with the stems typically < 2× as long as the leaves (though sometimes elongating later in the season). [= FNA, K, S, V, WH, X, Y, Z]
**TRILLIACEAE**

*Trillium undulatum* Willdenow, Painted Trillium, Striped Wake-robin. Acidic soils of ridges, slopes, and bog margins, mostly at high elevations and often associated with *Rhododendron*, *Tsuga*, *Pinus*, or *Picea*. Late April-May; late July-August. NB, e. QC, s. ON, and MI, south to w. NC, nw. SC, n. GA, e. TN, and ne. OH. Of all our species, this is the species best adapted to acidic soils. Petals white with a red blaze. [= RAB, C, F, FNA, G, K, S, V, W, WV, X, Z]

*Trillium vaseyi* Harbison, Sweet Trillium, Vasey’s Trillium, Sweet Beth. Cove forests, other rich forests. Late April-early June. This species is a Southern Appalachian endemic: w. NC and e. TN south to nw. SC, n. GA, and ne. AL. Perhaps the largest trillium species, with the stems to 7 dm tall. Petals maroon or white. [= FNA, K, S, V, W, X, Z; < *T. erectum* var. *vaseyi* (Harbison) Ahles – RAB (also see *T. simule* and *T. flexipes*)]

### 53b. XEROPHYLLACEAE Takhtajan 1994 (Beargrass Family) [in LILIALES]


*Xerophyllum* Michaux 1803 (Turkeybeard, Beargrass)


*Xerophyllum asphodeloides* (Linnaeus) Nuttall, Turkeybeard, Beargrass, Mountain-asphodel. Dry ridges and slopes in the mountains, primarily in dry, strongly acidic sites which burn periodically, such as pine/heath woodlands and forests, heath balds, and xeric oak forests, most of the populations in the Blue Ridge Escarpment, often associated with *Pinus rigida* or *P. pungens*, disjunct to similar sites on quartzite monadnocks of the upper Piedmont, in the Coastal Plain in acidic pinelands. May-June; July-August. In two disjunct areas; the Coastal Plain of s. NJ and DE, and the Southern Appalachians from w. VA and e. WV south to e. TN, w. NC, nw. SC, and ne. GA. Sterile plants resemble tussocks of a bunchgrass, but the leaf bases are white and flattened and are obviously not those of a grass. The leaves remain green throughout the winter. [= RAB, C, F, FNA, G, K, W, WV, Z]

### 53c. HELONIADACEAE J. Agardh 1858 (Swamp-pink Family) [in LILIALES]


1 Flowers white to cream; plants dioecious (individual flowers either male or female) ................................................................. *Chamaelirium*

1 Flowers pink; plants hermaphroditic (individual flowers perfect) ............................................................................................................. *Helonias*

*Chamaelirium* Willdenow 1808 (Devil’s-bit)


*Chamaelirium luteum* (Linnaeus) A. Gray, Devil’s-bit. Moist slopes, bottomlands, wet savannas. March-May; September-November. MA west to ON, OH, s. IN, and AR, south to FL and LA. The ecological amplitude and morphologic variability of this species is surprising; it needs additional, more careful, study. *C. obovate* Small (or other previously unnamed entities) may warrant recognition at some level. [= RAB, C, F, FNA, G, GW, K, W, WH, Z; > *C. luteum* – S; > *C. obovate* Small – S]

*Helonias* Linnaeus 1753 (Swamp Pink)

A monotypic genus, an herb of temperate e. North America. Although *Helonias* has traditionally been considered a monotypic genus, Takahashi & Kawano (1989) have suggested that the closely related *Heloniopsis* and *Ypsilandra* (both of e. Asia) may be congeneric. Perhaps better to be placed in the segregate family Heloniadaceae. References: Zomlefer (1997a)=Z; Utech in FNA (2002a); Tamura in Kubitzki (1998a).
**Helonias bullata** Linnaeus, Swamp Pink. Bogs, usually under dense shrubs in peaty soils, in the VA Coastal Plain in acidic sandy seepage swamps. April-May; June-July. S. NY and NJ to e. VA on the Coastal Plain, and from w. VA through w. NC to nw. SC and ne. GA (Jones & Coile 1988) in the Blue Ridge Mountains. The flowering scape elongates markedly in fruit, reaching 1 m in height. [= RAB, C, F, FNA, GW, G, K, S, W, Z]

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**53d. MELANTHIACEAE** Batsch 1802 (Bunchflower Family) [in LILIALES]

A family of about 8 genera and 80 species, mostly temperate and northern hemisphere, but extending into South America (Peru). References: Dahlgren, Clifford, & Yeo (1985); Zomlefer (1997a)=Z; Zomlefer (1996, 2003); Tamura in Kubitzki (1998a); Tamura et al. (2004); Zomlefer et al. (2001).

1 Leaves 3, whorled at the summit of the stem; flowers 1 per plant, solitary and terminal. [see TRILLIACEAE]

2 Leaves many, not whorled at the summit of the stem; flowers many per plant, in spikes, racemes, or panicles. [see XEROPHYLLACEAE]

3 Main (basal) leaves elliptic, or obovate, the main veins parallel, all diverging at the base of the leaf and rejoicing at the apex; flowers white, pink, or cream. [see HELONIADACEAE]

3 Main (basal) leaves linear, linear, or oblong, the main veins parallel, all diverging at the base of the leaf and rejoicing at the apex; flowers white, cream, yellowish, greenish, or brownish.

4 Inflorescence a spike or raceme.

5 Inflorescence a spike; flowers white, cream, yellowish, or greenish. [Amianthium]

6 Basal leaves 1-3, 2-7 mm wide; capsule 7-9 mm long, 3-4 mm wide; bulb cylindrical. [Stenanthium densus]

6 Basal leaves many, 4-23 mm wide; capsule 5-7 mm long, 5-7 mm wide; bulb broadly ovoid. [Amianthium]

7 Inflorescence a spike or raceme. [Schoenocaulon]

7 Inflorescence axes scurfy-pubescent; seeds winged; leaves either linear or broader, < 14 cm wide. [Veratum]

8 Inflorescence axes glabrous; seeds not winged (though sometimes angled); leaves linear, < 2 cm wide. [Anticlea]

8 Leaves strongly keeled, (5-) 10-20 mm wide; plant colonial, from thick, hard, horizontal, short-creeping rhizomes covered with fibrous old leaf bases; inner tepals (petals) 7-17 mm long, distinctly clawed, acute-acuminate at the tip, bearing 2 glands well above the base. [Zigadenus]

9 Inner tepals (petals) 7-12 mm long, clavated, with a single bilobed gland borne well above the base; [of calcareous habitats in the Mountains] [Stenanthium]

9 Inner tepals 3-10 mm long, not clavated, with a single, unlobed gland borne near the base (this often difficult or impossible to see, consisting only of a greenish line at the very base of the tepal); [of acidic habitats of the Mountains, Piedmont, and Coastal Plain] [Zigadenus]

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**Amianthium** A. Gray 1837 (Fly-poison)


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**Anticlea** Kunth 1843 (Death-camas)


**Anticlea glauca** Kunth, White Death-camas. Limestone and dolostone woodlands, glades, cliffs, and outcrops. July-August; September-October. *A. glauca* is the more eastern component of a complex variously treated as two species or a single variable species, with or without recognized varieties or subspecies. *A. elegans* (in the broadest sense) ranges from QC and NY west to AK, south to n. OH, n. IN, n. IL, MO, IA, NM, AZ, and n. Mexico; disjunct in the mountains of w. VA, e. WV, and w. NC. Two taxa have often been recognized, at the specific, subspecific, or varietal level. The more eastern taxon (epithet "*glauca*" – see synonymy below) ranges from NB west to ND, south to w. NC, TN, and MO, and is distinguished by glaucous foliage, paniculate inflorescence, and tepals often purplish or brownish basally. The more western taxon (epithet "elegans"), occurring to the MN and MO, has the foliage greener, the inflorescence often only racemose, and the tepals yellow. [= Anticlea elegans (Pursh) Rydberg – Y; = Zigadenus elegans Pursh ssp. glauca (Nuttall) Hultén – K; = Zigadenus glaucus Nuttall – RAB, F, W, Z; = Zigadenus elegans var. glaucus (Nuttall) Precee – C; = Zigadenus elegans – FNA; = Zigadenus glaucus – G; = Anticlea chlorantha (Richardson) Rydberg – S, misapplied; = A. elegans ssp. glauca (Nuttall) A. Haines; = A. elegans var. glauca (Nuttall) Zomlefer & Judd]

Schoenocauleon dubium (Michaux) Small, Florida Feathershank. Dry pine savannas, sandhills, scrub. S. GA and n. peninsular FL south to s. peninsular FL. [= FNA, K, S, WH, Z]

Stenanthium (A. Gray) Kunth 1843 (Featherbells, Featherfleece)


1. Tepals obovate, the tip rounded-obtuse.
2. Inflorescence a raceme; flowers all bisexual; plants 3-10 dm tall; flowering April-early June; [of the Coastal Plain (in our area)] S. densus
3. Inflorescence a panicle of racemes; lower flowers of the inflorescence branches bisexual and fertile, the upper staminate or superficially perfect but the pistils nonfunctional (not producing fruits); plants 4-20 dm tall; flowering July-August; [of the Mountains of NC and VA and Coastal Plain of GA westward to LA] S. leimanthoides
4. Larger leaves to 15 mm wide, firm to coriaceous, strongly ribbed; panicle diffuse, the branches ascending, spreading, or drooping, the flowers scattered; perianth 3-8 (-10) mm long, whitish; capsules ovoid to urceolate, 6-9 mm long, deflexed; seeds 5-5.5 mm long; leaves mainly near the base, rapidly reduced upwards; plant to 1.9 m tall and the stem to 1 cm in diameter near its base; [of dry to moist upland forests].
5. Perianth 5-10 mm long; plant to 1.9 m tall, the stem 4-10 mm in diameter near the base S. gramineum var. gramineum
6. Perianth 3-4.5 (-5.0) mm long; plant to 1.0 m tall, the stem 1.5-5 mm in diameter near the base S. gramineum var. micranthum

Stenanthium densum (Desrousseaux) Zomlefer & Judd, Crow-poison. Pine savannas, pine flatwoods. April-early June; late May-July. Se. VA south to c. peninsular FL and west to se. TX, on the Coastal Plain. See Z. leimanthoides for discussion of the taxonomy of the 2 species. Z. densum is superficially very similar to Amianthium muscitoxicum; Z. densum has a conical capsule, 2× or more as long as broad (vs. about 1× as long as broad), a bladeless purple sheath, 3-8 cm long, enclosing the leaves at the base (vs. absent, the base leaves with blades), and basal leaves usually 1-3 in number, 3-6 (-10) mm wide (vs. mostly 4 or more in number, mostly 7-10 mm wide). [= Y; = Zigadenus densum (Desrousseaux) Fernald – RAB, C, GW, K, Z; < Zigadenus densus (Desrousseaux) Fernald – FNA, WH (also including S. leimanthoides); = Zigadenus densus – G (an orthographic variant); = Tricyanthus augustolius (Michaux) Small – S]


Stenanthium gramineum (Ker-Gawler) Morong var. gramineum, Common Featherbells. Moist forests, grassy balds, to 1700m in elevation. July-early September; August-October. PA west to IL and MO, south to ne. NC, Panhandle FL, and TX. [= F, K; < S. gramineum – RAB, C, FNA, G, S, WH, Z; < S. gramineum var. gramineum – WV]

**Veratrum Linnaeus 1753 (White-hellebore)**

A genus of about 30-55 species, herbs of temperate Northern Hemisphere. *Veratrum* is here interpreted broadly, including *Melanthium*, following the molecular phylogeny work of Zomlefer et al. (2003). A proposal to conserve the name *Veratrum* against *Melanthium* has been made but not yet ruled on (Zomlefer, Judd, & Gandhi 2010). References: Zomlefer (1997)=Z; McNeal & Shaw in FNA (2002a); Bodkin & Utech in FNA (2002a); Tamura in Kubitzki (1998a); Zomlefer et al. (2003).

1 Leaves all linear, 1-2 (-3) cm wide; tepals greenish white to creamy white (sometimes fading brownish); [section Fuscoveratrum]......................... **V. viride**

1 Leaves (at least the basal) oblanceolate to obovate or elliptic, 3-15 cm wide (the upper leaves sometimes linear); tepals yellowish green, green, or maroon.

2 Leaves strongly plicate, 6-15 cm wide; tepals pubescent, 8-13 mm long, 3-5 mm wide, with a conspicuous pair of glands near the base of the tepal blade (these sometimes more or less fused); filament free from the tepals; [section Veratrum]............................................................... **V. viride**

2 Leaves not at all or slightly plicate, 3-14 cm wide; tepals glabrous, 4-9 mm long, 1-3 mm wide (3-5 mm wide in *V. latifolium*), with either conspicuous (*V. latifolium*) or diffuse (*V. parviflorum* and *V. woodii*) glands; filament fused to the basal claw of the tepal; [section Fuscoveratrum].

3 Tepals 3-5 mm wide, the blade of the tepal abruptly narrowed to a claw, the blade nearly as wide as long, with undulate margins, and 2 conspicuous succulent glands; leaves 1-7 cm wide.......................................................... **V. species 1**

3 Tepals 1-3 mm wide, the blade gradually narrowed to the base, the blade much longer than wide, with entire margins, and with diffuse glandular areas; leaves 3-12.5 cm wide.

4 Tepals pale to olive green, 4-7 mm long; ovaries glabrous; leaves 4.5-14 cm wide; [common, of the Mountains in our area] ......................

4 Tepals dark maroon, 6-9 mm long; ovaries densely pubescent; leaves 3-10 cm wide; [rare disjunct in our area]................................. **V. parviflorum**

4 Tepals pale to olive green, 4-7 mm long; ovaries glabrous; leaves 4.5-14 cm wide; [common, of the Mountains in our area] ......................

**Veratrum species 1**, Crisp Bunchflower. Moist to dry forests. July-August; September-October. An Appalachian endemic: CT south to NC, SC, and n. GA. The basionym with priority is apparently *Melanthium hybridum*; the combination in *Veratrum* has not yet been made (Ward 2010; Weakley, in prep.). [= *Veratrum latifolium* (Desrousseaux) Zomlefer – Z; = Melanthium latifolium Desrousseaux – FNA, K, S]

**Veratrum parviflorum** Michaux, Mountain Bunchflower. Moist to rather dry forests, up to at least 1700 meters. July-early September; August-October. A Southern Appalachian endemic: e. and sc. WV and KY south to VA, NC, n. GA, and TN. [= RAB, C, G, W, S, Z; = Melanthium parviflorum (Michaux) S. Watson – F, FNA, K, WV]

**Veratrum virginicum** (Linnaeus) Aiton, Bog Bunchflower, Virginia Bunchflower. Savannas, bogs, seepage bogs, wet forests. June-August; August-October. S. NY, PA, OH, IN, IL, and IA south to c. peninsular FL and e. TX. This species is superficially quite similar to *Zigadenus glaberrimus*, which, in addition to characters given in the family key, has the stem glabrous (vs. pubescent in *M. virginicum*). [= WH, Z; = Melanthium virginicum Linnaeus – RAB, C, F, FNA, G, GW, K, W, WV; > Melanthium dispersum Small – S; = Melanthium virginicum – S]

**Veratrum viride** Aiton, White-hellebore, Indian Poke, Green Hellebore, Cornhusk Lily. Seeps, streambanks, wet boulderfields. June-August; July-September. QC and ON south in the mountains to NC, TN, and ne. GA. The closely related *V. eschscholtzii* A. Gray, sometimes treated as *V. viride* ssp. *eschscholtzii* (A. Gray) A. & D. Löve or *V. viride* var. *eschscholtzii* (A. Gray) Breitung, is western, ranging from AK to OR. This plant is strongly poisonous; an insecticide was formerly manufactured from the roots. [= RAB, C, F, G, W, S, WV, Z; < Z. densus – K; > V. viride var. *viride* – F, FNA; = V. viride ssp. *viride*]

**Veratrum woodii** J.W. Robbins ex Wood, Ozark Bunchflower, Wood's False-hellebore. Circumneutral soil of woodlands over mafic rocks (such as amphibolite) or other calcareous substrates, hammocks. July; September. Primarily Ozarkian, but...
MELANTHIACEAE extending in scattered populations eastwards as far as FL Panhandle (Gadsden and Liberty counties), sw. GA, nw. GA, sc. TN, nw. SC (Pickens County), and sw. NC (Polk County). [= C, F, G, Z; = Melanthium woodii (J.W. Robbins ex Wood) Bodkin – FNA, K; > V. intermedium Chapman – S]

Zigadenus Michaux 1803 (Death-camas)

As redefined, a monotypic genus of se. North America. A molecular systematics study by Zomlefer et al. (2001) gives strong support to a treatment recognizing Zigadenus as monotypic (Zigadenus glaberrimus), Anticlea (including for our area the former Zigadenus elegans ssp. glaucus), Stenanthium (including for our area Stenanthium spp. and the former Zigadenus densus and Z. leimanthoides). Zigadenus (as redefined) has a tentatively reported chromosome number of 2n=52 (Zomlefer & Smith 2002). References: Zomlefer (1997)=Z; Tamura in Kubitzki (1998a); Zomlefer et al. (2001); Schwartz in FNA (2002a). [also see Anticlea, Stenanthium]

Zigadenus glaberrimus Michaux, Large Death-camas, Snakeroot. Sandhill seepage bogs, pine savannas, pocosin edges. Late June-early September; August-November. Se. VA south to Panhandle FL, west to se. TX, on the Coastal Plain. [= RAB, C, F, NFA, GW, K, WH, Z; = Zygadenus glaberrimus – G, S (orthographic variant)]

55. ALSTROEMERIACEAE Dumortier 1829 (Peruvian-lily Family) [in LILIALES]

A family of 5 genera and about 170 species, perennial herbs, of Central and South America. References: Holmes in FNA (2002a).

Alstroemeria (Peruvian-lily, Alstroemeria)

A genus of about 60 species, perennials, of South America. References: Holmes in FNA (2002a).

* Alstroemeria pulchella Linnaeus f., Peruvian-lily. Disturbed areas, roadsides near plantings; native of Brazil. Naturalized in GA, FL, AL, MS, LA, and TX (Holmes in FNA 2002; Singhurst, Keith, & Holmes 2005). [= FNA, WH]

56. COLCHICACEAE A.P. de Candolle 1805 (Meadow Saffron Family) [in LILIALES]

As here circumscribed, a family of about 15 genera and about 250 species, nearly cosmopolitan. References: Vinnersten & Manning (2007); Dahlgren, Clifford, & Yeo (1985); Nordenstam in Kubitzki (1998a).

1 Plant acaulescent, from a tunicated bulb; [tribe Colchiceae] ................................................................................................................................................. Colchicum
1 Plant with leafy stem, from a rhizome or tuber.
2 Tepals red or orange, reflexed; leaves attenuate into a tendril-like tip; [alien]; [tribe Colchiceae] ........................................................................................................................................ Gloriosa
2 Tepals yellow, not reflexed; leaves acute to obtuse; [native]; [tribe Uvularieae] ................................................................................................................................ Uvularia

Colchicum Linnaeus 1753 (Meadow Saffron)


* Colchicum autumnale Linnaeus, Meadow Saffron, Autumn-crocus. Planted as an ornamental, at least long-persistent; native of s. Europe. September-October. [= C, F, G, K]

Gloriosa Linnaeus 1753 (Flamelily)

A genus of about 5 species, perennials, native of Africa and Asia.

* Gloriosa superba Linnaeus, Flamelily, Glory-lily. Disturbed areas; native of tropical Africa. [= FNA, K, WH]
**COLCHICACEAE**


1. Leaves perfoliate, the margins scarious but smooth; upper stems terete in cross-section, hollow; [section *Uvularia*].

2. Tepals glabrous within; leaves puberulent beneath (or rarely glabrate); leaves below the fork (0-) 1 (-2)................. **U. grandiflora**

2. Tepals conspicuously granular-papillose within; leaves glabrous and often glaucous beneath; leaves below the fork 2-4........**U. perfoliata**

1. Leaves sessile, the margins scarious and minutely papillose-denticulate; upper stems angled in cross-section, solid; [section *Oakesiella*].

3. Undivided portion of the style 0.5-1× as long as the style branches; upper stem and lower leaf surfaces puberulent to glabrous, light green; rhizome very short, with clustered, thickened roots................................................................. **U. puberula**

3. Undivided portion of the style 3-5× as long as the style branches; upper stem and lower leaf surfaces glabrous, usually also glaucous; rhizome elongate, with scattered, fibrous roots.

4. Pedicel bearing a sessile, leaf-like bract 5-17 mm below the flower; capsule sessile at base, conspicuously beaked at apex ... **U. floridana**

4. Pedicel bractless; capsule on a stalk 2-4 (-6) mm long, not beaked................................................................. **U. sessilifolia**

**Uvularia floridana** Chapman, Florida Bellwort. Alluvial forests, moist ravines. Mid March-early April. C. SC south to ne. FL, and Panhandle FL, west to c. MS, rare and local throughout its range. [= RAB, FNA, GW, K, WH, Z; = Oakesiella floridana (Chapman) Small – S]

**Uvularia grandiflora** J.E. Smith, Large-flowered Bellwort. Cove forests and other moist, rich, forested sites. Mid April-mid May; July-August. S. QC west to ND, south to w. NC, w. SC, n. GA, c. AL, MS, c. AR, and e. OK. [= RAB, C, F, FNA, G, K, S, W, WH, Z]

**Uvularia perfoliata** Linnaeus, Perfoliate Bellwort. Moist to fairly dry hardwood forests. April-early May; June-August. S. NH, s. ON, and c. OH, south to Panhandle FL and LA. [= RAB, C, F, FNA, G, K, S, W, WH, WV, Z]

**Uvularia puberula** Michaux, Carolina Bellwort, Appalacian Bellwort, Coastal Bellwort. Dry to moist upland, acidic forests, up to at least 1500m. Early April-Early May; August-October. Sometimes interpreted as having two varieties, the montane and Piedmont plants as var. *puberula* (leaves broader, rounded to slightly clasping at the base, firm in texture, obviously reticulate on the lower surface, the stem puberulent in lines on the ridges) and var. *nitida* (Britton) Fernald (leaves narrower, more cuneate, thin in texture, the reticulation of cross veins less evident, the stems glabrous); see Wilbur (1963b) and Uttal (1991). S. PA to GA in the Mountains and (more rarely) Piedmont, and from Long Island NY south to GA in the Coastal Plain and Sandhills. While Wilbur (1963b) chose not to recognize varieties, Uttal (1991) supports varietal recognition. The differences seem minor and variable, and poorly correlated with geography. [= FNA, K, W, Z; > *Uvularia puberula* Michaux var. *puberula* – C; Y; > *Uvularia puberula* Michaux var. *nitida* (Britton) Fernald – C; Y; = *U. pubica* (Walter) Fernald – RAB, WV, nomen dubium; > *U. pubica* var. *pubica* – F, G; > *U. pubica* var. *nitida* (Britton) Fernald – F, G; = Oakesiella puberula (Michaux) Small – S; = *Uvularia caroliniana* (J.F. Gmelin) Wilbur]

**Uvularia sessilifolia** Linnaeus, Straw-lily, Wild-oats. Moist hardwood forests, on slopes and mainly in bottomlands. Late March-early May; August-October. NS west to ND, south to Panhandle FL and n. LA. [= RAB, C, F, FNA, K, W, WH, WV, Z; = Oakesiella sessilifolia (Linnaeus) S. Watson – S]

**59. SMILACACEAE** Ventenat 1799 (Greenbrier Family) [in LILIALES]

A family of 3-12 genera and about 375 species, widespread in tropical, subtropical, and temperate regions. References: Holmes in FNA (2002a); Judd (1998); Conran in Kubitzki (1998a).

**Smilax** Linnaeus 1753 (Greenbrier, Carrionflower, Smilax)

A genus of about 300 species, woody vines and herbs, subcosmopolitan in temperate and tropical regions. Our deciduous species are a monophyletic group within *Smilax*, with a classic eastern North American - east Asian disjunction, and are treated as section Nemexia or subgenus Luiste (Wilbur 2004, Fu et al. 2005). *Smilax* berries and shoots provide important food sources for many

1 Stem woody, usually with prickles; ovules 1 per carpel; peduncles usually ≤ 3 cm long; [section Nemexia].
2 Plants erect, 0.2-1.0 m tall, even when well-developed with < 20 leaves [note that immature or depauperate individuals (nonflowering) of S. pseudochina, S. heracea, S. lasioneura, and S. pulverulenta often have this aspect]; tendrils absent or rudimentary; peduncles usually few (usually 1-4), the lowest often from bract axis.
3 Leaves glabrous and glaucous beneath, thick in texture, base cordate, tip acute or acuminate; lowest peduncle from a leaf axil (very rarely from bract axis), upper peduncles from leaf axils; leaves 5-7, clustered together near the summit of the stem .........S. biltmoreana
4 Leaves pubescent and green (or glaucous) beneath, usually thin in texture, base cordate, truncate, or rounded, tip acuminate, acute, or obtuse; lowest peduncles from axils of bracts below the lowest leaves, upper peduncles also often from bracts (the uppermost often from leaf axils); leaves either clustered together near the summit of the stem or well distributed.
5 Leaves relatively many, (7-) 10-13 (-20), often well distributed in the upper half of the stem, notably reduced in size from lower to upper, mostly with the base cordate and the tip acuminate; berry 3-5 seeded ...
6 Leaves few, usually 4-8, usually clustered together near the summit of the stem (rarely well distributed), about the same size, mostly with the base ovate (to subcordate), the tip acute to obtuse; berry 2-3 seeded.................................S. hugeri

2 Plants vine-like, climbing or sprawling, to 3 m tall, when well-developed with > 30 leaves; tendrils present and numerous; peduncles usually many, from leaf axils.
5 Leaf bases hastate, the leaf margins straight or concave in outline; longest fruiting pedicels < 2× as long as the fruit; anthers equaling or longer than the filaments; perianth 1.5-2.5 mm long; leaves glabrous and glaucous beneath.............................................................S. pseudochina

4 Leaves, usually 4-8, usually clustered together near the summit of the stem (rarely well distributed), about the same size, mostly with the base ovate (to subcordate), the tip acute to obtuse; berry 2-3 seeded.................................S. hugeri

8 Leaves bright green and shiny beneath; fruit black, not glaucous; peduncles 1-2 (-3)× as long as the subtending pedicels ...

9 Lower surfaces of leaves strongly glaucous .................................................................S. glauca

10 Prickles of the stem fewer, broad-based and awl-like or catclaw-like, green, brown, or black.
11 Midvein (as seen on the lower surface) much more pronounced than the principal lateral veins, which are scarcely raised; leaves evergreen, thick, coriaceous.................................S. laurifolia

12 Leaves mostly ovate, oblong, pandurate, or hastate, the base cordate, truncate, rounded, or cuneate, the tip rounded to acute; berries various in color.
13 Margin of the leaf blade prominent, orbiculate, thickened as a marginal vein (this appearing as a thickening, a visible vein, or an apparent revolute margin); leaves with 1-3 seeds.

14 Inflorescence pedicule (stalk of the umbel) as long as or shorter than the subtending leaf pedicel; stems and prickles glabrous; leaves evergreen; berries usually with 2-3 seeds; [generally of xeric or less commonly mesic sands].................................S. aureulata

15 Margin of the leaf blade thick, sometimes revolute; berries with (1-) 2-4 seeds.

16 Berries blue-black; perianth green; leaves semi-evergreen to evergreen, margins of mature leaves generally not revolute, the margins of the leaves and the petioles often with minute, flabellate, tooth-like projections; berries with (1-) 2-3 seeds; [a wide variety of habitats] ...............................................................................................................................S. bona-nox

17 Berries bright red; perianth brownish-yellow; deciduous, margins of mature leaves usually revolute, the margins of the leaves and the petioles lacking minute, flabellate, toothlike projections; berries with 2-4 seeds; [swamp forests, bogs, often where submersed for at least part of the year] ..................................................................................S. watleri

**Smilax auriculata** Walter, Dune Greenbrier. Dunes on barrier islands, dry sandy openings in maritime forests or sandhills (northwards, as in the Carolinas, limited to sites near the near the coast). May-July; October-November (and persisting). E. NC (Dare County) south to s. FL and west to LA; Bahama Islands. [= RAB, FNA, CK, K, S, WH, Y]

**Smilax biltmoreana** (Small) J.B.S. Norton ex Pennell, Biltmore Carriornflower. Dry forests (such as dry pine ridges and chestnut oak forests) and moist forests. April-May; August-October. The species is apparently limited to to NC, SC, and GA, primarily in the Blue Ridge Escarpment region, with disjunct occurrences in Panhandle FL, s. AL, and se. KY. [= FNA, K, W, Y, Z; = Smilax eicirrata (Engelmann ex Kunth) S. Watson var. biltmoreana (Small) Ahles – RAB; < S. eicirrata – G, WH; = Nemexia biltmoreana Small – S]
**SMILACACEAE**

**Smilax bona-nox** Linnaeus. Catbrier, Tramp's-trouble. In a wide variety of upland and wetland habitats. Late April-May; September-October. MD and MO south to s. FL and TX, and also in Mexico. [= RAB, C, F, FNA, GW, K, S, W, WH, Y; > S. bona-nox var. hastata (Wildenow) Alphonse de Candolle – F; > S. bona-nox var. exauriculata Fernald – F; > S. bona-nox var. hederifolia (Beyrich) Fernald – F; > S. bona-nox var. bona-nox – F]

**Smilax ecirrata** (Engelmann ex Kunth) S. Watson. Forests. Mid May-early June; August-September. N. OH MI, WI, and s. MN south to w. VA, TN, s. IL, MO, and e. OK. [= K, Y, Z; > S. ecirrata – C, F, FNA, WV, orthographic variant; < S. ecirrata – G; = Nemexia ecirrata (Engelmann ex Kunth) Small – S]

**Smilax glauca** Walter, Whiteleaf Greenbrier, Wild Sarsaparilla. In a wide variety of upland and wetland habitats. Late April-early June; September-October (and persisting). NJ, e. PA, OH, IN, MO, and KA, south to c. peninsular FL and TX, and also in Mexico. [= RAB, C, FNA, GW, S, W, Y; > S. glauca var. glauca – F, G, K, WV; > S. glauca var. leurophylla Blake – F, G, K, WV]

**Smilax herbeca** Linnaeus, Common Carrionflower. Moist deciduous forests. May-June; August-October. Centered in the Appalachian Mountains, from QC and ME west to OH, south to AL, GA, and TN. Young, non-flowering plants closely resemble *S. bitilmoreana*. [= F, FNA, K, W, WV, Y, Z; = S. herbacea var. herbacea – RAB, C, G; = Nemexia herbacea (Linnaeus) Small – S]

**Smilax hispida** Rafinesque, Bristly Greenbrier, Hellfetter. Moist to wet forests. CT, NY, MN, and NE south to s. FL and TX. Wilbur (2003) discusses the complicated nomenclatural problems involving this plant and concludes that *S. hispida* Raf. is the correct name. [= RAB, C, G, S, WV; = S. tannoides Linnaeus – FNA, GW, K, W, WH, Y, misapplied; > S. tannoides var. hispida (Muhlenberg) Fernald – F; > S. tannoides var. tannoides – F; > S. hispida var. australis Small – S; > S. hispida var. hispida – S]


**Smilax lasioneura** Hooker, Midwestern Carrionflower. Moist deciduous forests, hammocks, bluff forests, pine-oak hickory submesic forests, perhaps only or primarily over mafic rocks. April-May; August-September. ON and MT south to w. VA (?), w. NC, Panhandle FL, OK, and CO. Material from VA is ambiguous. [= F, FNA, K; = S. herbacea var. lasioneura (Hooker) Alphonse de Candolle – C, G; = Nemexia lasioneura (Hooker) Rydberg – S; = S. lasioneura – WH, Y, orthographic variant]

**Smilax laurifolia** Linnaeus, Blaspheme-vine, Bamboo-vine. Pocosins, swamp forests, mountain bogs in sw. NC. July-August, September-October of the second year (and persisting). Primarily a Southeastern Coastal Plain species: NJ south to s. FL, west to w. TN, AR, and e. TX, and also in the Bahamas Islands and Cuba. [= RAB, C, F, FNA, GW, K, S, W, WH, Y]

**Smilax leptanthera** Pennell. Moist forests. See Pennell (1916) for additional information. Treated as valid and rare by GAHP. [= Nemexia leptanthera (Pennell) Small – S; < S. pseudochina] {investigate}


**Smilax pulverulenta** Michaux. Moist deciduous forests. May-June; August-October. Se. NY, se. and sc. PA, IN, MO, and e. KS south to NC, TN, and AR. [= F, FNA, K, W, WV, Y, Z; = S. herbacea var. pulverulenta (Michaux) A. Gray – RAB, C, G; = Nemexia pulverulenta (Michaux) Small – S]

**Smilax pumila** Walter, Sarsaparilla-vine, Dwarf Smilax. Mesic to dryish hammocks and bluffs, northward primarily in maritime-influenced mainland forest, with *Magnolia grandiflora* and *Tilia americana var. caroliniana*. October-November; January-April (and persisting). Ne. SC (within a few hundred miles of Brunswick County, NC) to c. peninsular FL and west to TX. It occurs on Collins Neck, along the NC-SC border, in maritime-influenced forests with southern affinities, now largely destroyed by golf-course development. This unusual *Smilax* is sometimes cultivated as an ornamental ground-cover. [= RAB, FNA, K, S, WH, Y]

**Smilax rotundifolia** Linnaeus, Common Greenbrier, Bullbrier, Horsebrier. In a wide variety of upland and wetland habitats. April-May; September-October (and persisting). NS and s. ON south to n. FL and e. TX. [= RAB, C, F, FNA, GW, K, S, W, WH, WV, Y; > S. rotundifolia var. quadrangularis (Muhlenberg ex Wildenow) Wood]

**Smilax smallii** Morong, Jackson-brier. Bottomland forests. June-July; April-June of the next year. Ne. NC (se. VA?) to c. peninsular FL, west to s. AR and e. TX, primarily on the Coastal Plain. Unless the name *S. smallii* is conserved, it must be replaced by the older *S. maritima* Alph. Wood. [= RAB, FNA, G, GW, K, W, WH, Y; = S. lanceolata Linnaeus – S, misapplied; = S. maritima Alph. Wood]
**Smilax walteri** Pursh, Coral Greenbrier, Red-berried Swamp Smilax. Swamp forests, bogs, often where submersed for at least part of the year. Late April-May; September-November (and persisting). NJ south to c. peninsular FL and west to TN, AR, and TX. In its relatively narrow leaves, *S. walteri* can resemble *S. smallii*. *S. walteri* has a thicker-textured leaf, and is almost always rounded at the base rather than cuneate. [= RAB, C, F, FNA, G, GW, K, S, W, WH, Y]

61. **LILIACEAE** A.L. de Jussieu 1789 (Lily Family) [in LILIALES]

As here interpreted narrowly, the Liliaceae constitutes about 11 genera and 550 species, of the Northern Hemisphere. There has been much recent investigation and re-interpretation of evidence regarding the upper-level taxonomy of the Liliaceae, with strong suggestions that the broad Liliaceae recognized by Cronquist (1981) is artificial and polyphyletic. Cronquist (1993) himself concurs, at least to a degree: "we still await a comprehensive reorganization of the lilies into several families more comparable to other recognized families of angiosperms." Dahlgren & Clifford (1982) and Dahlgren, Clifford, & Yeo (1985) synthesized an early phase in the modern revolution of monocot taxonomy. Since then, additional research, especially molecular (Duvall et al. 1993, Chase et al. 1993, Bogler & Simpson 1995, and many others), has strongly validated the general lines (and many details) of Dahlgren's arrangement. The most recent synthesis (Kubitzki 1998a) is followed as the basis for familial and generic taxonomy of the lilies and their relatives (see summary below). References: Angiosperm Phylogeny Group (1998, 2003, 2009); Tamura in Kubitzki (1998a). [also see AGAVACEAE, ALLIACEAE, ALSTROEMERIACEAE, AMARYLLIDACEAE, ASPARAGACEAE, COLCHICACEAE, HEMEROCALLIDACEAE, HOSTACEAE, HYACINTHACEAE, HYPOXIDACEAE, MELANTHIACEAE, NARTHICEAEC, RUSCACEAE, SMILACACEAE, THEMIDACEAE, TOFIELDIACEAE, TRILLIACEAE]

Our "liliaceous" genera (members of orders placed in the Lilianae) are therefore divided as shown below, largely following Kubitzki (1998a) and some more recent molecular analyses.

**ALISMATALES**
- TOFIELDIACEAE: Harperocallis, Pleea, Tofieldia, Triantha.

**LILIACEAE**
- ALSTROEMERIACEAE: Alstroemeria.
- COLCHICACEAE: Colchicum, Uvularia.
- HELONIADACEAE: Chamaelirium, Helonias. (or to be included in MELANTHIACEAE)
- LILIACEAE: Clintonia, Erythronium, Lilium, Medeola, Prosartes, Streptopus, Tulipa.
- MELANTHIACEAE: Amianthium, Anticlea, Schoenocaulon, Stenanthium, Veratrump, Toxicoscordion, Zigadenus.
- SMILACACEAE: Smilax.
- TRILLIACEAE: Trillium. (or to be included in MELANTHIACEAE)

**ASPARAGALES**
- AGAVACEAE: Camassia, Manfreda, Schoenolirion, Yucca. (or to be included in ASPARAGACEAE)
- AMARYLLIDACEAE: Allium, Crinum, Galanthus, Habranthus, Hymenocallis, Leucojum, Lycoris, Narcissus, Nothoscordum, Sternbergia, Tristagma, Zephyranthes. [including ALLIACEAE]
- ASPARAGACEAE: Asparagus.
- HOSTACEAE: Hosta. (or to be included in ASPARAGACEAE)
- HYACINTHACEAE: Hyacinthoides, Hyacinthus, Muscari, Ornithogalum. (or to be included in ASPARAGACEAE)
- HYPOXIDACEAE: Hypoxis.
- IRIDACEAE: Alophia, Calydoarea, Crocus, Crocosmia, Gladiolus, Herberia, Iris, Nemastylis, Sisyrinchium.
- RUSCACEAE: Convallaria, Liriope, Maianthemum, Nolina, Polygonatum. (or to be included in ASPARAGACEAE)
- XANTHORHOEACEAE: Hemerocallis. (or to be split, and then in HEMEROCALLIDACEAE)

**DIOCOSOREALES**
- BURMANNIACEAE: Apteria, Burmannia.
- DIOSCOREACEAE: Dioscorea.
- NARTHICEAEC: Alcetris, Lophiara, Narthecium.

**PANDANALES**
- STEMONACEAE: Croomia.

1 Leaves basal; flowers on a leafless scape; tepals yellow or white.
2 Flowers in an umbel at the summit of a leafless scape; fruit a berry; [subfamily Medeoloideae]..........................................................Clintonia
2 Flowers solitary and scapose; tepals yellow or white; fruit a capsule; [subfamily Lilioideae]..........................................................Erythronium
1 Leaves on a stem; flowers not scapose; tepals orange, red, rose, yellow, or white.
3 Leaves whorled at 1 node or more.
**Clintonia Rafinesque 1819**


1. Flowers yellow; berry blue (rarely to whitish-blue); leaf margins glabrous or slightly ciliate; [mostly of high elevations].............. *C. borealis*
2. Flowers white (often marked with purple); berry black; leaf margins copiously retrorsely ciliate, the cilia 2-4 mm long; [plants of middle elevations] .......................................................... *C. umbellulata*

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**Erythronium Linnaeus 1753** (Trout Lily)


Identification notes: Stolons are white shoots produced from the bulb. Most run horizontally, either underground or along the ground surface but beneath leaf litter. Flowering individuals often produce no stolons. The stolon characters in the key below are those of non-flowering individuals and refer to horizontal stolons only.

1. Perianth white (sometimes pinkish or bluish).................................................................................................................. *E. albidum*
2. Perianth yellow.
3. Petals lacking auricles at base; capsule and ovary distinctly indented (umbilicate) at apex (or rarely truncate in *E. umbilicatum* ssp. monostolum, or the ovary when young not yet displaying the apical indentation); mature capsules usually reclining on ground, with the apex downward; stolons 0-1 per bulb; anthers usually lavender, brown, cinnamon, or purple (sometimes yellow).
4. Horizontal stolons 0 per bulb; flecking on perianth segments absent to slight; perianth margins entire, smooth; stigma lobes short; pale spot on adaxial side of perianth segments usually present, small to medium, usually white; [of lower to mid elevations, widespread in our area].................................................................................................................. *E. umbilicatum* ssp. umbilicatum
5. Perianth white or pinkish; stolons more or less developed; capsule 1 per bulb; capsule and ovary reclining on ground, the apex oriented horizontally or ascending; stolons usually 1-2 per bulb; anthers usually yellow (rarely brown or lavender).
6. Capsule distinctly beaked at the apex; petals with well-developed auricles at the base, these encircling a filament ............... *E. rostratum*
7. Capsule truncate, rounded, or apache at the apex; petals with small auricles at the base, which do not encircle a filament.
8. Capsule apiculus absent or poorly developed .............................................................................................................. *E. americanum* ssp. americanum
9. Capsule apiculus well developed. ................................................................................................................................. *E. americanum* ssp. harperi

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**Erythronium americanum** Ker-Gawler *spp. americanum*, American Trout Lily. Moist bottomland or slope forests, especially over mafic rocks. February-April; April-May. NB west to ON and MN, south to sc. NC, c. TN, AR, and OK. It is much rarer than *E. umbilicatum* in NC. *E. americanum* is a tetraploid (2n = 48); Parks & Hardin suggest the possibility that it is an allotetraploid involving *E. rostratum* and *E. umbilicatum* as parents. *E. americanum* is larger-flowered, more graceful, and later-blooming (by 1-2 weeks) than *E. umbilicatum* ssp. umbilicatum, where they co-occur. [= FNA, GW, K, Y, Z; < *E. americanum* – RAB, F, G, S (also see *E. umbilicatum*); < *E. americanum* – C, W, WV]


**LILIACEAE**


**Erythronium rostratum** W. Wolf, Beaked Trout Lily. Moist bottomland or slope forests. C. TN, MO, and se. KS, south to c. AL, wc. LA, and se. OK. [= FNA, GW, K, Y, Z; < *E. umbilicatum* – C, W]

**Erythronium umbilicatum** Parks & Hardin ssp. *monostolum* Parks & Hardin, Southern Appalachian Trout Lily. High elevation coves, slopes, and grassy balds, moist forests. March-May; April-June. Ssp. *monostolum* is endemic to the high mountains of NC and TN. It approaches the VA border and should be sought, especially in the Grayson Highlands area. *E. umbilicatum* ssp. *monostolum* is a diploid (2n = 24). [= FNA, GW, K, Y, Z; < *E. americanum* – RAB, F, G, S; < *E. umbilicatum* – C, W]

**Erythronium umbilicatum** ssp. *umbilicatum* Roemer & Schultes, May Apple. Moist bottomland or dry upland habitats. February-April (May?); April-June. VA and e. WV south through NC, SC, and e. TN to c. GA, e. AL, and Panhandle FL. *E. umbilicatum* ssp. *umbilicatum* is a diploid (2n = 24). Mathew (1992) suggests the possibility that an earlier name, *E. nuttallianum* Roemer & Schultes, may apply to this taxon; the two locations mentioned on the type, Pennsylvania and Albany, NY, are outside the known range of the species, however. [= FNA, GW, K, Y, Z; < *E. americanum* – RAB, F, G, S; < *E. umbilicatum* – C, W, WH, WV]

**Lilium** Linnaeus 1753 (Lily)


1 Dark bulblets produced in many leaf axils; [exotic] ................................................................. *L. lancifolium*

1 Dark bulblets never produced; [native (except *L. longiflorum* and *L. philippinense*), though some species also cultivated].

2 Flowers white; leaves narrowly linear or lanceolate; [exotic].

3 Leaves lanceolate; plants < 1 m tall; perianth parts 13-18 cm long, glabrous at the base (internally) ................................... *L. philippinense*

3 Leaves linear; plants 1-3 m tall; perianth parts 18-25 cm long, papillose at the base (internally) ........................................... *L. longiflorum*

4 Flowers erect, facing upwards; tepals clawed.

5 Leaves all alternate; [of the Coastal Plain].................................................................................. *L. catesbaei*

5 Leaves (at least some of them) whorled or verticillate; [of the Mountains] ............................. *L. philadelphicum* var. *philadelphicum*

4 Flowers nodding or declined, facing downwards or to the side; tepals narrowed to the base, but not clawed.

6 Leaves ob lanceolate to obovate, alternate and whorled, in many plants 50% or more of nodes bearing a single leaf; flowers 1-4 (rarely more), nodding to pendant, fragrant ................................................................. *L. michauxii*

6 Leaves lanceolate or narrowly elliptic, not broader distally, alternate and whorled, in most plants 10-30% of nodes bearing a single leaf; flowers 1-30+, oriented variously, not fragrant.

7 Flowers at maturity campanulate (tepals with somewhat recurved tips); style and stamens included or barely exserted.

8 Flowers 3-4 cm in diameter; pistil 3-4 cm long; tepals 3-5.5 cm long, deep red, mucronate by extension of the midrib, reflexed < 45 degrees from the flower axis, the terminal third of the tepals generally incurved; anthers 4-6 mm long, completely included within the perianth when viewed from the side; [high elevations in the Blue Ridge of w. NC, ne. TN, and sw. VA].

9 Perianth yellow (rarely orange to red); mid-stem leaves 5-10 cm long as wide .......... *L. canadense* var. *canadense*

9 Perianth orange to red; mid-stem leaves 2-5 cm long as wide .......... *L. canadense* var. *editorum*

10 Style reddish, more-or-less the same color as the tepals; [west of the Blue Ridge] .............. *L. michiganense*

10 Style pale green, strongly contrasting with tepals; [Blue Ridge and eastward and southward].

11 Leaves 7-26 cm long, oriented horizontally, with the tips downward-arching; leaf whorls 6-24; plants 1.2-2.8 m tall; inflorescences (1-) 5-22 flowered, tepals orange to reddish; [Mountains, Piedmont, and Coastal Plain] .......... *L. superbum*

11 Leaves 2-16 cm long, ascending or more or less horizontal, but with the tips not downward-arching; leaf whorls 1-12; plants 0.6-2.0 m tall; inflorescences 1-4 (-7) flowered, tepals yellow to orange (to dusky red); [Coastal Plain].

12 Leaf whorls 1-5; petals yellow to yellow-orange; [East Gulf Coastal Plain] ................. *L. iridollae*

12 Leaf whorls 1-12; petals orange to dusky red; [seepage bogs and margins of tree-shrub streamheads in se. VA, c. NC, and c. SC] ........................................................................................................ *L. pyrophilum*

**Lilium** Linnaeus var. *canadense*, Yellow Canada Lily. Wet meadows. June-July; late July-September. Apparently ranging from NB to NC, mostly east of or in the Appalachians; the range is obscured by different interpretations of var. *canadense* and var. *editorum*, by spread from cultivation, and by collections of cultivated plants not clearly so indicated.

*Lilium canadense* Linnaeus var. *editorum* Fernald, Red Canada Lily.  Wet meadows, forest openings.  June-July; late July-September.  According to Adams & Dress (1982), who emphasize tepal color in distinguishing the infraspecific taxa, ranging from NB west to s. ON, south (mostly in and west of the Appalachians) to n. GA and n. AL.  Wherry (1946) and Fernald (1950) emphasize leaf shape, and secondarily flower color, restricting var. *editorum* to a range from PA west to s. IN, south to AL.  There has been considerable confusion between *L. canadense* var. *editorum* and *L. grayi*, and populations in sw. VA appear to show some intergradation between the two.  [= F, WV; < *L. canadense* – RAB, C, FNA, G, GW, S; = *L. canadense* ssp. *editorum* (Fernald Wherry – K, W, Y, Z]


*Lilium grayi* S. Watson, Gray's Lily, Roan Lily.  Bogs, seepages, grassy balds, moist forests, and wet meadows, at medium to high elevations.  June-July; August-September.  A Southern Appalachian endemic: sw. VA, nw. NC, and ne. TN.  Clearly related to *L. canadense* (especially through the somewhat intermediate *L. canadense* var. *editorum*).  *L. grayi* appears to be adapted for pollination by Ruby-throated Hummingbirds (Adams & Dress 1982).  See *L. canadense* var. *editorum* for additional comments.  The two most important strongholds for this rare lily (each with thousands of individuals) are the Roan Mountain massif (Avery and Mitchell counties, NC and Carter County, TN), where it was first found, and Long Hope Valley (Watauga and Ashe counties, NC).  Otherwise, it tends to occur in very small, isolated populations in bogs, wet pastures, and seeps.  In addition to the characters in the key, *L. grayi* can be distinguished in sterile condition from the 2 more common species of the Mountains by leaves, which are widest near the midpoint, typically 4-6× as long as wide (vs. distinctly wider towards the apex in *L. michauxii*, and widest near the midpoint but typically 10× or more as long as wide in *L. superbum*).  Certainly one of our most beautiful wild plants!  [= RAB, C, F, G, K, S, W, Y, Z]

*Lilium iridollae* M.G. Henry, Panhandle Lily, Pot-o’-gold Lily.  Bogs.  Panhandle FL west to s. AL.  [= FNA, GW, WH; < *L. iridollae* – K (also see *L. pyrophilum*))

* *Lilium lancifolium* Thunberg, Tiger Lily.  Disturbed areas, trash heaps; native of Asia.  The more familiar name, *L. tigrinum*, must be rejected in favor of the older *L. lancifolium* (Ingram 1968).  [= C, FNA, K; = *L. tigrinum* Ker-Gawler – F, G, WV]

* *Lilium longiflorum* Thunberg, Easter Lily.  Disturbed areas, persistent from cultivation.  [= FNA, K]

*Lilium michauxii* Poiret, Carolina Lily.  Dry upland forests, ridges, slopes, and ridges.  July-August; September-October.  S. VA, e. TN, n. AL, c. MS, and e. LA south to s. SC, Panhandle FL, s. AL, s. MS, and s. LA.  [= C, F, FNA, G, GW, K, W, WH, WV, X, Y, Z; = *L. michauxii* – RAB; = *L. michauxii* (Farwell) Boivin & Cody]

*Lilium michiganense* Farwell, Michigan Lily.  Wet prairies and calcareous hardwood flatwoods.  ON and MN south to e. TN, KY, nw. GA, AL, AR, and e. OK.  [= C, F, FNA, K; < *L. superbum* – G; = *L. canadense* Linnaeus ssp. michiganense (Farwell) Boivin & Cody]

*Lilium philadelphicum* Linnaeus var. *philadelphicum*.  Wood Lily.  Grassy balds, moist to wet meadows (especially in thin soils over rock), open woodlands.  June-July; August-October.  The species ranges from ME west to BC, south to NC, nw. GA (Jones & Coile 1988), KY, IL, IA, NE, and NM.  Var. *philadelphicum*, distinguished by the leaves whorled at 3-6 nodes, 10-15 (-25) mm wide, the capsule 2.5-3.5 (-5) cm long, is eastern and mainly Appalachian, ranging from ME and s. ON south to NC, GA, and KY.  Var. *andinum* (Nuttall) Ker-Gawler, distinguished by the leaves whorled at 1-2 nodes, 3-10 mm wide, the capsule 4-8 cm long, is western, ranging from OH, MN, and BC south to NM.  [= C, F, G, K; < *L. philadelphicum* – RAB, FNA, S, W, WV; = *L. philadelphicum* ssp. *philadelphicum* – Y]

*Lilium philippinense* Baker, Philippine Lily.  Escaped from cultivation; native of the Philippines.  July-August.  This species is introduced at various locations in the Southeast, including FL and LA (Kartesz 1999), and has been documented from Richmond Co. NC (B.A. Sorrie, pers. comm.).  In North America there has been confusion between this species and *L. formosanum* A. Wallace.  [= FNA, K, WH]

Superficially, this plant is somewhat similar to *L. michauxii*, in its one to several, nodding flowers with recurved tepals, relatively few whorls of leaves, and relatively few leaves per whorl. In addition to the character used in the key, this plant differs from *L. michauxii* in the following ways: flowers not fragrant or only slightly so (vs. flowers strongly fragrant), leaves generally widest near the middle (vs. widest towards the tip), leaves only slightly paler below and lacking a pronounced waxy sheen (vs. leaves strongly bicolored, the lower surface much paler and with a waxy sheen), and habitat in sphagnous, peaty bogs (vs. in xeric to mesic, sandy to loamy soils). [= FNA, X; < *L. michauxii* – RAB (misapplied to these plants); < *L. iridollae* M.G. Henry – K, misapplied]

**Lilium superbum** Linnaeus, Turk’s-cap Lily, Lily-royal. Cove forests and moist forests, moist ravines, blackwater stream swamps, Coastal plain bogs. July-August; September-October. MA and s. NY south to ne. NC, Panhandle FL, and c. MS, southwards primarily in the Appalachians, but extending across the Piedmont to the Coastal Plain of VA and ne. NC, and with a similarly odd extension south of the southern terminus of the Appalachians into the Coastal Plain of GA, w. FL, AL, and MS. The plants of blackwater swamps of se. VA and ne. NC are very narrow-leaved and yellow-tepaled; this form, atypical in habitat, range, and morphology has been referred to speculatively as "*Lilium* species 1." Further study is needed to determine whether it is a distinct taxon (species, or variety of *L. superbum*) or only a form. [= C, F, FNA, GW, K, RAB, S, WH, WV, X, Y, Z; < *L. superbum* – G (also see *L. michiganense*)]

**Medeola** Linnaeus 1753 (Indian Cucumber-root)


**Identification notes:** *Medeola* is sometimes mistaken (when sterile) for *Isotria*; *Medeola* has a wiry stem, floccose-pubescent, *Isotria* a fleshy, glabrous stem.

**Medeola virginiana** Linnaeus, Indian Cucumber-root. Moist forests, usually with acidic soils. Mid April-mid June; September-October. QC and ON west to MN, south to GA, Panhandle FL and LA. The tuber is white, crisp, tasting cucumber-like, usually about 5 cm long and 5 mm in diameter. Bell (1974) describes patterns of vegetative growth. Flowering plants have a second, smaller whorl of leaves; the flowers are borne on recurved pedicels beneath the top whorl of leaves. In fruit, however, the pedicels are ascending or erect, bringing the fruits above the top whorl. When the berries are ripe, the leaves of the upper whorl become scarlet at the base, presumably acting as an attractant to animals. [= C, F, FNA, GW, K, RAB, S, WH, WV]

**Prosartes** D. Don 1839 (Fairybells, Mandarin)

A genus of 6 species, of temperate e. North America, w. North America, and e. Asia. Dahlgren, Clifford, & Yeo (1985) suggest that American species of *Disporum* are generically distinct from Asiatic species and should be segregated in the genus *Prosartes*, a distinction made as long ago as 1839. Asian *Disporum* species lack the distinctly reticulate venation of our plants, have strictly glabrous foliage (vs. pubescent), have spurred tepals (vs. unspurred), blue or black berries (vs. red or straw-colored), tripartite stigma (vs. not), and other differences (Jones 1951). Further study of generic limits by Shinwari et al. (1994) shows that the separation into *Prosartes* of the American species often assigned to *Disporum* is clearly warranted, based on morphological and karyological grounds. *Prosartes* is much more closely related to *Streptopus* than to (Asian) *Disporum*; (Asian) *Disporum* is more closely related to *Uvularia*. References: Johnson (1968)=Z; Shinwari et al. (1994)=Y; Jones (1951); Tamura, Utech, & Kawano (1992); Utech in FNA (2002a); Tamura in Kubitzki (1998a).

1 Fruit glabrous, ellipsoid, weakly triangular in cross-section, the surface smooth and shiny, red when ripe; tepals greenish, unspotted; leaves relatively many and small; leaf glabrous on the surface above (except for sparsely pubescent on the midrib and main veins), densely pubescent on the midrib below, sparsely pubescent on the surface below; leaf pubescence weak, often twisted or curled apically (as seen at 10-20× magnification), the leaf therefore very soft to the touch. 

**Prosartes lanuginosa** (Michaux) D. Don, Yellow Mandarin, Yellow Fairybells. Deciduous forests, especially coves. April-May; August-September. Primarily an Appalachian species: NY and s. ON south to n. GA (Jones & Coile 1988) and AL. [= FNA, K, Y; = *Disporum lanuginosum* (Michaux) Nicholson – RAB, C, F, G, S, W, WV, Z]

**Prosartes maculata** (Buckley) A. Gray, Spotted Mandarin, Nodding Mandarin. Nutrient-rich deciduous forests, especially cove forests. April-May; July-August. AL, n. GA, KY, MI, w. NC, OH, TN, w. VA, and s. WV; its distribution is rather fragmented, and the species is considered rare or uncommon in every state in its range. The fruits are more reminiscent of *Uvularia* than of *Prosartes lanuginosa*. [= FNA, K, Y; = *Disporum maculatum* (Buckley) Britton – RAB, C, F, G, S, W, WV, Z]
**Streptopus** Michaux 1803 (Twisted-stalk)


1 Leaf margins and nodes not coarsely ciliate; leaves strongly cordate-clasping; fruit ellipsoid ..............................

   *S. amplexifolius* var. *amplexifolius*

1 Leaf margins and nodes coarsely ciliate; leaves sessile to somewhat cordate-clasping (especially the lower leaves of robust individuals); fruit globose

   *S. lanceolatus* var. *lanceolatus*

**Streptopus amplexifolius** (Linnaeus) A.P. de Candolle var. *amplexifolius*, White Mandarin, Pagoda-bells. Moist forests and seepages at high elevations. Late April-early June; late July-September. Fassett recognized seven varieties, the plants in our area being var. *americanus*. The species ranges from Greenland and NL (Labrador) to MN, south (in the mountains and disjunctly) to NC, and in the west from AK (and Kamchatka) south to AZ, in Japan, and in the Alps in Europe. [= K; < *S. amplexifolius* – RAB, FNA, W; > *S. amplexifolius* var. *americanus* J.A. & J.H. Schultes – C, F, G, Z; < *Tortipes amplexifolius* (Linnaeus) Small – S]

**Streptopus lanceolatus** (Aiton) Reveal var. *lanceolatus*, Eastern Rose Mandarin, Eastern Twisted-stalk. Moist forests at high elevations. Late April-early June; late July-September. Fassett (1935) recognized four varieties in *S. roseus*. Reveal (1993c) determined that the correct name for the species widely known as *S. roseus* is *S. lanceolatus* (Aiton) Reveal, and he transferred Fassett's varieties. Fassett (and Reveal) considered *S. lanceolatus* var. *lanceolatus* [*S. roseus* var. *perspectus* Fassett] to range from s. NL (Labrador) west to MI, south to NJ and PA, and in the mountains to w. NC, e. TN, and ne. GA (Jones & Coile 1988). *S. lanceolatus* var. *longipes* (Fernald) Reveal [*S. roseus* var. *longipes* (Fernald) Fassett] is midwestern, from s. ON and nw. PA west to MI, WI, MN, and s. MB. Var. *curvipes* (Vail) Fassett is western, ranging from AK to se. BC and nw. OR. Var. *roseus* was considered to be a Southern Appalachian endemic, differing from var. *perspectus* only in having the pedicel-peduncles entirely glabrous (vs. ciliate with few to many multicellular hairs). The number of hairs on the peduncles varies constantly, and recognition of two varieties in e. North America does not appear warranted; all of our material is then *S. lanceolatus* var. *lanceolatus* [*S. roseus* var. *roseus* (in a broader sense)], which does differ significantly from the more western varieties. [< *S. roseus* – RAB, S, W, WV; > *S. roseus* var. *roseus* – C, F, G, Z; > *S. roseus* var. *perspectus* Fassett – C, F, G, Z; < *S. lanceolatus* – FNA; > *S. lanceolatus* var. *lanceolatus* – K; > *S. lanceolatus* var. *roseus* (Michaux) Reveal – K]

**Tulipa** Linnaeus 1753 (Tulip)


* *Tulipa sylvestris* Linnaeus, Tulip, Dutch-lily. Very commonly cultivated; native of w. Asia. "Occasionally naturalized in moist meadows, fields and roadsides" in se. PA (Rhoads & Klein 1993) and MD (Kartesz 1999). [= FNA, K]

**62. ORCHIDACEAE** A.L. de Jussieu 1789 (Orchid Family) [in ASPARAGALES]

A family of about 800 genera and 19,000 species, perennial (rarely annual), mycotrophic herbs and vines. Only a small minority of orchid species worldwide are terrestrial rather than epiphytic; only *Epidendrum magnoliae* in our flora shows the common epiphytic habit. References: Luer (1972) and Luer (1975)=L; Correll (1950)=X; Romero-González, Fernández-Concha, Dressler, Magrath, & Argus in FNA (Williams & Williams (1983); Brown (2003); Homoya (1993); Correll (1937); Pridgeon et al. (1999a, 1999b, 1999c).

**Identification notes**: Flowering plants are necessary for use of the key to genera.
1 Plant terrestrial, growing on the branches or trunks of trees in swamps ................................................................. Epidendrum
1 Plant terrestrial, growing on soil.
2 Leaves absent at flowering, or with a solitary leaf with a purplish undersurface withering at about the time of flowering.
3 Flowers with a spur ........................................................................................................................................................
3 Flowers without a spur.
4 Flowers white, the lip, sepals, and petals all predominantly white ........................................................................ Spiranthes
4 Flowers pink, greenish, yellowish, or purplish, the lip sometimes white or marked with white, the sepals and petals colored.
5 Flower solitary; lip strongly bearded ......................................................................................................................... Arethusa
5 Flowers in spikes or racemes; lip not bearded.
6 Lip with 2 fleshy ridges near the base; pollinia 4; plants mycorrhizal and never with leaves ...................................... Corallorhiza
6 Lip with 3-7 ridges near the base or extending most of the length of the lip; pollinia 4 or 8; plants either mycorrhizal and
never with leaves, or with a plicate winter leaf withering shortly before flowering.
7 Plants with a plicate winter leaf withering shortly before flowering (the withered remnant usually detectable); pollinia 4;
veins of the petals and sepals not strikingly different in color than the intervein areas; lip with 3 ridges .......................... Aplectrum
7 Plants never with leaves and saprophytic; pollinia 8; veins of the petals and sepals strikingly different in color than the
intervein areas; lip with 5-7 ridges ................................................................................................................................ Hexalectris
2 Leaves present at flowering (Cleistesiopsis with a foliaceous bract at the summit of the stem).
8 Leaf solitary.
9 Leaf basal.
10 Flower with a spur .......................................................................................................................................................... Platanthera
10 Flower without a spur.
11 Flower solitary; leaf plicate .......................................................................................................................................... Arethusa
11 Flowers in a raceme or spike.
12 Flowers relatively large, pink, to rarely white, the lip oriented upwards ................................................................. Calopogon
12 Flowers relatively small, white, the lip oriented downwards .................................................................................. Platanthera
9 Leaf cauline.
13 Flower solitary (4), pink (rarely nearly white); [subfamily Vanilloideae; tribe Pogonieae].
14 Sepals brown to purple, linear or narrowly oblanceolate, 3-6.5 cm long, about 5 mm wide; leaf coriaceous .......... Cleistesiopsis
14 Sepals pink (rarely white), elliptic or oblanceolate, 1.3-2.7 cm long, 3-11 mm wide; leaf herbaceous ......................... Pogonia
15 Flowers in spikes or racemes, 5-many, reddish, yellowish, or greenish.
16 Flower without a spur; petals, sepals, and lip 1-3 mm long ......................................................................................... Malaxis
15 Flower with a spur; petals, sepals, and lip 3-25 mm long ............................................................................................ Platanthera
8 Leaves 2-many
16 Lip inflated, pouch-like or slipper-like, 2-6 cm long ................................................................................................. Cypripedium
16 Lip not inflated, or if so, then 0.3-1.1 cm long.
17 Leaves basal (sometimes with bladeless sheaths upwards on the stem).
18 Leaves plicate.
19 Lip oriented upwards; flowers pink to white ............................................................................................................ Calopogon
19 Lip oriented downwards; flowers greenish, purplish-brown, or yellowish................................................................. Liparis
20 Leaves obovate to oblanceolate, > 10× as long as wide; plant 1-3 dm tall ................................................................. Pteroglossaspis
20 Leaves linear-lanceolate, > 10× as long as wide; plant 1-3 dm tall ............................................................................. Platanthera
18 Leaves smooth, often creased at the midrib, but not plicate.
21 Lip with a spur.
22 Flowers bicolored, the lip white, the sepals and petals pink; leaves 2 ................................................................. Galearis
22 Flowers not bicolored, the lip, petals, and sepals similarly colored; leaves 2-5.
23 Lip deeply divided into 3 linear segments; leaves 3-5 .................................................................................................................................. Habenaria
23 Lip entire; leaves 2 .............................................................................................................................................. Platanthera
21 Lip without a spur.
24 Leaf blades ascending.
25 Leaf blades more-or-less horizontally oriented, flat against the ground or 1-2 cm above it.
25 Lip oriented upwards ........................................................................................................................................ Goodyera
25 Lip oriented downwards.
26 Leaves variegated with white; lip sacculate ................................................................................................................ Goodyera
26 Leaves green, not variegated; lip not sacculate .......................................................................................................... Liparis
24 Leaf blades ascending.
27 Leaves linear to lanceolate, 2-4 ......................................................................................................................................... Spiranthus
27 Leaves elliptic to ovate, 2.
28 Lip broadest near its apex ........................................................................................................................................... Liparis
28 Lip broadest near its base, tapering to the apex ........................................................................................................ Malaxis
17 Leaves cauline.
29 Leaves plicate; lip sacculate ..................................................................................................................................... Epipactis
29 Leaves smooth, often creased at the midrib, but not plicate; lip not sacculate.
30 Leaves whorled, terminating the stem ....................................................................................................................... Isotria
30 Leaves alternate or opposite, not terminating the stem.
31 Leaves 2, opposite, near the middle of the stem ........................................................................................................... Listera
31 Leaves (2-) 3-many, alternate, variously distributed on the stem.
32 Lip without a spur; leaves 0.8-8.0 cm long.
33 Leaves ovate, 0.8-2.0 cm long .................................................................................................................................. Triphora
33 Leaves linear or narrowly lanceolate, 1-8 cm long.
32 Lip with a spur; leaves linear, lanceolate, or narrowly elliptic, 5-40 cm long (at least the larger > 5 cm long, except in
Platythelys, with lanceolate to ovate leaves 1.5-6.5 cm long).
34 Leaves 1.5-6.5 cm long, with inflated tubular sheaths; plants from creeping rhizomes ................................. Platythelys
34 Leaves 5-40 cm long, sessile; plants from fleshy or fusiform roots.
35 Lip divided into 3 linear divisions, the divisions not further divided, fringed, or eroded ................................. Habenaria
**ORCHIDACEAE**

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<thead>
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<th>Page 129</th>
</tr>
</thead>
</table>

35 Lip not divided into 3 divisions, or divided into 3 divisions but the divisions not linear.  
36 Spur saccate, 2-3 mm long, the orifice minute ......................................................... **Coeloglossum**  
36 Spur elongate and slender, 4-50 mm long, the orifice larger ........................................... **Platanthera**

*Aplectrum* Torrey 1818 (Puttyroot, Adam-and-Eve)


**Identification notes:** Like *Tipularia*, *Aplectrum* has a single, overwintering leaf, purplish on the underside, and withering prior to the appearance of the flowering stalk; they are readily separable by leaf shape, texture, and veining (see *Tipularia*).


**Arethusa** Linnaeus 1753 (Dragon's-mouth, Bog-rose, Arethusa)

A monotypic genus (Sheviak & Catling in FNA 2002). References: Sheviak & Catling in FNA (2002a); Correll (1950)=X.

**Identification notes:** The combination of the following characters serves to separate *Arethusa* from other, vaguely similar, genera: flowers magenta, solitary and scapose, the lip descending, the other 2 petals and 3 sepals erect or ascending. *Calopogon* has a leafy stem, the inflorescence a raceme, the lip crested but oriented upwards. *Pogonia* has solitary, pale pink flowers, with a descending, bearded lip, but the stem has a well-developed, flat leaf, 1-2.5 cm wide, the flower is subtended by a well-developed, leaf-like bract, and the 2 lower sepals are spreading-descending. *Cleistesiopsis* has 3 brown to purplish brown sepals.

*Arethusa bulbosa* Linnaeus, Dragon's-mouth, Bog-rose, Arethusa. Bogs. May-June. NL (Newfoundland) and NL (Labrador) west to SK, south to NJ, DE, IN, and MN, and to NC and SC in the mountains, rare south of ME, MI, and MN. The lanceolate, plicate leaf (15-30 cm long, 2-4 mm wide) develops after flowering, the flowering plant thus consisting (aboveground) of the solitary scape only. The lip is crested with fimbriate ridges, marked with yellow and purple. [= RAB, C, F, FNA, G, GW, K, L, S, W, X]

**Bletilla** Reichenbach f.

A genus of 9 species, of temperate e. Asia. References: Correll (1950)=X.

* Bletilla striata* (Thunberg) Reichenbach f., Urn Orchid. Lawns, roadsides; native of China. Known only from Escambia County, FL. [= FNA, K, WH]  

**Calopogon** R. Brown 1813 (Grass-pink)


**Identification notes:** The lip is oriented upwards.

1 Petals wider towards the tip than towards the base; lip usually as wide as or wider than long; flowers strongly fragrant ............... **C. multiflorus**  
1 Petals equal or narrower towards the tip than towards the base; lip usually narrower than long; flowers scentless or mildly fragrant.  
2 Leaf appressed to the inflorescence during flowering; flowers < 1 cm apart; flowers not fragrant; flowers on same plant opening simultaneously ................................................................. **C. barbatus**  
2 Leaf not appressed to the inflorescence during flowering; flowers > 1 cm apart; flowers faintly to distinctly fragrant; flowers on same plant opening nearly simultaneously to sequentially.  
3 Lateral sepals 10-15 mm long, falcate, widely spreading .............................................................. **C. pallidus**  
3 Lateral sepals 15-28 mm long, weakly falcate to straight.

1 Flowers of each plant opening nearly simultaneously; dilated distal portion of middle lip lobe usually much narrower than long, triangular to broadly rounded; stigma typically flat against column surface; corns elongate, forked ........................................... **C. oklahomensis**

4 Flowers of each plant opening sequentially; dilated distal portion of middle lip lobe usually much wider than long, typically anvil-shaped; stigma at angle to column surface; corns globose to elongate, not forked............................... **C. tuberosus** var. *tuberosus*


Calopogon oklahomensis D.H. Goldman, Oklahoma Grass-pink. Pine savannas, prairies. E. SC south to s. GA, west to e. TX, north in the eastern Great Plains to MN. [= FNA, Y, Z]


Calopogon tuberosus (Linnaeus) Britton, Sterns, & Poggenburg var. tuberosus, Common Grass-pink. Savannas, sandhill seeps, floating peat mats, in the Piedmont and Mountains in bogs. April-July. Var. tuberosus occurs from NL west to MT, south to s. FL and e. TX, also in Cuba and the West Indies. Var. simpsonii (Chapman) Magrath occurs in peninsular FL, Cuba, and the West Indies. [= FNA, K, L, WH, Y, Z; = C. pulchellus R. Brown – F, G, RAB, X; < C. tuberosus – C, GW, W; = Limodorum tuberosum Linnaeus – S]

Cleistesiosis Pansarin & F. Barros 2008 (Spreading Pogonia, Rosebud Orchid)

A genus of 3 species, endemic to e. North America. As traditionally circumscribed, Cleistes was a genus of about 55 species, primarily of tropical America. The circumscription of this genus has been uncertain (Cameron & Chase 1999; Cameron et al. 1999; Pridgeon et al. 1999c). North American "Cleistes" is not closely related to South American Cleistes (which includes the type of the genus), and two alternative treatments are possible: the North American species can be housed in a separate genus, or alternatively, Pogonia, Isotria, and N. American "Cleistes" could be combined into Pogonia (a generic disposition popular many decades ago). Pansarin & de Barros (2008) favor the former idea, and have named the new genus Cleistesiosis. References: Pansarin & de Barros (2008)=Y; Catling & Gregg (1992)=Z; Brown & Pansarin (2009)=V; Gregg & Catling in FNA (2002a); Gregg (1991); Correll (1950)=X.

1 Column 21-29 mm long; lip (26-) 34-56 mm long, the basal 3/4 of the central keel of the lip with 1-3 parallel, continuous low ridges; sepals (31-) 40-56 (-65) mm long; petals 27-53 mm long; distance between median leaf and floral bract 9-20 cm; fresh flower with daffodil-like odor........................................................................................................... C. divaricata

1 Column 13-19 mm long; lip 21-33 (-38.5) mm long, the basal 3/4 of the central keel of the lip with 5-7 discontinuous and irregular ridges; sepals (24-) 30-40 (-55) mm long; petals 21-36 mm long; distance between median leaf and floral bract 3-16 cm; fresh flowers with strong vanilla odor ............................................................................................................. C. bifaria

2 Fresh flowers odorless; [of the Mountains and Piedmont] ........................................................................................................ C. bifaria

2 Fresh flowers with strong vanilla scent; [of the Coastal Plain]........................................................................................................... C. oricamporum

Cleistesiosis bifaria (Fernald) Pansarin & F. Barros, Appalachian Small Spreading Pogonia. Moist to fairly dry meadows, dry ridgetops under pines (where seasonally moist). May-July. WV south through w. VA, e. KY, w. NC, and e. TN to w. SC, n. GA and n. AL. Catling & Gregg (1992) make a convincing case for the recognition of Cleistesiosis bifaria and C. divaricata as specifically distinct (as Cleistes), based on differences in morphology, range, phylogeny (in the sympatric portions of their ranges), and floral fragrance. [= V; < Cleistesiosis bifaria – Y; < Cleistes bifaria (Fernald) Catling & Gregg – FNA, K, Z; < Cleistes divaricata – RAB, C, G, GW, L, S, W, X; < Cleistes divaricata var. bifaria Fernald – F; < Cleistes divaricata var. bifaria – WV, misspelling; < Pogonia bifaria (Fernald) P.M. Brown & Wunderlin – WH]

Cleistesiosis divaricata (Linnaeus) Pansarin & F. Barros, Large Spreading Pogonia. Pine savannas. May-mid June. S. NJ to sw. GA and ne. FL, in the Coastal Plain; reports from more inland (non Coastal Plain) areas are based on a taxonomic concept of C. divaricata including C. bifaria, and reports from the East Gulf Coastal Plain (west of ne. FL) are based on C. oricamporum. [= V; Y; = Cleistes divaricata (Linnaeus) Ames – FNA, K, Z; < Cleistes divaricata – RAB, C, G, GW, K, L, S, W, X (also see Cleistes bifaria); = Cleistes divaricata var. divaricata – F; = Pogonia divaricata (Linnaeus) R. Brown – WH]

Cleistesiosis oricamporum P.M. Brown, Small Coastal Plain Spreading Pogonia. Savannas, sandhill seeps. May-July. Se. NC to e. peninsular FL and west to e. LA. Catling & Gregg (1992) make a convincing case for the recognition of Cleistesiosis oricamporum (including C. oricamporum) and C. divaricata as specifically distinct (as Cleistes), based on differences in morphology, range, phylogeny (in the sympatric portions of their ranges), and floral fragrance. The co-occurrence of C. divaricata and C. oricamporum at such sites as the Green Swamp, Brunswick County, NC, where phylogenically separated, supports their taxonomic status. Where co-occurring, C. oricamporum flowers on average about 10 days before C. divaricata. Recent studies (Smith et al. 2004) suggest the probability that montane and Coastal Plain populations of "C. bifaria" represent 2 different species, a suggestion formalized by Brown & Pansarin (2009). [= V; < Cleistesiosis bifaria – Y; < Cleistes bifaria (Fernald) Catling & Gregg – FNA, K, Z; < Cleistes divaricata – RAB, C, G, GW, K, L, S, W, X; < Cleistes divaricata var. bifaria Fernald – F, WV; < Pogonia bifaria (Fernald) P.M. Brown & Wunderlin – WH]

Coeloglossum Hartman 1820 (Frog Orchid, Long-bracted Orchid)
Usually regarded as a monotypic genus, of north temperate regions of the Old and New World. However, Coeloglossum is probably not distinct from Dactylorhiza Necker ex Nevski; Coeloglossum is the older name, but Dactylorhiza has been accepted for nomenclatural conservation. The taxonomic and nomenclatural outcome is uncertain. References: Sheviak & Catling in FNA (2002a); Bateman, Pridgeon, & Chase (1997)=Z; Pridgeon et al. (1997, 1999b); Correll (1950)=X.

Coeloglossum viride (Linnaeus) Hartman var. virescens (Muhlenberg ex Willdenow) Luer, Long-bracted Frog Orchid. Moist woods. April-June. The species is circumboreal; var. virescens is e. Asian and North American, in e. North America south in the Appalachians to NC. It is generally more "southern" than the typic var. viride, which is more completely circumboreal, widespread in n. Eurasia and far northern North America. [= K, L, W = Habenaria viridis (Linnaeus) R. Brown var. bracteata (Muhlenberg ex Willdenow) Reichenbach ex A. Gray – RAB, C, F, G, X; < Coeloglossum viride (Linnaeus) Hartman – FNA = Coeloglossum bracteatum (Muhlenberg ex Willdenow) Parlato – S; < Dactylorhiza viridis (Linnaeus) R.M. Bateman, Pridgeon, & M.W. Chase – Z]

Corallorrhiza Gagnebin 1755 (Coralroot)

A genus of about 15 species, distributed in north temperate regions of the Old and New World. The closest relative of Corallorrhiza in our flora is Aplectrum (Freudenstein 1992). The mycotrophic nature of Corallorrhiza is well established, but the exact means of the transfer of nutrients from the fungal hyphae to the orchid is not yet understood. References: Freudenstein (1992, 1997, 1999)=Z; Magrath & Freudenstein in FNA (2002a); Correll (1950)=X.

1 Lip with two lateral teeth or lobes; lateral sepals spreading to down-curved.
   1 Lip without lateral teeth or lobes (though sometimes erose or minutely toothed near its apex); lateral sepals arching, upcurved, or forward-directed.
   2 Sepals 1-veined. ............................................................................................................. C. trifida
   2 Sepals 3-veined.
    3 Middle lobe of lip expanded slightly or not at all distally, the ratio of the width of the dilated part to the base of the mid-lobe < 1.5; floral bracts averaging 0.5-1.0 mm long.......................................................................................................................... C. maculata var. maculata
    3 Middle lobe of the lip distinctly expanded, the ratio of the width of the dilated part to the base of the midlobe greater than 1.5; floral bracts averaging 1.0-2.8 (-4.5) mm long.......................................................................................................................... C. maculata var. occidentalis

Corallorrhiza bentleyi Freudenstein. Dry-mesic to mesic forests, especially near roadsides. The species was recently named and was known (at the time of publication) only from a single population (Freudenstein 1999). This species is now known from about 15 populations in e. WV (Monroe and Pocahontas counties) and w. VA (Giles, Alleghany, and Bath counties). It is most closely related to C. involuta Greenman of Mexico, a component of the C. striata Lindley complex of w. and n. North America. [= FNA, Z]

Corallorrhiza maculata (Rafinesque) Rafinesque var. maculata, Eastern Spotted Coralroot. Moist forests, northern hardwood forests. July-August. Var. maculata is irregularly distributed in much of North America, primarily northern, from NL (Newfoundland) QC, and MN south to PA, OH, and IN, and south in the Appalachians to ne. GA, in the west from BC south to s. CA, s. AZ, and s. NM. Var. mexicana (Lindley) Freudenstein ined. is restricted to Mexico. [= FNA, Z; < C. maculata – RAB, C, F, G, K, L, W, WV, X; < Corallorrhiza maculata – S, orthographic variant]

Corallorrhiza occidentalis (Rafinesque) Rafinesque var. occidentalis (Lindley) Ames, Western Spotted Coralroot. Forests. May-July. Var. occidentalis (Lindley) Ames has a distribution similar to var. maculata, except that in the east it ranges south only to PA, s. ON, and WI, with disjunct populations in e. WV (Pocahontas County; Morton et al. 2004) and VA. [= FNA, Z; < C. maculata – RAB, C, F, G, K, L, W, WV, X; < Corallorrhiza maculata – S, orthographic variant]

Corallorrhiza odontorhiza (Willdenow) Poiret, Autumn Coralroot. Forests. August-October. The cleistogamous form is the more common, and is widespread in n. North America, from ME, NY, s. ON, MI, and MN south to SC, e. GA, ne. FL, e. AL, n. MS, c. AR, and e. OK. The chasmogamous form is less common, and is scattered in ne. United States and adjacent Canada, in ON, CT, PA, MI, IA, IN, DC, NC, and TN, and in Mexico (Chiapas, Distrito Federal, Guerrero, Hidalgo, Jalisco, México, Michoacán, Morelos, Oaxaca, Puebla, Sonora), Guatemala, and Nicaragua. It may be recognized as a variety; see synonymy. [= RAB, C, F, G, L, W, WH, WV, X; > C. odontorhiza var. pringlei (Greenman) Freudenstein – FNA, K, Z; > C. odontorhiza var. odontorhiza – FNA, K, Z; = C. odontorhiza odontorhiza – S, orthographic variant; > C. pringlei Greenman]
**Cypripedium** Linnaeus 1753 (Lady's-slipper)


1 Plant scapose, with 2 basal leaves; pouch-like lip of flower with a longitudinal fissure, pink (rarely nearly white); [section *Acaulia*] ............................................................ C. acaule

1 Plant caulescent, with (2) 3-7 leaves alternate on the stem; pouch-like lip of flower with a rounded orifice, yellow or pink (rarely white).

2 Pouch-like lip of flower pink and white (rarely all white); lateral petals and dorsal sepal white, not twisted, obtuse to acute; [section *Obstipetala*] ........................................................................................................................................ C. reginae

2 Pouch-like lip of flower yellow or white; lateral petals and dorsal sepal brown, purplish brown, or yellow, slightly to strongly twisted, acuminate-attenuate; [section *Cypripedium*] ........................................................................................................................................ C. candidum

3 Pouch-like lip of flower bright yellow, pale yellow, or rarely white, (2.0-) 2.2-6.3 cm long (if pale yellow or white, then > 4 cm long); orifice margin rounded-obtuse on the apical margin; [of various habitats].

4 Dorsal sepal 3.5-5.0 cm wide; pouch orifice 2.7-4.5 cm long; pouch-like lip 4.5-6.3 cm long, pale yellow or creamy white; plants robust, typically 5-8 dm tall................................................................. C. kentuckiense

4 Dorsal sepal 1.5-2.9 cm wide; pouch orifice 0.5-1.3 cm long; pouch-like lip (2.0-) 2.2-5.8 cm long, medium to rich yellow; plants not robust, typically 2-5 (-6) dm tall.

5 Pouch-like lip 2.2-3.4 cm long; sepal and lateral petals usually densely and minutely spotted with dark reddish brown or purple, thus appearing uniformly dark ................................................................. C. parviflorum var. parviflorum

5 Pouch-like lip (2.0-) 3.0-5.8 cm long; sepal and lateral petals unmarked (greenish-yellow), or more often streaked, blotched, striped or reticulately marked with dark reddish brown or purple (but generally not extensively blotched) ................................................................. C. parviflorum var. pubescens

**Cypripedium acaule** Aiton, Pink Lady's-slipper, Moccasin-flower. Dry to mesic, acid forests and woodlands, often under pine or other conifers. April-July. NL (Newfoundland) west to n. AB, south to NC, SC, GA, TN, n. IN, and MN. [= RAB, C, F, FNA, G, K, L, W, WV, X; *Fissipes acaulis* (Aiton) Small – S]

**Cypripedium candidum** Muhlenberg ex Willdenow, White Lady's-slipper. Calcareous barrens and bluffs. NY and NJ west to ND, south to w. VA, nw. and se. AL, and MO. [= C, F, FNA, G, K, L, X]

**Cypripedium kentuckiense** C.F. Reed, Kentucky Yellow Lady's-slipper. Sandy ravine bottoms and springhead seeps along small streams. First reported for our area by Weldy et al. (1996). *C. kentuckiense* C.F. Reed is similar to *C. parviflorum* var. pubescens and, in addition to the site discovered in e. VA, reaches AL, e. TN (Franklin and Scott counties, Cumberland Plateau) and e. KY. Case et al. (1998) studied isozymes of *C. kentuckiense* and related *Cypripedium spp.*; the recognition of *C. kentuckiense* as a species was supported. [= C, FNA, K, Y, Z; often included in a broad concept of *C. calceolus*, *C. pubescens*, or *C. calceolus* var. pubescens by most earlier authors]

**Cypripedium parviflorum** Salisbury var. parviflorum, Small Yellow Lady's-slipper. Mesic forests, seepy forests over amphiboline, other habitats. April-June. VT, NY, OH, IN, IL, MO and KS, south to NC, GA, AL, AR, and OK. The exact range, abundance, and habitats of this variety in our area are obscure, because of confusion with the more northern var. *makasin* (Farwell) Sheviak and small-flowered forms of var. *pubescens*. See Sheviak (1994) for a discussion of why North American plants of yellow lady's-slipppers are recognized as a species distinct from the European *C. calceolus* Linnaeus. [= FNA, Y, Z; *C. calceolus* Linnaeus var. pubescens – RAB, G, X; *C. parviflorum* – K, S, WV; *C. calceolus* var. parviflorum (Salisbury) Fernald – C, F, L, W]

**Cypripedium parviflorum** Salisbury var. pubescens (Willdenow) Knight, Large Yellow Lady's-slipper, Whippoorwill Shoes. Rich mesic forests. April-June. NL (Labrador) and AK south to GA, AL, MS, NM, and AZ. [= FNA, Y, Z; *C. calceolus* Linnaeus var. pubescens (Willdenow) Correll – RAB, G, X (also see *C. parviflorum* var. parviflorum); *C. pubescens* Willdenow – K, S, WV; *C. calceolus* var. pubescens (Willdenow) Correll – C, F, L, W]

**Cypripedium reginae** Walter, Showy Lady's-slipper. Queen Lady's-slipper. Over circumneutral to basic rocks, or (allegedly) in mossy wet forests under *Rhododendron*. May-June. NL (Newfoundland), ON and SK south to NC (?), GA, TN, AR, and ND. The native occurrence of this species in NC is questionable; the only definite specimen from the state is from an implausible habitat for the species (highly acid humus under rhododendron). [= RAB, C, F, FNA, G, K, L, S, W, WV, X]
**Epidendrum** Linnaeus 1759 (Green-fly Orchid)

A genus of about 1000 species, of tropical (and rarely subtropical) America. References: Hágsater in FNA (2002a); Pridgeon et al. (2005); Correll (1950)=X.

**Epidendrum magnoliae** Muhlenberg, Green-fly Orchid. Epiphytic on limbs of trees, especially *Magnolia grandiflora*, *Quercus virginiana*, and *Taxodium* spp., in blackwater river swamps and mesic hardwood hammocks, usually on relatively horizontal limbs mixed with *Pleopeltis polypodioides*, also rarely in crevices of Altamaha Grit outcrops. July-October. The northernmost epiphytic orchid: se. NC south to c. peninsular FL, west to LA; also in ne. Mexico. It is locally rather common, but rarely seen as it occurs primarily in blackwater swamps, on upper limbs of *Taxodium*, *Nyssa*, and other trees, typically mixed with *Pleopeltis*. See Correll (1936) for additional discussion of this species at its northern limit. Hágsater (2000) indicates that *E. magnoliae* Muhlenberg has nomenclatural priority over *E. conopseum* R. Brown. [= FNA; = *E. conopseum* Aiton f. – RAB, L, WH, X; > *E. conopseum* var. conopseum – K; = *Amphiglossit conopsea* (Aiton f.) Small – S]

**Epipactis** Zinn 1757 (Helleborine)


* **Epipactis helleborine** (Linnaeus) Crantz, Broad-leaved Helleborine. Forests; native of Europe. June-September. This species has been collected a handful of times in various parts of the mountains, some of the colonies dating back to the early 1960's; it has become common in ne. United States and se. Canada. [= C, F, NGA, K, L, WV, X; = *E. latifolia* (Linnaeus) Allioni – G]

**Eulophia** R. Brown ex Lindley 1823

A genus of about 215 species, pantropical (Romero-González in FNA 2002). References: Romero-González in FNA (2002a); Correll (1950)=X. [also see *Pteroglossaspis*]

**Eulophia alta** (Linnaeus) Fawcett & Rendle, Wild Coco. Flatwoods, swamps. S. GA south through the FL peninsula into the West Indies, Mexico, Central America, and South America. [= FNA, GW, K; = *Platypus altus* (Linnaeus) Small – S] [add X to synonymy]

**Galearis** Rafinesque 1833 (Showy Orchis)

A genus of 3-6 species, of e. North America and e. Asia. References: Sheviak & Catling in FNA (2002a); Pridgeon et al. (1999b); Correll (1950)=X.


**Goodyera** R. Brown 1813 (Rattlesnake Orchid)

A genus of about 55-100 species, widespread in distribution but primarily Northern Hemisphere. References: Kallunki in FNA (2002a); Pridgeon et al. (1999c); Correll (1950)=X.

1. Leaves blue-green, the upper surface variegated with white, the midrib broadly whitened (1-3 mm wide), the remainder of the network of white variegations narrow (< 0.5 mm wide), generally lacking any internal variation in color, the outlines of the variegations smooth; inflorescence cylindric, not secund or one-sided.................................................................................................................. **G. pubescens**

1. Leaves dark green, the upper surface variegated with pale green, the midrib only irregularly and narrowly pale green, most of the network of pale green variegations broad (0.5-1 mm wide), with a dark green center line (thus the variegations appearing double), the outlines of the variegations finely and irregularly toothed; inflorescence secund, primarily one-sided, or loosely spiraled.

2. Lip narrowly saccate (th pouch much longer than deep), with an elongate recurved apex.................................................................................................................. **G. repens**
Goodyera pubescens (Willdenow) R. Brown, Downy Rattlesnake-orchid. Dry to moist forests and woodlands. June-August. NB west to ON and MN, south to Panhandle FL, MS, and AR. One of the commonest of orchids in much of its range. [= RAB, C, F, FNA, G, K, L, W, WV, X; = Peramium pubescens (Willdenow) MacMillan – S]


Goodyera tesselata Loddiges, Checkered Rattlesnake-plantain. Mixed deciduous and pine woods. NL (Newfoundland) and MB south to NJ, MD, PA, n. OH, MI, WI, and MN. Probably an allopolyploid, derived from G. oblongifolia × repens. [= FNA, C, F, G, K, L, X]

Habenaria Willdenow 1805 (Longspur Orchid, Habenaria)

A genus of about 600 species, tropical and subtropical in the Old World and New World. References: Sheviak in FNA (2002a); Pridgeon et al. (1999b); Correll (1950)=X. [also see Coeloglossum, Platanthera]

1 Lip and lateral petals toothed .............................................................................................. H. floribunda
2 Lip or lateral petals divided into linear segments. ................................................................. H. quinqueseta
2 Spur 4-10 cm long; [terrestrial, though in moist habitats] .................................................... H. quinqueseta
2 Spur 0.4-1.4 cm long; [aquatic or semi-aquatic in marshes and swamps] ................................ H. repens

Habenaria floribunda Lindley, Mignonette Orchid. Rich, moist hardwood hammocks. Ne. FL south to s. FL; West Indies, Mexico, Central America, South America. [= WH; = H. odontotetala Reichenbach f. – FNA, K; = Habenella odontotetala (Reichenbach f.) Small; = Habenella floribunda (Lindley) Szlachetko & Kras-Lapinska] {add X to synonymy}

Habenaria quinqueseta (Michaux) A. Eaton, Long-horned Habenaria, Michaux’s Orchid. Wet pine flatwoods, moist hardwood hammocks, Altamaha Grit outcrops, ditches. August-October. SC south to s. FL, west to se. TX. [= FNA, K, WH; = H. quinqueseta var. quinqueseta – L; < H. quinqueseta – RAB, GW, S, X]

Habenaria repens Nuttall, Water-spider Orchid, Floating Orchid. Blackwater swamps, pools, banks of creeks and rivers. April-November. NC south to FL and west to TX; West Indies, Mexico, Central America, and n. South America. Reported from se. VA. [= RAB, FNA, GW, K, L, S, WH, X]

Hexalectris Rafinesque 1825 (Crested Coralroot)


Hexalectris spicata (Walter) Barnhart, Crested Coralroot, Brunetta. Dry forests and woodlands, especially over mafic or calcareous rocks, such as diabase, gabbro, calcareous siltstone, and dolomite (though sometimes in distinctly acid situations), shell middens. April-August. MD, OH, and MO south to s. FL and w. and s. TX. The yellow and purple flowers borne on a brown stem present a very peculiar color combination. [= V; = H. spicata var. spicata – FNA, Y, Z; < H. spicata – RAB, C, F, G, K, L, S, W, WH, WV, X]

Isotria Rafinesque 1808 (Whorled Pogonia, Five-leaves, Fiveleaf Orchid)
A genus of 2 species, of e. North America. Cameron & Chase (1999) indicate that *Isotria* should perhaps be included in a more broadly circumscribed *Pogonia* (as was often done prior to 1922). References: Mehrhoff & Homoya in FNA (2002a); Correll (1950)=X.

**Identification notes:** Sterile *Isotria* is sometimes confused with *Medeola*. *Medeola* has a wiry-textured stem, with floccose hairiness, at least towards the base. *Isotria* has a flesher stem, lacking hairs.

1 Sepals 12-30 mm long, greenish-brown; lip 10-15 mm long; pedicel of fruit (0-) 5-10 (-15) mm long; plant glaucous, the stem whitish-green. .................................................................................................................................................................................. *I. meleoloides*  

1 Sepals 35-60 mm long, purple-brown; lip 20-25 mm long; pedicel of fruit (12-) 20-55 mm long; plant scarcely glaucous (if all), the stem generally purplish. .................................................................................................................................................................................. *I. verticillata*  

*Isotria meleoloides* (Pursh) Rafinesque, Small Whorled Pogonia, Little Five-leaves. Moist forests, in the mountains and upper Piedmont usually with *Pinus strobus*. May-June. Widespread (but very local) in ne. North America, from s. ME and MI south to c. and e. WV, w. VA, w. NC, e. TN, and n. GA. The reproductive biology of this species was studied by Vitt & Campbell (1997). Van Alstine et al. (1996) discuss the habitats of known occurrences in Virginia. [= RAB, C, F, FNA, G, K, L, W, X; = *I. affinis* (C.F. Austin) Rydberg – S; = *Pogonia affinis* C.F. Austin]  


**Liparis** L.C. Richard 1817 (Wide-lip Orchid, Twayblade)

A genus of about 250-350 species, cosmopolitan. References: Magrath in FNA (2002a); Correll (1950)=X.

1 Lip (8-) 10-12 mm long, pale purple; pedicels 11-18 mm long, equal to or longer than the capsule. ............................................................................................................................................................................. *L. liliifolia*  

1 Lip 4-5.5 mm long, yellowish-green; pedicels 3-7 mm long, shorter than the capsule. ............................................................................................................................................................................. *L. loeselii*  


**Liparis loeselii** (Linnaeus) L.C. Richard, Fen Orchid, Loesel's Twayblade, Bog Twayblade, Yellow Wide-lip Orchid. Seepages at moderate to high elevations in the mountains, mucky bay swamps (dominated by *Persea palustris* and *Magnolia virginiana*) at about sea level on the Outer Banks, and other moist, seepy habitats, especially over mafic or calcareous rocks. May-July. NS and QC west to NT and BC, south to ne. NC (Dare County), sw. NC, AL, AR, KS, NE, and WA. [= RAB, C, F, FNA, G, GW, K, L, S, W, WV, X]

**Listera** R. Brown 1813 (Twayblade)

A genus of about 25 species, boreal, north temperate, and south temperate (Magrath & Coleman in FNA 2002). Recent studies suggest that *Listera* may be best included in *Neottia* Guettard. References: Magrath & Coleman in FNA (2002a); Correll (1950)=X.

1 Lip usually cleft about one-third its length, the two lobes oblong, with rounded apices. ............................................................................................................................................................................. *L. smallii*  

1 Lip usually cleft about two-thirds its length, the two lobes linear, with acute apices.

2 Lip 6-10 mm long, lacking prominent teeth near the base (but with 2 vertically-oriented lobes); pedicels and raceme axis glandular-puberulent; sepals and petals 1-2 mm long. .......................................................................................................................................................................................... *L. australis*  

2 Lip 3-5 mm long, with 2 prominent teeth near the base, these diverging horizontally; pedicels and raceme axis glabrous; sepals and petals 1-3 mm long. .......................................................................................................................................................................................... *L. cordata var. cordata*  

**Listera australis** Lindley, Southern Twayblade. Swamps, second terraces in floodplain forests, wet woods under *Rhododendron maximum*. February-July. Mainly a Southeastern Coastal Plain species, from NJ south to wc. peninsular FL (Kunzer et al. 2009) and west to e. TX, but also scattered inland of the Coastal Plain and north into VT and s. Canada. [= RAB, C, F, FNA, G, GW, K, L, WH, X; = *Ophrys australis* (Lindley) House – S; = *Neottia bifolia* (Rafinesque) Baumbach]  

**Listera convallarioides** (Swartz) Nuttall. Attributed to NC by Correll (1950); this record of this far-northern species is almost certainly an error. [= *Neottia convallarioides* (Swartz) Richard] (rejected; not keyed)


**Malaxis** Solander ex Swartz 1788 (Adder's-mouth)


1 Leaves 2-5; lip oriented upwards, erect, entire, obtuse to acuminate ................................................................. ***M. spicata***
1 Leaf solitary; lip oriented downwards, deflexed, 3-lobed (the central lobe smaller than the 2 lateral lobes).
2 Pedicels 3-5 (-5.8) mm long (even in plants with inflorescences over 80 mm long); basal lobes of the lip prominent, 0.75-1.1 mm long, usually 1.5-2 (-2.5)× as long as the apical lateral lobes and > 0.6× as long as the length from the base to the tip of the mid-lobe; inflorescences loosely flowered above, the lower flowers withering slowly ................................................................. ***M. bayardii***
2 Pedicels (4-) 5-10 (-13) mm long (and > 5 mm long in plants with inflorescences > 45 mm long); basal lobes of the lip not prominent, 0.4-1.1 mm long, mostly < 1.5× as long as the apical lateral lobes and < 0.6× as long as the length from the base to the tip of the mid-lobe; inflorescences densely flowered above, the lower flowers soon withering ................................................................. ***M. unifolia***


**Malaxis unifolia** Michaux, Green Adder's-mouth. Bogs, moist forested slopes, in the Sandhills in longleaf-oak-hickory forests. June-August. NL (Newfoundland) and FL west to MN, IA, MO, e. OK, and e. TX; also in Mexico, Cuba, the West Indies, and Central America. [= F, FNA, K, Z; < *M. unifolia* – RAB, C, G, GW, L, S, WH, WV, X (also see *M. bayardii*)]

**Mesadenus** Schlechter 1920

A genus of 7 species, of tropical and subtropical s. North America, West Indies, Central America, and South America. References: Ackerman in FNA (2002a); Correll (1950)=X.

**Mesadenus lucayanus** (Britton) Schlechter, Gray Ladies'-tresses. Shell middens, dry calcareous hammocks. Late December-March. Ne. FL (Duval County) south to s. FL; West Indies; e. Mexico and n. Central America. [= F, FNA, K, Z; < *Spiranthes polyantha* Reichenbach f. – L, WH] [add to genus key; add X to synonymy]

**Platanthera** L.C. Richard 1817 (Fringed Orchid, Fringeless Orchid)

A genus of about 200 species, largely of the temperate northern hemisphere, extending south into tropical Central America and tropical se. Asia. The recognition of *Gymnadeniopsis* as separate from *Platanthera* is uncertain at this time; originally named by Rydberg, its recognition was acknowledged as possibly warranted by Sheviak in FNA (2002a) and embraced by Brown (2006a).
Three of our species would belong to Gymnadeniopsis: *P. clavellata*, *P. integra*, and *P. nivea*. References: Sheviak in FNA (2002a); Correll (1950)–X; Reddoch & Reddoch (1993); Pridgeon et al. (1999b).

Identification Notes: Hybrids are frequent and are not keyed; they are generally intermediate in characters and are generally found in mixed populations of the two parents.

1. Lip entire, finely toothed, or eroded (neither fringed nor deeply divided into 3 lobes).
2. Leaves basal, 1 or 2, orbicular, (5-)8-25 cm wide, prostrate on the ground, the stem naked or with a few bladeless bracts..............*P. orbiculata*
3. Leaves cauline, 1-10 or more, mostly lanceolate, 1-5 cm wide, ascending, the stem with at least 1 (usually several) bladeless leaves.
4. Lip 11-15 mm long; spur mostly 40-50 mm long.............*P. integrilabia*
5. Lip 2-8 mm long; spur 4-23 mm long.
6. Large stem leaves usually 1, rarely 2, near the middle of the stem; raceme 2-9 cm long, 2-3.5 cm in diameter; lip without a tubercle on the upper surface near the base, also lacking lateral auricles near the base..............................*P. clavellata*
7. Lip 1-5 mm long; spur 5-10 mm long, about 1× as long as the ovary; lip descending and thence curved back towards the stem, narrowed at its base to a very short isthmus (the section between the base and the fringed portion); lip fringing short and relatively coarse; [of NL (Newfoundland) west to MI and IL, south to GA].
8. Lip segments deeply and compoundly lacerate; isthmus of the lip slender, about 4× as long as wide; spur 21-35 mm long, 2-3× as long as the lip, orifice round (the pollen sacs collectively close together); spur 12-20 mm long
9. Lip segments moderately to deeply fringed; isthmus of the lip stout, about 2× as long as wide; spur 20-26 mm long, ca. 1.25× as long as the lip; orifice round; flowering mid June-early July........................................................................*P. grandiflora*
10. Lip segments deeply and compoundly lacerate; isthmus of the lip slender, about 4× as long as wide; spur 21-35 mm long, 2-2.5× as long as the lip; orifice angled at top; flowering mid July-early August........................................................................*P. shriveri*

*Platanthera blephariglottis* (Willdenow) Lindley, Small White Fringed Orchid. See pages, sandhill-pocosin ecotones. July-September. NL (Newfoundland) west to MI and IL, south to GA. Following Brown (2006b), it seems best to recognize the two white-fringed orchids as separate species; they are morphologically distinctive, and where they co-occur their blooming time is offset. [= *Platanthera blephariglottis* (Willdenow) Lindley var. *blephariglottis* – FNA, K, L; < *Habenaria blephariglottis* (Willdenow) Hooker var. *blephariglottis* – RAB, X; < *Habenaria blephariglottis* var. *blephariglottis* – F (possibly misapplied); < *Habenaria blephariglottis* – GW; = *Blephariglottis blephariglottis* (Willdenow) Lindley – S (possibly misapplied); < *Platanthera blephariglottis* (Willdenow) Lindley – W; = *Blephariglottis albiflora* Raf.]

*Platanthera chapmanii* (Small) Luer, Chapman's Orange-fringed Orchid. Pine savannas. S. GA and n. FL; e. TX. Previously generally confused with the hybrid between *P. ciliaris × cristata* (F × *chapmanii*); see Folsom (1984) and Brown (2004) for details. [= FNA, K, WH; = *Blephariglottis chapmanii* Small – S] [synonymy incomplete]

*Platanthera ciliaris* (Linnaeus) Lindley, Yellow Fringed Orchid. Savannas, moist roadbanks, meadows, pastures, bogs. July-September. NH, MI, MO, and OK south to c. peninsular FL and TX. *P. ciliaris* is probably our most common and least habitat-specific *Platanthera*. [= FNA, K, L, W, WH; = *Habenaria ciliaris* (Linnaeus) R. Brown – RAB, C, F, G, GW, VW, X; = *Blephariglottis ciliaris* (Linnaeus) Rydberg – S]

*Platanthera clavellata* (Michaux) Luer, Small Green Wood Orchid. See pages, bogs, swamps, other wet places. June-September. NL (Newfoundland) and ND south to Panhandle FL and TX. [= FNA, K, L, W, WH; = *Habenaria clavellata* (Michaux)
Platanthera conspicua (Nash) P.M. Brown, Large White Fringed Orchid. Savannas, seepages, sandhill-pocosin ecotones. July-September. NC south to c. peninsular FL, west to TX. Brown (2006b) and Sheviak in FNA (2002a) clarify the taxonomy of this complex; previous studies (such as Hardin 1961) used different characters, and interpreted the white-fringed orchid taxa differently. (= Platanthera blephariglottis (Willdenow) Lindley var. conspicua (Nash) Luer – FNA, K, L, WH; < Habenaria blephariglottis (Willdenow) Hooker var. blephariglottis – RAB, X; = Habenaria blephariglottis var. conspicua (Nash) Ames – C, F; < Habenaria blephariglottis – GW; = Blephariglottis conspicua (Nash) Small – S)

Platanthera cristata (Michaux) Lindley, Crested Fringed Orchid, Golden Fringed Orchid. Savannas, bogs, moist roadsides. June-September. P. cristata is more limited to the Coastal Plain than the related P. ciliaris, ranging from s. MA south to FL and west to TX, and also inland in KY, TN, AR, SC, and NC. (= FNA, K, L, W, WH; = Habenaria cristata (Michaux) R. Brown – RAB, C, F, G, GW, X; = Blephariglottis cristata (Michaux) Rafinesque – S)


Platanthera flava (Linnaeus) Lindley var. flava, Southern Rein Orchid, Southern Gypsy-spike. Shaded wet places, such as swampy forests. March-September. VA, IN, IL, MO, and OK, south to c. peninsular FL and TX; remarkably disjunct in s. NS, where it occurs associated with other disjuncts from the Southeastern Coastal Plain. See Homoya (1993) for additional discussion of the two varieties of P. flava. (= FNA, K, L; = Habenaria flava (Linnaeus) R. Brown var. flava – RAB, C, F, G, X; < Habenaria flava – GW; > Perularia scutellata (Nuttall) Small – S; > Perularia bidentata (Elliot) Small – S)


Platanthera grandiflora (Bigelow) Lindley, Large Purple Fringed Orchid, Plume-royal. Bogs, seepages, moist places at high elevations. June-early July. NL (Newfoundland) and ON south to NJ, OH, and MI, and south in the mountains to w. NC and ne. GA. Blooming 3-4 weeks earlier than either P. psycodes and P. shriveri when they grow in proximity. If Orchis fimbriata Aiton is conspecific, the correct name is P. fimbriata (Aiton) Lindley. (< FNA, K, L, W; < Habenaria psycodes (Linnaeus) Sprengel var. grandiflora (Bigelow) A. Gray – RAB, C, G, X; < Habenaria fimbriata (Aiton) R. Brown – F, WV; < Blephariglottis grandiflora (Bigelow) Rydberg – S; = Platanthera fimbriata (Aiton) Lindley)

Platanthera integra (Nuttall) A. Gray ex Beck, Golden Fringeless Orchid, Yellow Fringeless Orchid. Savannas in the Coastal Plain, bogs in the Mountains and Piedmont. July-September. Essentially endemic to the Southeastern Coastal Plain, ranging from s. NJ south to FL and west to se. TX, with disjunct occurrences in TN (Eastern Highland Rim) and in bogs at low elevations of the Blue Ridge of NC. It is apparently now extirpated in the Mountains and Piedmont of NC. (= FNA, K, L, WH; = Habenaria integra (Nuttall) Sprengel – RAB, C, F, G, GW, X; = Gymnadeniopsis integra (Nuttall) Rydberg – S)


**Phalanthera leucophaea** (Nuttall) Lindley, Prairie Fringed Orchid. Damp calcareous meadows. May-July. ME west to NE, south to w. VA, nw. PA, c. OH, c. IN, IL, MO, and OK. [= FNA, K; = Habenaria leucophaea (Nuttall) A. Gray var. leucophaea – C; = Habenaria leucophaea (Nuttall) A. Gray – G, X; = Blephariglottis leucophaea (Nuttall) Farwell]

**Phalanthera nivea** (Nuttall) Luer, Snowy Orchid, Bog-spike. Wet savannas. May-September. Essentially a Southeastern Coastal Plain endemic, *P. nivea* ranges from s. NJ and DE (at least formerly) south to FL and west to TX, disjunct in Coffee County, TN (Eastern Highland Rim). This species is even more irregular than most *Phalanthera* in its flowering, whole populations sometimes not flowering for a number of years. The flowers are so white as to seem illuminated from within. This species was once locally abundant in the outer Coastal Plain of the Carolinas and further south; Correll (1950) describes "large colonies of this species which form a blanket of white over the landscape." Also see the picture in B.W. Wells' *Natural Gardens of North Carolina.* [= FNA, K, L; = Habenaria nivea (Nuttall) Sprengel – RAB, C, F, G, GW, WH, X; = Gymnadeniopsis nivea (Nuttall) Rydberg – S]

**Phalanthera orbiculata** (Pursh) Lindley, Large Round-leaved Orchid, Dinner-plate Orchid. Moist hardwood forests, especially over amphibolite. June-September. NL (Newfoundland) and NL (Labrador) west to AK, south to PA (and in the mountains to NC and TN), OH, IN, MN, SD, and OR. Reddoch & Reddoch (1993) have shown that *P. orbiculata* differs from *P. macrophylla* at the species level. Pollination is by night-flying moths, likely noctuids. [= FNA; = Habenaria orbiculata (Pursh) Lindley – RAB, WV; = Habenaria orbiculata var. orbiculata – C, F; < Habenaria orbiculata – G, W, X (also see *P. macrophylla*); = Platanthera orbiculata var. orbiculata – K, L; = Lysias orbiculata (Pursh) Rydberg – S]


**Phalanthera shriveri** P.M. Brown, Shriver’s Purple Fringed Orchid, Shriver’s Frilly Orchid. Seepages, northern hardwoods forests, roadbanks. Mid July-August. SW. PA south through e WV and w. VA to nw. NC. See Brown, Smith, & Shriver (2008) for additional information. [= FNA, K, L, W; < Habenaria psycodes (Linnaeus) Sprengel var. grandiflora (Bigelow) A. Gray – RAB, C, G, X; < Habenaria fimbriata (Aiton) R. Brown – F; < Blephariglottis grandiflora (Bigelow) Rydberg – S; = Blephariglottis shriveri (P.M. Brown) Baumback & Lökel]

**Platyzelys** Garay (Jug Orchid)

A genus of about 9 species, of the New World tropics and subtropics. References: Ackerman in FNA (2002a); Correll (1950)=X.

**Platyzelys querceticola** (Lindley) Garay, Jug Orchid. Wet hammocks and swamps. Late July-September. N. FL south to s. FL, west to AL(?), MS, and LA; Mexico; West Indies; Central America; South America. [= FNA, K; = Erythrodes querceticola (Lindley) Ames – L, X; = Physurus querceticola Lindley – S; ? P. latifolia (Linnaeus) Garay & Ormerod – WH] {add to genus key}

**Pogonia** Antoine Laurent de Jussieu 1789 (Rose Pogonia, Pogonia)

A genus of 3 species, of temperate e. North America and e. Asia. Cameron & Chase (1999) indicate that molecular analyses indicate that there may be merit in the traditional broad circumscription of *Pogonia* to include *Isotria* and N. American taxa of *Cleistes*; alternatively, North American "Cleistes" can be segregated as *Cleistesiopsis*, as done here. References: Catling & Sheviak in FNA (2002a); Correll (1950)=X.

**Pogonia ophioglossoides** (Linnaeus) Ker-Gawler, Rose Pogonia, Snakemouth, Beardflower, Ettercap, Addermouth. Savannas, bogs, especially in open peaty or gravelly situations. March-June. NL (Newfoundland) and MB south to s. FL and TX. [= RAB, C, FNA, G, GW, K, L, S, W, WH, WV, X; > P. ophioglossoides var. ophioglossoides – F]

**Ponthieva** R. Brown 1813 (Shadow Witch)

A genus of about 30-53 species, of tropical and warm temperate America. References: Ackerman in FNA (2002a); Pridgeon et al. (1999b); Correll (1950)=X.

**Ponthieva racemosa** (Walter) C. Mohr, Shadow Witch. Bottomlands, floodplains, moist ravines, nearly always over calcareous rock ("marl" or coquina limestone). September-October. Se. VA south to s. FL and west to se. TX; disjunct in the Eastern Highland Rim, TN, and south into Central and South America. The basal rosette of leaves, white (suffused with green) flowers in fall, and habitat are distinctive. [= RAB, C, F, FNA, G, GW, K, S, WH, X; = P. racemosa var. racemosa – L]
**ORCHIDACEAE**

**Pteroglossaspis** Reichenbach filius 1878 (Wild Coco)

A genus of 7-10 species, of s. North America, Cuba, Colombia, and tropical Africa (Romero-González in FNA 2002).

References: Romero-González in FNA (2002a); Correll (1950)=X.

**Identification notes:** The long (to 7 dm), plicate leaves are distinctive among our orchids. Small individuals can be mistaken for *Calopogon* when not in bloom. *Pteroglossaspis* differs, however, in having the stem covered from node to node by a succession of sheaths (vs. the sheaths much shorter) and in having the leaves 2-3 on a separate shoot emerging from the corm before the bloom-stalk (vs. leaf 1, on the bloom-stalk).

**Pteroglossaspis ecristata** (Fernald) Rolfe, Spiked Medusa, Smooth-lipped Eulophia. Mesic pinelands with blackjack oak, other sandhills and dry-mesic to mesic longleaf pinelands. June-September; July-November. Se. NC south to FL, west to LA; West Indies (Cuba). One of the rarest orchids in our region. [= FNA, K, WH; = *Eulophia ecristata* (Fernald) Ames – RAB, L, X; = *Triorchos ecristatus* (Fernald) Small – S]

**Sacoila** Rafinesque 1838

A genus of ca. 10 species, of the tropics and subtropics. References: Brown & Catling in FNA (2002); Correll (1950)=X.

**Sacoila lanceolata** (Aublet) Garay var. *lanceolata*. Pine flatwoods, road shoulders. April-June. Ne. and Panhandle FL south to s. FL; West Indies, Mexico, Central America, South America. [= FNA, WH; = *Stenorrhynchos lanceolata* (Aublet) L.C. Rich var. *lanceolata* – K; = *Spiranthes lanceolata* (Aublet) Léon var. *lanceolata* – L; < *Stenorrhynchos orchisoides* (Swartz) L.C. Richard – S] {add to genus key; add X to synonymy}

**Spiranthes** L.C. Richard 1817 (Ladies'-tresses, Pearl-twist, Spiral Orchid)

A genus of about 30-40 species, mainly north temperate, but with species scattered in other areas. The *Spiranthes* flora of our region is still rather poorly understood, and the treatment here will undoubtedly change further. References: Sheviak & Brown in FNA (2002a); Luer (1975); Sheviak (1991); Pridgeon et al. (1999c). Key adapted largely from Sheviak & Brown in FNA (2002a); Correll (1950)=X. [also see *Sacoila*]

**Identification notes:** Flowering plants are necessary for identification of the species.

1 Rachis of inflorescence with all hairs not glandular, tapering to a pointed tip; [flowering March-September] .................................................. S. vernalis
2 Rachis of inflorescence either glabrous or with some or all hairs gland-tipped, capitate or clavate.
3  Lip bright yellow or orange-yellow, with greenish veins; sepals and petals pure white; [flowering May-July] .................................................. S. lucida
4  Lip either white, or lip yellowish and lacking greenish veins; sepals and petals creamy, ivory, yellow, or greenish; [collectively flowering February-December].
5  Rachis glabrous; flowers gaping from near middle, the tubular portion < 3 mm long; lip pure white; [flowering June-September] ...... .......................................................... S. tuberosa
6  Rachis pubescent or glabrous; flowers gaping only from beyond the middle, the tubular portion > 3 mm long; lip white, creamy, yellow, or centrally green; [collectively flowering February-December].
7  Inflorescence with 3 or 4 flowers per cycle of spiral, the spiral usually tight and obscure, but then with 3 or 4 secondary ranks of flowers evident; [collectively flowering August-December]

**Key A**

1 Petals ca. 6 mm long; lower portion of stem with recurved-spreading leaves
2 Rostellum and viscidium absent; sepals 3.5-5 mm long .......................................................... S. ovalis var. erostellata
2 Rostellum and viscidium present; sepals 4-6.1 mm long.......................................................... S. ovalis var. ovalis
1 Petals 7.5 mm long or longer; leaves wholly basal, or lower portion of stem with recurved-spreadimg blades, or leaves absent at flowering.
3 Lip only slightly or not at all differentiated from the petals; buds often failing to open (but setting seed through agamospermy); column normal, or abnormal or aborted; leaves usually absent at flowering......................................................... S. cernua
4 Basal callus of the lip relatively short and conic, a wide as high, and usually < 1 mm long; lateral sepals free and spreading, often over the top of the flower; leaves absent at flowering; [of dry calcareous barrens of the Ridge and Valley and westward, in the Ridge and Valley of sw. VA and nw. GA, and westward] .......................................................... S. magnicamporum
4 Basal callus of the lip 1-2 mm long; lateral sepals more or less appressed (very rarely spreading over the top of the flower); leaves present at flowering; [of various dry to wet sites, collectively widespread in our area].
5 Upper margin of the lateral sepals obviously separated from the adjacent margin of the dorsal sepal, the separation abrupt at the base (commonly by about 1 mm); lip strongly curving from the claw (the resulting angle 20-60 degrees), cuneate at the base; perianth creamy, yellowish, or greenish white; [of upland, dry to mesic sites] ..................................................... S. ochroleuca
5 Upper margin of the lateral sepals touching (or nearly so) the adjacent margin of the dorsal sepal, or only gradually separated with distance from the base; lip not strongly curving from the claw (angle < 30 degrees), cordate to truncate at the base; perianth white to creamy or ivory, the center of the lip ivory to pale yellowish or rarely greenish; [primarily of wet sites, such as bogs, fens, marshes, bottomland swamps].
6 Plants to about 30 cm tall, not colonial; leaves comparatively slender, flaccid-membranaceous with thickened midrib, the peridiole of the basal leaves < 6 mm wide; leaves wholly basal or the lower sheaths with ascending-spreadimg blades; perianth usually 8-11 mm long; lip membranaceous to fleshy, < 7 mm long; [widely spread in our area].
7 Lateral sepals spreading to appressed, not widely diverging, 3.8-10 mm long; lip ovate to oblong-quadrate, lacking a distinct basal dilation; [flowering late November-December} .......................................................... S. longilabris
7 Lateral sepals spreading to appressed, not widely diverging, 3.8-10 mm long; lip ovate to oblong-quadratet, lacking a distinct basal dilation, white or creamy centrally; inflorescence usually with several spiral cycles (rarely nearly secund); [flowering February-November].
8 Lip with lacerate-dentate tip; leaves usually linear, > 30° as long as wide, persistent and present at flowering; [flowering May-August].
9 Lip with undulate to crisped tip; leaves lanceolate to ovate or obovate, < 30° as long as wide, either persistent and present at flowering, or withering prior to flowering.
10 Plants comparatively large and stout, the perianth 5-10 mm long, white to yellowish, the lip often darker centrally but not green or greenish yellow; leaves ascending, relatively slender, not ovate or obovate, present at flowering; rachis conspicuously and densely glandular-pubescent; [flowering August-November].
11 Flowers comparatively large and stout, the perianth 5-10 mm long, leaves strictly basal, spreading and ovate or obovate; rachis glabrous or densely but minutely glandular-pubescent; [flowering February-September].
12 Rachis densely pubescent; flowers yellowish to pale greenish yellow, the lip centrally yellow; [flowering February-April]; [of s. SC southward and westward] ......................................................................................................................................................... S. brevilabris
13 Rachis densely pubescent; flowers yellowish to pale greenish yellow, the lip centrally yellow; [flowering February-September]; [collectively widespread in our area].
14 Flowers yellowish to pale greenish yellow; lip yellow centrally .......................................................... S. floridana
15 Flowers white, lip green centrally.
16 Leaves oblanceolate, withering at anthesis; lateral sepals spatulate, green at base; flowering February-May................. .. S. eatonii
16 Leaves ovate to obovate or elliptic, spreading, present or absent at anthesis; lateral sepals acuminate, white throughout; flowering July-September.
17 Flowers densely arranged on the spike (ratio of spike length in mm: flower number < 2.3); entire plant essentially glabrous; leaves usually absent at anthesis; [flowering earlier, mostly July] ..................................................... S. lacera var. gracilis
18 Flowers laxly arranged on spike (ratio of spike length in mm: flower number = or > 2.3); inflorescence capitately-pubescent; leaves usually persisting through anthesis; [flowering later, mostly August-September] ............................................ S. lacera var. lacerca

_Spiranthus brevilabris_ Lindley, Short-lipped Ladies’-tresses. Pine savannas. Late February-April. Se. SC south to s. FL, west to se. TX. [= FNA, K, WH; = S. gracilis (Bigelow) Beck var. brevilabris (Lindley) Correll – GW; = S. brevilabris Lindley var. brevilabris – L] 


_Spiranthus floridana_ (Wherry) Cory, Florida Ladies’-tresses. Wet savannas, other moist sites. April-May. A Southeastern Coastal Plain endemic: se. NC south to c. peninsular FL and west to TX, a Southeastern Coastal Plain endemic. [= FNA, K, WH; = S. brevilabris Lindley var. floridana (Wherry) Luer – L; = S. gracilis (Bigelow) Beck var. floridana (Wherry) Correll – RAB, GW, X; = _Ibidium floridanum_ Wherry – S] 

_Spiranthus lacerca_ (Rafinesque) Rafinesque var. gracilis (Bigelow) Luer, Southern Slender Ladies’-tresses. Fields, meadows, pastures, woodlands. August-September. NS, MI, WI, and KS south to GA and TX. [= C, FNA, K, L, W; = S. gracilis
**Spiranthes lacinia** (Small) Ames, Lace-lip Ladies'-tresses. Pond cypress depressions and savannas, swamps. May-August. A Southeastern Coastal plain endemic: NJ south to s. FL and west to se. TX. [= RAB, C, FNA, K, L, WH, X; = S. lacera – F, GW; = Ibidium laciniatum (Small) House – S]

**Spiranthes longilabris** Lindley, Giant Spiral Orchid. Wet pine savannas. Late October-December. A Southeastern Coastal Plain endemic: se. NC south to s. FL and west to e. TX. [= RAB, FNA, GW, K, L, WH, X; = Ibidium longilabre (Lindley) House – S]

**Spiranthes lucida** (H.H. Eaton) Ames, Shining Ladies'-tresses. Sunny seepage over amphibolite or other basic rock, moist banks and shores. June. Widespread in ne. United States, south to NC, e. TN, sc. TN (Chester et al. 1993), c. AL, MO, and KS. The species was reported for NC by Fernald (1950) and by Small (1933), but was not treated by RAB; its occurrence in NC was verified in 1992 by its discovery in a seepage area in Ashe County. [= F, FNA, G, K, L, W, WV, X; = Ibidium plantagineum (Rafinesque) House – S]

**Spiranthes lucerna** Sheviak, Great Plains Ladies'-tresses. Grassy barrens and glades over limestone. Primarily in the Great Plains, from ND south to TX, east (often as widely disjunct populations) to sw. ON, se. PA, sw. VA (Ludwig 1999), KY, w. TN (Jones 2006), and nw. GA. [= C, FNA, K, L; < S. cernua – G; < S. cernua var. cernua – F, X]

**Spiranthes magnicamporum** Sheviak, Giant Spiral Orchid. Wet pine savannas. Late October-December. A Southeastern Coastal Plain endemic: se. NC south to s. FL and west to se. TX. [= RAB, FNA, GW, K, L, X; = Ibidium magnicamporum (Sheviak) Rydberg – S]


**Spiranthes ovalis** Lindley var. erostellata Catling, Oval Ladies'-tresses. Swamp forests, bottomland forests, hammocks, ravine forests. August-November. Var. erostellata is fairly widespread in se. North America, ranging from sc. PA, MI, and IL south to Panhandle FL, s. MS, and s. LA. Var. ovalis is limited to AR, LA, and TX, differing in having a viscidium and rostellum. See Catling (1983b) for further information about this variety and its biology. [= C, FNA, K, W, WH; < S. ovalis – RAB, F, G, GW, L, WH, X; = Ibidium ovalae (Lindley) House – S; ? S. montana Rafinesque]

**Spiranthes ovalis** Lindley var. ovalis. Oval Ladies'-tresses. Swamp forests, mesic ravines. October-November. GA, TN, AR, and TX, south to n. peninsular FL and LA. [= FNA, K, WH; < S. ovalis – GW, L, X; = Ibidium ovalae (Lindley) House – S]

**Spiranthes praecox** (Walter) S. Watson, Grass-leaved Ladies'-tresses, Giant Ladies'-tresses. Savannas, swamps, bogs. March-July. A Southeastern Coastal Plain endemic: NJ south to s. FL and west to TX. [= WH; < S. praecox – RAB, C, F, FNA, G, GW, K, L, W, X (also see S. sylvatica); < Ibidium praecox (Walter) House – S (also see S. sylvatica)]

**Spiranthes sylvatica** P.M. Brown, Woodland Ladies'-tresses, Pale Green Ladies'-tresses. Live oak hammocks, other woodlands. Late March-early May. VA south to c. peninsular FL, west to e. TX. [= WH; < S. praecox – RAB, C, F, FNA, G, GW, K, L, X; = Ibidium praecox (Walter) House – S]


**Spiranthes vernalis** Engelmann & A. Gray, Spring Ladies'-tresses. Savannas, bogs, marshes, fairly dry fields. March-July (early September in the mountains). MA to s. FL, and west to TX and SD, also in Mexico and Central America. [= RAB, C, F, FNA, G, GW, K, L, WH, X; = Ibidium vernalume (Engelmann & A. Gray) House – S]
**Tipularia** Nuttall 1818 (Cranefly Orchid)

A genus of 3 species; the other species of the genus are e. Asian (1 in Japan and 1 in the Himalayas) (Catling & Sheviak in FNA 2002). References: Catling & Sheviak in FNA (2002a); Correll (1950)=X.

Identification notes: The leaves are present during the winter, withering before the flowering stalk appears, the plant thus occasionally mistaken for one of the saprophytic orchids. The leaves are usually purple underneath, a characteristic shared with *Aplectrum*, but *Tipularia* leaves are ovate, < 10 cm long, and are not notably plicate along the veins (vs. *Aplectrum*, with leaves narrowly elliptic, 10-20 cm long, and notably plicate along the very prominent, white, cartilaginous veins).

*Tipularia discolor* (Pursh) Nuttall, Cranefly Orchid. In a wide variety of mesic to rather dry forests. July-September. Se. MA, s. NY, OH, IN, and s. MI south to n. peninsular FL and TX. Along with *Goodyera pubescens*, *Tipularia* is one of the commonest orchids in e. North America. [= RAB, F, FNA, G, K, L, W, WH, WV, X; = T. unifolia (Muhlenberg) Britton, Sterns, & Poggenburg – S]

**Triphora** Nuttall 1818 (Three Birds Orchid)

A genus of about 25 species, of e. North America, the West Indies, and Central and South America (Medley in FNA 2002). References: Medley in FNA (2002a); Brown & Pike (2006)=Z; Correll (1950)=X.

1 Flowers yellow, erect, not opening fully, the lip uppermost ............................................................... *T. rickettii
1 Flowers pink to white, nodding, opening fully, the lip lowermost .................................................... *T. trianthophoros

**Triphora rickettii** Luer. Upland hardwood hammocks. Late July-August. Ne. FL (Columbia County) south into wc. Peninsular FL. Sometimes treated as a disjunct component of the Mexican *T. yucatanensis*. [= L, WH, X; < *Triphora yucatanensis* Ames – FNA, K]

**Triphora trianthophoros** (Swartz) Rydberg var. *trianthophoros*, Three Birds Orchid, Nodding Pogonia, Nodding Ettercap. Humid forests and swamps, rhododendron thickets, especially on rotten logs or on humus. July-September. The species is widespread (but scattered) in e. North America, and south into Central America. Var. *trianthophoros* occurs from ME and ON west to WI, south to c. peninsular FL and e. TX; disjunct in nc. Mexico; var. *mexicana* (S. Watson) P.M. Brown occurs from Mexico south to Central America. The recently named var. *texensis* P.M. Brown & R.B. Pike needs additional evaluation. The flowers are extremely ephemeral, making the species very difficult to locate. The correct spelling of the epithet is “trianthophoros.” [= *Triphora trianthophora* (Swartz) Rydberg var. *trianthophora* – Z, orthographic variant; = *T. trianthophora* ssp. *trianthophora* – FNA, orthographic variant; < *T. trianthophora* – RAB, F, G, GW, K, L, S, W, WV, X; < *T. trianthophoros* – WH]

**Zeuxine** Lindley 1826 (Soldier Orchid)

A genus of about 26 species, of tropical and subtropical Old World (introduced elsewhere). References: Ackerman in FNA (2002a); Correll (1950)=X.

* Zeuxine strateumatica (Linnaeus) Schlechter, Lawn Orchid, Soldier Orchid. Lawns; native of Asia. [= FNA, GW, K, L, WH] {add X to synonymy}
A family of about 7-9 genera and 100-220 species, herbs, subcosmopolitan (though not well distributed in the northern hemisphere of the Old World, and especially diverse in South Africa). The recognition of Hypoxidaceae at the family level is supported by a variety of authors, on morphologic and molecular grounds (see Judd 2000 for summary). References: Nordal in Kubitzki (1998a); Herndon in FNA (2002a); Judd (2000).

**Hypoxis Linnaeus 1759 (Stargrass)**


| 1 Leaves glabrous, or with a few trichomes near the base; seeds black. | H. curtissii Rose in Small, Swamp Stargrass. Swamp forests, alluvial forests, water courses, wet hammocks. March-June; May-July. E. NC south to e. peninsular FL, west to e. TX. [= FNA, K, WH, Z; = H. hirsuta (Linnaeus) Coville var. leptocarpa (Engelmann & A. Gray) Fernald – RAB; < H. curtissii – C, G; = H. leptocarpa (Engelmann & A. Gray) Small – GW, S].
| 2 Leaves filiform, 0.3-1.2 mm wide, stiff; seeds pebbled (the exposed portion of each cell rounded); floral bracts 1-7 (-12) mm, > 2× as long as the pedicels; ovaries densely pubescent; [of Coastal Plain pinelands] H. juncea |
| 3 Leaves over 2 mm wide, soft and flexible; seeds coarsely muricate (the exposed portion of each cell pointed-conical); floral bracts (1-) 2-20 (-80) mm; ovaries sparsely to densely pubescent; [collectively widespread]. | H. rigida Chapman, Savanna Stargrass. Wet pine savannas. April (-later, especially in response to fire); May-June. (= H. hirsuta var. hirsuta – C, G, K] |
| 4 Pedicels usually >2× as long as the bracts; seeds black; [collectively widespread]. | H. sessilis Linnaeus, Glossy-seed Stargrass. Wet pine savannas. April-May (-later, especially in response to fire); May-June. (= H. longii Fernald – C, F, G; > H. sessilis – C, F, G] |
| 5 Leaves flattened, > 1 mm wide; seeds coarsely muricate (the exposed portion of each cell pointed-conical); [widespread] H. sessilis |
| 6 Anthers < 2 mm long; tepals longer than the pedicels; floral bracts longer than the pedicels; seeds black, pebbled with round pebbling (the exposed portion of each cell rounded). | H. rigida |
| 7 Tepals 1.5-2× as long as ovaries; seed coats iridescent ............................................................................................................. H. hirsuta var. hirsuta – RAB; < H. hirsuta – C, G, K] |
| 7 Tepals 1.5-2× as long as ovaries; seed coats not iridescent ............................................................................................................. H. hirsuta var. hirsuta – RAB; < H. hirsuta – C, G, K] |

71. IRIDACEAE A.L. de Jussieu 1789 (Iris Family) [in ASPARAGALES]
IRIDACEAE

1 Inflorescence an umbellate 1-sided cyme; plants from rhizomes or bulbs; flowers actinomorphic.

4 Leaves planar; plants from rhizomes (or indistinct) or a bulb (in Iris xiphium).

5 Style branches broad, petaloid, terminating in paired crests .................................................. Iris

5 Style branches not broad or petaloid.

6 Tepals 16-35 mm long, orange or red; seeds 4-6 mm in diameter........................................... Iris domestica

6 Tepals 6-15 mm long, blue, purple, lavender, pink, magenta, white, or yellowish-white; seeds 0.6-1.3 mm in diameter ................. Sisyrinchium

4 Leaves plicate; plants from bulbs.

7 Tepals unequal, the inner whorl < ½ as long as the outer whorl ................................................... Herbertia

7 Tepals nearly equal in length.

8 Style recurved, with 3 flat branches that are < 2 mm long ...................................................... Calydorea

8 Style straight, each of the 3 branches further divided into slender lobes

9 Style branches divided for ca. ½ their length; style arms arching over or between the anthers; tepals dark purple .......... Alophia

9 Style branches divided nearly to base; style arms extending horizontally between the anthers; tepals blue, white in the center ...... Nemastylis

Alophia Herbert (Propellor-flower)


Alophia drummondii (Graham) R.C. Foster, Propellor-flower. E. LA (and MS?) west to TX and OK; Mexico; Guyana. [= FNA, K; = Herbertia drummondii (Graham) Small]

Calydorea Herbert 1843 (Ixia)

A genus of about 8 species, of warm temperate and tropical America. The circumscription relative to Nemastylis is uncertain. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

Calydorea coelestina (Bartram) Goldblatt & Henrich, Bartram's Ixia. Pine flatwoods. Endemic to ne. FL (Chafin 2000); the single GA record is by P.O. Schallert, notoriously sloppy with his location data, and is therefore best discounted unless additional information comes to light. [= FNA, K; = Salpingostylis coelestina (Bartram) Small – S; = C. caelestina – WH, orthographic variant; = Nemastylis coelestina (Bartram) Nuttall; = Sphenostigma coelestinum (Bartram) R.C. Foster; = Ixia coelestina Bartram]

Crocosmia Planchon 1851 (Montbretia)

A genus of 8-9 species, herbs, native of sub-Saharan Africa. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Dunlop (2004); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

* Crocosmia ×crocosmiiflora (V. Lemoine) N.E. Brown [C. aurea × pottsii], Montbretia. Disturbed areas, ditches, especially in moist to wet sites, including salt marshes; the parents of the hybrid both native to sub-Saharan Africa. Late June-July. Reported for Lowndes and Thomas counties, GA (Carter, Baker, & Morris 2009). [= FNA, K, WH; = C. ×crocosmiflora – RAB, orthographic variant]

Crocus Linnaeus 1753 (Crocus)


* Crocus tomasinianus Herbert, Woodland Crocus. Disturbed areas, long-persistent after cultivation around house-sites. Reported as rarely naturalizing in DE (McAvoy & Bennett 2001). {not yet keyed}

Crocus vernus (Linnaeus) Hill, Dutch Crocus. Disturbed areas, long-persistent after cultivation around house-sites. [= K] {not yet keyed}

Freesia Ekloen ex Klatt 1865 (Freesia)


A genus of about 255 species, largely of Africa. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a). Key based on FNA.

1 Inner tepals 60-70 mm long ................................................................. G. ×gandavensis
1 Inner tepals < 60 mm long.
2 Tepals white, cream, orange, or red; perianth tube plus dorsal sepal 60-95 mm long ............................................. G. dalenii ssp. dalenii
2 Tepals pink, reddish, or light purple, with white markings on the outer 3 tepals.
3 Anthers 10-13 mm long; capsules oblong, 18-24 mm long; seeds winged ..................................................... G. communis
3 Anthers ca. 15 mm long; capsules globose, 10-12 mm long; seeds not winged ........................................... G. italicus


* Gladiolus dalenii Van Geel ssp. dalenii. Sometimes cultivated, rarely persisting or spreading; native of s. Africa. Introduced in AL and LA. [= FNA]

* Gladiolus ×gandavensis Van Houtte [G. dalenii × oppositiflorus]. Commonly cultivated as ornamentals, rarely persisting or weakly spreading, native of s. Africa. Goldblatt suggests that as many as 5 species are involved in the origin of the large-flowered garden gladiolus. [= RAB, FNA, K, WH; > G. hortulanus L.H. Bailey – S; > G. dalenii Van Geel]

* Gladiolus italicus P. Miller. Sometimes cultivated, rarely persisting or spreading; native of Eurasia. Introduced in TN. [= FNA, K; > G. segetum Ker-Gawler – S]

Herbertia Sweet 1827 (Pleat-leaf Iris)


Herbertia lahue (Molina) Goldblatt, Prairie-nymph. Prairies and marshes. AL and FL west to TX; central South America. [= FNA, WH; > H. lahue ssp. caerulea (Herbert) Goldblatt – K; > H. caerulea Herbert – S]

Iris Linnaeus 1753 (Iris, Flag, Blackberry-lily)


Identification notes: the petals are usually erect, smaller than the petaloid sepals (which are brightly colored, generally reflexed, and marked with a "signal"). The styles are also petaloid, arched over the sepals, and 2-cleft at the tip (except in I. domestica).

1 Plant from an ovoid bulb; [subgenus Xiphium] ................................................................. I. xiphium
1 Plant from short to elongate rhizomes.
2 Style branches not broad, petaloid, or crested; seeds black, shiny, in a blackberry-like cluster (the seeds exposed at maturity by dehiscence of the papery to chartaceous capsule walls) ..................................................................................... I. domestica
2 Style branches broad, petaloid, terminating in paired crests; seeds tan to brown, in a capsule.
3 Sepal "signal" (see above) of multicellular hairs (the "beard"), along the midrib of the claw and the base of the blade; [subgenus Iris].
4 Spathes green (or purplish) and herbaceous, with scarious margins ..................................................... I. germanica
4 Spathes scarious, silvery-white ................................................................................... I. pallida
IRIDACEAE

3 Sepal "signal" consisting of contrasting color, ridges, small unicellular hairs, and/or a cockskel-like crest; [subgenus Limniris].
5 Rhizome branches cordon-like, with scale-like leaves, enlarging at the apex to produce vegetative leaves, additional branches, and flowering stems.
6 Stems 30-80 cm tall; leaves 30-60 cm long, 0.2-0.7 cm wide; cordlike portions of rhizomes to 4 dm long; [of wetlands]; [section Linniris, series Prismaticae]..........................I. prismatica

IRIS

1 Stems 2-15 cm tall; leaves 10-45 cm long, 0.3-2.5 cm wide; cordlike portions of rhizomes to 2 dm long; [of dry to mesic uplands].
7 Sepals not crested; leaves 3-13 mm wide, blue-green, straight or nearly so; flowers strongly fragrant; rhizomes deeply buried (not easily "pulled" out); [generally of dry and acid soils]; [section Limniris, series Versica]........................................................................I. cristata

IRIS fulva*

* Iris fulva

IRIS

1 Stems 4-10 dm tall, usually with 1-2 well-developed branches; capsule 4-7 cm long......................I. virginica var. virginica

IRIS

1 Perianth dull copper or orange-brown (or dark yellow) (fading in nature or drying in the herbarium to a bluish or purplish color); petals spreading or declining.........................I. fulva

IRIS

1 Petals 1-2 cm long; [section Linniris; series Tripetalae]..................................................................................I. tridentata

IRIS

1 Petals 2-9.5 cm long.
10 Stems slender; [section Lophiris; series Sibirica]..................................................................................I. pseudacorus

IRIS

11 Spathe scarious at flowering time; capsule 2-3.5 cm long.................................................................I. sibirica

IRIS

12 Capsules 3-angled or nearly round in cross-section; [section Linniris; series Laevigatae].
13 Perianth yellow..........................................................I. pseudacorus

IRIS

13 Perianth blue-violet (rarely white).
14 Flowers 8-15 cm in diameter; leaves 0.5-1.5 cm wide; [alien, cultivated, rarely escaped]......................I. ensata

IRIS

14 Flowers 6-8 cm in diameter; leaves 1-4 cm wide; [native].
15 "Signal" a greenish-yellow, papillate patch, surrounded by an area of heavily veined purple-on-white; [of VA northward]..........................................................I. versicolor

IRIS

15 "Signal" a bright yellow, pubescent patch.
16 Plants to 10 dm tall, usually with 1-2 well-developed branches; capsule 7-11 cm long..............I. virginica var. shrevei

IRIS

16 Plants to 6 dm tall, little or not at all branched; capsule 4-7 cm long..............................I. virginica var. virginica

IRIS

19 Capsules 2.5-3.5 cm long, hexagonal in cross-section, 3 sides flat, the alternating sides with 2 rounded ridges separated by a shallow groove .................I. hexagona

IRIS

20 Capsules 6-10 cm long, slightly to strongly hexagonal in cross-section.
20 Capsules with 6 broad rounded lobes, dehiscent..........................................................I. giganticaerulea

IRIS

20 Capsules with 6 sharp, winglike ridges, dehiscent..........................................................I. savannarum

IRIS

Iris brevicaulis


IRIS cristata

Aiton, Dwarf Crested Iris. Moist forests, rich woods, roadbanks. April-May; June-July. MD west to IN and MO, south to NC, AL, MS, AR, and e. OK. [= RAB, C, F, FNA, G, K, W, WV; = Neubeckia cristata (Aiton) Alefani – S]

* Iris domestica


* Iris ensata

Thunberg, Japanese Iris. Roadsides; cultivated and rarely escaped, native of Japan, n. China, and Sakhalin. Also reported from se. PA (Rhodes & Klein 1993). [= K; I. kaempferi Siebold ex Lamark]

IRIS fulva


* Iris germanica

Linnaeus, German Iris, Fleur-de-Lys. Roadsides, old homesites, ditches; cultivated and rarely persistent or escaped, native of Europe. April-May. [= RAB, C, F, FNA, G; > I. flavescens Delile – K; > I. ×germanica – K]

IRIS giganticaerulea

**Iris hexagona** Walter, Anglepod Blue Flag. Swamps. May-June. SC south to s. FL. [= RAB, FNA, GW, S, WH; = *I. hexagona* var. *hexagona* – K; > *I. hexagona* – S]

* Iris pallida* Lamarck in J. Lamarck et al., Sweet Iris. Cultivated and persistent around buildings in GA and elsewhere (FNA). [= F, FNA, K]

**Iris prismatica** Pursh ex Ker-Gawler, Slender Blue Iris, Slender Blue Flag. Bogs and marshes. May-June; June-July. NS south to GA, disjunct in w. NC (Henderson County) and sc. TN (Coffee County). [= RAB, C, FNA, G, GW, K, S, W; > *I. prismatica* var. *prismatica* – F; > *I. prismatica* var. *austrina* Fernald – F]


* Iris sanguinea* Hornemann ex Donn, Japanese Iris. Roadsides, cultivated and rarely escaped; native of Japan, n. China, Korea, Japan, and w. Russia. [= K]

* Iris savannarum* Small. [habitat]. GA and AL south to s. FL. [= FNA, S; = *I. hexagona* Walter var. *savannarum* (Small) R.C. Foster – K; > *I. kimballiae* Small – S; > *I. alabamensis* Small – S]

* Iris sibirica* Linnaeus, Siberian Iris. Cultivated and escaping or persisting near plantings; native of Eurasia (c. and e. Europe west to Lake Baikal). [= FNA, K]

**Iris verna** Linnaeus var. *smalliana* Fernald ex M.E. Edward, Upland Dwarf Iris. Dry, rocky or sandy woodlands and forests. April-May; June-early August. Sc. PA and WV south to w. NC, e. TN, n. GA, se. GA, Panhandle FL, and AL. [= RAB, F, FNA, K, W, WH, WV; > *I. verna* – C, G; < *Neubeckia verna* (Linnaeus) Alefani – S]

**Iris verna** Linnaeus var. *verna*, Coastal Plain Dwarf Iris, Sandhill Iris. Longleaf pine sandhills, dry, rocky forests and woodlands. March-May; May-June. MD south to se. SC and e. GA, primarily on the Coastal Plain, but extending into the Piedmont. [= RAB, F, FNA, K; < *I. verna* – C, G; < *Neubeckia verna* (Linnaeus) Alefani – S]

**Iris versicolor** Linnaeus, Northern Blue Flag, Poison Flag. Marshes, swamps, shores. May-July. Reported as occurring as far south as VA in C, F, and W. [= C, FNA, G, K, S?, W]


**Iris virginica** Linnaeus var. *virginica*, Southern Blue Flag. Marshes, swamps, streams. April-May; July-September. Se. VA south to c. peninsular FL, west to e. TX, north in the interior to w. TN; disjunct in sc. TN. [= C, F, K; < *I. virginica* – RAB, FNA, W; > *I. virginica* – G, S]

* Iris xiphium* Linnaeus, Spanish Iris. Disturbed areas; native of Spain and Portugal. [= K]

**Nemastylis** Nuttall 1835 (Celestial-lily)

A genus of about 5 species, herbs, of s. North America and Central America. The circumscription relative to *Calydorea* is uncertain. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

**Nemastylis geminiflora** Nuttall, Prairie Celestial, Prairie Pleatleaf. Prairies. MO and e. KS south to w. LA and TX; disjunct eastward in AL and MS. [= FNA, K; *Ixia acuta* Bartram; *Nemastylis acuta* Herbert]
IRIDACEAE

Sisyrinchium Linnaeus 1753 (Blue-eyed-grass, Irisette) by A.S. Weakley & B.A. Sorrie

A genus of about 80 species, herbs, of the Americas. Sisyrinchium is a very difficult genus, with a number of taxonomic questions remaining in our area. References: Cholewa & Henderson in FNA (2002a); Hornberger (1991)=Y; Bicknell (1896, 1899a, 1899b); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

Identification notes: For fully successful identification, it is necessary to collect underground parts; fibrous remains of leaves, and rhizomes (if any), are critical characters.

1 Perianth with tepals campanulate basally, flaring distally; annual; plants usually <2 dm tall; tepals lavender, pink, white, magenta, or yellow, and rhizomes (if any), are critical characters. For fully successful identification, it is necessary to collect underground parts; fibrous remains of leaves, and rhizomes (if any), are critical characters.  

2 Stems with 3-6 nodes; tepals yellow basally; mature capsules broadly fusiform or elliptical, uniformly light brown; [of MS to TX]..............  

S. minus

2 Stems with 1-2(-3) nodes; tepals with maroon blaze near base; mature capsules globose, tan with purple sutures; [widespread] ..............  

S. rosulatum

1 Perianth with tepals abruptly spreading in a plane; perennial, plants usually >2 dm tall; tepals blue, violet, or white.  

3 Inflorescences paired (each inflorescence composed of 1-5 flowers, their pedicels emanating from within 2 chartaceous scales; thus, there are 2 pairs of scales within the 2 outer, leaflike, green spathe bracts); outer spathe bract connate 0-1 mm.  

4 Stems 1.3-3.4 mm wide, obviously winged; base of plant without fibrous remains of leaves; [of the Piedmont and Mountains]..............  

S. albidum

4 Stems 0.5-1.0 mm wide, wiry, not or scarcely winged; base of plant with numerous fibrous remains of leaves; [of the Coastal Plain].....  

S. capillare

3 Inflorescences solitary, not paired (within the 2 green spathe bracts there is only one pair of chartaceous scales); outer spathe bract connate 2-6 mm (except 0-1 mm in S. campestre).

5 Stems simple, unbranched (rarely branched).  

6 Spathes bracts connate 0-1 mm..................................................S. campestre

6 Spathes bracts connate >1 mm.  

7 Base of plant with fibrous remains of leaves................................S. sagittiferum

7 Base of plant without fibrous remains of leaves  

8 Spathes bracts equal or subequal, outer bract up to 4.2 mm longer than inner; [coastal sw LA-s TX]...........................S. biforme

8 Spathes bracts distinctly unequal, outer usually >6 mm longer than inner; [southern Appalachians and northward].  

9 Stems (1.5-)2-4 mm wide, obviously winged; spathe bracts green, rarely purplish; capsules 4-6.8 mm long; [northern, extending south to n. VA].................................S. montanum

9 Stems 1-2 mm wide, narrowly winged; spathe bracts purple on margins at least (often throughout); capsules 3.2-5.5 mm long; [northern, extending south to GA and e. AL]........................................S. mucronatum

5 Stems branched, with 1-5 nodes.  

10 Stems with 2-5 nodes, the branching dichotomous; tepals white, recurved at maturity; [of escarpment region of sw. NC and nw. SC].  

S. dichotomum

10 Stems with 1-3 nodes, the branching uneven; tepals blue to violet, oriented in a plane; collectively widespread.

11 Plant bases with fibrous remains of leaves (usually abundant).  

12 Main stems 0.5-2.1 mm wide (usually <2 mm wide).  

13 Stems mostly 1.5-2.1 mm wide, scabrous; plants drying dark brown or blackish; spathe bracts 15-20(25) mm long............S. fuscatum

13 Stems 0.5-1.2 mm wide, not scabrous; plants drying pale brown or greenish brown; spathe bracts 12-14(15) mm long .......S. rufipes

12 Main stems 1.5-6 mm wide (usually >2 mm wide).  

14 Stems and leaves shiny, especially in life; stems mostly 3-6 mm wide; mature capsules mostly 5.5-8 mm long; [of FL and sw. GA]..........................................................S. xerophyllum

14 Stems and leaves dull; stems 1.5-4.5 mm wide; mature capsules 2.5-6 mm long; [widespread].  

15 Stems and branches smooth on margins; stems mostly 2.3-4.5 mm wide; plants dry dull green or brownish green; [widespread] ..........................................................S. nashii

15 Stems and branches scabrous on margins at least distally; stems 1.5-3.0(-3.5) mm wide; plants dry dark brown or blackish; [of the Coastal Plain].  

16 Stems mostly 2.0-3.0(-3.5) mm wide; mature capsules 4-6 mm long; [of e. MD northward to sw. Nova Scotia]..............S. arenicola

16 Stems mostly 1.5-2.1 mm wide; mature capsules 2.5-4 mm long; [of se. VA to se. LA]..........................S. fuscatum

11 Plant bases without fibrous remains of leaves  

17 Main stems usually >2 mm wide.  

18 Spathes bracts connate 2.5-4 mm; spathe bracts and stems with abundant white spicules or papillae, sometimes these +/- flattened like lenticels; stems 1-2.8 mm wide; leaf blades scabrous........................................S. pruinosa
Sisyrinchium albidum Rafinesque. Woodlands, savannas, mesic sandhills, open limestone barrens. March-May; May-June. S. NY west to s. WI, south to Panhandle FL and e. TX. [= C, F, FNA, G, K, Y; < S. albidum – RAB, W, WH (also see S. capillare); > S. albidum – S; > S. scabrellum E.P. Bicknell – S]


Sisyrinchium arenicola E.P. Bicknell. Sandyland Blue-eyed-grass. Sandy habitats. A Coastal Plain endemic: MA to e. MD (Caroline Co.). [= F; < S. fuscatum – FNA]

Sisyrinchium atlanticum E.P. Bicknell. Atlantic Blue-eyed-grass. Dry, sandy or rocky places. March-June; June-August. NS and ME west to OH, IN, and MO, south to s. FL and LA. [= C, F, FNA, GW, K, S, Y; = S. mucronatum var. atlanticum (E.P. Bicknell) Ahles – RAB; < S. angustifolium – WH]

Sisyrinchium campesrte E.P. Bicknell. Prairie Blue-eyed-grass. Prairies. MI and SD south to MS and NM. [= FNA, K] [add to synonymy]


Sisyrinchium corymbosum E.P. Bicknell. Pinelands. Se. GA and ne. FL west to s. AL. See Ward (2005a) for its resurrection. [= S. atlanticum Bicknell – FNA, K; < S. angustifolium – WH]

Sisyrinchium dichotomum E.P. Bicknell. White Irisette, Isothermal Irisette. Dry to mesic woodlands and forests, usually over mafic rocks (such as amphibolite), at low to moderate elevations (400-1000 m) in the Blue Ridge escarpment. May-June; June-August. Endemic to Henderson, Polk, and Rutherford counties, NC, and Greenville County, SC. [= FNA, K, W]

Sisyrinchium fuscatum E.P. Bicknell. Xeric to dry soils of pine barrens, Carolina bay rims, sandhills, fluvial sand ridges. Late April-June; June-October. E. VA south to n. FL, west to LA. [= RAB, F, G, GW; < S. fuscatum – C, FNA, K; > S. fuscatum – S; > S. incarnatum E.P. Bicknell – S; < S. nashii – WH]

Sisyrinchium langloisii Greene. {habitats}. AR and OK south to w. LA and s. TX; disjunct eastwards in AL, GA, MS, TN, and nw. GA. [= FNA; < S. langloisii – K (also see S. pruinosum)]

Sisyrinchium miamiense E.P. Bicknell. {habitats}. Ne FL and s. GA south to s. FL and west to s. MS. [= FNA, K; < S. angustifolium – WH] [add S to synonymy]

Sisyrinchium minus Engelmann & A. Gray. {habitats}. E. LA west to c. TX. Reported for NC (Sida 1962) and MS {check}. [= K] [add to synonymy]

Sisyrinchium montanum Greene var. crebrum Fernald. {habitat in our area not known}. May-July. NL (Newfoundland) and ON south to NY. The status of this taxon in our area is not clear. S. montanum var. crebrum is reported for VA by F, and S.
**IRIDACEAE**

*Sisyrinchium montanum* Greene var. *montanum*. Reported for n. WV (Harmon, Ford-Wernzt, & Grafton 2006). {rejected; not keyed; not mapped} [= C, F, FNA, K; < *S. angustifolium* – G]


*Sisyrinchium nashii* E.P. Bicknell, Nash’s Blue-eyed-grass. Woodlands and forests. April-June. NC and TN (sw. VA?) south to s. FL and MS. [= FNA, K, W; > *S. fibrosum* E.P. Bicknell – S; < *S. nashii* – WH]

*Sisyrinchium pruinosum* E.P. Bicknell. {habitats}. AR south to w. LA and AR, disjunct at scattered localities eastwards in e. LA, MS, AL, and so. TN. [= FNA; < *S. langloisii* – K] {add to synonymy}

*Sisyrinchium rosulatum* E.P. Bicknell, Lawn Blue-eyed-grass, Fairy-stars. Lawns, roadsides. April-May; May-June. Se. VA south to FL, west to e. TX. [= RAB, FNA, GW, K, S, WH, Y; > *S. exile* E.P. Bicknell]

*Sisyrinchium xerophyllum* Greene, Florida Blue-eyed-grass. Xeric sands. S. GA south to s. peninsular FL; also alleged to occur in NC (FNA) but this report does not seem plausible. [= FNA, K, S, WH]

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**73. XANTHORRHOEACEAE** R. Brown 1810 (Day-lily Family) [in ASPARAGALES]


**Hemerocallis** Linnaeus 1753 (Day-lily)


1 Flowers tawny-orange (or many variants thereof), not fragrant; inner tepal margins wavy .............................................................. *H. fulva*

1 Flowers lemon-yellow, fragrant; inner tepal margins planar ........................................................... *H. lilioasphodelus*

* *Hemerocallis fulva* (Linnaeus) Linnaeus, Orange Day-lily, Tawny Day-lily. Commonly cultivated, frequently escaping to forests, streambanks, suburban woodlands, lawns, waste places; native of Asia. Late May-early July. [= RAB, C, FNA, GW, K, S, WH, Y; > *H. fulva* var. *fulva* – F; > *H. fulva* var. *kwanso* Regel – F]

* *Hemerocallis lilioasphodelus* Linnaeus, Yellow Day-lily, Lemon Day-lily. Roadside, bottomlands, less commonly cultivated, only rarely escaping; native of Asia. May-July. [= C, FNA, K, Z; = *H. flavum* (Linnaeus) Linnaeus – F, G, WH]

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**74. AMARYLLIDACEAE** J. St. Hilaire 1805 (Amaryllis Family) [in ASPARAGALES]

A family of about 59 genera and 850 species, nearly cosmopolitan (especially diverse in the tropics). Here circumscribed to include the Alliaceae following the recommendation of APG III (2009). References: Dahlgren, Clifford, & Yeo (1985); Müller-Doblies & Müller-Doblies (1996); Meerow & Snijman in Kubitzki (1998a); Fay & Chase (1996); Rahn in Kubitzki (1998a). [also see AGAVACEAE and HYPOXIDACEAE]
AMARYLLIDACEAE

1 Ovary superior; [subfamily Allioideae].
2 Inflorescence a solitary flower; flowers blue, lavender, or white; fresh plant with an onion odor; [tribe Gillesieae] .................. 3. Tristagma
2 Inflorescence an umbel; flowers white, greenish white, cream, pink, or magenta-purple; fresh plant with or without an onion odor.
3 Tepals 2-9 mm long; ovary 3-celled, each with 1-2 ovules; fresh plant with an onion odor; [tribe Allieae] .................. 1. Allium
3 Tepals 10-15 mm long; ovary 3-celled, each with 6-10 ovules; fresh plant usually without an onion odor; [tribe Gillesieae] ...
1 Ovary inferior; [subfamily Amaryllidoideae].
4 Corona present (a fused tubular or flattened petaloid structure in the center of the flower, above the tepals).
5 Filaments fused with the corona; corona membranous in texture, distinctly thinner than the tepals; flowers white; [native, of riverine or tidal shores and marshes]; [tribe Hymenocallideae, subtribe Hymenocallidinae] .................. 12. Hymenocallis
5 Filaments not fused with the corona; corona membranous in texture, but similar to the tepals (in texture, though sometimes of a different color); flowers usually at least partly yellow or orange (sometimes purely white); [alien, naturalized in primarily upland and disturbed habitats]; [tribe Narcisseae, subtribe Narcissinae] .......... 8. Narcissus
4 Corona absent.
6 Flowers red; stamens about 2× as long as the tepals; [tribe Lycoidae] .................................................. 5. Lycorts
6 Flowers white, yellow, copper, or white-pink; stamens shorter than or about as long as the tepals.
7 Flowers yellow to copper.
8 Tepals apiculate at the tip, especially the outer 3 tepals; scape hollow; [tribe Hippeastreae, subtribe Zephyranthinae] ........
9 Tepals 3-16 cm long, white or sometimes white-pink.
10 Tepals spreading, separate, the perianth rotate; inflorescence a several-flowered umbel terminating the stem; leaves arranged spirally; leaf margins finely toothed; [tribe Amaryllideae, subtribe Crininae] .............. 4. Crinum
10 Tepals ascending, overlapping, the perianth tubular; inflorescence of a single flower; leaves arranged disjunctively; leaf margins smooth; [tribe Hippeastreae, subtribe Zephyranthinae] ............................. 11. Zephyranthes
9 Tepals 0.4-2.5 cm long, white, with small green or yellow spots; [tribe Galanthinae] ............................................... 6. Galanthus
11 Inner 3 tepals distinctly shorter and blunter than the outer 3 tepals ......................................................... 7. Leucojum
11 Inner 3 tepals and outer 3 tepals of similar size and shape .............................................................

1. Allium Linnaeus 1753 (Onion, Garlic, Leek, Ramps, Chives)


1 Leaves appearing before the flowers and withering before anthesis; leaves lanceolate to elliptic (the margins not parallel for most of the length), mostly > 2 cm wide; [subgenus RhiZideae].
2 Leaves (1.5-) 2-4 (-4.5) cm wide, without a distinct petiolar base, the basal portion white; flowers (6-) 10-18 (-25) per umbel (fruits often fewer by abortion); spathe bracts 1-2 cm long; fruiting pedicels (8-) 10-15 (-18) mm long .................. 10. Habranthus
2 Leaves (3-) 5-8 (-9) cm wide, with a distinct petiolar base, the petioles usually red or pink; flowers (15-) 30-55 (-63) per umbel (fruits often fewer by abortion); spathe bracts 2-3 cm long; fruiting pedicels (10-) 15-25 (-30) mm long ................ A. tricoccum
1 Leaves present at flowering; leaves linear (the margins parallel for most of the length), mostly < 2 cm wide.
3 Leaves cylindric (round or channelled-indented in cross section), hollow.
4 Stem stout, usually > 10 mm in diameter; peduncles with a distinct swollen portion .... .................................. 7. A. cepa
5 Stems clustered, 1-3 dm tall; pedicels shorter than the flowers .......... A. schoenoprasum var. schoenoprasum
5 Stems solitary, 3-10 dm tall; pedicels longer than the flowers .................. A. vineale
3 Leaves variously flattened or keeled (flat or V-shaped in cross section), not hollow.
4 Stem leafy for half its length; leaves 1.5-4.5 cm wide; [subgenus Allium].
5 Inflorescence of flowers only .......................................................... 5. A. ampeloprasum
6 Inflorescence of bulblets (and often flowers as well).
8 Leaves 2-4 mm wide; bulbs simple at maturity; involucral bracts 2 ............................................ 8. A. oleraceum
8 Leaves 6-12 mm wide; bulbs compound at maturity (with separable cloves); involucral bract 1 .................................. 7. A. sativum
6 Stem scapose, leafy only at its base; leaves < 1.4 cm wide; [subgenus Ameerallium].
7 Inflorescence erect, the peduncle not bent.
10 Ovary or capsule crested with projections about 1 mm long; tepals acuminate.
11 Spathae bracts usually 5-nerved; ovary crests contorted, ascending; tepals reflexed; leaves 3-10 mm wide .. A. cutibertii
11 Spathae bracts 1-nerved; ovary crests plane, flattened, spreading; tepals spreading; leaves 1-2 mm wide .......... A. speculæ
10 Ovary or capsule not crested with projections; tepals acute.
12 Inflorescence partly or entirely of bulblets .............................................................. A. canadense var. canadense
12 Inflorescence entirely of normal flowers .............................................................. A. canadense var. mobilense
9 Inflorescence nodding, the peduncle bent 30-150 degrees in its uppermost several cm (at least in bud) – in A. stellatum becoming erect in flower or fruit.
13 Flowers stellate, the tepals spreading; scape nodding in bud, becoming erect in flower or fruit; bulb ovoid .......... A. stellatum
13 Flowers urceolate, campanulate, to nearly rotate, the tepals strongly to slightly incurved; scape nodding in bud, flower, and fruit; bulb elongate.
14 Perianth urceolate, deep magenta-purple; tepals obtuse; [plants of moderate to high elevations in the Mountains] ................. A. allegheniense
14 Perianth campanulate to nearly rotate, pink, pale pink, or nearly white; sepals acute (obtuse in A. oxyphilum); [of moderate to low elevations in the Mountains, Piedmont, and Coastal Plain].
Allium allegheniense Small, Allegheny Onion. In thin soils around outcrops, generally of mafic rocks (such as amphibolite or hornblende gneiss) or calcareous rocks, primarily at moderate to fairly high elevations (1000-1600m). July-August; October. Known from w. NC, w. VA, and e. WV, possibly more widespread. Although not recognized by most recent authors, A. allegheniense seems distinctive enough in morphology, ecology, and distribution to warrant taxonomic recognition at some level; additional study is needed. [= K, S; < A. cernuum – RAB, C, FNA, G, W]

* Allium burdickii (Hanes) A.G. Jones, Narrow-leaf Ramps, White Ramps. Northern hardwood forests, primarily at higher elevations than A. tricoccum, perhaps also in cove forests and rich mountain slopes. June; August. Only recently determined to be a separate taxon, A. burdickii is apparently rare in our area. It blooms about a month earlier than A. tricoccum. See Jones (1979) for more details and discussion. Largely sympatric with A. tricoccum, it is somewhat more northern and midwestern, ranging from ME west to ND and south to NJ, and in the Mountains to (?) w. VA. All material ascribed to A. burdickii in w. NC and c. TN appears to be A. tricoccum. [= K, W; = A. tricoccum var. burdickii Hanes – C, FNA; < A. tricoccum – F, G]


* Allium canadense Linnaeus var. mobilense (Regel) Ownbey. Dry woodlands. Mid April-May; Late May-June. S. SC south to ne. FL and Panhandle FL, west to TX. This taxon is perhaps better treated as a distinct species. [= RAB, FNA, K, WH; > A. microscordion Small – S; = A. mutabile Michaux – F; > A. arenicola Small – S; A. canadense ssp. mobilense (Regel) Traub & Ownbey]

* Allium cepa Linnaeus, Garden Onion. Persisting from gardens, or appearing around compost or trash piles; native to c. Asia. May-June; July. [= RAB, C, FNA, G; > A. cepa var. cepa – K]

* Allium cernuum Roth, Nodding Onion. Generally in open woodlands or around outcrops of shale, mafic, ultramafic, or calcareous rocks, in the mountains at low elevations. June-early August; August-October. NY, MI, MN, and BC, south to GA and AZ; the distribution is oddily fragmented into largely Rocky Mountain, Ozarkian, and Appalachian segments, and it is quite possible that cryptic taxa are involved. See discussion of A. oxyphilum at end of genus. [= S; < A. cernuum – RAB, C, F, FNA, G, W (also see A. allegheniense and/or A. oxyphilum); > A. cernuum var. cernuum – K]

* Allium cuthbertii Small, Cuthbert's Onion. Sandhills, granite domes and flatrocks, in NC in thin soils around rock outcrops, receiving nutrient-rich seepage and occurring with many strict calciphiles. May-June; June-July. The bright emerald green ovary of the fresh flowers is striking and distinctive. Two morphological forms occur in our area, probably warranting taxonomic recognition. Typical A. cuthbertii occurs on xeric Coastal Plain sands from c. SC south through GA and AL to ne. FL; the perianth is white and the plants 1.5-3.5 dm tall. In NC, a peculiar form of A. cuthbertii is apparently limited to a series of unusual granitic domes in the Brushy Mountains of Alexander and Wilkes counties; these plants are more robust (4-8 dm tall), and the perianth is always pink. [= RAB, FNA, K, S, W, WH]


Allium oxyphilum Wherry. Shale barrens. Endemic to WV (Greenbrier, Mercer, Monroe, and Summers counties). Although there has been much discussion of its taxonomic status, it is apparently distinct from A. cernuum. It should be expected...
AMARYLLIDACEAE

154

in VA, although the outcrops of suitable shales are quite limited (Bartgis, pers. comm.; Wieboldt, pers. comm.).  [= K; < A. cernuum – C, F, FNA, G, W]

* Allium sativum Linnaeus, Garlic.  Gardens, trash heaps, fields; commonly cultivated, rarely occurring as a waif or persistent in gardens, native of Eurasia.  [= C, F, FNA, G, K, Z]

* Allium schoenoprasum Linnaeus var. schoenoprasum, Chives.  Disturbed areas, native of Eurasia.  June-August.  [= C, F, G; < A. schoenoprasum – FNA, K]

Allium species 1, Savanna Onion.  Wet savannas over coquina limestone (marl).  Late August-early October; late September-November.  This remarkable Coastal Plain relative of A. cernuum was first discovered in 1981 by Steve Leonard in Pender County; it has since been found in similar sites in Onslow and Brunswick counties, always associated with other endemic species of primarily montane genera, such as Thalictrum cooleyi and Parnassia caroliniana.  It appears to warrant taxonomic status.


Allium stellatum Nuttall ex Ker-Gawler, Glade Onion, Prairie Onion.  Limestone glades.  July-September.  ON and SK south to n. AR and e. TX; disjunct east of the Mississippi in c. TN.  [= C, F, FNA, G, K]


* Allium vineale Linnaeus, Field Garlic.  Lawns, pastures, other disturbed places; native of Eurasia.  Late May-June; June-August.  This is the common weed, often known as "onion grass".  [= RAB, C, F, FNA, G, S, W; > A. vineale ssp. vineale – K; > A. vineale var. vineale – Z; > A. vineale var. capsuliferum Koch – Z; > A. vineale var. compactum (Thuill.) Coss. – Z]

2. Nothoscordum Kunth 1843 (Grace Garlic, False Garlic)


1 Leaves 1-4 (-5) mm wide; tepals distinct or only slightly connate at the base; flowers 3-6 (-10) per umbel; flowers not fragrant .... N. bivalve

1 Leaves 4-12 mm wide; tepals connate up to 1/3 of their length; flowers 10-20 per umbel; flowers fragrant (similar to cocoa) .......... N. gracile

Nothoscordum bivalve (Linnaeus) Britton, Grace Garlic, False Garlic.  Around granite flatrocks, in glades and barrens of various kinds, in open woodlands, and also weedy in fields and along roadsides.  Mid March-mid May, and again in September-October; May-June, and again in October-November.  SE VA west to s. OH and KS, south to c. peninsular FL, TX, and South America.  An onion-like plant, but generally lacking the odor of onion.  [= C, F, G, K, S, W, WH, Z; = Allium bivalve (Linnaeus) Kuntze – RAB]

* Nothoscordum gracile (Aiton) Stearn.  Disturbed areas, lawns; native of South America.  [= FNA, K; = Nothoscordum borbonicum Kunth – WH, Z, misapplied?; = Allium inodorum Aiton – RAB; = N. fragrans (Ventenat) Kunth – S]

3. Tristagma Poeppig (Star-of-Bethlehem)


4. **Crinum** Linnaeus 1753 (Swamp Lily, String Lily)


**Identification notes:** *Crinum* can be distinguished vegetatively from *Hymenocallis* by its spiral (vs. distichous) leaf arrangement and leaf margins finely toothed (vs. entire).

1. Leaves 7.5-12 cm wide; umbels 20-100-flowered .................................................................................................................... *C. asiaticum*
2. Leaves 1-5 (-7) cm wide; umbels 2-13-flowered.

3. Umbels 2-5-flowered; perianth white; [native] .............................................................................................. *C. americanum* var. *americanum*
4. Umbels 8-13-flowered; perianth usually at least in part reddish; [exotic].

5. Flowers pedicellate; bulb 6-8 cm in diameter .................................................................................................................... *C. bulbispermum*
6. Flowers sessile; bulb 12-15 cm in diameter ............................................................................................................. *C. zeylanicum*

**Crinum americanum** Linnaeus var. *americanum*. Swamp-lily, String-lily. Swamp forests. June-October. Se. NC south to s. FL and west to TX. Var. *traubii* (Moldenke) R.S. Hannibal is endemic in se. TX. [= FNA; < *C. americanum* – GW, K, S, WH]


* *Crinum zeylanicum* (Linnaeus) Linnaeus. Milk-and-wine Lily. Disturbed areas, escaped or persistent from cultivation; native of Sri Lanka and w. India. [= FNA, K, WH]

5. **Lycoris** Herbert 1819 (Magic Lily)


* *Lycoris radiata* (L'Héritier) Herbert, Magic Lily, Surprise Lily, Hurricane Lily. Frequently cultivated, sometimes persistent for long periods of time, especially in lawns around older homes; native of e. Asia. September-October. Leaves and flowers are not present at the same time. Reported as “established as waifs over past decade in lawn” in Jackson County, NC by Pittillo & Brown (1988). [= RAB, K, WH]

6. **Galanthus** Linnaeus 1753 (Snowdrop)


* *Galanthus nivalis* Linnaeus, Snowdrop. Persistent after cultivation; native of s. and c. Europe. February-March. [= F, FNA, K, Z]

7. **Leucojum** Linnaeus 1753 (Snowflake)
**Amaryllidaceae**


1. Seeds black; flowers (1-) 2-5 (-7) per stem, flowering March-April; tepals 10-22 mm long. ......................................................... *L. aestivum*
2. Seeds pale; flowers 1 (-2) per stem, flowering January-March; tepals 15-25 mm long. ................................................................. *L. vernum*


**Leucojum vernum** Linnaeus, Spring Snowflake. Persistent after cultivation; native of Europe. January-March. [= FNA, K, WH]

### 8. Narcissus Linnaeus 1753 (Daffodil, Jonquil, Narcissus, Buttercup)


**Identification notes:** The familiar flower consists of 6 tepals spreading in more or less a plane, and a fused, tubular, corona. The hypanthial tube is below the perianth lobes. Other taxa are under cultivation and may be expected as persistent or escaped in our area. Manuals of cultivated plants and the extensive horticultural literature on *Narcissus* (such as the references listed above) should be consulted by those interested in more information on members of this genus.

1. Perianth lobes 10-15 mm long; corona 3-5 mm long; leaves and stems cylindrical, hollow; umbel (or spathe, or stem) with 1-10 flowers ........... .................................................................
2. Perianth lobes 20-50 mm long; corona 5-50 mm long; leaves and stems flattened, solid; umbel (or spathe, or stem) with 1-4 flowers.
3. Hypanthial tube (below the tepals) parallel-sided (though sometimes suddenly expanded at its apex); corona < 10 mm long, usually wider than high; corona < 0.5x as long as the perianth lobes; corona rarely undulate; umbel (or spathe, or stem) with 1-10 flowers; stamens of 2 distinct lengths.
4. Corona rim red, contrasting with the white or yellow corona; umbel (or spathe, or stem) with 1 flower..............................
5. Corona of a single color, all white or yellow; umbel (or spathe, or stem) with (1-) 2-8 (-20) flowers.
6. Umbel (or spathe, or stem) with (2-) 3-8 (-20) flowers; pollen fertile.
7. Umbel (or spathe, or stem) with 1 flower; corona usually conspicuously darker in color than the tepals; leaves somewhat glaucous, > 8 mm wide; stem distinctly 2-edged
8. Umbel (or spathe, or stem) with (1-) 2-4 flowers; corona and tepals the same color; leaves green, < 8 mm wide; stem nearly terete

**Narcissus bulbocodium** Linnaeus, Hoop-petticoat Daffodil. Grassy roadsides, established; native of Eurasia. March. [= Y, Z]

**Narcissus ×incomparabilis** P. Miller (pro sp.) [poeticus × pseudonarcissus], Nonesuch Daffodil. Cultivated as an ornamental, persistent and naturalized in lawns, roadides, woodland borders, and disturbed areas; native of Europe. March-April. [= C, FNA, K, Z; = N. incomparabilis – RAB, F, G]

**Narcissus jonquilla** Linnaeus, Jonquil, Apodanthus Daffodil. Cultivated as an ornamental, persistent and naturalized in lawns, roadides, woodland borders, and disturbed areas; native of Europe. March-April. [= RAB, C, F, FNA, G, K, Z]

**Narcissus ×mediolatus** P. Miller (pro sp.) [poeticus × tazetta], Primrose-peerless. Cultivated as an ornamental, persistent and naturalized in lawns, roadides, woodland borders, and disturbed areas; native of Europe. March-May. [= FNA, K, Z; = N. tazetta × poeticus – RAB]

**Narcissus ×odoratus** Linnaeus (pro sp.) [jonquilla × pseudonarcissus], Campernelle Jonquil, Sweet-scented Jonquil. Cultivated as an ornamental, persistent and naturalized in lawns, roadides, and disturbed areas; native of Europe. [= FNA, K, Z]

**Narcissus ×papyraceus** Ker Gawler, Paper-white Daffodil. Cultivated as an ornamental, persistent and naturalized in lawns, roadides, and disturbed areas; native of Mediterranean Europe. [= FNA, K, Z]


* Narcissus tazetta* Linnaeus, Bunch-flowered Daffodil. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, and disturbed areas; native of Mediterranean Europe. [= FNA, K, Z]

9. *Sternbergia* Waldst. & Kit. 1805 (Winter Daffodil)


* Sternbergia lutea* (Linnaeus) Ker-Gawler ex Sprengel, Winter Daffodil, Lily-of-the-field. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; native of Europe. This species has yellow, *Crocus*-like flowers, in the autumn. [= K]

10. *Habranthus* Herbert (Copper-lily)

A genus ca. 30 species, perennial bulbous herbs, of s. North America and South America.

* Habranthus tubispathus* (L’Hér. ex Traub, Rio Grande Copperlily. Road shoulders, lawns, disturbed areas; native of s. Brazil. Reported for Coastal Plain of AL (Woods & Diamond 2006), GA (Carter, Baker, & Morris 2009), and FL. [= FNA, K]


A genus of about 70 species, from s. North America and the West Indies south to s. South America. References: Flagg, Smith, & Flory in FNA (2002a); Meerow & Snijman in Kubitzki (1998a). Key adapted in part from FNA.

1 Stigma 1, capitate; perianth either 3-5 cm long or (7.3-) 9-14 (-16) cm long; stamen filaments either 1-2 cm long or 0.2-0.5 cm long; leaves up to 5 mm wide.

2 Perianth yellow. ........................................................................................................................................................................Z. citrina

2 Perianth white (to pinkish).

3 Perianth 3-4.5 cm long; perianth tube shorter than the spathe; perianth tube shorter than the filaments .........................Z. candida

3 Perianth (7.3-) 9-14 (-16) cm long; perianth tube longer than the spathe; perianth tube longer than the filaments ...............Z. chlorosolen

4 Stigmas (trifid); perianth (4-) 4.3-9.5 (-11) cm long; stamen filaments (1.5-) 1.6-4.4 (-4.7) cm long; leaves up to 8 mm wide.

4 Stamen filaments 0.1-0.2 mm long; perianth tube 3-4 (-4.7) cm in length, the stigmas included ...........................................Z. drummondii

5 Anthers 3-6 (-8) mm long. .........................................................................................................................................................Z. grandiflora

5 Anthers 13-22 mm long. .........................................................................................................................................................Z. simpsonii

6 Style and stigma as long as or shorter than the anthers; perianth segments erect-ascending at full anthesis, (4-) 4.3-8.5 (-10) cm long.. .........................................................................................................................................................Z. atamasca

6 Style and stigma extending beyond the anthers; perianth segments spreading at full anthesis, (5.5-) 6.6-9.5 (-11) cm long.

7 Mature leaves concave, 3-8 mm wide; perianth tube (0.8-) 1-2 (-2.1) cm long; filaments > 1.5× as long as the perianth tube........Z. treatiae

7 Mature leaves grooved, 1-4 mm wide; perianth tube usually (1.7-) 2-3 (-3.1) cm long; filaments < 1.5× as long as the perianth tube.........................................................................................................................................................Z. atamasca

*Zephyranthes atamasca* (Linnaeus) Herbert, Common Atamasco-lily. Bottomland forests and adjacent road shoulders, wet meadows. Late March-April; May-June. Se. and sc. VA south to n. FL, west to s. MS. [= FNA; = Z. atamasca – RAB, C, F, G, GW, orthographic variant; = Zephyranthes atamasca var. atamasca – K, WH; = Atamosco atamasca (Linnaeus) Greene – S, orthographic variant]

*Zephyranthes candida* (Lindley) Herbert. Cultivated, persistent or spreading from cultivation; native of South America. Late September-October. [= RAB, FNA, K, WH; = Atamosco candida (Lindley) Small – S]

*Zephyranthes chlorosolen* (Herbert) D. Dietrich. Prairies and other moist to dry habitats. May-October. [= FNA; = Cooperia drummondii Herbert – GW, S; = Cooperia chlorosolen Herbert – K]
**Zephyranthes citrina** Baker, Yellow Zephyr-lily, Citron Rain-lily. Disturbed areas; native of South America. [= FNA, K, WH]

**Zephyranthes drummondii** (Herbert) D. Don, Ceboletta. Disturbed areas; native of TX and Mexico. [= FNA, WH; = Cooperia pedunculata Herbert – K]

**Zephyranthes grandiflora** Lindley. Disturbed areas; native of Mexico. [= K, SE]

**Zephyranthes simpsonii** Chapman, Florida Atamasco-lily. Dry to dry-mesic sandy soils (usually with admixture of shell hash) of coastal fringe sandhills or mainland maritime forests, usually associated with *Quercus hemispherica*, on barrier islands or within about 10 km of the ocean (NC, SC), pine flatwoods (FL, GA). April-May; May-June. Se. NC (Brunswick and Columbus counties) and ne. SC (Horry and Georgetown counties); s. GA, c. and s. peninsular FL. The disjunct populations in NC and SC may differ from *Z. simpsonii* (sensu stricto) of s. GA and c. and s. peninsular FL, and need additional study. [= RAB, FNA, GW, K, WH; = *Atamusco simpsonii* (Chapman) Greene – S]


**12. Hymenocallis** Salisbury 1812 (Spider-lily)


**Identification notes:** *Hymenocallis* can be distinguished vegetatively from *Crinum* by its distichous (vs. spiral) leaf arrangement and leaf margins entire (vs. finely toothed).

1 Ovules 4-8 per locule; ovary 14-30 mm long, 6-15 mm wide; [FL].
2 Corona 6-9 cm wide .......................................................................................................................... *H. rota*  
2 Corona 3-6 cm wide.  
3 Tepals white ........................................................................................................................................ *H. godfreyi*  
3 Tepals yellowish-green to pale green.  
4 Flowers 1 per inflorescence; tepals ascending, equal to or shorter than the perianth tube; [ne. FL south to s. FL] ......................................... *H. palmeri*  
4 Flowers 2 per inflorescence; tepals spreading, nearly always longer than the perianth tube; [Panhandle FL].  
5 Leaves strongly glaucous; tepals to 16 cm long; plants in loose to dense clumps; [east of the Apalachicola River (Liberty County, FL)] .................................................................................................................. *H. henryae* var. *glaucifolia*  
5 Leaves green to slightly glaucous; tepals to 13 cm long; plants singly or in loose clumps; [west of the Apalachicola River (Bay, Gulf, and Walton counties, FL)] .................................................................................................................. *H. henryae* var. *henryae*  

1 Ovules 1-3 (-4) per locule; ovary 7-15 mm long, 5-10 mm wide; [collectively more widespread].
6 Staminial cup >4.5 cm long; [rocky river shoals of the Piedmont of SC, GA, and AL] ......................................................................................... *H. coronaria*  
6 Staminial cup <4.5 cm long; [Coastal Plain, Piedmont floodplains, and the GA Ridge and Valley].  
7 Leaves oblongolate, slightly to distinctly wider toward the tip.  
8 Leaves not coriaceous, distinctly glaucous; scape bracts 4-7 cm long, the tip long-acuminate; bulbs non-rhizomatous; [of moist but not mucky habitats] .................................................................................................................. *H. occidentalis* var. *occidentalis*  
8 Leaves coriaceous, not glaucous; scape bracts 3-4 (-6) cm long, the tip acute; bulbs rhizomatous; [of wet habitats].  
9 Scape bracts 3-4 (-6) cm long, the tip acute; leaves distinctly wider towards the tip; bulb 3-6 cm long, 1.5-5 cm wide .................................................................................................................. *H. choctawensis*  
9 Scape bracts 4-5 cm long, the tip acuminate; leaves slightly wider towards the tip; bulb 4.5-7.5 cm long, 2.5-5.5 cm wide .................................................................................................................. *H. gholsonii*  
7 Leaves liguliform, not wider toward the tip, the margins parallel throughout.  
10 Flowers (3-) 5-12 per inflorescence ........................................................................................................... *H. liriosme*  
10 Flowers 1-3 (rarely more) per inflorescence.  
11 Staminial cups rotate at full anthesis; leaves chiefly arching low, often appearing prostrate; [of s. GA south into FL]  
11 Staminial cups funneliform at full anthesis but gradually spreading in time; leaves suberect to erect; [of se. NC south to FL].  
12 Perianth segments 5.0-6.5 cm long; leaves 1.5-4 dm long ............................................................................. *H. pygmaea*  
12 Perianth segments (6-) 7-11.5 cm long; leaves 3-7 dm long  
13 Scape bracts narrowly lanceolate, 2.5-5 cm long, 7-12 mm wide; [NC south to ne. FL] ................................................................. *H. crassifolia*  
13 Scape bracts lanceolate, 3-4.5 cm long, 10-15 mm wide; [lower Ochlockonee River, Panhandle FL] .................... *H. franklinensis*  

**Hymenocallis choctawensis** Traub, Florida Panhandle Spiderlily, Choctaw Spiderlily. Floodplains. GA (floodplain of the Ochlockonee River) and Panhandle FL west to LA. [= FNA, K, WH, Z; = *Hymenocallis sp. ?* – GW]
Hymenocallis coronaria (LeConte) Kunth, Shoals Spiderlily, Cahaba Lily. Rocky river shoals, usually with Justicia americana and Podostemum ceratophyllum. Mid May-July; July-September. SC south and west to AL. Notable stands of this spectacular plant occur at Landsford Canal State Park (on the Catawba River south of Rock Hill, SC), on the Saluda River (SC), on the Savannah River below I-20 (GA-SC border), and on the Cahaba River (Bibb County, AL). [= FNA, Z; H. occidentalis (LeConte) Kunth – RAB, S, misapplied; < Hymenocallis sp. ? – GW; H. caroliniana (Linnaeus) Herbert – K, misapplied]


Hymenocallis franklinensis G. Lom. Smith, L.C. Anderson, & Flory, Cow Creek Spiderlily. Slightly brackish river margins. Endemic to the Ochlockonee River (Franklin and Wakulla counties) in the FL Panhandle. [= FNA, WH, Z; < Hymenocallis sp. ? – GW] [synonymy incomplete]


Hymenocallis godfreyi G. Lom. Smith & Darst, Godfrey’s Spiderlily, St. Marks Marsh Spiderlily. Brackish marshes. Endemic to Wakulla County in the FL Panhandle. [= FNA, K, WH, Z; < Hymenocallis sp. ? – GW] [synonymy incomplete]


Hymenocallis henryae Traub var. henryae, Henry’s Spiderlily, Green Spiderlily. Cypress depressions and wet pine flatwoods. Endemic to Bay, Gulf, and Walton counties in the Panhandle of FL. [= FNA, WH, Z; < Hymenocallis sp. ? – GW; < H. henryae – K] [synonymy incomplete]

Hymenocallis liriosme (Rafinesque) Shinners, Western Marsh Spiderlily; Louisiana Marsh Spiderlily. Swamps, bottomlands, ditches. March-May. AR and OK south to s. AL and TX. [= FNA, Z; < Hymenocallis sp. ? – GW; < H. liriosme – K]

Hymenocallis occidentalis (LeConte) Kunth var. occidentalis, Hammock Spiderlily, Woodland Spiderlily. Mesic soils of slopes and floodplain forests, gabbro glades and other calcareous upland flats. NC west to AR and LA. Var. eulae (Shinners) G. Lom. Smith & Flory is endemic in the West Gulf Coastal Plain. [= FNA, WH, Z; < Hymenocallis sp. ? – GW; < H. occidentalis – S, WH; = H. caroliniana (Linnaeus) Herbert – K, misapplied]

Hymenocallis palmeri S. Watson, Alligator-lily. Cypress swamps; wet pine flatwoods, disturbed wet areas. From ne. FL (Bradford and Duval counties) south to s. peninsular FL. [= FNA, WH, Z; < Hymenocallis sp. ? – GW; < H. palmeri S. Watson – K] [synonymy incomplete]


Hymenocallis rotata (Ker Gawler) Herbert, Spring-run Spiderlily. Spring-runs. Endemic to FL, in the Panhandle (Wakulla County) and n. peninsular FL (Alachua, Columbia, and Duval counties southward to c. peninsular FL). [= FNA, K, WH, Z; < Hymenocallis sp. ? – GW] [synonymy incomplete]
A family of a single genus and 170-300 species, widespread in Europe, Africa, Asia, and Australia (introduced elsewhere). References: Dahlgren, Clifford, & Yeo (1985); Kubitzki & Rudall in Kubitzki (1998a).

**Asparagus** Linnaeus (Asparagus)


1. Cladophylls flattened, ca. 2 mm wide........................................................................................................**A. aethiopicus**
2. Cladophylls filiform, <0.7 mm wide.
3. Flowers in 1-3-flowered axillary racemes; berries 6-10 mm long, red; erect herb (sometimes arching in age)................................**A. officinalis**
4. Flowers in 1-4-flowered terminal umbels; berries 4-5 mm long, purplish-black; scrambling vine .................................................**A. setaceus**


75b. RUSCACEAE M. Roemer 1840 (Ruscus Family) [in ASPARAGALES]

As here circumscribed, a family of about 28 genera and 500 species, of North America, Central America, Europe, and Asia. The Convallariaceae has been supported by molecular studies (Judd 2003, Bogler & Simpson 1995). Molecular studies show that *Nolina* is much more closely related to *Convallaria, Polygonatum*, etc. than to the Agavaceae (*Yucca* and *Manfreda* in our flora), with which it has often been associated. References: Bogler & Simpson (1995); Bogler in Kubitzki (1998a); Yeo in Kubitzki (1998a); Conran & Tamura in Kubitzki (1998a); Yamashita & Tamura (2000).

1. Plant with an upright stem with alternate leaves.
2. Shrubs; "leaves" (actually phylloclades) coriaceous, evergreen, glossy; [exotic, rarely naturalized]; [tribe *Ruscaceae*] .................... **Danae**
3. Herb; leaves herbaceous, deciduous, dull or slightly glossy; [native]; [tribe *Polygonatae*] .................................................... **Malanthemum**
4. Inflorescence terminal, a raceme or panicle; tepals separate ............................................................................................. **Convallaria**
5. Inflorescence of 1-several axillary flowers; tepals fused ................................................................................................. **Polygonatum**

1. Plant tufted, the leaves essentially basal (although the sheathing bases form a 'false' stem in *Convallaria*).
2. Leaves 2-3, narrowly elliptic; tepals fused, white or greenish; [tribe *Convallarieae*] ............................................................... **Convallaria**
3. Leaves many, linear; tepals separate (or fused basally), white or violet.
4. Fruit dehiscent, dry and capsular; inflorescence a panicle or raceme, to 15 dm tall; [natives, of longleaf pine woodlands of SC, GA, and FL]; [tribe *Nolineae*] ............................................................................. **Nolina**
5. Fruit indehiscent, quickly exposing berry-like seeds with a fleshy seed coat; inflorescence spike-like, to 4 dm tall; [aliens, naturalized from horticultural plantings]; [tribe *Ophiopogoneae*].
6. Flowers erect, the pedicel strict; ovaries superior ....................................................... **Liriope**
7. Flowers nodding, the pedicel recurved; ovaries inferior or half-inferior.......................... **Ophiopogon**

*Convallaria* Linnaeus 1753 (Lily-of-the-Valley)


1. Leaf blades averaging 10-15 cm long, 3-5 cm wide; rhizomes short-creeping, the "individual" plants spaced closely (typically 5-10 cm apart); flowering scape < ½ as long as the leaves; longer bracts of the inflorescence 4-10 mm long; [introduced, persistent around old home sites and other plantings].......................................................................................................................... **C. majalis**
2. Leaf blades averaging 15-35 cm long, 5-13 cm wide; rhizomes absent or long-creeping, the individual plants spaced widely (usually at least 15 cm apart); flowering scape < ½ as long as the leaves; longer bracts of the inflorescence 8-20 mm long; [native, of forests of the Mountains and upper Piedmont] .............................................. **C. majuscula**

*Convallaria majalis* Linnaeus, European Lily-of-the-Valley. Persistent after cultivation; native of Eurasia. April-May; July-August. [= F, K, W, WV; = *C. majalis* var. *majalis* – RAB, FNA; < *C. majalis* – C, G, S, Z (also see *C. majuscula*)]

*Convallaria majuscula* Greene, American Lily-of-the-Valley. Mountain forests, particularly in rocky woodlands or forests on or near ridgetops under northern red oak at about 1000 to 1500 m elevation, sometimes at lower elevations (down to at least 700 m) and under Quercus montana. April-June; August. Endemic to the Southern Appalachians: WV and VA through NC and TN to ne. GA (Jones & Coile 1988) and nw. SC. Cronquist's (1991) statement that Southern Appalachian plants "may reflect an early escape of a different phase of the species from cultivation" cannot be discounted; there is no doubt that *C. majuscula* is both native and taxonomically distinct, at a varietal level at least. Utech in FNA (2002a) states that our plants are more closely related to the Asian taxon, variously treated as *C. keiskei* Miquel or *C. majalis* var. *keiskei* (Miquel) Makino, than to the European *C. majalis* s.s. As best as can be determined, Rafinesque's name *Convallaria montana* does not apply to this species. [= K; = C.
**RUSCACEAE**


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**Danae** Medikus (Alexandrian Laurel, Danaé)

A monotypic genus, a shrub, of sw. Asia.

* Danae *racemosa* (Linnaeus) Moench, Alexandrian Laurel. Suburban forests; rare, uncommon in cultivation, rarely escaping to suburban forests; native of sw. Asia. The "leaves" are actually odd structures called phylloclades, and represent modified stems.

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**Liriope** Loureiro 1790 (Liriope, Lilyturf)

A genus of 8 species, herbs, of e. and se. Asia. References: Nesom (in prep.)=Y; Conran & Tamura in Kubitzki (1998a); Judd (2003)=Z. Key based on Y.

1 .......................................................... .................................................................................................................. *L. muscari*

1 .......................................................................................................................................................... *L. spicata*

* Liriope *muscari* (Decaisne) L.H. Bailey, Liriope, Big Blue Lilyturf. Commonly planted, rarely persistent and escaping, but locally abundant; native of China, Japan, and Taiwan. [= K, Y, Z]

* Liriope *spicata* Loureiro, Creeping Lilyturf. Commonly planted, rarely persistent and escaping; native of {}. [= Y, Z; = L. *spicatum* – K, orthographic variant]

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**Maianthemum** G.H. Weber ex Wiggers 1780 (Mayflower, Solomon's-plume)

A genus of about 28 species, herbs, of n. Europe, e. Asia, North America, and Central America. The inclusion of the traditional *Smilacina* in *Maianthemum* will cause considerable consternation; LaFrankie’s (1986) reasoning, however, seems very strong, and has been additionally supported by more recent evidence (Conran & Tamura in Kubitzki 1998a). The only consistent difference between the two previously accepted genera is whether the flowers are dimerous (*Maianthemum*) or trimerous (*Smilacina*). LaFrankie cites research that shows that the dimerous flowers of *Maianthemum (sensu stricto)* are the result of reduction from trimerous flowers, as indicated by vestigial vascular traces. Consideration of the many close similarities, particularly as compared to similar genera such as *Proseratex, Polygonatum, Streptopus,* and *Clintonia,* may convince the skeptical (see LaFrankie 1986 and Therrian 1956). As an example, the fruits of *M. canadense* and *M. racemosum* are closely similar in form, coloration, and size; much more similar than the fruits of our 2 species of *Proseratex.* References: LaFrankie (1986)=Z; Judd (2003)=Y; LaFrankie in FNA (2002a); Conran & Tamura in Kubitzki (1998a).

1 Flowers in a terminal panicle ............................................................................................................................ *M. racemosum* ssp. *racemosum*

1 Flowers in a simple raceme.

2 .......................................................................................................................................................... *M. canadense*

2 Perianth segments 6 (flowers 2-merous); leaves (1-) 2 (-3) .......................................................................................................................................................... *M. stellatum*

**Maianthemum canadense** Desfontaines, Canada Mayflower, False Lily-of-the-valley. Moist forests, especially at high elevations. Mid May–early July; August–September. NL (Labrador) and NL (Newfoundland) west to NT, south to MD, NC, n. GA (Jones & Coile 1988), KY and SD. Two varieties have been described, but their recognition is not strongly supported. Var. *canadense,* with leaves glabrous beneath, the margins entire or minutely crenulate, cross-veins of the leaf well-developed, is widespread in the distribution of the species. Var. *interius* Fernald has the leaves pubescent beneath, the leaf margins distinctly ciliate, and cross-veins obscure; it is not known from our area, but extends east and south as far as MA, NY, and OH. Further study of these varieties is needed. Weller (1970) reports equivocal results on the recognition of varieties, based on a study in n. MI. [= RAB, FNA, K, W, WV, Y, Z; > Maianthemum *canadense* Desfontaines var. *canadense* – C, F, G; = Unifolióum *canadense* (Desfontaines) Greene – S]

**Maianthemum racemosum** (Linnaeus) Link ssp. *racemosum,* Eastern Solomon's-plume, False Solomon's-seal. Forests. Mid April–June; August–October. The species ranges from NS west to BC, south to GA, FL Panhandle, and AZ. A variety of chromosome races are known (2n = 36, 72, 144). The eastern ssp. *racemosum* is tetraploid; ssp. *amplexicaule* (Nuttall) LaFrankie is diploid and more western; these are perhaps more appropriately treated as species. Under the generic name *Smilacina,* two varieties had been described for our area, *Smilacina* *racemosa* var. *racemosa* and *S. racemosa* var. *cylindrica* Fernald, the former larger in nearly all respects and more northern than the latter, smaller, and more southern form (see F for
Nolina 1803 (Beargrass)


Nolina atropurpurea Bartlett, Florida Beargrass. Pine flatwoods and savannas. Endemic to Panhandle FL (Liberty and Franklin counties) and e. peninsular FL (St. Johns and Brevard counties). [= FNA, K, S, WH, Z]

Ophiopogon Ker-Gawler (Mondo Grass)


* Ophiopogon japonicus (Thunberg) Ker-Gawler, Mondo Grass, Black Mondo. Suburban forests; native of China, Taiwan, Japan, and Korea. [= K, Y]

Polygonatum P. Miller 1754 (Solomon's-seal)

A genus of about 57 species, of temperate Eurasia and North America (most diverse in e. Asia). The P. biflorum complex is in need of further study. References: Ownbey (1944)=Z; Judd (2003)=Y; Utech in FNA (2002a); Eigsti (1942); Therman (1950, 1953); Kawano & Iltis (1963); Conran & Tamura in FNA (2002a); Eigsti (1942); Therman (1950, 2003); Kawano & Iltis (1963); Conran & Tamura in Kubitzki (1998a).

Polygonatum biflorum (Walter) Elliott var. biflorum, Small Solomon's-seal. Moist to dry forests. April-June; August-October. CT, NY, and s. ON west to ME, NE, and IN, south to n. FL and s. AL. In addition to the varieties recognized for our area, P. biflorum includes two additional varieties: var. melleum (Farwell) R. Ownbey of MI and ON, and var. necopinum R. Ownbey from the Black Hills of SD. The complex needs additional study. See var. commutatum for discussion of its distinction from var. biflorum. [= Z; < P. biflorum – RAB, C, FNA, W, WH, Y; = P. biflorum – F, G, WV; < P. biflorum var. commutatum (J.A. & J.H. Schultes) Morong – K; < P. commutatum (J.A. & J.H. Schultes) A. Dietrich – S]

There has been a wide divergence of opinion regarding the merits (and practicality) of distinguishing this taxon from typical *P. biflorum*, and the characters considered most reliable; the two taxa may differ in chromosome number and geographical distribution; they are not, however, always readily distinguished morphologically. I prefer to recognize this taxon as a variety. See references for additional discussion.


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**75c. AGAVACEAE** Endlicher 1841 (Agave Family) [in ASPARAGALES]

A family of about 25 genera and 640 species, herbs and rosette shrubs, of temperate and tropical America. The placement of *Camassia*, *Schoenolirion*, and *Hastingsia*, sometimes grouped as Hyacinthaceae subfamily Chlorogaloideae, is uncertain; they are probably better placed in the Agavaceae, a position supported by molecular, serological, and biogeographic evidence. References: Verhoek & Hess in FNA (2002a); Bogler & Simpson (1995, 1996); Verhoek in Kubitzki (1998a).

1 Plants with erect woody stems; leaves cauline .................................................................................................................................................. *Yucca*

1 Plants acaulescent; leaves in basal rosettes.

2 Margins of leaves fraying into coarse, whitish, curly fibers; tepals about 4 cm long; leaves stiff and > 15 mm wide ......................... *Yucca*

2 Margins of leaves entire, not fraying; tepals < 2 cm long; leaves stiff and wiry (and < 5 mm wide), herbaceous, or fleshy.

3 Leaves oblong-acute, 2-9 cm wide, 2-10× as long as wide, fleshy .................................................................................................. *Manfreda*

3 Leaves linear, 0.3-1.8 cm wide, 20-100× as long as wide, herbaceous or wiry.

4 Leaves narrowly linear, 3-5 mm wide, wiry and grasslike; inflorescence a diffuse panicule; perianth segments 2-4 mm long, white...... ................................................. [Nolina – see RUSCACEAE]

4 Leaves linear, 2-18 mm wide, herbaceous; inflorescence a raceme; perianth segments 13-18 mm long, blue or nearly white.

5 Perianth segments 13-18 mm long, blue or nearly white ........................................................................................................ *Camassia*

5 Perianth segments 5-7 mm long, white, cream, or yellow .......................................................................................... *Schoenolirion*

**Camassia** Lindley 1832 (Wild Hyacinth, Quamash Lily, Camas Lily)

A genus of 6 species, of North America. The family placement of *Camassia* is uncertain; there is increasing evidence that the affinities of *Camassia* are with the Agavaceae, rather than the Hyacinthaceae (Fay & Chase 1996, Bogler & Simpson 1996, Speta in Kubitzki 1998a). References: Ranker & Hogan in FNA (2002a); Speta in Kubitzki (1998a).

**Camassia scilloides** (Rafinesque) Cory, Wild Hyacinth, Quamash Lily, Eastern Camas Lily. Moist forests, over circumneutral soils, in GA, VA, and WV on limestone, in NC on slopes and natural levees along the Roanoke River, in SC over gabbro. April–May. W. PA and s. ON west to s. WI and e. KS, south to nw. GA (Jones & Coile 1988) and TX, nearly entirely west of the Blue Ridge, with only a few disjunct occurrences in the Piedmont and Coastal Plain. [= RAB, C, F, FNA, G, K, W; = Quamasia hyacintha (Rafinesque) Britton – S]

**Manfreda** Salisbury 1866 (False-aloe)


**Manfreda virginica** (Linnaeus) Salisbury ex Rose, Rattlesnake-master, Eastern False-aloe. Granite flatrocks, diabase glades, xeric woodlands over mafic or calcareous rocks, sandhill woodlands. Late May–August; August–October. E. SC, c. NC, sw. VA, w. WV, s. OH, s. IN, s. IL, and MO south to c. peninsular FL and TX. [= FNA, K, W, WH; = Agave virginica Linnaeus – RAB, C, F, WV; > *M. tigrina* (Engelmann) Small – S; > *M. virginica* – S; = Polianthes virginica (Linnaeus) Shimer]

**Schoenolirion** Torrey ex Durand (Sunnybell)

1 Inflorescence with 1-6 branches; leaves without fleshy bases, withering to a persistent fibrous crown.........................................S. albilorum
1 Inflorescence rarely branched; leaves with fleshy bases, not fibrous.
2 Perianth golden-yellow ...........................................................................................................................................................................S. croceum
2 Perianth white .........................................................................................................................................................................................S. wrightii

Schoenolirion albilorum (Rafinesque) R.R. Gates, White Sunnybell. Wet pinelands, cypress depressions, Hypericum depressions, wet hammocks. E. GA south to s. FL and west to AL. [= FNA, K, WH; = S. elliottii Feay ex A. Gray – GW; = Oxytria albiflora (Rafinesque) Pollard – S]

Schoenolirion croceum (Michaux) Wood, Yellow Sunnybell. Wet pine savannas, bogs, seepage slopes, seepages on granite flatrocks. April-May; May-June. SC (and allegedly NC) south to ne. FL, west to se. TX; and in c. TN on limestone glades (Chester et al. 1993). The occurrence in NC in "wet pinelands" in Richmond County referred to in RAB has not been relocated or further documented. [= RAB, FNA, GW, K, WH; = Oxytria crocea (Michaux) Rafinesque – S]

Schoenolirion wrightii Sherman, Texas Sunnybell. Seepage over sandstone. April-early May. N. AL; w. LA and e. TX. [= FNA, K; = Oxytria texana (Scheele) Pollard – S]

Yucca Linnaeus 1753 (Yucca, Adam's-needle)


1 Leaf margins fraying into filamentous threads or fibrils; plant acaulescent (or essentially so); fruit erect.
2 Inflorescence branches glabrous; tepals 5-7 cm long; leaves 2-6 cm wide, stiff, the apex acute-acuminate to obtuse, often concave upward at the apex, the marginal fibrils usually elongate (to 20 cm long).........................................................Y. filamentosa
2 Inflorescence branches scurfy-pubescent; tepals 3-5 cm long; leaves 1.5-4 cm wide, pliable, the apex attenuate-acuminate, not notably concave, the marginal fibrils usually short (to 4 cm long).
3 Leaves 1.5-4 cm wide, abundantly filamentous-margined; [widespread].................................................................Y. flaccida
3 Leaves 1-3 cm wide, sparingly filamentous-margined; [mainly west of the Mississippi River, rarely in the Florida parishes of c. LA]............

.................................................................Y. louisianensis
1 Leaf margins not fraying, minutely notched-serrulate or entire, and hyaline; seeds ca. 1 mm thick, marginless ........................................Y. aloifolia
3 Leaf margins entire, smooth, hyaline-brown or hyaline-tellow; seeds ca. 1 mm thick, marginless.
4 Leaf blades recurved, flexible; fruits generally erect, 2.5-4.5 cm long; [of NC south to FL].........................................................Y. gloriosa
4 Leaf blades rigid, straight; fruits pendent, 5.5-8 cm long; [of GC south to FL].........................................................................................Y. recurvifolia

Yucca aloifolia Linnaeus, Spanish Dagger. Dunes. June-early July; October-December. Se. VA south to s. FL and west to LA. [= RAB, FNA, K, S, WH]

Yucca flaccida Linnaeus, Curlyleaf Yucca, Spoonleaf Yucca. Woodlands, forests, dunes, roadsides, disturbed areas. Late April-early June; September-October. S. NJ south to GA, west to MS; escaped from cultivation over a broader area of e. United States. [= FNA, F, S, W, WV; = Y. flaccida var. flaccida – RAB; < Y. flaccida var. – C, G, K (also see Y. flaccida); > Y. concava Haworth – S; > Y. filamentosa – S]

Yucca gloriosa Linnaeus, Mound-lily Yucca, Spanish Bayonet. Dunes, shell middens, also regularly cultivated and often persistent or weakly escaped around old housesites inland. (April-) October; November-December. E. NC (Dare County) south to ne. FL and w. peninsular FL (Sorrie & LeBlond 2008). [= RAB, K, S; = Y. gloriosa var. gloriosa – FNA; < Y. gloriosa – WH]

Yucca recurvifolia Salisbury, Curve-leaf Yucca. Dunes, dry sandy soils. GA west to w. LA. [= S; = Y. gloriosa Linnaeus var. recurvifolia (Salisbury) Engelmann – FNA; < Y. gloriosa – WH]
75d. HOSTACEAE  B. Mathew 1988 (Hosta Family) [in ASPARAGALES]

A family of a single genus, of about 25 species, of temperate e. Asia. This family is closely related to the Agavaceae, and its inclusion there may prove warranted. References: Kubitzki in Kubitzki (1998a).

Hosta Trattinick 1812 (Hosta, Plantain-lily)

A genus of about 25-40 herbs, of temperate Asia, widely cultivated (since at least the 8th century), and with numerous cultivars. References: Kubitzki in Kubitzki (1998a); Utech in FNA (2002a). Key based on Utech in FNA (2002a).

1 Flowers long-tubular, to 13 cm long, white, fragrant ..............................................................................................................................................H. plantaginea

2 Leaves lanceolate to oblanceolate, 4-5.5 cm long, blue or purplish, not fragrant; flowers purplish violet; anthers purple ...............................................................

2 Flowers campanulate to urceolate, 4-5.5 cm long, blue or purplish, not fragrant.

2 Leaves lanceolate to oblanceolate, 10-17 cm long, 5-7.5 cm wide, with 5-6 lateral veins on each side of the midvein; flowers purplish violet; anthers purple ..............................................................................................................................................H. lancifolia

2 Leaves ovate to cordate, the blade 20-30 cm long, 15-20 cm wide, with 7-9 lateral veins on each side of the midvein; flowers bluish purple; anthers spotted purple ............................................................................................................................................................H. ventricosa

* Hosta lancifolia Engler, Narrowleaf Plantain-lily. Widely planted as a shade ornamental, rarely persistent; "native" of Japan (probably only of garden origin). [= FNA, K]

* Hosta plantaginea (Lamarck) Ascherson, Fragrant Plantain-lily. Widely planted as a shade ornamental, rarely persistent; rare, native of China. [= FNA, K]

* Hosta ventricosa (Salisbury) Stearn, Blue Plantain-lily. Widely planted as a shade ornamental; rare, native of China. [= FNA, K]

75e. THEMIDACEAE Salisbury 1866 (Brodiea Family) [in ASPARAGALES]


Dichelostemma Kunth 1843


* Dichelostemma congestum (Smith) Kunth. Disturbed areas; native of Pacific northwestern North America, cultivated and apparently escaped in the Piedmont of nc. GA (Jones & Coile 1988). {further investigate} [= FNA, K; = Brodiaea congesta Smith]

75f. HYACINTHACEAE Batsch 1786 (Hyacinth Family) [in ASPARAGALES]

A family of about 67 genera and 900 species, herbs, nearly cosmopolitan. References: Speta in Kubitzki (1998a); Pfosser et al. (2003). [also see AGAVACEAE]

1 Tepals united into a perianth tube longer than the free portion; [subfamily Hyacinthoideae, tribe Hyacintheae].

2 Perianth tube <2 × as long as the lobes; corolla spreading and open at the mouth ..............................................................................................................................................Hyacinthus

2 Perianth tube >2 × as long as the lobes; corolla contracted at the mouth ..............................................................................................................................................Muscari

3 Tepals white, with a greenish stripe on the outer surface, separate; bracts 0-1 per flower; [subfamily Ornithogaloideae] ..............................................................................................................................................Ornithogalum

3 Tepals blue (less commonly white or pink), separate or fused at the extreme base; bracts either 0-1 or 2 per flower; [subfamily Hyacinthoideae, tribe Hyacintheae].

4 Bracts 2 subtending each flower ..............................................................................................................................................Hyacinthoides

4 Bracts 0-1 subtending each flower

5 Tepals connate basally for more than 1/10 of their length ..............................................................................................................................................Chionodoxa

5 Tepals separate ........................................................................................................................................................................................................Scilla
**HYACINTHACEAE**

166

**Chionodoxa** Boissier 1844 (Glory-of-the-snow)


* **Chionodoxa luciliae** Boissier, Glory-of-the-snow. Lawns, disturbed areas; native of w. Turkey. April-May. [= FNA, K]

**Hyacinthoides** Heister ex Fabricius 1759 (Bluebell)


1 Racemes erect; perianth campanulate; anthers blue ............................................................................................................................ *H. hispanica*

1 Racemes pendant at apex; perianth tubular; anthers cream ................................................................................................................ *H. nonscripta*

* **Hyacinthoides hispanica** (P. Miller) Rothmaler, Spanish Bluebell. Persistent after cultivation; native of Europe. [= FNA, K, Y, Z; = Endymion hispanicus (P. Miller) Chouard]

* **Hyacinthoides nonscripta** (Linnaeus) Chouard ex Rothmaler, English Bluebell. Persistent after cultivation; native of Europe. [= K, Z; = Scilla non-scripta (Linnaeus) Hoffmannsegg & Link – C, G; = Scilla nonscripta (Linnaeus) Hoffmannsegg & Link – F; = Hyacinthoides non-scripta – FNA, Y, orthographic variant; = Endymion nonscripta (Linnaeus) Garcke]

**Hyacinthus** Linnaeus 1753 (Hyacinth)


* **Hyacinthus orientalis** Linnaeus, Hyacinth. Persistent after cultivation; native of w. Asia. [= K, Z]

**Muscari** P. Miller 1754 (Grape-hyacinth)


1. Raceme 10-20 cm long; pedicels of the terminal flowers > 5 mm long; flowers brown (the lower and fertile) and blue (the upper and sterile); leaves flat, mostly 8-20 mm wide ................................................................................................................................................................. *M. comosum*

1. Raceme 1-5 cm long in flower (somewhat longer in fruit); pedicels < 5 mm long; flowers all blue to blue-black; leaves flat, channeled, or terete, mostly 1-8 mm wide.

2. Leaves flat or channeled, 3-8 mm wide; corolla nearly spherical, the lobes strongly recurved ................................................................................................................................. *M. botryoides*

2. Leaves nearly terete, 1-3 mm wide; corolla ellipsoid-ovoid, distinctly longer than wide, the lobes erect.

3. Perianth of lower (fertile) flowers bright blue ................................................................................................................................................................. *M. armeniacum*

3. Perianth of lower (fertile) flowers deep blackish-blue or -purple ................................................................................................................................................................. *M. neglectum*

* **Muscari armeniacum** Leichtlin ex Baker, Garden Grape-hyacinth, Armenian Grape-hyacinth. Cultivated as an ornamental, persistent and naturalized in lawns, old fields, suburban woodlands, and disturbed areas; native of Mediterranean e. Europe and w. Asia. March-April; May-June. [= FNA, K, Z]


* **Muscari comosum** (Linnaeus) P. Miller, Tassel Grape-hyacinth. Cultivated as an ornamental, persistent and naturalized in lawns, old fields, suburban woodlands, and disturbed areas; native of Europe. March-April; May-June. [= C, F, FNA, G, K, Z]
HYACINTHACEAE


**Ornithogalum** Linnaeus 1753 (Star-of-Bethlehem)


1. Lower pedicels < 1 cm long, about as long as the upper pedicels (and shorter than the perianth segments); leaves mostly 8-15 mm wide; scape 2-5 dm tall................................................................................................................................................................................................... *O. nutans*

2. Lowest pedicels 2-6 cm long, longer than the upper pedicels (and longer than the perianth segments); leaves mostly 2-5 mm wide; scape 1-3 dm tall .................................................................................................................................................................................................. *O. umbellatum*


**Scilla** Linnaeus 1753 (Squill)


*Scilla siberica* Haworth, Siberian Squill. Suburban woodlands; native of Russia. [= FNA, K, Z]

76. ARECACEAE Schultz 1832 or PALMAE de Jussieu 1789 (Palm Family) [in ARECALES]

A family of about 190 genera and 2000 species, trees and shrubs, of tropical and subtropical regions of both hemispheres. Cold-hardy palms in other genera are sometimes planted in thje southern parts of our area, particularly near the coast. References: Zona in FNA (2000); Dransfield & Uhl in Kubitzki (1998b).

1. Leaves pinnate (with a well-developed central axis, the leaf blade much longer than wide); [introduced species]; [subfamily Arecoideae, tribe Cocoeae].

2. Petiole with spines; leaflets 44-80 per leaf side, glaucous; fruit 1.8-3.5 cm long .................................................................................................................. *Butia*

3. Petiole unarmed; leaflets 75-100 per leaf side, green; fruit 20-30 cm long .................................................................................. *Cocos*

1. Leaves palmate or costapalmate (lacking a central axis or with a short central axis, the leaf blade about as long as wide; [native species]; [subfamily Coryphoideae, tribe Coryphaeae].

3. Petioles armed with sharp recurved teeth; [subtribe Livistoniinae]

4. Petiolar spines > 2 mm long; tree (trunk erect) .................................................................................. *Livistona*

4. Petiolar spines 0.5-2 mm long; shrub (trunk prostate or leaning) .................................................................................. *Serenoa*

5. Petioles smooth, unarmed (leaf sheaths with long needle-like spines in *Rapidophyllum*).

5. Petioles and lower leaf surfaces more or less silvery pubescent; leaf sheaths bearing long (10-50 cm) needle-like spines; [subtribe Thrinacininae] .............................................................................................................. *Rapidophyllum*

5. Petioles and lower leaf surfaces green and glabrous; leaf sheaths without spines; [subtribe Sabalinae] .............................................................................................................. *Sabal*

*Butia* (Beccari) Beccari 1916 (Butia)

* Butia capitata* (Martius) Beccari, Brazilian Butia, South American Jelly Palm, Pindo Palm. Widely planted in the outer Coastal Plain of se. NC, e. SC, e. GA, and FL; native of s. Brazil and Uruguay. It persists and can appear naturalized in apparently semi-natural situations.

*Cocos* Linnaeus 1753 (Coconut Palm)

A monotypic genus, the single species now pantropical. References: Zona in FNA (2000).

* Cocos nucifera* Linnaeus, Coconut Palm. Coconut palm rarely reaches our shores as propagules (coconuts, which may germinate and live briefly), but it is not established; native region unknown, but probably tropical islands of the western Pacific (now pantropical). Photographic evidence has been supplied from as far north as Bear Island, Onslow County, NC, 11 June 1996 (Dave Owen, pers. comm. and photograph). [= FNA, K, S, WH]

*Livistona* R. Brown 1810 (Fan Palm)


*Rhapidophyllum* H. Wendl. & Drude ex Drude 1876 (Needle Palm)


*Rhapidophyllum hystrix* (Pursh) H. Wendl. & Drude ex Drude, Needle Palm. Moist to wet soils of small blackwater stream swamps, especially where underlain with coquina limestone ("marl"), hydric hammocks and rich, wetland-upland transitions. Se. SC (Beaufort and Jasper counties) south to c. peninsular FL, and west to s. MS. Becoming somewhat popular as a hardy palm that can be grown in the Southeast, well north of its natural range. [= FNA, GW, K, S, WH, Z]

*Sabal* Adanson 1763 (Palmetto)


Identification notes: The hastula is the midrib of the leaf, as seen on the upper (adaxial) surface.

1 Tree, with erect trunk (though young plants appear as trunkless shrubs, similar in habit to *S. minor*); leaves 15-30 per plant; hastula 5.3-18 cm long, acute to acuminate; margins of leaf segments with filamentose fibrils; leaf segment apices 2-cleft .................................................. *S. palmetto*

1 Shrub, with subterranean, rhizomatous "trunk" (very rarely emerging as much as 1 meter from the ground); leaves 4-10 per plant; hastula 0.8-4.7 cm long, obtuse to acute; margins of leaf segments with or without filamentose fibrils; leaf segment apices 2-cleft (*S. etonia*) or entire (*S. minor*).

2 Margins of leaf segments with filamentose fibrils; hastula acute; fruits 9.0-15.4 mm in diameter; segment apices 2-cleft; [of dry sandy habitats] ................................................................................................................................. *S. etonia*

2 Margins of leaf segments without filamentose fibrils; hastula obtuse; fruits 6.4-9.7 mm in diameter; segment apices generally entire; [of moist to wet habitats] ................................................................................................................................. *S. minor*

*Sabal etonia* Swingle ex Nash, Scrub Palmetto. Florida scrub. Late May-July. Endemic to FL (Clay County, FL south to Miami-Dade County, FL, primarily on the Lake Wales Ridge but also on coastal and intermediate ridges). See Zona & Judd (1986) for extensive information about the ecology and distribution of this species. [= FNA, K, S, WH, Y, Z]

*Sabal minor* (Jacquin) Persoon, Dwarf Palmetto. Swamps, maritime forests, low moist woods, especially in calcareous soils developed from shell limestone (marl). May-July; September-November. Ne. NC (Currituck County) south to e. peninsular FL, west to e. TX, c. TX, se. OK, and s. AR; disjunct in Nuevo León (Goldman 1999). This palm reaches its northern limit at Monkey Island, Currituck County, NC (L. Musselman, J. Boggs, pers. comm., 2006). No other New World palm has a native range extending so far north. [= RAB, FNA, GW, K, WH, Z; > S. minor – S; > S. deeringiana Small – S]
Sabal palmetto (Walter) Lodolges ex J.A. & J.H. Schultes, Cabbage Palmetto. Maritime forests, marsh edges, and other near-coastal communities. July; October-November. Native from se. NC south to s. FL, west to w. Panhandle FL, and in the West Indies in Cuba and the Bahamas; planted beyond that range, especially on the Gulf Coast. This palm is the state tree of South Carolina and is common and conspicuous (both as a native tree and in plantings) along the South Carolina coast; it currently reaches its northern limit as a native species in Brunswick County, NC, where it is a conspicuous part of the forest on Smith Island complex (Bald Head Island, Middle Island, Bluff Island). It is planted elsewhere (and further north) on the coast. Periodic disturbance by hurricanes helps maintain populations of Sabal palmetto, which survives winds and flooding that topple or kill Quercus virginiana. Curtis (1883) reports that "Cape Hatteras is, or was, the northern limit of this Palm... It is to be deeply regretted, however, that a reckless indifference to the future, which has been charged as a characteristic of Americans, is likely to efface, at no very distant time, every vestige of this interesting ornament of our coast. The inner portion of the young plant is very tender and palatable, somewhat resembling the Artichoke and Cabbage in taste (hence its name of Cabbage Tree), and is often taken for pickling, and the stock is ruined by the process. Thus for a pound or two of pickles, no better either than many other kinds, the growth of half a century is destroyed in a moment, and posterity left to the wretched inheritance of vain mourning for the loss of the greatest beauty of our maritime forest." [= RAB, FNA, GW, K, S, WH, Z]

Serenoa Hooker f. 1828 (Saw Palmetto)


Serenoa repens (Bartram) Small, Saw Palmetto. Pine flatwoods and maritime forests. May-July; October-November. Se. SC (in maritime forests in Charleston and Colleton counties, and in spodosolic flatwoods in Beaufort and Jasper counties) south to s. FL and west to e. LA. Serenoa forms extensive clonal patches, connected by underground rhizomes, and is a dominant plant in many parts of FL, in pine flatwoods or scrub. [= RAB, FNA, GW, K, S, WH]

78. COMMELINACEAE R. Brown 1810 (Spiderwort Family) [in COMMELINALES]

A family of about 41 genera and 650 species, herbs, of tropical and warm temperate regions of both hemispheres. References: Faden in FNA (2000); Faden in Kubitzki (1998b); Tucker (1989).

1 Spathes absent; inflorescence open and repeatedly branched; [tribe Tradescantieae].........................................................Gibasis
2 Spathes single, or paired; inflorescence compact, unbranched.
3 Spathe fold then pointed, and scale-like, scarious, and inconspicuous, not closely subtending and surrounding the flower pedicels; petals equal, in both size and coloration.
4 Leaves linear, < 20° as long as wide; petals bright pink (rarely white); [tribe Tradescantieae].................................Cuthbertia
5 Fertile stamens 3, alternating with 3 staminodia; petals pink to purplish or bluish; [tribe Commelinae] ...............Murdannia
6 Fertile stamens 0-6, all fertile; petals white; [tribe Tradescantieae]..............................................................Callisia

Callisia Loebling


1 Leaves 15-30 cm long, 2.5-5 cm wide; stems ascending.................................................................C. fragrans
2 Leaves 1-3.5 cm long, 0.5-1.4 cm wide; stems creeping.
3 Inflorescences pedunculate; flowers on pedicels; capsule with 3 locules .........................................................C. cordifolia
4 Inflorescences sessile; flowers sessile or nearly so; capsule with 2 locules .........................................................C. repens
**Callisia cordifolia** (Swartz) E.S. Anderson & Woodson. Disturbed area? Native from n. peninsular FL to s. FL; Mexico, the West Indies, and n. South America. Reported for nw. GA (Faden in FNA 2000). [= FNA, K; *Tradescantia cordifolia* (S. Watson) Small – S = *Tradescantia cordifolia* Swartz]

* Callisia fragrans (Lindley) Woodson, Basketflower. Disturbed areas; native of Mexico. February. [= FNA, K]
* Callisia repens (Jacquin) Linnaeus. Disturbed areas; native of tropical America. [= FNA, K, WH]

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**Commelina** Linnaeus 1753 (Dayflower)


1 Spaths with margins free to the base; [introduced species, usually in weedy habitats],
2 Spaths generally whitish or pale green toward the peduncle, with contrasting dark green veins; middle petal white or paler than the others; capsules with 2 locules (the third aborting); seeds rugose foveate-recticulate.................................................. *C. communis*
2 Spaths lacking contrasting veins; middle petal about the same color as the others; capsules with 3 locules; seeds reticulate or smooth to faintly alveolate.
3 Spaths not at all to slightly falcate (the lower margin straight or very nearly so); upper cyme usually vestigial (rarely well-developed and 1-flowered); seeds smooth to faintly alveolate; peduncles of the spathes with hairs to 0.5 mm long................................. *C. caroliniana*
3 Spaths usually distinctly falcate (the lower margin curved); upper cyme in larger spathes usually well-developed and 1-severalflowered; seeds deeply reticulate; peduncles of the spathes with hairs to 0.1 mm long .................................................. *C. diffusa*

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**Commelina benghalensis** Linnaeus, Tropical Spiderwort, Bengal Dayflower. Fields; native of tropical Asia and becoming a serious weed. This annual, pantropical weed is well established in FL and s. GA (Faden 1993). Spot infestations have been reported in NC (Wayne County), SC (Edgefield County), and MS as well. "This annual species can be recognized by: its funneliform spathes that are often clustered; relatively broad leaves that frequently have red hairs at the summit of the sheath; and cleistogamous flowers that are borne at the base of the plant and are usually subterranean (in addition to normal, aerial, funnelform spathes that are often clustered; relatively broad leaves that frequently have red hairs at the summit of the sheath; and cleistogamous flowers that are borne at the base of the plant and are usually subterranean."

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**Commelina communis** Linnaeus, Common Dayflower. Gardens, bottomlands, disturbed ground; native of the Old World. May-October. Var. *communis* and var. *ludens* are sometimes distinguished (see synonymy): var. *communis* has flowers with larger petals pale blue and sterile anthers completely yellow, var. *ludens* has larger petals intense violet blue and sterile anthers with a brownish-purple spot. [= RAB, C, FNA, GW, S, W, X, Y; > *C. communis* Linnaeus var. *ludens* (Miquel) C.B. Clarke – F, G, K, WV, Z; > *C. communis var. communis* var. – F, G, K, WV, Z]


**Commelina erecta** Linnaeus var. *angustifolia* (Michaux) Fernald, Sand Dayflower. Dunes and dry sand flats on barrier islands, sandhills, other dry sandy sites, shale barrens, other dry rocky sites. June-October. E. NC south to s. FL, west to TX, and north and west in the interior to IA, n. NE, CO, and NM. Contrary to the specific epithet, *C. erecta* var. *angustifolia* is a
trailing plant, the stems as long as 1.3 m. The taxonomy and distribution of the two varieties here recognized need further study. [= C, F, FNA, G, K, WV, X; < C. erecta – RAB, W, Y, Z; > C. angustifolia Michaux – S; > C. crispa Wooton – S]

Commelina erecta Linnaeus var. erecta, Erect Dayflower. Dry openings and woodlands, especially in thin soil around rock outcrops, streambanks, riverbanks, mesic forests. June-October. PA west to MO and e. KS, south to FL and TX. [= C, F, FNA, G, K, X; < C. erecta – RAB, W, Y, Z; = C. erecta – S]

* Commelina gambiae C.B. Clarke. Disturbed areas. A West African species first collected in North America in 1976 (Manatee County, FL), is immediately distinguishable from our species by its peach-colored flowers and fused spathes. Faden (1993) reports that it “appears to be spreading rapidly,” but whether it can spread significantly northward from peninsular FL is questionable. [= FNA; = Commelina nigricana Bentham var. gambiae (C.B. Clarke) Brenan – K, Y]


Cuthbertia Small 1903 (Roseling)

A genus of 3 species, herbs, of se. North America. There seems ample reason for recognizing Cuthbertia as distinct from Tradescantia, based on the single spathes (vs. paired), glabrous filaments (vs. hairy), differently shaped anther connectives, etc. Hunt (1983, 1986) has treated Cuthbertia as a section of Callisia Loefling, a decision followed with little additional comment or discussion by Tucker (1989). While this course may be warranted, the authors advocating it have presented little evidence to support it. Hunt (1986), in discussing a number of small tropical genera which he also reduces to sections of Callisia, states “this leaves two alternatives: to recognize numerous (perhaps 10) genera of 1-2 species, or to experiment with an amplification and sectionalization of Callisia, which I find the lesser of the two evils.” He mentions that “the succulent habit ... is a principal unifying feature of the enlarged genus as a whole, reflecting the concentration of its species in tropical seasonal habitats, often on rocks.” Cuthbertia is endemic to se. North America (a separate and more northerly distribution than the remainder of a broad Callisia), is only slightly succulent, occurs primarily in sandy habitats, and has a different base chromosome number (x=6) than some components of a broad Callisia. Until and unless a more compelling case is presented for the inclusion of Cuthbertia in Callisia, I prefer a more conservative and traditional maintenance of Cuthbertia, which is also more in line with the philosophy on the circumscription of genera. References: Faden in FNA (2000); Tucker (1989)=Z; Giles (1942); Giles (1943); Lakela (1972); Faden in Kubitzki (1998b).

1 Leaves loosely spreading, the leaf blades 4-15 mm wide (as wide as or wider than the opened, flattened sheaths)..........................C. rosea
2 Leaves erect or ascending, the blade 1-5 mm wide (narrower than the opened, flattened sheaths)

Cuthbertia erecta Small, Grassleaf Roseling. Sandhills. May-July. Cuthbertia erecta includes 3 morphologically distinguishable cytological races, occupying different (but partially overlapping) ranges (Giles 1942, Giles 1943, Tucker 1989). The predominant race is tetraploid, occupying the outer Coastal Plain of VA, NC, and SC, middle Coastal Plain of NC and SC, fall-line sandhills of SC, and south into FL. The diploid race is endemic to the fall-line sandhills of NC and ne. SC, a distribution similar to those of Pyxidanthera brevifolia, Liatris cokeri, and Lycopus cokeri. Rare haploids have been found at scattered sites in SC and FL. The tetraploid race averages about 25% larger than the diploid in most vegetative and floral characters, and is reported to exhibit a greater ecological amplitude (Giles 1942, 1943). [= S; = Tradescantia rosea Ventenat var. graminea (Small) E.S. Anderson & Woodson – RAB, C, F, G; = Callisia graminea (Small) G. Tucker – FNA, K, WH, Z]

Cuthbertia graminea Small, Grassleaf Roseling. Sandhills, scrub, dunes. FL peninsula; disjunct in Gulf County in the FL Panhandle. [= S; = Callisia ornata (Small) G. Tucker – FNA, K, WH, Z; = Tradescantia rosea Ventenat var. ornata (Small) E.S. Anderson & Woodson]

Cuthbertia rosea (Ventenat) Small, Common Roseling. Sandhills, other dry woodlands. May-July. MD south to peninsular FL, west to s. AL. [= S; = Tradescantia rosea Ventenat var. rosea – RAB; = Callisia rosea (Ventenat) D.R. Hunt – FNA, K, WH, Z]

Gibasis Rafinesque 1837 (Bridal-veil)

* **Gibasis pellucida** (M. Martens & Galetti) D.R. Hunt, Tahitian Bridal-veil. Disturbed areas; native of Mexico. April-October. [= FNA, WH; = G. schiedeana (Kunth) D.R. Hunt]


| 1 | Flowers solitary or in 2-4-flowered racemes borne in the upper leaf axils; capsules 8-10 mm long; seeds ca. 3 mm long; pedicels much longer than the capsule; .............................. M. keisak |
| 1 | Flowers in stalked cymose racemes borne terminally or the uppermost leaf axil; capsules 4-5 mm long; seeds 1.0-1.5 mm long; pedicels about as long as the capsule; ..................................................... M. nudiflora |

* **Murdannia nudiflora** (Linnaeus) Brenan. Moist sands, ditches, wet disturbed places; native of Asia, now widespread in the tropics and subtropics of both hemispheres. May-October. This species apparently arrived in the se. United States earlier than *M. keisak* (S, for instance, treats this species and not *M. keisak*), but is distinctly less common. [= FNA, GW, K, Z; = Anelilema nudiflorum (Linnaeus) Sweet – RAB, S]

**Tradescantia** Linnaeus 1753 (Spiderwort)

[also see *Callisia* and *Cuthbertia*]

| 1 | Leaves purple; flowers nearly sessile; petals clawed, the claws fused basally; stamens epipetalous......................................................... **T. pallida** |
| 1 | Leaves green; flowers distinctly pedicelled; petals neither clawed nor connate; stamens not adnate to the petals. ....................................................... **T. fluminensis** |
| 2 | Plant sprawling, rooting at the nodes; leaves > 4 cm long, > 5× as long as wide; [exotic] ............................................................................................................. **T. ernestiana** |
| 2 | Plant erect or ascending, not rooting at the nodes; leaves > 4 cm long, > 5× as long as wide; [native]. ................................................................. **T. subaspera** |
| 3 | Leaf blades of the upper stem constricted at their bases to a narrower subpetiolar sheath, the opened sheath narrower than the leaf blade; leaf blades 6-27 cm long, 1.0-5.0 cm wide, mostly > 10× as long as wide; stomates much more abundant on the lower leaf surface than on the upper, giving the lower surface a much paler color. ................................................. **T. virginitana** |
| 4 | Pedicels 2.0-3.2 cm long; sepals 9-16 mm long ................................................................................................................................................. **T. rosalena** |
| 5 | Pedicels 1.0-1.7 cm long; sepals 4-10 mm long ................................................................................................................................................. **T. hirsuticaulis** |
| 6 | Leaves glaucous to subglaucous, puberulent; sepals, pedicels, and ovary puberulent with glandular hairs only; pedicels 1.2-2.5 cm long ................................................................................................................. **T. roseolens** |
| 7 | Leaves dull green, densely pilose (rarely glabrate); sepals, pedicels, and ovary pubescent with a mixture of glandular and eglandular hairs; pedicels 2.0-3.5 cm long ................................................................................................................................................. **T. hirsuticaulis** |
| 8 | Sepals, pedicels, and ovary pubescent with glandular hairs only (use 10× magnification); leaves glabrous or pilose at the junction of the blade and the sheath (or pilose throughout in *T. hirsuticaulis*). ................................................................................................................................................. **T. roseolens** |
| 9 | Plants distinctly glaucescent; leaves 5-45 cm long, arcing, at an acute angle to the stem ................................................................................................................. **T. ohiensis** |

**Tradescantia ernestiana** E.S. Anderson & Woodson. Dry woodlands. Primarily Ozarkian (AR, MO, OK, disjunct east to nw. GA and ne. AL, and west to n. TX (Faden in FNA 2000).  
[= FNA, K, Y, Z; < T. pilosa J.G.C. Lemaire – S]
* Tradescantia fluminensis da Conceição Vellozo, Wandering Jew. Disturbed areas, lawns, vacant lots, moist suburban woods, along streams; native of tropical America. Reported for Beaufort Co. SC (Daniel C. Payne 2009, pers. comm.). [= FNA, K, WH, Z]

Tradescantia hirsuticaulis Small, Hairy Spiderwort. Dry rocky woodlands, and rock outcrops (especially granitic flatrocks and domes). April-June. W. NC and wc. TN south to sc. SC, s. GA, s. AL, and sc. MS; disjunct in AR, e. OK, and nw. LA. There is some question about the validity of this species. [= RAB, FNA, K, W, Y, Z]


Tradescantia pallida (Rose) D.R. Hunt, Purplequeen, Purpleheart, Wandering Jew. Disturbed areas; native of Mexico. [= FNA, K, WH]

Tradescantia paludosa E.S. Anderson & Woodson. Swamps and bottomlands. March-May. Coastal Plain of AL and FL (?), west to TX and AR. [= FNA, K, Y, Z; = T. ohiensis var. paludosa (E.S. Anderson & Woodson) D.T. MacRoberts]

Tradescantia roseolens Small, Sandhill Spiderwort. Dry sandy woodlands. May-June. SC south through GA to c. peninsular FL, west to AL. [= RAB, FNA, K, WH, Y, Z; = T. longifolia Small – S]

Tradescantia subaspera Ker-Gawler, Wide-leaved Spiderwort. Dry to mesic woodlands and forests, hammocks. June-July. Nc. NC, w. VA, WV, OH, IN, IL, and MO, south to NC, SC, sw. GA, Panhandle FL, and AL. Two questionable varieties are sometimes recognized. Var. subaspera may be distinguished by the stem conspicuously zigzag above, except on depauperate or juvenile plants (vs. the stems straight or only slightly zigzag), uppermost lateral cymes sessile or short-pedunculate (vs. pedunculate throughout), uppermost internodes very reduced, crowding the upper leaves (vs. internodes less reduced), leaves much broader than the sheath (vs. only slightly broader), and its generally greater size than var. montana. T. subaspera var. montana ranges from sw. VA and c. WV south to nw. SC, n. GA, and se. TN, with disjunct occurrences in c. AL and Panhandle FL. Var. subaspera ranges from WV west to n. IL, south to se. TN, ne. AR, and s. MO, with disjunct occurrences in NC. [= RAB, FNA, W; > T. subaspera var. montana (Shuttleworth ex Britton) E.S. Anderson & Woodson – C, F, G, K, WV, Y, Z; > T. subaspera – C, F, G, K, WV, Y, Z; < T. pilosa J.G.C. Lemaire – S]


80. PONTEDERIACEAE Kunth 1816 (Pickerelweed Family) [in COMMELINALES]

A family of about 9 genera and 33 species, primarily of the tropics, but with some temperate representatives. References: Rosatti (1987a); Cook in Kubitizki (1998b); Horn in FNA (2002a).

1 Inflorescence with >50 flowers; fruit 1-seeded, indehiscent; leaves lanceolate to ovate, 1.5-10× as long as wide, the base cordate, truncate, or cuneate. ................................................................. Pontederia

2 Inflorescence with <30 flowers; fruit 10-200-seeded, capsular; leaves either reniform, 0.5-1.5× as long as wide, the base cordate or rounded, or narrowly linear, 20-50× as long as wide, the base attenuate.

1 Leaves coriaceous; petioles expanded into air-filled floats or not; perianth lobes 1.3-3.7 cm long. ................................................................. Eichhornia

2 Leaves membraneous; petioles never expanded into air-filled floats; perianth lobes 0.4-1.0 cm long. ................................................................. Heteranthera

Eichhornia Kunth 1842 (Water Hyacinth)

A genus of 7-8 species, native of tropical America and Africa, but now introduced widely in warm regions. References: Cook in Kubitizki (1998b); Horn in FNA (2002a).
### Pontederiaceae

1. Plants rooted; stems elongate, with leaves spaced and alternate; petioles not inflated.......................................................... *E. azurea*
2. Plants floating (or stranded by dropping water levels); stems short, with leaves in a rosette with very short internodes; petioles inflated............

*Eichhornia azurea* (Swartz) Kunth, Rooted Water-hyacinth. Ditches, rivers; native of tropical America. June-October. [= FNA, K, WH]

*Eichhornia crassipes* (Martius Solms-Laub, Water Hyacinth. Ponds, ditches, sluggish water, native of tropical America. June-September. *E. crassipes* is "generally considered the world's most serious aquatic weed" (Rosatti 1987). Originally native to tropical South America. *E. crassipes* is now a widespread naturalized weed throughout the tropics and subtropics. In the northern part our area, water hyacinth is rare, probably not long persisting. Further south, it can be an aggressive aquatic weed. [= RAB, C, F, FNA, G, GW, K, Z = *Piaropus crassipes* (Martius) Rafinesque – S]

#### Heteranthera Ruiz & Pavón 1794 (Mud-plantain)


1. Leaves narrowly linear, 20-50× as long as wide, the base attenuate; flowers solitary, the corolla yellow; stamens and anthers all alike.......................................................... *H. dubia*
2. Leaves reniform, 0.5-1.5× as long as wide, the base cordate; flowers 1-several, the corolla white or pale blue; stamens and anthers dimorphic.

#### Heteranthera dubia* (Jacquin) MacMillan, Water Stargrass. Streams, rivers. Late July-October. QC west to WA, south to Cuba and Central America, but rare or absent in much of the se. United States. The attribution of this species to SC is in error (as by Kartesz 1999), based on a misidentified specimen (C. Horn, pers. comm.). [= RAB, F, FNA, GW, K, W, WV; = *Zosterella dubia* (Jacquin) Small – C, G, S]

#### Heteranthera limosa* (Swartz) Willdenow. Wet ditches, other wet areas. KY, MN, SD, and CO, south to AL, MS, LA, TX, and AZ; Mexico, Central and South America, West Indies. East to TN, KY, AL (Diamond & Woods 2009), and FL (Kartesz 1999); it is attributed to VA in Small (1933), but the documentation is not known. [= FNA, C, F, G, K, S, Z]

#### Heteranthera multiflora* (Grisebach) Horn. In shallow, stagnant water in floodplains, or emerged on mud. June-October. IL west to NE, south to MS; also on the Atlantic Coastal Plain from NJ south through PA to ne. NC; also in South America (Brazil, Paraguay, Argentina, and Venezuela). [= C, FNA, K, Z]


#### Heteranthera rotundifolia* (Kunth) Grisebach. Ponds. Midwestern, as a rare disjunct east to c. KY (Larue County) (Medley 1993); Central and South America, West Indies. [= FNA, C, K, Z]

#### Pontederia Linnaeus 1753 (Pickerelweed)


1. Floral tube villous when young, essentially glabrous to sparsely glandular in maturity; leaves primarily ovate to triangular-lanceolate, 2.2-21 cm wide, the base generally cordate or truncate (rarely cuneate)................................. *P. cordata var. cordata*
1. Floral tube persistently pubescent with short glandular hairs; leaves lanceolate, 0.4-8.3 cm wide, the base generally cuneate to truncate..........

*P. cordata var. lancifolia*
**PONTEDERIACEAE**

*Pontederia cordata* Linnaeus, Heartleaf Pickerelweed. Marshes, pond-shores, lake-shores. May-October. NS west to MN, south to FL and TX; s. Brazil, Argentina, Paraguay, and Uruguay. The recognition of infraspecific taxa in *Pontederia cordata* is controversial and requires additional study. *P. cordata* exhibits tristyly, an interesting breeding system. Each plant has one of 3 types of flowers: (a) a short style, 3 medium and 3 long stamens, (b) a medium style, 3 short and 3 long stamens, or (c) a long style, 3 short and 3 medium stamens. [= GW, Z; < *P. cordata* – RAB, C, FNA, K, W; = *P. cordata* – F, G, S, WV]

*Pontederia cordata* Linnaeus var. *lancifolia* (Muhlenberg ex Elliott) Torrey, Lanceleaf Pickerelweed. Marshes, pond-shores, lake-shores. May-October. S. MA (alleged to occur as far north as ME, but these reports may be entirely based on misidentifications of var. *cordata*) to s. FL, west to e. TX, mostly on the Coastal Plain, with a few records around the Great Lakes; Cuba; s. Brazil, Argentina, Paraguay, and Uruguay. A third variety of *P. cordata*, var. *ovalis* (Martens in Roemer & Schultes) Solms in A.P. de Candolle, is restricted to South America. [= GW, Z; < *P. cordata* – RAB, C, FNA, K, W; = *P. lanceolata* Nuttall – F, G, S]

81. **HAEMODORACEAE** R. Brown 1810 (Bloodwort Family) [in COMMELINALES]

A family of about 14 genera and 100 species, herbs, of semicosmopolitan distribution, but centered in Australia. The Haemodoraceae is primarily a family of the Southern Hemisphere; *Lachnanthes* is the only member native to e. North America. *Lophiola* has often been treated in the Haemodoraceae; recent evidence, however, indicate that it is better placed in the Nartheciaceae (or Liliaceae *sensu lato*); see *Lophiola* (Nartheciaceae) for additional details. References: Robertson (1976)=Z; Simpson in Kubitzki (1998b); Robertson in FNA (2002a). [also see **MELANTHIACEAE**]

*Lachnanthes* Elliott 1816 (Redroot)


Identification notes: A very distinctive plant when in flower, with its densely woolly inflorescence and flowers. When not in flower, recognizable by its equitant (iris-like) base and bright red roots.

*Lachnanthes caroliniana* (Lamarck) Dandy, Redroot. Wet savannas, pocosin edges, shores of Coastal Plain depression ponds (and similar ponds in the mountains of Virginia), ditches, wet disturbed ground. June-early September; September-November. The range is almost strictly on the Coastal Plain, and rather disjunct: s. NS, from MA to DE, from se. VA south to s. FL and west to LA, with inland disjunctions in w. VA and se. TN (Coffee County); Cuba. The correct spelling of the specific epithet has been disputed; the original spelling was "caroliana," but Gandhi (1999) argues convincingly that this is a correctable typographic error. [= RAB, C, FNA, GW, W, Y; = *Lachnanthes carolina* – K, WH, Z, orthographic variant (correctable typographic error); = *L. tinctoria* (J.F. Gmelin) Elliott – F, G; = *Gyrotheca tinctoria* (J.F. Gmelin) Salisbury – S]

86. **CANNACEAE** A.L. de Jussieu 1789 (Canna Family) [in ZINGIBERALES]


*Canna* Linnaeus 1753 (Canna)


Identification notes: The petals are generally sepaloid (sometimes brightly colored); the showy, colored portions of the flower are the staminodes.

1 Flowers not tubular at the base (or with a short tube to 2 cm long); petals erect; [alien, cultivated and persistent] ......................... *C. ×generalis*
2 Flowers tubular at the base; petals reflexed; [native or cultivated]; 

1 Flowers yellow; capsule 5-6 cm long, ellipsoid (longer than broad); leaves glaucous; [native] ...................................................... *C. flaccida*
2 Flowers red, orange, or mixed red-and-yellow; capsule 1.5-3 cm long, globose or subglobose (about as long as broad); leaves green; [alien, cultivated and persistent] ................................................................. *C. indica*
**87. MARANTACEAE** Petersen in Engler & Prantl 1888 (Arrowroot Family) [in ZINGIBERALES]

A family of about 31 genera and 550 species, herbs and vines, nearly pantropical (absent from Australia), and rarely extending into subtropical and warm temperate regions. References: Kennedy in FNA (2000); Andersson in Kubitzki (1998b).

*Thalia* Linnaeus 1753 (Thalia)


1. Flowers crowded on the rachis, the zigzag internodes 2-3 mm long; leaves pilose at the base on the upper surface; bracts of the inflorescence white-pruinose .......................................................... *T. dealbata*
2. Flowers separated on the rachis, the zigzag internodes 5-10 mm long; leaves glabrous at the base on the upper surface; bracts of the inflorescence green or purple, not pruinose .......................................................... *T. geniculata*

*Thalia dealbata* Fraser ex Roscoe, Powdery Thalia, Powdery Alligator-flag. Swamp forests, wet ditches, brackish marshes. May-September; June-October. Ne. SC south to GA, west to TX and OK, north in the Mississippi Embayment to w. KY, s. IL, and se. MO. [= RAB, FNA, GW, K, S]

*Thalia geniculata* Linnaeus, Lilies, Bent Thalia, Bent Alligator-flag. Ponds, sloughs, marshes. AL, FL, LA, south through Central and South America; West Indies; w. Africa. [= FNA, GW, K, S, WH]

**89. ZINGIBERACEAE** Martynov 1820 (Ginger Family) [in ZINGIBERALES]

A family of about 50 genera and 1200 species, herbs, of tropical and subtropical areas, especially se. Asia.

1. Inflorescence terminal on short stems with scale leaves, distinct from the main leafy stems .......................................................... *Curcuma*
2. Inflorescence terminal on long stems with normal, well-developed leaves .................................................................................. *Hedychium*

*Curcuma* Linnaeus 1753 (Hidden Lily)

A genus of about 80 species, rhizomatous herbs, native of the Old World tropics.

*Curcuma zedoaria* (Bergius) Roscoe, Zedoary, White Turmeric. Disturbed areas; native of se. Asia. [= K, WH]

*Hedychium* J. König 1783 (Ginger-lily)

A genus of about 40 species, rhizomatous herbs, native of the Old World tropics.

*Hedychium coronarium* J. König, White Ginger-lily. Disturbed areas, commonly cultivated, rarely persisting and spreading; native of India. [= K, WH]

**91. TYPHACEAE** A.L. de Jussieu 1789 (Cattail Family) [in POALES]

1 Inflorescences headlike, globular
1 Inflorescences spike-like, cylindrical

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**Sparganium** Linnaeus 1753 (Bur-reed)

A genus of about 14 species, wetland and aquatic herbs, primarily circumboreal in arctic and temperate regions, but also in the tropics of Asia, and temperate Australia. References: Kaul in FNA (2000); Thieret (1982)=Z; Beal (1960)=Y; Crow & Hellquist (2000b)=X; Kubitzki in Kubitzki (1998b).

1 Stigmas 2; fruits truncate at apex, obpyramidal, very abruptly beaked, 4-8 mm broad
1 Stigmas 1; fruits rounded or acuminate to a beak at the apex, elliptic, fusiform, or obovate, 1-3 (-4) mm broad.
2 Pistillate heads (primarily those upward) supra-axillary (borne distinctly above the axes of the subtending leaf-like bracts); tepals lacking subapical dark spot.
2 Pistillate heads (all) axillary (borne in the axes of the subtending leaf-like bracts) or several on axillary branches which lack leaf-like bracts; tepals with prominent subapical dark spot.
3 Mature fruits dull, finely pitted, the body 3-5 mm long; fruiting heads 1.5-2.5 cm in diameter; branches of the inflorescence with 0-3 pistillate heads (in addition to staminate heads); stigma 0.8-1.9 (-2.8 in the Coastal Plain) mm long
3 Mature fruits shiny, smooth, the body 5.5-7 mm long; fruiting heads 2.5-3.5 cm in diameter; branches of the inflorescence with 0 (-1) pistillate heads (in addition to staminate heads); stigma 1.5-3 mm long

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**Sparganium americanum** Nuttall, American Bur-reed. Streams, marshes, ponds, pools, often submerged. May-September. NL (Newfoundland) west to MN, south to c. peninsular FL and c. TX. Beal (1960) discusses the interesting variation in *S. americanum*, perhaps worthy of taxonomic recognition. The "Appalachian Race" has stigmas 0.6-0.9 mm long, inflorescence branches 0-3, and relatively narrow leaves; in our area it is montane in distribution, and in general is Appalachian, Ozarkian, and northern. The "Coastal Race" has stigmas 1.5-2.8 mm long, 2-5 inflorescence branches, and relatively wide leaves; in our area it is primarily of the Coastal Plain, disjunct to the mountains of NC and SC south of the Asheville Basin (like many Coastal Plain taxa), and in general is nearly limited to the Coastal Plain, ranging from MA south to FL, west to e. TX, and north in the interior to sc. TN, s. IN, and s. MO. The "Ubiquitous Race" is intermediate, with stigmas 1.0-1.4 m long; it occurs throughout the range of the species. The pattern is suggestive of imperfect evolutionary separation of two taxa. [= RAB, C, F, FNA, G, GW, K, S, W, WH, WV, X, Y, Z]

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**Sparganium androcladum** (Engelmann) Morong. Marshes, shores. May-September. ME and QC west to MN, south to se. VA, s. WV, e. TN, s. MO, and ne. OK. [= C, F, FNA, G, K, W, WV, X, Y, Z]

**Sparganium emersum** Rehmann, Greenfruit Bur-reed. Bogs, stream margins. May-September. NL (Newfoundland) and c. QC west to s. AB and WA, south to w. NC, IN, IA, CO, and CA; Eurasia. [= FNA, X; > S. chlorocarpum Rydberg – RAB, C, F, G, W, WV, Y, Z; > S. chlorocarpum var. acaule (Beeby) Fernald – F; > S. angustifolium Michaux – K, misapplied; > S. acaule (Beeby) Rydberg; > S. emersum var. acaule (Beeby) A. Haines]

**Sparganium eurycarpum** Engelmann ex A. Gray, Giant Bur-reed. Marshes, shores. NS west to BC, south to w. VA, n. WV, IN, OK, CA and Baja California; e. Asia. Its attribution to more southern localities in some older sources (such as FL according to Small) is believed to be in error. [= C, F, FNA, G, K, S, W, WV, X; = S. erectum Linnaeus ssp. stoloniferum (Graebner) C.D.K. Cook & M.S. Nicholls]

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**Typha** Linnaeus 1753 (Cattail)

A genus of 8-13 species, wetland herbs, cosmopolitan. References: Ward (2007a)=Z; Smith in FNA (2000); Kubitzki in Kubitzki (1998b). Key adapted from FNA.

1 Pistillate bracteoles absent, or if present then narrower than stigmas and generally not evident at spike surface; stigmas ovate to lanceolate, persistent on mature spikes; pistillate spikes green in flower when fresh, in fruit mostly 19-36 mm thick; carpodia concealed among pistil hairs; compound pedicels on denuded axis 0.6-3.5 mm; staminate scales colorless to brown.
2 Pistillate bracteoles absent; stigmas ovate to ovate-lanceolate, often blackish when dry; [add] ...............
2 Pistillate bracteoles present (but generally evident only at 20-30×) after removal from spike, resembling perigonal hairs, with brown, enlarged tips narrower than stigmas; stigmas lanceolate, brown when dry; pistillate spikes usually separated from staminate spikes by gap,
Typha angustifolia Linnaeus, Narrowleaf Cattail. Brackish to fresh waters of marshes and swamps, usually tidal, and also inland in non-tidal wetlands (where probably only introduced). May-July; June-November. NS west to ND, south to SC, FL (?), LA, and TX (?); Eurasia. Stuckey & Salamon (1987) consider T. angustifolia an invasive alien in North America, but later studies suggest that it was native at least in coastal areas of NE and Mid-Atlantic North America, and has expanded its range westwards in recent decades (Shih & Finkelstein 2008). [= C, F, FNA, G, GW, K, RAB, W, WH, WV, Z; = T. angustifolia – S (also see T. domingensis)]

Typha domingensis Persoon, Southern Cattail. Brackish to nearly fresh waters of marshes and swamps, usually tidal. June-July; July-November. DE south to s. FL, west to TX; north inland to NE and UT; and south into tropical America; Eurasia; Africa; Oceania. [= C, F, FNA, G, GW, K, RAB, Z; = T. domingensis – S]

Typha ×glauca Godron (pro sp.) [angustifolia × latifolia], Hybrid Cattail. Fresh to brackish waters of lakes, ponds, and rivers. May-July; June-November. Both C and K apply this name to two different hybrids: T. angustifolia × latifolia and T. domingensis × latifolia. The name properly applies to T. angustifolia × latifolia (Smith in FNA 2000). [= GW, Z; = T. glauca Godron – RAB, F; = T. ×glauca – C, K]

Typha latifolia Linnaeus, Common Cattail. Fresh waters of ponds, lakes, ditches, marshes, including in tidal freshwater marshes. May-July; June-November. NL (Newfoundland) west to AK, south to FL, TX, CA, and Mexico; Central America; South America; Eurasia. [= C, F, FNA, G, GW, K, RAB, S, W, WH, WV, Z]

Typha angustifolia
Typha domingensis
Typha ×glauca
Typha latifolia

92. Bromeliaceae A.L. de Jussieu 1789 (Bromeliad or Pineapple Family) [in POALES]

A family of about 56 genera and 2600 species, herbs, shrubs, and trees, of the New World tropics and subtropics (very rarely warm temperate). References: Luther & Brown in FNA (2000); Smith & Till in Kubitzki (1998b).

Tillandsia Linnaeus 1753 (Spanish-moss)

A genus of about 540 species, herbs, of s. North America south to s. South America. References: Luther & Brown in FNA (2000); Smith & Till in Kubitzki (1998b). Key based in part on FNA.

1 Leaves distichous; inflorescence 1-2 (-3) flowered.
2 Plants in dense, more or less spherical clusters; inflorescence scapose, exerted from the cluster; corolla violet.................................................. T. recurvata
3 Plants in elongate, pendulous festoons; inflorescence sessile; corolla yellowish green..................................................... T. usneoides

1 Leaves spiral in a rosette; inflorescence > 3-flowered.
3 Leaves narrowly linear, 1-5 mm wide.
4 Leaves densely and coarsely lepidote, appearing gray; floral bracts rose; corolla violet.................................................. T. bartramii
4 Leaves finely lepidote, appearing green or reddish; floral bracts green or reddish; corolla lavender................................. T. setacea
BROMELIACEAE

3 Leaves broader, 10-35 mm wide.
5 Scape 10-35 cm long; floral bracts imbricate, covering all of the rachis, or nearly all................. T. fasciculata var. densispica
5 Scape 20-30 cm long; floral bracts widely spaced, leaving much of the rachis exposed at anthesis............................... T. utriculata

Tillandsia bartramii Elliott, Bartram's Air-plant. On tree branches in bayswamps, tidal swamp forests, and mesic hardwood bluffs. E. GA south through FL; disjunct in Tamaulipas. In five counties in e. GA, as far north as Liberty County (Jones & Coile 1988), and reported for SC as extirpated (Kartesz 1999). [= FNA, K, WH; T. myriophylla Small – S]

Tillandsia fasciculata Swartz var. densispica Mez, Quill-leaf Airplant. Branches of trees, especially evergreen oaks. Se. GA south through FL, and in the West Indies, Mexico, and Central America. [= FNA, K, WH; < T. fasciculata – S]

Tillandsia recurvata (Linnaeus) Linnaeus, Ball-moss, Bunch-moss. On tree branches in maritime forests. Se. GA (Duncan 1985) south to s. FL; LA to AZ and south through Mexico, Central America, and South America; West Indies. Introduced in e. SC (Beaufort, Jasper, Charleston, Georgetown counties) via landscaping plants (Gramling 2010; P. McMillan, pers. comm. 2005). Outside of our area, this species also occurs on rock cliffs and is frequent on powerlines. [= FNA, K, WH; Diaphoranthema recurvata (Linnaeus) Beer – S]

Tillandsia setacea Swartz, Wild-pine, Pine-needle Airplant. In tree branches, especially on hardwoods, in mesic bluff forests. Se. GA south to s. FL; West Indies; Mexico and Central America. [= FNA, K; = T. tenusfolia Linnaeus – S, misapplied]

Tillandsia usneoides (Linnaeus) Linnaeus, Spanish-moss. Branches of trees, especially in swamps, but elsewhere where air humidity is high enough, often even in dry forests (near Wilmington, NC Tillandsia is abundant on Quercus laevis in an extensive dry sandhill area which receives frequent fog from the Cape Fear, Brunswick, and Northeast Cape Fear rivers). April-June. S. MD (historically), se. VA south to s. FL, west to TX and Mexico; Central and South America, West Indies. T. usneoides is the only member of a very large genus to occur north of s. GA. The epithet 'usneoides' refers to its resemblance to the common lichen Usnea. [= RAB, C, F, FNA, G, K, WH; = Dendropogon usneoides (Linnaeus) Rafinesque – S]


94. XYRIDACEAE C. Agardh 1823 (Yellow-eyed Grass Family) [in POALES]

A family of 5 genera and about 325-350 species, nearly cosmopolitan (most diverse in tropical and subtropical regions, and especially South America). References: Kral in FNA (2000); Kral in Kubitzki (1999b).

Xyris Linnaeus 1753 (Yellow-eyed Grass)

A genus of about 300 species, nearly cosmopolitan (most diverse in tropical and subtropical regions, and especially South America). This "technical" genus is known well by only a few botanists, and additional undescribed taxa are possible. References: Kral in FNA (2000); Ward (2007b)=V; Bridges & Orzell (2003)=X; Kral (1966a)=Z; Kral (1983b, 1999); Kral in Kubitzki (1999b). Key adapted from X, GW, and Z.

Identification notes: In vegetative condition, Xyris is often confused with other monocots with equitant leaves, such as Iris spp. (Iridaceae), Lachnanthes caroliniana (Haemodoraceae), and Tofieldia spp. (Tofieldiaceae).

1 Keel of the lateral sepals shortly ciliate-seabrid (or sometimes entire in X. brevifolia, and then the bract tips purplish-tinged).
2 Plants small, usually < 30 cm tall; principal leaves usually < 10 cm long; mature spikes < 1 cm long when mature.
3 Leaves filiform, with expanded brownish lustrous bases, usually exceeding the sheath of the scape; [plants of s. AL and the FL Panhandle].......................... X. isoetifolia
3 Leaves linear, the bases not expanded, shorter than, equaling, or slightly exceeding the sheath of the scape; [plants collectively more widespread].
4 Keel of the lateral sepals straight to slightly curved, remotely ciliate or entire; spikes broadly ovoid to subglobose, the bracts loose, bicolored, the distal portions maroon or purplish and often with erose margins.............................. X. brevifolia
4 Keel of the lateral sepals strongly curved, densely ciliate; spikes lance-ovoid to ovoid, the bracts entire, not purple-tinged, and lacking erose borders.
5 Plants perennial, and its leaves ascending, green with a distinct brown patch at the base; fruiting spikes ovoid, blunt, somewhat 2-edged from the strongly keeled outer bracts................................................................. X. drummondii
5 Plants annual; leaves flabellate arranged, spreading to recurved against the substrate, usually maroon; fruiting spikes often elongated and acute, not 2-edged................................................................. X. flabelliformis
2 Plants large, usually > 30 cm tall; principal leaves > 10 cm long; mature spikes > 1 cm long when mature.
6 Leaves ascending, twisted, strongly grooved; spikes ovoid, the bracts and lateral sepals with a small tuft of short, reddish-brown hairs; bases of leaves abruptly expanded, pinkish or purplish (dark brown in age), the outermost leaves often scale-like, the plant base therefore appearing bulbous; [of the Mountains, Piedmont, and Coastal Plain] X. ambigua

6 Leaves spreading, not twisted or only slightly so; spikes narrowly ovoid, ellipsoid, or oblong; bracts and sepals without a small apical tuft of hairs; bases of leaves white to variegated, white to variegated, tan, pink, purplish, maroon, or dark brown, the outermost leaves not scale-like, the plant base not appearing bulbous; [typically of the Coastal Plain, rarely disjunct inland].

7 Seeds lustrous, translucent, broadly ovoid; spike pale brown or tan, the scales loosely imbricate; plant bases pinkish, purplish, or tan, with dark longitudinal striations on the inner leaf bases; leaves 3-20 mm wide; petal blades obovate, 6-7 mm long, opening in early morning, usually closing by mid-day ................................................................. X. stricta

7 Seeds lustrous, purplish; spike pale brown or tan, the scales loosely imbricate; plant bases pinkish, purplish, or tan, with dark longitudinal striations on the inner leaf bases; leaves 3-20 mm wide; petal blades obovate, 6-7 mm long, opening in early morning, usually closing by mid-day ................................................................. X. ambigua

8 Seeds lustrous, translucent, broadly ovoid; spike pale brown or tan, the scales loosely imbricate; plant bases pinkish, purplish, or tan, with dark longitudinal striations on the inner leaf bases; leaves 3-20 mm wide; petal blades obovate, 6-7 mm long, opening in early morning, usually closing by mid-day ................................................................. X. ambigua

9 Leaves narrowly linear to filiform, 0.5-2.0 (-2.5) mm wide, not twisted (or scarcely so); leaf bases expanded, lustrous, hard, tan to brown, neither bulbous nor deeply set in the substrate; spikes ovoid or ellipsoid, 4-15 mm long.

9 Leaves broader, (1.5-) 2.0-25 mm wide, strongly twisted to straight, the leaf bases either not expanded, lustrous, hard, and tan to brown, or, if so, then the base also either bulbous and/or deeply seated in the substrate; spikes narrowly lanceolate, ellipsoid, to broadly ovoid, 4-40 mm long.

10 Leaves filiform, terete or elliptic in cross-section, 0.5-1.0 mm wide, without a paler, hardened margin; scale bases broad as or broader than the leaf blades; scales smooth-edged to denticulate, not curled away from the head, the head thus appearing smooth; staminodia beardless ................................................................................................. X. baldwiniana

10 Leaves linear, flattened in cross-section, 1-2 (-2.5) mm wide, with a pale, hardened margin; scale bases usually narrower than the leaf blades; scales ragged-lacerate, the tips curling away from the head, giving it a ragged appearance; staminodia bearded .................................................................................. X. elliottii

11 Keel of the lateral sepals irregularly lacerate or fimbriate, or if entire then the bract tips not purplish.

12 Leaves strongly twisted, 2-5 mm wide; leaf bases hardened, swollen, bulbous, dark lustrous brown; scale ridges smooth; petal blades white or yellow; [of moist to dry pinelands] ................................................................................................................................. X. caroliniana

12 Leaves not twisted or slightly twisted, 3-25 mm wide; leaf bases either soft, not swollen, not bulbous, and pale green (X. fimbriata) or somewhat hardened and bulbous, deep red (X. panacea); scale ridges strongly scabrous or smooth; petal blades yellow; [of aquatic to very wet peaty, mucky, or wet ponds, marshes, or other wetlands].

13 Leaves 5-25 mm wide; scale ridges well-developed, strongly scabrous; flowers open 1:00-3:00 p.m. EDT; [widespread] ................................................................................................................................. X. fimbriata

13 Leaves 3-5 (-8) mm wide; scale ridges poorly-developed, smooth; flowers open 11:30-4:00 p.m. EDT; [endemic to Wakulla County, FL] .......................................................................................................... X. panacea

14 Lateral sepals longer than and exserted from the subtending bract; spikes 5-15 cm tall.

15 Leaf blades 1-2 (-3) mm wide, 6-30 cm long; spikes 10-16 mm long; seeds 0.4-0.6 mm long; [endemic to Panhandle FL and s. AL] ................................................................................................................................................. X. longisepala

15 Leaf blades 5-15 mm wide; (20-) 30-50 (-60) cm long; spikes 10-20 (-25) mm long; seeds (0.6-) 0.7 (-0.8) mm long; [more widespread in our area] ................................................................................................. X. smalliana

15 Leaf blades 1-2 (-3) mm wide, 6-30 cm long; spikes 10-16 mm long; seeds 0.4-0.6 mm long; [endemic to Panhandle FL and s. AL] ................................................................................................................................................. X. longisepala

16 Scapes flexuous, usually spirally twisted; upper portion of leaf blades conspicuously twisted; plant bases pinkish, purplish, or dark brown, bulbous or deeply set in the substrate.

17 Plant forming a rather dense tuft; scale bases < 50 cm long; scale diverging at a 10-20° angle; seed surface farinose; of ne. FL southward] ................................................................................................................................. X. calcicola

18 Base of plant deeply set in the substrate, without distinct outer scale leaves; leaf bases not noticeably expanded, the plant base therefore not bulbous; leaves smooth, 2-4 mm wide; petal blades ca. 3 mm long. ....................................................... X. chapmani

18 Base of plant shallowly set on the substrate, often with short, black outer scale leaves; leaf bases noticeably expanded, the plant base therefore appearing bulbous; leaves either smooth and 5-10 mm wide, or scabrous and 2-10 mm wide; petal blades ca. 5 mm long.

19 Leaf and scape surfaces prominently papillose or tuberculate-scabrid; petal blades suborbicular, yellow; seeds narrowly ovoid or narrowly ellipsoid, ca. 1.0 mm long. ................................................................................................. X. scabrifolia

19 Leaf and scape surfaces smooth (or scabrous only along margins and ridges); petal blades obovate, white or yellow; seeds ovoid or ellipsoid, 0.5-0.6 mm long.

20 Seeds translucent; leaf margins smooth; [plants of acidic sites of the Coastal Plain] ........................................................................................................................................................................ X. platylepis

20 Seeds transversely ovoid; leaf margins slightly scabrous; [plants of calcareous seeps and fens of the Ridge and Valley] ovoid or ellipsoid, about 1.5× as long as wide, with lines of very fine papillae, not farinose .................................................................................................................. X. diffusum

21 Summit of the scape distinctly flattened and broad relative to the spike; scape ridges 2-3, the 2 most prominent comprising the flattened edge of the scape.

22 The 2 principal scape ridges noticeably and abruptly flattened and winglike below the spike, their combined width (on fresh material) broader than the scape proper; fruitsing spikes mostly 8-15 cm long; seeds 0.8-1.0 mm long, dark when ripe, fusiform to narrowly elliptic, 2.3× as long as wide, with lines of very fine papillae, these however obscured by a farinose covering .................................................................................................................. X. iridifolia
XYRIDACEAE

Summit of the scape nearly terete or somewhat flattened, much narrower than the spike; scape ridges several (usually > 3), at least on the mid to lower portion of the scape.

23 Seeds farinose, very dark; surfaces of leaves tuberculate-scarbid, the leaves strongly ascending, linear, generally > 10 cm long; leaves generally dull-colored.

24 Mature spikes ovoid, sharply acute; plants solitary or in small clumps; leaves 10-30 (-50) cm long, 1.5-6.0 mm wide, dark maroon or purplish at the base .......................................................... X. floridana

24 Mature spikes ovoid to ellipsoid, acute to obtuse; plants typically in large dense tufts; leaves 20-50 cm long, 3-12 mm wide, the older ones with dark-brown to gray bases, the younger with tan bases .................................. X. serotina

23 Seeds translucent, not farinose; surfaces of leaves smooth (or sparsely tuberculate-scarbid in X. curtissii, which also has leaves linear-curved and generally < 10 cm long); leaves generally a bright yellowish-green above the base.

25 Leaves ascending to erect, 5-60 cm long, 2-5 (-15) mm wide; scapes (0.5-) 1.0-1.5 (-2.0) mm wide; mature spikes 7-15 (-25) mm long; fertile bracts 5-7 mm long; leaf bases tan to brown (very rarely pinkish); old flowers often persisting on spikes, drying blackish .......................................................... X. jupicai

25 Leaves spreading-recurved to erect, 3-10 (-13) cm long, 1-4.5 mm wide; scapes 0.4-0.6 (-0.7) mm wide; mature spikes 3-7 (-12) mm long; fertile bracts 3-5 mm long; leaf bases various; old flowers fugacious, not persisting on spikes.

25 Leaves spreading-recurred to ascending, 2-4.5 mm wide; leaf bases pinkish or purplish; spikes 3-5 (-7) mm long, often abruptly acute; seeds 0.4-0.5 mm long, yellowish-amber.......................................................... X. curtissii

26 Leaves ascending to erect, 1-2 mm wide; leaf bases tan to brown; spikes 3-7 (-12) mm long; blunts; seeds 0.3-0.4 mm long, reddish-brown to brown.................................................. X. species 1

Xyris ambiguus Beyrich ex Kunth. Wet savannas and flatwoods, pinelands, edges of depression ponds. June-August. Se. VA south to s. FL, west to AL and ec. TX, primarily on the Coastal Plain; also West Indies (Cuba), and Mexico south into Central America. [= RAB, C, F, FNA, G, K, W, WH, X; < X. ambiguus – GW, S, Z (also see X. louisianica)]

Xyris baldwiniana J. A. Schultes. Grassleaf Yellow-eyed Grass. Wet savannas, seepage bogs, sandhill seeps, wet savanna ecotones. June-July. Se. NC south to n. peninsular FL, west to s. AR and ec. TX, primarily on the Coastal Plain; also s. Mexico and Central America. [= RAB, FNA, GW, K, S, WH, X, Z]

Xyris brevifolia Michaux. Shortleaf Yellow-eyed Grass. Wet sands of pinelands, especially seasonally wet, open, white sands of spodosol longleaf pine flatwoods (Leon series soils), margins of Carolina bay sandrims. June-August. Se. NC south to s. FL, west to s. AL and w. FL; West Indies and South America. [= RAB, FNA, GW, K, W, WH, X, Z]

Xyris calciola E. L. Bridges & Orzell. Limestone Yellow-eyed Grass. Wet calcareous savannas and flatwoods. August-November. C. and s. peninsular FL; disjunct in ne. FL (Baker County; Wunderlin & Hansen 2008). See Bridges & Orzell (2003) for detailed information. [=WH, X]


Xyris chapmanii E. L. Bridges & Orzell, Chapman's Yellow-eyed Grass. Sandhill seepage bogs in areas of copious lateral seepage in deep muck soils. Se. NC south to Panhandle FL, west to e. TX. This taxon is abundantly distinct from X. scabrifolia. [=WH, X; < X. scabrifolia – FNA, K, Z]

Xyris curtissii Malme, Curtiss's Yellow-eyed Grass. Savannas. July-August. Se. VA south to ne. FL, FL Panhandle, and west to s. AR and ec. TX, primarily on the Coastal Plain; disjunct in s. NJ and Central America (Belize). [= RAB, G, WH; = X. difformis Chapman var. curtissii (Malme) Kral – C, FNA, GW, K, X, Z; > X. bayardii Fernald – F; > X. curtissii – F; = X. neglecta Small – S]

Xyris difformis Chapman. Savannahs, roadside ditches, pond margins, other wet habitats. August-October. New England and s. Canada south to n. peninsular FL and ec. TX. [= X, WH; = X. difformis Chapman var. difformis – C, FNA, GW, K, Z; < X. difformis – RAB, F, S, W (also see X. curtissii)]

Xyris drummondii Malme, Drummond's Yellow-eyed Grass. Wet pine flatwoods, ditches. Se. GA south to ne. FL, west to Panhandle FL and s. MS. [= FNA, GW, K, WH, X, Z]

Xyris elliottii Chapman, Elliott's Yellow-eyed Grass. Margins of drawdown zones of clay-based Carolina bays, limesinks and flatwoods swales, wet savannas. May-June. E. SC south to s. FL, west to s. AL; West Indies; South America. [= RAB, FNA, GW, K, S, WH, X, Z; > X. elliottii var. elliottii; > X. elliottii var. stenotera Malme]

Xyris fimбриata Elliott, Giant Yellow-eyed Grass. In mucky or sandy soils of upland depression ponds, also along sandhill streams, impoundments and in deep muck of sandhills seepage slopes often just below the zone occupied by Xyris chapmanii. September-October. Se. VA south to e. FL, west (interruptedly) to se. TX; disjunct in s. NJ, DE, and c. TN. [= RAB, C, F, FNA, GW, K, S, WH, X, Z]

Xyris flabelliformis Chapman, Savanna Yellow-eyed Grass. Wet sands of pinelands, especially seasonally wet, open, white sands of spodosol longleaf pine flatwoods (Leon series soils), margins of Carolina bay sandrims. May-June. Se. NC south to s. FL, west to se. LA, on the Coastal Plain. [= RAB, FNA, GW, K, S, V, WH, X, Z]


Xyris grandis Chapman, Grand's Yellow-eyed Grass. In mucky or sandy soils of upland depression ponds, also along sandhill streams, impoundments and in deep muck of sandhills seepage slopes often just below the zone occupied by Xyris chapmanii. September-October. Se. VA south to c. peninsular FL, west (interruptedly) to se. TX; disjunct in s. NJ, DE, and c. TN. [= RAB, C, F, FNA, GW, K, S, WH, X, Z]

Xyris jupicai Chapman var. jupicai. Savannas, roadside ditches, pond margins, other wet habitats. August-October. New England and s. Canada south to n. peninsular FL and ec. TX. [= X, WH; = X. jupicai Chapman var. jupicai – C, FNA, GW, K, Z; < X. jupicai – RAB, F, S, W (also see X. curtissii)]

Xyris malmei Chapman, Malme's Yellow-eyed Grass. Wet savannas, seepage bogs, sandhill seeps, wet savanna ecotones. June-August. Se. VA south to s. FL, west to AL and ec. TX, primarily on the Coastal Plain; also West Indies (Cuba), and Mexico south into Central America. [= RAB, C, F, FNA, GW, K, S, WH, X, Z]

Xyris neglecta Chapman, Neglect's Yellow-eyed Grass. Wet savannas, seepage bogs, sandhill seeps, wet savanna ecotones. June-August. Se. VA south to s. FL, west to AL and ec. TX, primarily on the Coastal Plain; also West Indies (Cuba), and Mexico south into Central America. [= RAB, C, F, FNA, GW, K, S, WH, X, Z; < X. neglecta – C, FNA, GW, K, Z; < X. neglecta – WH, X, Z]

Xyris pallescens (C. Mohr) Small. Yellow-eyed Grass. In mucky or sandy soils of upland depression ponds, also along sandhill streams, impoundments and in deep muck of sandhills seepage slopes often just below the zone occupied by Xyris chapmanii. September-October. Se. VA south to e. FL, west (interruptedly) to se. TX; disjunct in s. NJ, DE, and c. TN. [= RAB, C, F, FNA, GW, K, S, WH, X, Z]
**Xyris floridana** (Kral) E.L. Bridges & Orzell, Florida Yellow-eyed Grass. Savannas, wet pine flatwoods, ditches. August. Se. NC south to s. FL, west to se. LA; Central America. [= WH; = Xyris diffinis Chapman var. floridana Kral – FNA, GW, K, Z]

**Xyris iridifolia** Chapman, Irisleaf Yellow-eyed Grass. Marshes, upland pond margins, blackwater river channels, floodplain pools, other wet habitats. July-September. Se. VA south to ne. FL and FL Panhandle, west to c. TX; disjunct in c. TN and Mexico. [= RAB, C, GW, S, Z; = X. laxifolia Mart. var. iridifolia (Chapman) Kral – FNA, GW, K, WH, X]

**Xyris isoetifolia** Kral. Bogs, savannas, and depression pond margins. Endemic to FL Panhandle and s. AL. [= FNA, GW, K, WH, X, Z]

**Xyris jupicai** L.C. Richard. Ditches, various wet habitats. July-September. NJ south to s. FL, west to TN, AR, se. OK (Singhurst, Bridges, & Holmes 2007), and TX; Mexico, Central America, South America, West Indies. Sometimes weedy and considered by some to be adventive from further south. At least some populations in our area are native and may additionally be worthy of taxonomic recognition as distinct from "true" *X. jupicai* (P. McMillan, pers. comm., 2003). [= RAB, C, GW, K, S; > X. elata Chapman – G, S; > X. communis Kunth – S; > X. caroliniana – G, S, misapplied]

**Xyris longisepala** Kral. Depression pond margins. Endemic to FL Panhandle and s. AL. [= FNA, GW, K, WH, X, Z]

**Xyris louisianica** E.L. Bridges & Orzell. Pine savannas, bogs, ditches and disturbed areas. FL Panhandle and GA west to se. TX. [= K, WH, X; = X. stricta Chapman var. obsocura Kral – FNA; < X. ambigua – GW, S, Z]

**Xyris panacea** L.C. Anderson & Kral, St. Marks Yellow-eyed Grass. Mucky depression ponds. Late June-early October. Endemic to FL Panhandle (Wakulla County). See Anderson & Kral (2008) for additional details.


**Xyris scabrifolia** R.M. Harper, Roughleaf Yellow-eyed Grass. Sandhill seepage bogs and wet pine savannas. Sc. and se. NC south to Panhandle FL, west to s. AL and s. MS; disjunct in sw. LA-se. TX. *X. chapmanii* is a taxon distinct from *X. scabrifolia*. [= GW, S, WH, X; < X. scabrifolia – FNA, K, Z (also see *X. chapmanii*)]

**Xyris serotina** Chapman. Depression meadows, ultisol savannas (Lynchburg/Rains complex or Eulonia/Oketee), ditches. September. Se. NC south to c. peninsular FL, west to s. MS, in the Coastal Plain. [= RAB, FNA, GW, K, S, WH, X, Z]

**Xyris smalliana** Nash, Small's Yellow-eyed Grass. Pond margins, ditches. July-August. S. ME south to s. FL, west to s. MS; disjunct to se. TX; s. Mexico south into Central America; West Indies (Cuba). [= RAB, C, FNA, GW, K, S, W, WH, X, Z; > X. congdonii Small – F; > X. smalliana – F; > X. smalliana var. smalliana – G; > X. smalliana var. olneyi (Wood) Gleason – G]

**Xyris spathifolia** Kral & Moffett, Ketona Yellow-eyed Grass. Seeps over dolomite. See Kral & Moffett (2009) for additional information. {not yet keyed}

**Xyris species 1.** Wet savannas and pond margins. July-September. Currently known only from Sandhills Region and inner Coastal Plain of NC and SC, and outer Coastal Plain of NC.

**Xyris stricta** Chapman. Depression ponds, depression meadows, borrow pits, ultisol savannas and ditches. July-September. SC south to ne. FL and Panhandle FL, west to s. MS and se. LA. Reported for our area by Kral (1966b). P. McMillan (pers. comm.) reports this species from a number of locations in the outer Coastal Plain of NC and SC. [=GW, K, S, WH, X, Z; = X. stricta var. stricta – FNA]

**Eriochara** Linnaeus 1753 (Pipewort)

A genus of about 400 species, of tropical and warm temperate regions (few in cold temperate areas). References: Kral in FNA (2000); Kral (1966c)=Z; Gomes de Andrade et al. (2010); Stützel in Kubitzki (1998b). Key based on Kral in FNA (2000).

1 Receptacle and/or base of flowers copiously hairy; some or most of perianth parts with chalk white hairs; heads overall appearing white, 5-20 mm in diameter when in full flower or fruit.

2 Heads hard (much flattened by a plant press, and easily compressed when fresh between finger and thumb); leaves dark green, the tip acute to obtuse; scape sheaths shorter than most leaves; involucral bracts straw-colored, the apex acute; receptacular bracteoles pale, the apex narrowly acuminate; pistillate flower petals adaxially glabrous; terminal cells of club-shaped hairs of the perianth whitened, the basal cells often un congested and transparent.

3 Leaves to 2 cm wide, with rounded tip; heads 13-20 mm in diameter; [of the East Gulf Coastal Plain, known from Panhandle FL and s. AL.].................................................................E. decangulare var. decangulare

4 Mature heads 5-10 mm in diameter; leaves 5-30 cm long; petals of staminate flowers conspicuously unequal; [plants primarily of seasonally flooded ponds].........................................................E. compressum

5 Stamens 6; pistil 3-carpellate...............................................................................................................E. cinereum

6 Heads 4-10 mm in diameter when in full flower or fruit; outer involucral bracts usually reflexed, obscured by bracteoles and flowers.

7 Inner involucral bracts, receptacular bracts, and sepals darkened, usually gray to nearly black; young heads dark; seeds very faintly reticulate, not papillose; [of the North American]

8 Heads 3-4 mm in diameter when in full flower or fruit; outer involucral bracts neither reflexed nor obscured by bracteoles and flowers.

9 Bracts straw-colored, greenish, or light gray to gray, dull, the margins often erose or lacerate, the apex blunt to obtuse; [of moist acidic sites].................................................................E. koernickianum

10 Bracts narrowly ovate to oblanceolate, the apex acute; bracts and perianth parts (except sometimes the petals) glabrous; seed conspicuously pale-reticulate.................................................................E. ravenelii

**Eriocaulon** Linnaeus 1753 (Pipewort)

A family of about 10 genera and 1100 species, of tropical and warm temperate regions (few in cold temperate regions), especially America, and most diverse in n. South America. References: Kral in FNA (2000); Kral (1966c)=Z; Stützel in Kubitzki (1998b).

1 Scape pubescent (in our species, or very rarely nearly glabrous), 6-40 cm tall at maturity; leaves lacking obvious air spaces; roots fibrous or spongy, not septate; petals 3 or absent; stamens 2-3, the anthers yellow at maturity.

2 Scape pubescent with eglandular hairs; roots fibrous, branched, dark; heads white, gray, or brown; leaves bright green, tapering gradually through most of their lengths, herbaceous in texture .................................................................Lachnocaulon

3 Scape pubescent with glandular hairs (or a mixture of glandular and eglandular hairs); roots spongy, unbranched, pale; heads yellowish-tan or gray; leaves bluish green, narrowly linear to the abruptly flared base, stiff in texture .................................................Syngonanthus

4 Stamens 4; pistil 2-carpellate.

5 All bracts of staminate and pistillate flowers straw-colored or pale with grayish midzone, sepals of pistillate flowers basally pale, darkening toward the tip to grayish, gray-green, or gray-brown; heads (young and mature) pale; seeds faintly rectangular-reticulate, often papillate in lines; [of the se. Coastal Plain]..................................................................................................................E. lineare

6 Heads 3-4 mm in diameter when in full flower or fruit; outer involucral bracts neither reflexed nor obscured by bracteoles and flowers.

7 Bracts straw-colored, greenish, or light gray to gray, dull, the margins often erose or lacerate, the apex blunt to obtuse; [of tidal waters and large natural lakes of the outer Coastal Plain]..................................................................................E. parkeri

8 Bracts narrowly ovate to oblanceolate, the apex acute; bracts and perianth parts (except sometimes the petals) glabrous; seed conspicuously pale-reticulate.................................................................................................................................................................E. ravenelii

9 Bracts narrowly ovate to oblanceolate, the apex acute; bracts and perianth parts (except sometimes the petals) glabrous; seed conspicuously pale-reticulate.................................................................................................................................................................E. ravenelii
Eriocaulon aquaticum (Hill) Druce, Seven-angled Pipewort. Ponds, lakes. July-October. NB and NL (Newfoundland) west to ON and MN, south to e. NC, VA, AL, and IN; also Great Britain and Ireland. The name E. septangulare is invalid. E. aquaticum is the correct name if the species is interpreted to include both northern European and northeastern North American plants. If North American plants are distinct from European, the correct name is E. pellucidum. [= C, FNA, K; > E. pellucidum Michaux – RAB; = E. septangulare Withering – F, G, GW, W, Z, invalid name]


Eriocaulon compressum Lamarck. Ponds, lakes, other depressions, wetter places in pine flatwoods and pine savannas. April-October. NJ south to s. FL, west to e. TX. [= RAB, C, F, FNA, G, GW, K, S, WH, Z]

Eriocaulon decangulare Linnaeus var. decangulare, Common Ten-angled Pipewort. Wet savannas and pine flatwoods, bogs, seasonally flooded ponds. June-October. NJ south to s. FL, west to sw. AR and e. TX; Mexico, Central America. [= FNA, K; < E. decangulare – RAB, C, F, G, GW, S, W, WH, Z]

Eriocaulon decangulare Linnaeus var. latifolium Chapman ex Moldenke, Panhandle Pipewort. Seepage bogs. Restricted to Panhandle FL, s. AL, and s. MS. It appears to warrant taxonomic status, but needs additional study. [= FNA, K; < E. decangulare – GW, S, WH, Z]

Eriocaulon koernickianum van Heurck & Müller of Aargau, Dwarf Pipewort. Seepage areas on granite flatrocks. W. AR and e. OK south to e. TX; disjunct in c. GA. See Watson et al. (2002) for information on variation within the species. [= FNA, K; = E. kornickianum – GW, orthographic variant]

Eriocaulon lineare Small. Seepage bogs. Sw. GA south to c. peninsular FL, west to s. AL. It has been reported for NC (Kral in FNA 2000), but this is apparently in error. Kral & Sorrie (1998) proposed the conservation of the name E. lineare, but this course was accepted by Brummitt (2005). [= FNA, GW, K, S, WH]

Eriocaulon nigrobracteatum E.L. Bridges & Orzell, Dark-headed Hatpins. Seepage bogs. Endemic to the FL Panhandle (Bay, Calhoun, and Gulf counties). [= FNA, K, WH] [not yet keyed]

Eriocaulon parkeri B.L. Robinson, Estuary Pipewort. Natural lakes, tidal marshes. ME and QC south to e. NC. [= C, F, FNA, G, GW, K, Z]


Eriocaulon texense Körnick, Texas Hatpins. Sandhill seepage bogs, Altamaha Grit outcrops. Sc. NC south to w. Panhandle FL, west to e. TX. [= FNA, GW, K, WH, Z]

Lachnocaulon Kunth 1841 (Bogbuttons)

A genus of 7 species, herbs, of se. North America and Cuba. Based on work of Gomes de Andrade et al. (2010), Lachnocaulon is likely to be included in the large and primarily neotropical genus Paepalanthus Martius. References: Kral in FNA (2000); Kral (1966c)=Z; Gomes de Andrade et al. (2010); Stützel in Kubitzki (1998b).

1 Trichomes at the tips of the receptacular bracts milky white, opaque, the head therefore appearing gray to white, obscuring the brown color of the bractlets.

2 Mature heads 4-7 mm across; seeds obviously longitudinally striate (as seen at 10× magnification).................................................................L. anceps

2 Mature heads 3.5-4.0 mm across; seeds not obviously longitudinally striate, the striations obscure and very fine (not visible at 10× magnification).................................................................L. beyrichianum

1 Trichomes at the tips of the receptacular bracts translucent, the head therefore showing the brown color of the bractlets.

3 Scape with ascending hairs.........................................................................................................................................................L. minus

3 Scape glabrous.

4 Leaves 0.5-1 (-2) cm long; head light brown, usually globose; carpels 2......................................................................................................L. digynum

4 Leaves 2-3 cm long; head reddish- or dark brown, usually elongate-cylindric; carpels 3..............................................................................L. engleri
**Lachnocaulon anceps** (Walter) Morong, Common Bogbuttons. Moist to dry sands, moist peats, in pinelands, sometimes locally abundant in open disturbed areas where competition has been removed. May-October. S. NJ south to s. FL, west to se. TX; disjunct in ec. TN; West Indies (Cuba). [= RAB, C, F, FNA, GW, K, WH, Z; > L. anceps – S; > L. floridanum – S; > L. glabrum Körnick – S]

**Lachnocaulon beyrichianum** Sporleder ex Körnick, Southern Bogbutton. Upper margins of Coastal Plain doline ponds (sometimes under scrub oaks), flatwoods. May-September. Se. NC south to Panhandle FL and s. peninsular FL. [= FNA, GW, K, S, WH, Z]

**Lachnocaulon digynum** Körnick, Pineland Bogbutton. Pine savannas, bogs. Panhandle FL and s. AL west to TX. [= FNA, GW, K, S, WH, Z]

**Lachnocaulon engleri** Ruhland, Engler’s Bogbutton. Pondshores, pine savannas. N. FL peninsula south to s. FL; Panhandle FL and s. AL. [= FNA, GW, K, S, WH, Z]

**Lachnocaulon minus** (Chapman) Small, Brown Bogbutton. Upper margins of Coastal Plain doline ponds, other pineland situations. May-October. N. FL peninsula south to s. FL; Panhandle FL and S. AL. [= RAB, FNA, GW, K, WH, Z; > L. minus – S; > L. eciliatum Small – S]

**Syngonanthus** Ruhland 1900 (Yellow Hatpins)

A genus of about 200 species, primarily of tropical America, but some in Africa and Madagascar; ours is the only temperate species. References: Kral in FNA (2000); Kral (1966c)=Z; Gomes de Andrade et al. (2010); Stützel in Kubitzki (1998b).

**Syngonanthus flavidulus** (Michaux) Ruhland, Yellow Hatpins, Bantam-buttons. Pine savannas, pine flatwoods, borders of pineland ponds, and adjacent ditches. May-October. Se. NC south to s. FL, west to s. MS. [= RAB, FNA, GW, K, S, WH, Z]

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**Mayaca** Aublet 1775 (Bogmoss)

A genus of 4-10 species, of tropical to warm temperate America and Africa. References: Thieret (1975); Stevenson in Kubitzki (1998b).

**Mayaca fluviatilis** Aublet, Bogmoss. Cp (FL, GA, NC, SC): marshes, streams, swamp forests, shores of natural lakes, seepage areas, in saturated soil or variously submersed; common. May-July. Se. NC south to c. peninsular FL, west to se. TX; West Indies; Central America to South America. The two species previously recognized appear to be only different growth forms, induced by different hydrologic conditions. [= FNA, GW, K, WH, Z; > M. aubletii Michaux – RAB, S; > M. fluviatilis – RAB, S]

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**Juncus** Linnaeus 1753 (Rush)

(by B.A. Sorrie and W.M. Knapp)

A genus of about 250-300 species, herbs, of cosmopolitan distribution. Drábková et al. (2003) indicate that *Juncus trifidus* may not be part of *Juncus*, and may be as closely related to *Luzula*. References: Brooks & Clemants in FNA (2000); Kirschner et al. (2002b, 2002c)=Y; Bridges & Orzell (2008); Clemants (1990); Balslev in Kubitzki (1998b); Zika (2003)=Z, Drábková et al. (2003); F; GW; RAB. The key based, in part, on those references.
subgenus *Juncus*, section *Juncus*: acutus ssp. leopoldii, roemerianus
subgenus *Juncus*, section Graminifoli*: filipendulius, marginatus, biflorus, longii, repens
subgenus *Juncus*, section *Iridofili*: polycyphatus
subgenus *Juncus*, section *Oxypodium*: acuminatus, brachycephalus, brevicaudatus, caesariensis, canadensis, megacephalus, militaris, nodosus, paludosus, pelocarpus, subcaudatus, torreyi, trigonocarpus, validus var. validus
subgenus *Agathryon*, section *Tenaigea*: bufonius var. bufonius
subgenus *Agathryon*, section *Steirochloa*: gerardii, coriaceus, [brachyphyllus], georgianus, secundus, dichotomus, tenuis, anhelatus, interior, dudleyi
subgenus *Agathryon*, section *Juncotypus*: gymnocarpus, [filiformis], inflexus, effusus var. solutus, pylaei, balticus
UNCERTAIN placement (perhaps not even a *Juncus*): tridens

Identification Notes:
For identification of most rushes, it is important to collect plants with mature capsules and seeds. Stamen number is often a diagnostic character and can be determined after anthesis by counting the number of persistent filaments located behind the tepals. Care must be taken to collect specimens with unjured heads, especially for the group of rushes in Key D; the long beaks of the capsules are often fragile and easily broken off.

1. Inflorescence appearing lateral; inflorescence bracteolate appearing to be a continuation of the culm. .............................. Key A
2. Leaf blades cotyledonate (sometimes obscure in dried specimens; if so, rest leaf on hard surface and run fingernail over it lengthwise).
   1. Flowers borne in heads (glomerules) of 2-6 flowers per head; leaves spine-tipped; single bracteole subtending glomerule present at base of pedicel; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*] ................................. J. acutus ssp. leopoldii
   2. Capsule 3.5-5 mm long, obviously longer than the tepals ......................................................... J. roemerianus
   3. Flowers borne singly on branches of inflorescence; leaves not spine-tipped; each flower subtended by two bracteoles in addition to bracteole (of the pedicel); [subgenus *Juncus*, section *Juncus*]; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*] ................................. J. coriaceus
   4. Capsule < 3.5 mm long, shorter than or nearly equaling the tepals ......................................................... J. gymnocarpus
   5. Heads spherical or nearly so, usually 15-60 flowered ......................................................... J. gymnocarpus
   6. Heads turbinate to hemispherical, 3-15 flowered; [subgenus *Juncus*, section *Oxypodium*] ................................. J. filiformis
   7. Culms well spaced along creeping rhizomes.
   8. Rhizomes 1.5-2 mm diameter; culms 1 mm diameter; inflorescence 3-12 flowered; [boreal, south to ne. WV] ............... J. filiformis
   9. Rhizomes 2-4 mm diameter; culms 1.5-2.5 mm diameter; inflorescence 8-30+ flowered; [rare montane plant in NC and SC] ............... J. gymnocarpus
   10. Anthers shorter than filaments ......................................................... J. balticus var. littoralis
   11. Culms cespitose or tufted on short branching rhizomes.
   12. Capsules 3-4 mm long; stamens 6; [rare alien in piedmont and mountains of VA] .............................................. J. inflexus
   13. Capsules 1.5-3.2 mm long; stamens 3; [widespread native].
   14. Stems finely grooved, with 25-30 striations just below inflorescence, soft, easily compressed; perianth 1.9-2.8 mm long, sepals
      equaling petals ......................................................... J. effusus ssp. solutus

1. Inflorescence appearing terminal; inflorescence bracteolate not appearing to be a continuation of the culm.

   2. Leaf blades septate; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*]; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*] ................................. J. filiformis
   3. Mature seeds distinctly tailed with elongate appendages at each end (may be obscure in J. subcaudatus), seeds 0.7-2.5 mm long;
      [subgenus *Juncus*, section *Oxypodium*] ................................. J. pelocarpus
   4. Flowers in heads (glomerules) of 2 or more, individual flowers not subtended by two bracteoles (in addition to the bracteole
      of the pedicel); [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*]; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*] ................................. J. longii
   5. widest leaf blade (2.6-) 3.1-4.5 (-5.4) mm wide; sheath of lowest leaf (3.2-) 4.3-7.8 (-9.7) cm long; tallest culm (27.2-) 50.8-81.2
      (-100.7) cm; anthers (0.5-) 0.6-1.0 (-1.3) mm long, exserted; stem base (3.4-) 5.8-9.6 (-12.0) mm wide ........................................ J. biflorus

KEY A

1. Flowers borne in heads (glomerules) of 2-6 flowers per head; leaves spine-tipped; single bracteole subtending glomerule present at base of
   pedicel; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*]; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*] ................................. J. acutus ssp. leopoldii
2. Capsule 3.5-5 mm long, obviously longer than the tepals ......................................................... J. acutus ssp. leopoldii
3. Flowers borne singly on branches of inflorescence; leaves not spine-tipped; each flower subtended by two bracteoles in addition to bracteole
   (of the pedicel); [subgenus *Juncus*, section *Juncus*]; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*] ................................. J. coriaceus
4. Capsule < 3.5 mm long, shorter than or nearly equaling the tepals ......................................................... J. gymnocarpus
5. Heads spherical or nearly so, usually 15-60 flowered ......................................................... J. gymnocarpus
6. Heads turbinate to hemispherical, 3-15 flowered; [subgenus *Juncus*, section *Oxypodium*] ................................. J. filiformis
7. Culms well spaced along creeping rhizomes.
8. Anthers shorter than filaments ......................................................... J. balticus var. littoralis
9. Rhizomes 1.5-2 mm diameter; culms 1 mm diameter; inflorescence 3-12 flowered; [boreal, south to ne. WV] ............... J. filiformis
10. Rhizomes 2-4 mm diameter; culms 1.5-2.5 mm diameter; inflorescence 8-30+ flowered; [rare montane plant in NC and SC] ............... J. gymnocarpus
11. Anthers longer than filaments ......................................................... J. gymnocarpus
12. Culms cespitose or tufted on short branching rhizomes.
13. Capsules 3-4 mm long; stamens 6; [rare alien in piedmont and mountains of VA] .............................................. J. inflexus
14. Capsules 1.5-3.2 mm long; stamens 3; [widespread native].
15. Stems finely grooved, with 25-30 striations just below inflorescence, soft, easily compressed; perianth 1.9-2.8 mm long, sepals
   equaling petals ......................................................... J. effusus ssp. solutus

KEY B

1. Flowers borne in heads (glomerules) of 2 or more, individual flowers not subtended by two bracteoles (in addition to the bracteole at the base
   of the pedicel); [subgenus *Juncus*, section *Juncus*]; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*]; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*] ................................. J. acutus ssp. leopoldii
2. Perianth 6-10 mm long; plant aquatic, submerged and sterile or emersed/s trenched and fertile; stems weak, creeping, mat-forming
   ......................................................... J. filiformis
3. Heads < 6 mm long; plant of uplands or wetland margins, never submerged; stems erect, never creeping or mat-forming.
4. Infructescence usually congested, (1.8-) 2.4-4.7 (-6.4) cm long; greatest distance between adjacent rhizome cataphylls (5.3-) 6-10.5
   (-13.0) mm; rhizome width (measured between adjacent cataphylls) (0.8-) 1.0-1.4 (-1.9) mm ........................................ J. longii
5. Heads 1-5 (-10) per culm; [calcareae glades inland, east to GA and TN] .............................................. J. filiformis
6. Heads > 9 per culm; [collectively widespread].
1 Leaves terete, not at all flattened; [subgenus Agathryon, section Tenageia] ........................................... J. bufonius

6 Plants perennial, with coarse roots or persistent leaf bases.

7 Leaves narrowly elliptic in cross-section.

8 Auricles 3-6 mm long at summit of leaf sheath.

9 Capsules < 3/4 length of perianth, borne broadly spaced along the usually diffuse branches of the inflorescence .......... J. anthelatus

3 Plants strictly cespitose, without any short, hard, knotty rhizomes; tepals lanceolate .................................. J. compressus

2 Leaves with complete septae; heads about 12 mm diameter; tips of dehisced capsules split; [subgenus Agathryon, section Steirochloa] ........................................... J. brachycephalus

5 Inflorescence narrow, the branches erect; mature capsules dark brown; heads 2-7 flowered................................. J. brevicaudatus

KEY C

1 Culms and leaves scabrid, gray-green or blue-green; seeds 2.0-2.5 mm long.......................................................... J. caesariensis

2 Seeds 1.2-2.2 mm long, seed body < ½ length of seed.

3 Mature capsules 3.0-4.0 mm long, < 1.5 mm longer than perianth, light reddish brown to light brown; heads 5-50 flowered......................................................... J. canadensis

4 Perianth usually 2.5-3.5 mm long; flowers not secund; capsules ellipsoid or narrowly so; restricted to granite flatrocks.

11 Leaf blades flat.

12 Perianth obtuse apically; capsule chestnut brown or darker; [alien, ranging south to MD].................................. J. dichotomus

6 Mature capsules pale tan or darker; [of prairies and plains, east to KY, se TN] ..................................................... J. subcaudatus

8 Auricles 3-6 mm long at summit of leaf sheath.

9 Capsules < 3/4 length of perianth, borne broadly spaced along the usually diffuse branches of the inflorescence .......... J. anthelatus

3 Plants strictly cespitose, without any short, hard, knotty rhizomes; tepals lanceolate .................................. J. compressus

2 Leaves with complete septae; heads about 12 mm diameter; tips of dehisced capsules split; [subgenus Agathryon, section Steirochloa] ........................................... J. brachycephalus

5 Inflorescence narrow, the branches erect; mature capsules dark brown; heads 2-7 flowered................................. J. brevicaudatus

5 Inflorescence open, the branches widely spreading; mature capsules dark straw colored; heads 5-20 flowered........ J. subcaudatus

9 Heads oblong or oblanceolate; mature capsule 3.0-4.5 mm long.......................................................... J. diffusissimus

1 Mature capsules 2 mm or more longer than perianth, 4.0-5.2 mm long.......................................................... J. diffusissimus

Juncus acutus Linnaeus ssp. leopoldii (Parlatore) Snogerup. Sandy soil at edge of salt marsh. Reported for se. GA by Jones & Coile (1988) and Kartesz (1999), but not by FNA. The distribution in GA is documented by a correctly-identified specimen at Herbarium GA. [= FNA, K, Y] [not yet keyed]


**Juncus caesariensis** Coville, New Jersey Rush. Sphagnum seepages in the Coastal Plain of VA, seeps and bogs at low to moderate elevations in the Mountains of NC. July-October. Found in 1992 from a seepage bog in Clay County, NC, and in 1993 from a bog in Henderson County, NC, where associated with northern disjuncts. Rare throughout its range, it is known only from several sites in NJ, MD, VA, NC, and NS (Newell & Newell 1994). The scabrid leaf blades and large seeds quickly separate this species from the other long-tailed rushes. It should be looked for along seepage slopes and bogs in the fall-line sandhills and the outer Coastal Plain. [= C, F, FNA, G, K, Y]

**Juncus canadensis** J. Gay ex Laharpe, Canadian Rush. Lake, pond and stream margins, swamps, bogs, seepage slopes, wet meadows, ditches. July-October. NL (Newfoundland) to MN, south to c. peninsular FL, TN, and LA. _J. canadensis_ is here treated as a single, polymorphic species. Fernald and others have described up to 5 forms and varieties of _J. canadensis_, based on variation in flower and capsule size (from 2.5 mm to nearly 4.0 mm), shape of the glomerules (densely flowered and subglobose to few-flowered and turbinate), and structure and size of the inflorescence (congested to open). Further study is necessary to determine whether any of these taxa should be recognized. [= RAB, C, FNA, G, K, S, WH, WV, Y; > _J. canadensis_ var. _canadensis_ – F; > _J. canadensis_ var. _euroauster_ Fernald – F]

* _Juncus capitatus_ Weigel. Reported for n. AL (Kartesz 1999); rejected by Kral et al. (2010). [= K] [rejected; not keyed]

* _Juncus compressus_ Jacquin. Disturbed ground, ditches, in saline or alkaline soils; native of Europe. NS to ON, south to MD, PA, w. NY, MI, WS, and sporadically distributed westward in high elevations. [= FNA, C, F, FNA, G, K, Y]

* _Juncus conglomeratus_ Linnaeus. Low, marshy or peaty places; native of Europe. July-September. Reported for WV and northwards. [= C, K; < _J. effusus_ – FNA; = _J. effusus_ Linnaeus var. _conglomeratus_ (Linnaeus) Engelmann – F]


**Juncus debilis** A. Gray, Weak Rush. Marshy shores, stream and pond margins, along puddles in wet, disturbed clearings, ditches. May-August. RI to MO, south to n. FL and e. TX; Honduras. [= RAB, C, F, FNA, G, K, S, WH, Y]

**Juncus dichotomus** Elliott. Often in disturbed, open, wet areas, ditches, wet meadows. June-October. MA to c. peninsular FL, west to OK and TX; Central America. The character used to separate _J. platyphyllus_ (Wiegand) Fernald from _J. dichotomus_ (flat leaf blade vs. terete leaf blade) does not appear to be reliable; leaf blades from culms in the same clump may vary from flat to slightly involute to completely terete. [= FNA, GW, W, WV, Y; > _J. dichotomus_ – RAB, F; > _J. platyphyllus_ (Wiegand) Fernald – RAB, F; = _J. tenuis_ var. _dichotomus_ (Elliott) A. Wood – C; > _J. dichotomus_ var. _dichotomus_ – G, K, S; > _J. dichotomus_ var. _platyphyllus_ Wiegand – G, K, S]

**Juncus diffusissimus** Buckley, Diffuse Rush, Slim-pod Rush. Low, wet open areas, ditches, margins of ponds and streams. May-September. Mostly Coastal Plain from se. VA to c. peninsular FL, west to e. and nc. TX; also s. IN to MO, KA, OK, TN, and KY. [= RAB, C, F, FNA, G, K, S, WH, WV, Y]


**Juncus ephriamii** Coville, Ephemeral Rush. Marshes of ponds and lakes, depressions in savannas and flatwoods, wet, disturbed clearings, roadside ditches. May-September. Coastal Plain, DE to c. peninsular FL, west to se. TX. Capsules of _J. ephriamii_ are similar in shape to _J. acuminatus_, but the presence of tubiferous roots, shorter perianth (2.0-2.5 mm long vs. 2.5-3.5 mm) and fewer-flowered glomerules (3-8 flowered vs. 5-many flowered) clearly distinguishes _J. ephriamii_ from _J. acuminatus_. [= RAB, C, F, FNA, G, K, S, WH, Y; > _J. ephriamii_ var. _ephrilii_ – K; > _J. ephriamii_ var. _polyanthesmus_ C. Mohr – K]

**Juncus effusus** Fernald ex Wiegand, Diffuse Rush. Wet meadows, ditches, alkaline soils. July-September. Coastal Plain, DE to c. peninsular FL, west to se. TX; also nw. VA, w. PA, w. WV, n. MI, and n. MN. [= C, F, FNA, G, K]
**Juncus filipendulus** Cowille. Texas Plains Rush. Prairies, limestone barrens. KY, TN, and AL west to OK and TX. [= FNA, GW, K, S, Y]


**Juncus greenei** Oakes & Tuckerman, Greene’s Rush. Pine barrens, other dry, open sandy sites. June-July. NB west to MN, south to s. NJ, n. OH, n. IN, n. IL, and IA. [= C, F, FNA, G, K]

**Juncus gymnocarpus** Cowille, Seep Rush. Bogs, seeps, streambanks. July-September. Local, mountains of e. PA, w. NC, e. TN, nw. SC and ne. GA, Coastal Plain of se. AL, s. MS (Sorrie & Leonard 1999), and w. Panhandle FL. In the Appalachians, *J. gymnocarpus* is scattered in mountain bogs and seeps throughout the mountain region; it reaches its most general occurrence in the escarpment gorge region of Transylvania, Macon, and Jackson counties, NC, where it also occurs along streambanks, especially in the vicinity of waterfalls. [= RAB, C, F, FNA, G, K, S, W, WH, Y]


**Juncus interior** Wiegang. Prairies, disturbed sites. OH west to SK, south to e. TN, AL (Sorrie & LeBlond 2008), MS (Sorrie & LeBlond 2008), LA, TX, and NM. Also reported for VA and NC (Kartesz 1999); the NC report is based on a misidentified specimen. [Further investigate] [= FNA, G, S, W, Y; > J. interior var. interior – K; < J. tenuis Willdenow var. tenuis – C; < J. tenuis – GW]

**Juncus longii** Fernald. Usually in very wet, often inundated sites, bogs, ditches, rooting in clay or peat. June-August. MD south through VA, NC, SC to s. MS, mainly in the Coastal Plain; disjunct inland in boggy sites, as in w. NC, nc. GA, TN, and n. AL (Knapp & Naczi 2008, more extensive distributions are based on misattribution). See Knapp & Naczi (2008) for clarification of the *Juncus marginatus* complex. [= RAB, F, K; < J. biflorus – C, G; < J. marginatus – FNA, GW, Y (also see J. biflorus and J. longii); = J. aristulatus Michaux var. aristulatus – S]

**Juncus marginatus** Rostkovius. Weat meadows, bogs, generally throughout in wet, sandy or peaty soil. June-September. NS to ON, MI, and NE, south to s. peninsular FL and TX; disjunct in CA and in South America. See Knapp & Naczi (2008) for clarification of the *Juncus marginatus* complex. [= RAB, C, G, K, S, W, WV; > J. marginatus var. marginatus – F; > J. marginatus var. setosus Cowille – F; < J. marginatus – FNA, GW, WH, Y (also see J. biflorus and J. longii); > J. marginatus var. setosus (Cowille) Small – G]


**Juncus militaris** Bigelow, Bayonet Rush. Lakeshores, shallow streams. NS to MD, DE, and ne. PA; inland near the Great Lakes; disjunct at Phelps Lake, Washington County, NC (Sorrie & LeBlond 2008). [= C, F, FNA, G, K, Y]

**Juncus nodatus** Cowille. Shallow water, marshes, sloughs, savannas, bogs. KY west to KS, south to TN, AL, w. Panhandle FL, MS (Sorrie & LeBlond 2008), LA, and TX. [= FNA, C, G, GW, K, Y; ? J. robustus, preoccupied] [synonymy incomplete]

**Juncus nodosus** Linnaeus. Swamps, streamsidies. July-August. NL (Newfoundland) to BC, south to DE, w. VA, WV, IN, MO, TX, and CA. [= C, F, FNA, G, WV, Y; > J. nodosus var. nodosus – K]

**Juncus paludosus** E.L. Bridges & Orzell. Hardwood swamps, cypress swamps and stringers with seasonally flowing water, adjacent ditches. April-May; May-July. Ne. FL and e. FL Panhandle south to s. FL. See Bridges & Orzell (2008) for more detailed information.

**Juncus pelocarpus** E. Meyer. Ditches, along pond and stream margins, seepage slopes, disturbed open areas, sea-level fens, interdunal swales, Atlantic white-cedar swamps. July-October. NL (Labrador) west to MN, south to DE, e. VA, n. IN; se. VA to SC; FL Panhandle and s. AL. The seaptae along the narrow leaf blades of *J. pelocarpus* are often difficult to detect. More southern populations (from VA southwards) are more robust and have sometimes been separated as *J. abortivus*, but variation appears to be clinal. [= FNA, WH, Y; > J. pelocarpus – K; > J. pelocarpus var. pelocarpus – C, F, G; > J. abortivus Chapman – RAB, F, GW, K, S; > J. pelocarpus E. Meyer var. crassicaudex Engelmann – C, F, G]
**Juncus polycephalus** Michaux, Many-headed Rush. Sandy pond margins, ditches, savannas. July-September. Coastal Plain, NC to s. FL, west to e. TX. [= WH = Juncus polycephalus – RAB, F, FNA, GW, K, S, Y, orthographic variant]

**Juncus pylaiei** LaHarpe, Common Rush. Moist soil, marshes, margin of streams, ponds, lakes and swamps, low meadows (overlooked and probably more widespread and common than shown). June-September. Throughout eastern North America, south to NC and SC. [= C, K, Y, Z; < J. effusus – RAB, FNA, GW, K, WH; > J. effusus var. costulatus St. John – F; > J. effusus Linnaeus var. pylaiei (LaHarpe) Fernald & Wiegand – F; < J. effusus Linnaeus var. solutus Fernald & Wiegand – G]

**Juncus repens** Michaux, Creeping Rush. Streams, ponds, lakes, ditches, wet depressions in flatwoods, cypress savannas. June-October. DE to s. FL, west to TX, north into OK and TN; Mexico (Tabasco); Cuba. This species commonly forms dense mats – a useful field character. [= RAB, C, F, FNA, G, GW, K, S, WH, Y]

**Juncus roemerianus** Scheele, Black Needle Rush. Coastal tidal marshes, forming dense stands at and above mean high tide, above the Spartina alterniflora zone. January-June; May-October. MD to s. FL, west to se. TX. See Eleuterius (1977) for additional information on this species. [= RAB, C, F, FNA, G, GW, K, S, WH, Y]


**Juncus scirpoides** Lamarrk var. **scirpoides**. Wet, open, disturbed areas, ditches, sandhill pocosin ecotones and seepage bogs, savannas and wet pine flatwoods, wet meadows. June-October. S. NY to s. FL, mostly Coastal Plain and Piedmont; west to TX; IN to MI, MO, OK. [= F, S; < J. scirpoides – RAB, C, FNA, GW, K, WH, WV, Y]

**Juncus secundus** Beauvois ex Poir. Dry fields, rock outcrops. June-October. ME to IN, south to e. OK, n. AL, and n. GA. [= RAB, C, F, FNA, GW, K, S, WH, WV, Y]

**Juncus subcaudatus** (Engelmann) Coville & Blake, Somewhat-tailed Rush. Bogs, mossy woods and other wet places. July-October. NS to NY, southwest to MO and southeast to GA. *J. subcaudatus* is one of the more difficult rushes to identify. Although it is grouped with *J. canadensis*, *J. brevicaudatus*, and the other long-tailed rushes, its seeds lack distinct, long appendages. In general appearance it matches *J. acuminatus* quite well; mature seed size and mature capsule size (*J. subcaudatus* capsules are generally well exerted above the perianth, while *J. acuminatus* capsules are equal to only slightly exerted above the capsule) need to be examined in order not to confuse the two taxa. [= RAB, C, FNA, GW, K, S, WH, Y; > J. subcaudatus var. subcaudatus – F, K]

**Juncus tenuis** Willdenow, Path Rush. Dry or moist soil along roadsides and paths, fields. June-September. NL (Labrador) west to AK, south to FL, TX, CA, and n. Mexico; Central and South America; introduced widely around the world. *J. tenuis* as it is here treated includes *J. tenuis* var. *williamsii* Fernald, which has a more congested inflorescence with arched to recurved inflorescence branches. [= FNA, Y; < J. tenuis – RAB, GW, K, S, WH; > J. tenuis var. tenuis – C; > J. tenuis var. tenuis – F, WV; > J. tenuis var. williamsii Fernald – F]


**Juncus trifidus** Linnaeus, Highland Rush. Rock crevices at high elevations, on greenstone, mica schist, amphibolite, hornblende gneiss, and quartztic sandstone. June-September. The species is circumboreal, occurring in arctic-alpine situations in n. Europe and n. North America where it ranges from NL (Newfoundland) to QC, south to s. New England and NY; disjunct in VA (Stony Man, Page County) and NC (Craggy Pinnacle, Craggy Dome, and Craggy Gardens, Buncombe County; Eagle Cliff, Mitchell County; Three Top Mountain, Ashe County), and WV (North Fork Mountain, Pendleton County). As with many circumboreal species of polymorphic nature, there is disagreement over the recognition of infraspecific taxa. *Var. monanthos* (Jacquin) Bluff & Fingerhuth or ssp. *monanthos* (Jacquin) A. Scherson & G. Graebner has often been applied to e. North American *J. trifidus*, but should apply (if considered valid at all) only to *J. trifidus* of limestone areas of Europe. Although Hämét-Ahti (1980) correctly showed that Appalachian *J. trifidus* (from acidic and mafic gneisses and schists) does not belong to *J. monanthos* (*J. trifidus* ssp. *monanthos*, *J. trifidus* var. *monanthos*), her treatment of Appalachian plants as ssp. *carolinianus* Hämét-Ahti has been controversial. This treatment follows Clements (1990), who concludes that the primarily vegetative characters used to separate Appalachian plants from the European (blade lengths and relative positions) are too variable to warrant recognition of subspecies or varieties in the taxon. Further study is warranted. [= Y; < J. trifidus – FNA, S; > J. trifidus var. monanthos (Jacquin) Bluff & Fingerhuth – RAB, F, GW, misapplied; > J. trifidus ssp. *carolinianus* Hämét-Ahti – C, K]
**Juncus trigonocarpus** Steudel. Seepage slopes, bogs, along stream margins, ditches. July-October. Coastal Plain, NC to FL Panhandle, west to e. TX. Young *J. trigonocarpus* and *J. canadensis* are often confused; once mature, however, the two can usually be separated by capsule color alone. Although *J. canadensis* capsules reddish-purple tone of *J. trigonocarpus*. Seed and capsule size are also distinct for the two taxa. [= RAB, FNA, GW, K, S, WH, Y]


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**Luzula A.P. de Candolle 1805 (Wood-rush)**


1 Flowers borne singly; inflorescences branched or unbranched; [subgenus *Pterodes*].

2 Inflorescences simple, with an occasional pedicel branching from the base of a flower; apical appendages of seeds 0.6-1.5 (-2.1) mm long; seed/appendage length ratio 1.0-2.8 .................................................................L. acuminata var. *acuminata*

3 Inflorescences usually branching, the pedicels commonly paired; apical appendages of seeds 0.4-1.1 mm long; seed/appendage length ratio 1.0-2.8 .................................................................L. acuminata var. *carolinae*

4 Seeds 1.1-1.7 mm long; caruncle 0.2-0.5 mm long; plants not producing basal bulblets ........................................L. multiflora var. *multiflora*


**Luzula echinata** (Small) F.J. Hermann, Spreading Wood-rush. Forests, bogs. Se. MA, se. NY PA, WV, and IA south to GA, AL, MS, and e. TX. March-August. [= C, FNA, GW, K, RAB, WV, Z; > L. echinata var. echinata – F; > L. echinata var. mesochorea F.J. Hermann – F; = L. campestris (Linnaeus) A.P. de Candolle var. echinata (Small) Fernald & Wiegand – G; = Juncoides echinatum Small – S; < L. multiflora – W]

**Luzula multiflora** (Ehrhart) Lejeune var. *multiflora*. Forests. March-August. Circumboreal, in North America from NL (Newfoundland), ON, SK, and BC, south to NC, GA, AL, MS, MO, MT, and OR; Eurasia; Costa Rica. [= F, WV; < L. multiflora – C, RAB; = L. campestris (Linnaeus) A.P. de Candolle var. multiflora (Ehrhart) Celak – G; = L. multiflora ssp. multiflora var. multiflora – K; = L. multiflora ssp. multiflora – FNA, Z; < L. multiflora – W]

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**99. CYPERACEAE** A.L. de Jussieu 1789 (Sedge Family) [in POALES]

A family of about 100 genera and 5000 species, mostly herbs, cosmopolitan. References: Ball, Reznicek, & Murray in FNA (2002b); Tucker (1987); Goetghbeur in Kubitzki (1998b).

1 Achene enclosed in a perigynium (a sac-like structure); [subfamily Caricoideae, tribe Cariceae] ................................................................. *Carex*

1 Achene not enclosed in a perigynium.
2 Scales obviously and strongly distichously imbricate; spikelets aggregated into spikes or heads; [subfamily Cyperoideae].
3 Inflorescence axillary; leaves predominantly cauline, conspicuously 3-ranked; perianth bristles subtending the achene 6-9; [tribe Dacilichaeae].................................................................................................................................Dacilichium
4 Inflorescence terminal, more-or-less scapos (though immediately subtended by leafy bracts); leaves predominantly basal, not 3-ranked; perianth bristles absent (Cyperus and Kylinga) or present (Schoenus); [tribe Cyperaeae].................................................................................................................................Schoenus
5 Perianth bristles present...........................................................................................................................................................................Kyllinga
6 Scales spirally imbricate; spikelets not usually aggregated.

Bolboschoenus Palla 1905 (Bulrush)

A genus of about 10-16 species, herbs, cosmopolitan. The distinction of this genus from Schoenoplectus is uncertain and controversial; it is generally accepted in the Old World, and generally not in the New World. References: Smith in FNA (2002b); Strong (1994)-Z, Goethegeber in Kubitzki (1998b).

1 Ventral summit of leaf sheaths truncate or concave, the nerves destined for the leaf margins diverging gradually..................................................B. maritimus ssp. paludosus
2 Ventral summit of leaf sheaths convex, the nerves destined for the leaf margins diverging abruptly, making a nearly right-angle bend.
3 Bristles mostly equaling to surpassing the distinctly trigonous achene..............................................................................................B. fluviatilis
4 Bristles shorter than to equaling the lenticular or plano-convex achene.
3 Inflorescence relatively open, with (10-) 15-50 spikelets; bristles persistent .......................................................... B. novae-angliae
3 Inflorescence relatively congested, mostly with 5-20 spikelets; bristles more or less caducous............................................ B. robustus

Bolboschoenus fluitatilis (Torrey) Sojak, River Bulrush. Tidal and river marshes. June-early July; July-August. NB west to SK, BC (Vancouver Island) and WA, south to VA, KY, TN, s. AL, OH, IN, KS, AZ, and CA; Asia; Australia and New Zealand. [= FNA; > Scirpus fluitatilis (Torrey) A. Gray – C, F, G; > Schoenoplectus fluitatilis (Torrey) M.T. Strong – K, Z]

Bolboschoenus maritimus (Linnaeus) Pall. sps. paludosus (A. Nelson) T. Koyama, Alkali Bulrush, Salt-marsh Bulrush. Marshes. Interruptedly circumboreal, south in North America to VA, NY, MN, MO, OK, TX, and Mexico. [= FNA; > Scirpus maritimus var. maritimus – C; > Scirpus maritimus var. fernaldii (Bicknell) Beetle – F (also see Bolboschoenus novae-angliae); = Scirpus maritimus var. fernaldii (Bicknell) Beetl – G; = Scirpus maritimus Linnaeus; = Schoenoplectus maritimus (Linnaeus) Lye – K, Z]

Bolboschoenus novae-angliae (Britton) S.G. Smith, Salt-marsh Bulrush. Fresh to brackish tidal marshes, ditches. Late June-July; July-September. ME to GA. Probably a hybrid derivative of Bolboschoenus fluitatilis and B. robustus, but its distinctiveness and ecological behavior suggest that it should be treated as a species; see Schuyler (1975) and Cronquist (1991) for additional discussion. [= FNA; > Scirpus cylindricus (Torrey) Britton – C, K, Beal (1977), illegitimate name; < Scirpus maritimus var. fernaldii (Bicknell) Beetle – F; = Scirpus robustus Pursh var. novae-angliae (Britton) Beetl – G; = Schoenoplectus novae-angliae (Britton) M.T. Strong – K, Z]

Bolboschoenus robustus (Pursh) Sojak, Salt-marsh Bulrush. Brickish marshes. Late May-June (-September); late June-September. Along the coasts, from NS to s. FL, west to TX, and into tropical America; also in CA. [= FNA; > Scirpus robustus Pursh – RAB, C, F, GW, S, W, WH; = Scirpus robustus var. robustus – G; = Schoenoplectus robustus (Pursh) M.T. Strong – K, Z]

A genus of about 100 species, herbs, of tropical and warm temperate areas, concentrated especially in tropical Africa and tropical South America. References: Kral (1971)–Z; Kral in FNA (2002b); Goetheheuer in Kubitzki (1998b).

1 Spikelets sessile, the inflorescence therefore a capitate cluster (sometimes a few spikelets pedicellate, but the pedicels not generally longer than the spikelets, the inflorescence still appearing glomerate).

2 Inflorescence bracts widened abruptly at its base, the widened portion prominently fimbriate-pectinate; perennial, culms 10-50 cm tall; achenes 1-1.3 mm long, tan or brown (when ripe); spikelet scales 0.7-1.8 mm long, with obtuse to rounded apices.

3 Inflorescence bracts widened abruptly at its base, the widened portion prominently fimbriate-pectinate; perennial, culms 10-50 cm tall; achenes 0.8-1.2 mm long, transversely rugose; spikelet scales usually greenish or pale brown, dull, puberulent...

4 Achenes very finely papillose and waxy, gray or dark greenish-brown (when ripe); spikelet scales 0.7-1.8 mm long, with obtuse to rounded apices.

5 Annual, to 1-2(-3) dm tall; inflorescence a simple (rarely compound) umbel of few (3-9) lance-ovoid spikelets; longest involucral bract seldom exceeding the inflorescence; leaf margins usually hispidulous.......................................................... B. ciliatifolia

5 Perennial, to 1.5-4 dm tall; inflorescence a compound (rarely simple) umbel of many (8-30) oblong or lance-linear spikelets; longest involucral bract commonly exceeding the inflorescence; leaf margins usually distinctly tuberculate-seabrid.............................. B. coarctata

* Bulbostyly barbata (Rottbøll) C.B. Clarke, Old World Hairsedge. Sandy fields; native of the Old World tropics. July-October. [= RAB, FNA, GW, K, W, WH, Z; = Stenophyllus barbatus (Rottbøll) Britton – S]

Bulboschoenus capillaris (Linnaeus) Kunth ex C.B. Clarke, Common Hairsedge. Thin soils on rock outcrops, especially granite domes and granite flatrocks (but also on mafic rocks, such as diabase), sandy soils, fields, bogs (in FL). July-October. ME to MN, south to Panhandle FL and TX, and west to AZ and CA, also in Mexico, Central America, the West Indies, and s. Asia. This species frequently has a mixture of long and very short culms, the short culms only a few cm long and thus nearly hidden amongst the leaves. [= RAB, C, F, G, GW, W, WH, Z; > B. capillaris var. capillaris – F; > B. capillaris var. crebra Fernald – F; > B. capillaris var. isopoda Fernald – F; = B. capillaris sps. capillaris – K; = Stenophyllus capillaris (Linnaeus) Britton – S]

Bulboschoenus ciliatifolia (Elliot) Fernald, Savanna Hairsedge. Moist to wet sands of savannas, roadsides, disturbed areas. July-October. Se. VA south to s. FL and west to s. AL. Kral (1971) describes this plant as occurring in generally wetter habitats and being much weedier than B. coarctata. The sympatry of this taxon and B. coarctata suggests that they are best recognized as species. [= F, G; = Bulboschoenus ciliatifolia (Elliot) Fernald var. ciliatifolia – C, F, GW, K, Z; < B. ciliatifolia – RAB, WH (also see B. coarctata); = Stenophyllus ciliatifolius (Elliot) C. Mohr – S]

Bulboschoenus coarctata (Elliot) Fernald, Elliot's Hairsedge. Sandhills, usually associated with longleaf pine and wiregrass. July-October. Se. VA south to s. FL and west to e. TX, north in the interior to sw. TN; Cuba. [= F, G; = Bulboschoenus ciliatifolia
A genus of about 2000 (or more) species, herbs, cosmopolitan, especially temperate and boreal. References: Mackenzie (1931-1935)=M; Ball & Reznicek in FNA (2002b); Goetghebeur in Kubitzki (1998b); Frye & Lea (2001). Key to sections adapted closely from FNA.

Key to the sections of Carex

1 Spike 1 per culm, all flowers attached to the main stem in a terminal spike ............................................................... Key A

1 Spike 2 or more per culm (some flowers in lateral spikes)

2 All flowers staminate .................................................................................................................................................. Key B

2 At least some flowers pistillate.

3 Stigmas 2; achenes flat or biconvex in cross-section (lenticular) .............................................................................. Key C

3 Stigmas (2-) 3 (-4); achenes trigonous or tereete in cross-section.

4 Body of perigynium pubescent, scabrous, hispid, or papillose (if papillose, the papillae longer than wide) .............. Key D

4 Body of perigynium glabrous or papillose (if papillose the papillae shorter than wide).

5 Bracts sheathless or with sheath < 4 mm long (rarely longer, and then the sheath shorter than the diameter of the stem) .... Key E

5 Bracts (at least the lower) with sheath > 4 mm long (and longer than the diameter of the stem) ... Key F

{not complete at this time}

Key A

1 Leaf blades 20-60 mm wide, without a midrib (with 40-100 parallel nerves all of equal prominence), leathery, the apex obtuse; leaf margin scarious, minutely crisped-ruffled (feeling scaberulous to the touch). ................................................................. C. fraseriana

1 Leaf blades 0.5-25 (-52) mm wide, with a midrib, herbaceous, the apex acute; leaf margin various (smooth or scabrous, but not as described below).

2 Spike entirely staminate

3 Culms distinctly red or purple at the base .................................................................................................................. C. picta in Section 41: Pictae

3 Culms yellow to brown or black, without red or purple coloration.

4 Culms shorter than the leaves; widest leaf blades > 2 mm wide ........................................................................ Section 44: Phyllostachyae

4 Culms longer than the leaves; widest leaf blades < 2 mm wide ............................................................................... C. exilis in Section 11: Stellulatae

2 Spike pistillate or with both pistillate and staminate flowers.

5 Stigmas 2; achenes lenticular ................................................................................................................................... C. exilis in Section 11: Stellulatae

5 Stigmas 3; achenes trigonous.

6 Perigynia pubescent near the tip ............................................................................................................................ C. picta in Section 41: Pictae

6 Perigynia glabrous.

7 Spikes gynecandrous; beak of perigynium with apical teeth > 0.3 mm long ........................................................ C. squarrosa in Section 34: Squarrosae

7 Spikes androgyneous or entirely pistillate; beak of perigynium with apex entire, emarginate, or with teeth < 0.2 mm long.

8 Lower pistillate scales > 10 mm long .......................................................................................................................... Section 44: Phyllostachyae

8 Lower pistillate scales < 10 mm long.

9 Perigynium beak > 2 mm long, as long as or longer than the perigynium body .................................................. Section 44: Phyllostachyae

9 Perigynium beak < 2 mm long, or if more, thentapering to the perigynium body and shorter than the body.

10 Perigynia > 4× as long as wide ........................................................................................................................ C. pauciflora of Section 38: Leucoglochin

10 Perigynia < 4× as long as wide ........................................................................................................................... Section 46: Leptocephalae

Key B

1 Widest leaves 4-8 mm wide; inflorescences more-or-less capitate (occasionally with the lowermost 1 or 2 spikes separated) ................................................................. C. kobomugi in Section 8: Macrocephalae

1 Widest leaves 1-4 mm wide; inflorescences ovoid to cylindric .................................................................................. Section 10: Divisae
Key C

1 Perigynia pubescent, not papillose ............................................................................................................. Section 39: Acrocystis
1 Perigynia glabrous, papillose or not. ........................................................................................................ Section 39: Acrocystis
2 Lateral spikes usually pedunculate; lowestmost inflorescence bracts sometimes with sheath; peduncles with prophyll at base.
3 Pistillate scales (at least the lower) long-awned ..................................................................................... Section 13: Phacocystis
3 Pistillate scales obtuse to acuminate or cuspidate. 
4 Perigynia smooth; style persistent on the achene .................................................................................. Section 30: Viscariae
4 Perigynia often papillose over most of the surface; style deciduous ........................................................ Section 13: Phacocystis
2 Lateral spikes sessile; bracts sheathless; peduncles without (or rarely with) a prophyll
5 Perigynia papillose (visible at 20× magnification).
6 Terminal spike staminate, androgyneous, or gynecandrous (if gynecandrous, the stamine flowers more numerous than the pistillate); lateral spikes at least 2× as long as wide ......................................................... Section 13: Phacocystis
6 Terminal spike staminate or gynecandrous (if gynecandrous, the pistillate flowers more numerous than the pistillate); lateral spikes not much longer than wide ........................................................................ Section 9: Glareosae
5 Perigynia smooth.
7 Terminal spike gynecandrous; lateral spikes gynecandrous or pistillate.
11 Margins of perigynia flat, at least in the upper ⅓, flat portion (measured at the tip of the achene and base of beak) > (0.1-) 0.2 mm wider
12 Achenes rounded at apex (style dehiscing at the surface of the achene); style conspicuously enlarged at the base .................................................. Section 10: Deweyanae
12 Achenes with short apiculus formed by the persistent base of the style; style not conspicuously enlarged at base .................................................. Section 12: Ovaes
11 Margins of perigynia rounded, or with flat portion < 0.1 mm wide.
13 Margins of perigynia rounded or with a very narrow rounded edge; achenes nearly filling the perigynium bodies .................................................................................................................................................. Section 9: Glareosae
13 Margins of perigynia sharply edged or narrowly winged; achenes distinctly perigynium than the perigynium bodies.
9 Perigynia mostly > 2× as long as wide, widest near the base ........................................................................ Section 1: Vulpinae
9 Perigynia mostly < 2× as long as wide, widest near middle.
10 Inflorescences usually branched, at least at the base, usually with > 15 spikes; pistillate scales usually yellow or brown, sometimes with hyaline margins, 3-veined .................................................................................................................................................. Section 3: Multiflorae
10 Inflorescences unbranched or with 1 or 2 short branches at the base, with < 15 spikes; pistillate scales greenish hyaline, 1-veined ........................................................................................................ Section 4: Phaestoglochin
7 Terminal spike androgyneous (rarely entirely stamine or entirely pistillate); lateral spikes androgyneous, stamine, or pistillate.
8 Sheath fronts of lower cauline leaves transversely rugose.
9 Perigynia mostly ≥ 2× as long as wide, widest near the base .................................................................. Section 1: Vulpinae
9 Perigynia mostly ≤ 2× as long as wide, widest near middle.
18 Inflorescences in fruit 1-1.5× as long as wide .......................................................................................... Section 12: Ovaes
18 Inflorescences in fruit 1.5-2 (or more)× as long as wide.
15 Lowermost perigynia in each spike spreading ..................................................................................... Section 11: Stellulatae
16 Lowermost perigynia in each spike ascending or erect. 
15 Lowermost perigynia in each spike ascending or erect.
16 Perigynium serrulate on the margins of the upper body and lower beak .................................................. Section 10: Deweyanae
8 Sheath fronts of lower cauline leaves smooth (or very weakly and indistinctly transversely rugose).
17 Fronts of leaf sheaths dotted red, brown, or yellow.
18 Perigynia widest near the base; culms usually > 1 mm wide .................................................................. Section 1: Vulpinae
18 Perigynia widest near the middle; culms usually < 1 mm wide.
19 Plants densely cespitose, with short rhizomes; pistillate scales acute to acuminate .................. Section 2: Heleoglochin
19 Plants loosely cespitose, sometimes with long rhizomes; pistillate scales (at least the upper) obtuse ................................................................................ Section 3: Multiflorae
17 Fronts of leaf sheaths not dotted, red, brown, or yellow.
20 Upper leaves of culms with front of sheaths green-veined, not differentiated from the rest of the sheath ................................................................................ Section 5: Holarrhenae
20 Upper leaves of culms with front of sheaths whitish-hyamine band extending at least ⅓ the length of the sheath.
21 Perigynia with flat, winglike margins ≥ 0.1 mm wide; plants long-rhizomatous, not cespitose, sometimes forming large colonies .................................................. Section 7: Ammoglochin
21 Perigynia without a flat margin, or with a flat margin < 0.1 mm wide; plants short-rhizomatous or inconspicuously rhizomatous, cespitose or not, sometimes forming large colonies.
22 Plants colonial from long rhizomes ......................................................................................................... Section 6: Divisae
22 Plants cespitose.
23 Spikes not consistently androgyneous, the terminal either entirely stamine or pistillate, the lateral spikes irregularly pistillate, or stamine, or mixed ............................................................................................................. Section 11: Stellulatae
23 Spikes consistently androgyneous, occasionally some of the lateral spikes entirely pistillate.
24 Perigynium widest near the base, tapering from base to beak ................................................................ Section 1: Vulpinae
24 Perigynium widest above the base, often abruptly beaked ................................................................ Section 4: Phaestoglochin

Key D

1 Pistillate spikes all from the base of the plant .......................................................................................... Section 39: Acrocystis
1 Pistillate spikes all or in part borne on the elongate, aboveground stem.
2 Bracts of the lowermost non-basal spike with well-developed sheath > 4 mm long.
3 Beak of perigynium with distinct teeth ≥ 0.6 mm long .......................................................................... Section 29: Carex
3 Beak of perigynium entire, notched, or with indistinct teeth < 0.6 mm long.
4 Bracts of the lowermost non-basal spike bladeless, or with a blade < 2 mm long.
1 Leaf sheath fronts yellow, thickened, and not fragile at the top; leaf blades papillose adaxially (at 25× magnification)........... *C. laevivaginata*

2 Leaf sheath fronts smooth.

3 Larger perigynia 6-8 mm long; leaves to 12 mm wide........................................................................................................... *C. crus-corvi*

4 Larger perigynia 3-5 mm long; leaves to 7 mm wide.  

5 Plants with at least some pellisolate spikes basal; culms much shorter than the leaves........... *C. acrocydanus*

6 Plants with most pellisolate spikes on obvious elongated stems; culms shorter than or longer than the leaves.

7 Larger leaves > 2 cm long, longer than the sheaths ......................................................... *C. acrocydanus*

8 Larger leaves bladeless or with blades < 1 cm long and also shorter than the sheaths.........................

2 Bracts of the lowermost non-basal spike sheathless or with sheath < 4 mm long.

10 Perigynium < 10 mm long.

12 Perigynium beak with 2 teeth > 0.6 mm long ................................................................. *C. scabrata*

13 Terminal spike gynandroecious or pistillate ................................................................. *Porocystis*

14 Leaf sheaths and blades glabrous.

19 Achene tip with persistent, enlarged, circinate style base.................................................... *C. caryophyllea*

19 Achene tip with at most a short apiculus.

22 Plants with at least some pellisolate spikes basal; culms much shorter than the leaves........... *C. acrocydanus*

23 Leaf blades, at least towards the tip, M-shaped in cross-section when young, the upper surface usually with 2 marginal veiins more prominent than the midvein; staminate spikes 1-4.......................... *C. acrocydanus*

24 Plants with at least some pellisolate spikes basal; culms much shorter than the leaves........... *C. acrocydanus*

25 Upper leaves with blades > 2 cm long, longer than the sheaths ........................................ *C. acrocydanus*

26 Perigynia 2-3-veined; beak < 0.5 mm long................................................................. *C. acrocydanus*

27 Outer perigynia with 2 marginal veins; beak > 0.7 mm long.............................. *C. acrocydanus*

28 Perigynia distinctly 20-30-veined; beak < 0.5 mm long ................................................... *C. acrocydanus*

29 Perigynia veinless except for 2 marginal veins; beak > 0.7 mm long.......................... *C. acrocydanus*

30 Plants forming large clonal colonies..............................................................................

31 Short peduncles of pistillate spikes > 1 cm long; perigynia > 3× as long as wide, tapering gradually to the base........

32 Perigynia > 10 mm long.

33 Perigynium beak with 2 teeth > 0.6 mm long ................................................................. *C. acrocydanus*

34 Perigynia strongly 12-30-veined. 

35 Leaf blades V-shaped in cross-section when young, the upper surface lacking 2 marginal veins more prominent than the midrib; staminate spike 1..............................

36 Plants with at least some pellisolate spikes basal; culms much shorter than the leaves........... *C. acrocydanus*

37 Upper leaves with blades > 2 cm long, longer than the sheaths ........................................ *C. acrocydanus*

38 Upper leaves bladeless or with blades < 1 cm long and also shorter than the sheaths.........................

39 Perigynia veinless except for 2 marginal veins; beak > 0.7 mm long..............................

40 Plants forming large clonal colonies..............................................................................

6 Perigynia (4-) avg. 4.7 (-5) mm long, the beak < 2.5 mm long; larger leaves mostly 4-10 mm wide; perigynium scales acuminate to cuspidate; [widespread in our area] ............................................................ C. stipata var. stipata

Key 1b

1 Beak of the perigynium shorter than the body.
2 Perigynia somewhat abruptly contracted into a beak ca. 0.5 × as long as the perigynium body; ventral surface of the perigynium with several incomplete veins basally; culms sharply triangular and narrowly winged, somewhat spongy and easily crushed; dorsal leaf sheaths green; ventral leaf sheaths with scattered red dots, and transversely rugose; [normally of shaded locations] ............................. C. conjuncta
2 Perigynia tapering into a beak, much shorter than the perigynium body; ventral surface of the perigynium with several inconspicuous complete veins; culms inconspicuously triangular to roundish, not winged, neither spongy nor easily crushed; dorsal leaf sheaths dark blue-green with conspicuous white dots; ventral leaf sheaths not transversely rugose; [normally of sunny locations] ........................................................................................................ C. oklahomensis

1 Beak of the perigynium as long as, or longer than, the body.
3 Ventral leaf sheath margins with orange-red dots; achene ovate-lanceolate; perigynium wall adhering to achene............... C. crus-corvi
3 Ventral leaf sheath margins without orange-red dots; achene broadly ovate to ovate-orbicular; perigynium wall not adhering to the achene (or only slightly so).
4 Ventral leaf sheaths not transversely rugose, more or less concave at the apex and not prolonged upward past the base of the blade, friable
4 Ventral leaf sheaths transversely rugose, more or less convex at the apex and prolonged upward past the base of the blade, friable.
5 Perigynia (5-) avg. 5.4 (-6) mm long, the beak > 3 mm long; larger leaves mostly 8-17 mm wide; perigynium scales cupulidate to short-awned; [mostly of the Coastal Plain and lower Piedmont] ........................................................................................................ C. stipata var. maxima
5 Perigynia (4-) avg. 4.7 (-5) mm long, the beak < 2.5 mm long; larger leaves mostly 4-10 mm wide; perigynium scales acuminate to cuspidate; [widespread in our area] ........................................................................................................ C. stipata var. stipata

[26b] Section 2: Heleoglochin (Paniculatae)

1 Inflorescence 7-15 cm long, the basal 3-9 branches well-separated from one another; perigynia broadly obovoid, 1.3-1.5× as long as wide; sheaths concave at the mouth; leaves 3-8 mm wide; [of swamps of the Coastal Plain and lower Piedmont] ............................. C. decomposita
1 Inflorescence 2-8 cm long, the basal 1-5 branches indistinct to slightly separated; perigynia ovoid to lance-ovoid, ca. 2× as long as wide; sheaths prolonged beyond the blade; leaves 1-3 mm wide; [of Mountain wetlands in VA (and TN?) and northward];
2 Inner band of leaf sheath whitish (and red-dotted); basal branches of inflorescence overlapping; perigynium not concealed by the scales ....
2 Inner band of leaf sheath strongly copper-colored (and also red-dotted); basal branches of inflorescence often weakly separated; perigynium nearly or completely concealed by the scales................................................................. C. praerat

[26c] Section 3 – section Multiflorae
A section of 7 species, of North America (including Mexico). References: Standley in FNA (2002b). Key based on FNA.

1 Perigynia red-dotted ................................................................................................................................. C. triangularis
1 Perigynia not red-dotted.
2 Perigynia golden yellow or yellowish-brown at maturity ..................................................................................... C. annectens
2 Perigynia dull yellow-green or pale brown at maturity.
3 Leaves longer than the flowering stem; perigynia 2.0-3.2 mm long, 1.3-1.8 mm wide, the beak 1/3-1/2 the length of the body........
3 Leaves shorter than the flowering stem; perigynia 3.2-4.0 mm long, 2.0-2.6 mm wide, the beak ca. 1/3 as long as the body.
4 Awn of pistillate scales 1-3 mm long; adaxial surface of perigynia with 3-5 nerves; [native, of wet pine savannas of se. SC, GA
southward................................................................. C. fissa var. aristata
4 Awn of pistillate scales 0.5-1.5 mm long; adaxial surface of perigynia lacking nerves; [introduced in our area from sc. United States,
of disturbed sites]............................................................................................................................... C. fissa var. fissa

[26d] Section 4 – section Phaestoglocrin (Bracteosae)

1 Sheaths loose, membranaceous, and fragile on the ventral side, sepal-nodulose and usually mottled or striped with green and white on the dorsal side.
2 Bodies of pistillate scales 1.5-2.5 mm long, 1.1-1.8 mm wide, mostly < ½ as long as the perigynia, apex obtuse to acuminate to shortly awned.
3 Basal internodes of the inflorescence usually < 1 cm long, and usually < 2× as long as the spikes; bodies of perigynia with wing < 0.1 mm wide ................................................................................................................ C. cephaloidea
3 Basal internodes of the inflorescence usually > 2 cm long, at least 2× as long as the spikes; bodies of perigynia with wing 0.1-0.2 mm wide ................................................................................................................ C. sparganioides
2 Bodies of pistillate scales 2.2-4.4 mm long, 1.2-2.4 mm wide, mostly > ½ as long as the perigynia, apex acuminate to awned.
4 Fronts of leaf sheaths yellow or brownish, thick, firm, the back often white-spotted................................................. C. aggregata
4 Fronts of leaf sheaths white, hyaline, fragile, the backs not white-spotted.
5 Perigynia 4-5 mm long, 2× as long as wide; perigynia nerveless or very obscurely nerved on the dorsal face... *C. gravida* var. *gravida*
6 Perigynia 3.4-5 mm long, 1.3–1.5× as long as wide; perigynia strongly few-nerved on the dorsal face... *C. grava var. lunelliana*
1 Sheaths tight on the ventral side, neither septate-nodulose nor mottled with green and white on the dorsal side.
7 Beak of perigynium smooth; pistillate scales acuminate, early deciduous.
8 Average perigynium width ≥ 1.3 mm; average spongy portion of the perigynium ≥ 1.1 mm long; perigynium base distinctly nerved, bulging on the ventral surface, making the perigynium biconvex in cross-section; perigynium 2-2.5× as long as wide; perigynium gradually narrowed to a short beak; leaves 1-3 mm wide.......................... *C. trifolium*
8 Average perigynium width < 1.3 mm; average spongy portion of the perigynium < 1.1 mm long; perigynium base nerveless, flattened on the ventral surface, making the perigynium planoconvex in cross-section; perigynium ca. 3× as long as wide; perigynium narrowed to a conspicuous beak; leaves 0.75-1.5 mm wide........................... *C. texensis*
7 Beak of perigynium serrulate; pistillate scales obtuse, persistent.
9 Plants with creeping rhizomes, the culms arising scattered along the rhizome; *C. gravida* 4-5× as long as wide.............. *C. socialis*
10 Widest leaves 0.9-1.7 mm wide; base of fertile culm 0.7-1.4 mm wide.
11 Base of perigynium cuneate to rounded; distance from base of perigynium to base of achene 0.1-0.5 mm; [primarily of the Mountains in our area].......................... *C. appalachica*
10 Widest leaves 1.7-3.0 mm wide; base of fertile culm 1.4-2.2 mm wide.
12 Stigmas 0.03–0.06 mm thick, straight to slightly twisted; widest leaves < 2.0 mm wide; perigynia 3-7 (-8) per spike... *C. radiata*
12 Stigmas 0.07-0.10 mm thick, mostly coiled; widest leaves > 1.7 mm wide; perigynia (6)-7-14 (-20) per spike.............. *C. rosea*
6 Perigynia not conspicuously corky-thickened at base (except corky-thickened in the rare alien, *C. spicata*, which has perigynia 4.0-5.5 mm long); perigynia ascending to spreading at maturity; perigynia (3)-4-8-40 per spike; leaves 1-5 mm wide.
13 Inflorescence ovoid in outline, the spikes densely aggregated, nearly indistinguishable except by the projecting setaceous bracts which subtend each spike.
14 Perigynia 1.3-1.7× as long as wide, widest near the broadly rounded, truncate, or even subcordate base.............. *C. leavenworthii*
14 Perigynia 1.6-2.5× as long as wide, widest just below the middle, the base broadly cuneate to rounded.
15 Pistillate scales (excluding the awns) shorter than the perigynium body; culms not greatly exceeding the leaves... *C. cephalephora*
15 Pistillate scales (excluding the awns) as long as or exceeding the perigynium body; culms much exceeding the leaves.......................... *C. mesochorea*
13 Inflorescence spicate-racemose; the individual spikes readily distinguishable (often separated by an exposed internode of the axis).
16 Pistillate scales brown or reddish-purple; [alien, sparsely naturalized in our area].
17 Roots and basal sheaths brown to black; perigynia not corky-thickened at base; ligule blunt, wider than long .......... *C. divisa*
17 Roots and basal sheaths purplish-tinted; perigynia corky-thickened at base; ligule acute, longer than wide............... *C. spicata*
16 Pistillate scales green, hyaline, or pale tan; [native in our area (except *C. australis* and *C. muricata* ssp. *lamprocarpus*), common and widespread in our area];
18 Spikes with 5-10 perigynia; pistillate scales brown with green-veined center.......................... *C. muricata* ssp. *lamprocarpus*
18 Spikes with 8-20 perigynia; pistillate scales scarious-white (rarely brown) with green-veined center.
19 Perigynia ascending, nerveless on the ventral surface; scales awned, the awns 1.5–4 mm long; lowest inflorescence bract elongate, the free portion 1-5 cm long.......................... *C. australis*
19 Perigynia spreading, either nerved or nerveless on the upper (ventral) surface; scales acuminate or with an awn to 1.5 (-2.0) mm long; lowest inflorescence bract short, delicate, the free portion 0.5-2 cm long.
20 Perigynia 3.0-3.5 mm long, nerveless on the upper (ventral) face.......................... *C. muehlenbergii* var. *enervis*
20 Perigynia 3.5-4.0 mm long, nerved on both faces.......................... *C. muehlenbergii* var. *muehlenbergii*

[26h] Section 5 – section Holarrheneae (Intermediae)


One species.............................................................................................................................................................................. *C. sartwellii*

[26i] Section 6 – section Diviseae


1 Beak of the perigynium 1/5 to 1/3 as long as the body; spikes 2-7; [alien, naturalized primarily in brackish to salty coastal habitats]... *C. divisa*
1 Beak of the perigynium 1/3 to 1/2 as long as the body; spikes 5-15; [alien, naturalized primarily inland along highways treated with salt]...... .......................................................... *C. praegracilis*

[26j] Section 7 – section Ammoglochin (Arenariae)

A section of 14 species, of temperate Northern Hemisphere. References: Reznicek in FNA (2002b). Key based closely on FNA

1 Perigynia thin-margined and prominently winged at base of beak; pistillate scales usually longer than perigynia; terminal spike usually stamine; [alien in maritime situations].......................................................... *C. arenaria*
1 Perigynia thin-margined, lacking a prominent, expanded wing; pistillate scales shorter than to nearly equalling the perigynia; terminal spike usually pistillate or androgynous; native, inland]........................................... *C. siccata*
[26k] Section 8 – section Macrocephalae


One species............................................................................................................................................................................. C. kobomugi

[26m] Section 9 – section Glareosae (Heleonastes)

A section of 20-25 species, circumboreal, but extending in montane areas to South America, New Zealand, and Australia. References: Toivonen in FNA (2002b).

1 Spikes (1-)2 (-3); perigynia 1.5-5 mm long.
   2 Leaves 0.3-0.8 mm wide, filiform-involute; ligules 0.3-0.8 (-1.2) mm long; inflorescences 14-32 mm long; spikes 2-3 per inflorescence; 
      terminal spike with 1-3 perigynia per spike; [south to PA and s. NJ] ..................................................... C. billingsii
   2 Leaves 0.8-1.9 mm wide, flat or thinly M-shaped; ligules 0.5-1.9 mm long; inflorescences (14-)23-55 mm long; spikes (2-)3-4 per 
      inflorescence; terminal spike with (1-)2-6 perigynia per spike; [south to w. NC] ..................................................... C. trisperma

1 Spikes 4-9; perigynia 5-30 per spike; 1.7-2.5 mm long.
   3 Perigynia (10-)15-30 per spike; perigynium without ventral nerves (or the nerves very obscure); spike at maturity somewhat bristly 
      appearing in silhouette because of the perigynium bracts. ................................................................................................. C. brunnescens var. sphaerostachya
   3 Perigynia 5-10 (-15) per spike; perigynium ventrally nerves; spike at maturity nearly smooth in silhouette (the perigynium bracts strongly 
      appressed)

2 Perigynium beak smooth-margined (use at least 10× magnification) .............................................................................................................
2 Perigynium beak serrulate on margin  (use at least 10× magnification).

3 Widest leaf 2.8-4.4 mm wide; culms 1.0-1.6 mm thick at mid-height; plants densely to loosely cespitose, the rhizome 
   internodes 0.2-20 mm long; [of swamp forests and other wetlands, widespread in our area] ...................................
3 Widest leaves 0.8-2.7 mm wide.

4 Culms 15-60 cm tall; inflorescence 3-5 (-7) cm long, all but the lowest spikes approximate, the lowest spikes 0.5-2.5 cm apart..........
   .................................................................................................................................................................................. C. canescens var. canescens
4 Culms 30-90 cm tall; inflorescences 6-12 (-15) cm long, the lower and middle spikes well-spaced, the lowest spikes 2-5 cm apart..........
   .................................................................................................................................................................................. C. canescens var. disjuncta

[26n] Section 10 – section Deweyanae

A section of 8 species, of North America and e. Asia. References: Naczi (1990); Naczi in FNA (2002b).

1 Widest leaf (1.3-)1.5-2.9 (-3.1) mm wide; culms (0.5-)0.6-1.0 (-1.1) mm thick at mid-height; plant densely to loosely cespitose, the rhizome 
   internodes 0.2-20 mm long; [of swamp forests and other wetlands, widespread in our area] ..........................................
1 Widest leaf 2.8-4.4 mm wide; culms 1.0-1.6 mm thick at mid-height; plants densely cespitose, the rhizome internodes 0.2-1.0 (-8.5) mm 
   long; [of seeps and bogs in the Blue Ridge and Blue Ridge Escarpment region] ..................................................... C. bromoides ssp. bromoides

2 Leaves 0.8-1.9 mm wide, flat or thinly M-shaped; ligules 0.5-1.9 mm long; inflorescences (14-)23-55 mm long; spikes (2-)3-4 per 
   inflorescence; terminal spike with (1-)2-6 perigynia per spike; [south to w. NC] ..................................................... C. trisperma

5 Terminal spikes partly or entirely pistillate; anthers 0.6-2.2 (-2.4) mm long.
5 Terminal spikes entirely staminate; anthers (1.0-)1.2-2.2 (-2.4) mm long ...

6 Terminal spikes without a distinct narrowed base of staminate scales, the staminate portion < 1 mm long ............ C. sterilis
6 Terminal spikes with a distinct narrowed base of staminate scales 1.0-16.5 mm long.

7 Lower perigynia 2.0-3.0 mm wide. .................................................................................................................................................
    8 Lower perigynia mostly 1.1-1.6× as long as wide; perigynia mostly 2.1-3.0 mm wide .................................................. C. atlantica
    8 Lower perigynia of spikes (1.5-)1.7-3× as long as wide; perigynia mostly 1.2-2.0 mm wide .......................................... C. ruthii

3 Widest leaves 2.8-5.0 mm wide.

5 Terminal spikes entirely staminate; anthers (1.0-)1.2-2.2 (-2.4) mm long ............................................................... C. sterilis
5 Terminal spikes partly or entirely pistillate; anthers 0.6-2.2 (-2.4) m long.

6 Terminal spikes without a distinct narrowed base of staminate scales, the staminate portion < 1 mm long ............ C. sterilis
6 Terminal spikes with a distinct narrowed base of staminate scales 1.0-16.5 mm long.

7 Lower perigynia 2.0-3.0 mm wide. .................................................................................................................................................
    8 Lower perigynia mostly 2.8-4.8 mm long; lower perigynia (1.7-)1.8-3.6× as long as wide; perigynia beaks 0.95-2.0 mm 
       long, mostly 0.45-0.85× as long as the perigynium body ................................................................. C. echinata ssp. echinata
    8 Lower perigynia mostly 1.9-3.0 mm long; lower perigynia 1.0-2.0 (-2.2)× as long as wide; perigynia beaks 0.4-0.95 mm 
       long, mostly 0.2-0.5× as long as the perigynium body.

9 Perigynia mostly nerveless over the achene on the adaxial surface; beak of perigynia conspicuously setulose-serrulate; 
   perigynia often more-or-less convexly tapered from widest point to the beak, thus forming a weak shoulder; [of 
   calcareous sites, in our area restricted to the Mountains of VA] ................................................................. C. interior

9 Perigynia mostly 1-1.9-nerved over the achene on the adaxial surface; beak of perigynia more sparsely serrulate, with 
   definite spaces between the often single teeth; perigynia more-or-less cuneate or concavely tapered from widest point to 
   the beak, not forming a shoulder; [of a variety of situations, not generally calcareous].

10 Widest leaves 1.6-2.7 mm wide; infructescence mostly 18-45 mm long; [widespread in our area] ....................... C. atlantica
10 Widest leaves 0.6-1.6 mm wide; infructescence mostly 8-20 mm long; [primarily of the Coastal Plain in our area, 
   widely scattered elsewhere] ................................................................................................................................. C. howei

[26o] Section 11 – section Stellulatae

A section of ca. 15 species, semicosmopolitan (except Africa). References: Reznicek & Ball (1980); Reznicek in FNA (2002b). Key based on Reznicek & Ball (1980).

1 Spikes usually solitary; leaves involute; anthers 2.0-3.6 mm long; [rare disjuncts in Coastal Plain bogs].......................... C. exilis
1 Spikes 2-8; leaves flat or folded; anthers 0.6-2.2 (-2.4) mm long.

2 Perigynium beak smooth-margined (use at least 10× magnification) ................................................................................................. C. seorsa
2 Perigynium beak serrulate on margin (use at least 10× magnification).

3 Widest leaves 0.8-2.7 mm wide.

5 Terminal spikes entirely staminate; anthers (1.0-)1.2-2.2 (-2.4) mm long ............................................................... C. sterilis
5 Terminal spikes partly or entirely pistillate; anthers 0.6-2.2 (-2.4) m long.

6 Terminal spikes without a distinct narrowed base of staminate scales, the staminate portion < 1 mm long ............ C. sterilis
6 Terminal spikes with a distinct narrowed base of staminate scales 1.0-16.5 mm long.

7 Lower perigynia 0.9-2.0 mm wide. .................................................................................................................................................
    8 Lower perigynia mostly 2.8-4.8 mm long; lower perigynia (1.7-)1.8-3.6× as long as wide; perigynia beaks 0.95-2.0 mm 
       long, mostly 0.45-0.85× as long as the perigynium body ................................................................. C. echinata ssp. echinata
    8 Lower perigynia mostly 1.9-3.0 mm long; lower perigynia 1.0-2.0 (-2.2)× as long as wide; perigynia beaks 0.4-0.95 mm 
       long, mostly 0.2-0.5× as long as the perigynium body.

9 Perigynia mostly nerveless over the achene on the adaxial surface; beak of perigynia conspicuously setulose-serrulate; 
   perigynia often more-or-less convexly tapered from widest point to the beak, thus forming a weak shoulder; [of 
   calcareous sites, in our area restricted to the Mountains of VA] ................................................................. C. interior

9 Perigynia mostly 1-1.9-nerved over the achene on the adaxial surface; beak of perigynia more sparsely serrulate, with 
   definite spaces between the often single teeth; perigynia more-or-less cuneate or concavely tapered from widest point to 
   the beak, not forming a shoulder; [of a variety of situations, not generally calcareous].

10 Widest leaves 1.6-2.7 mm wide; infructescence mostly 18-45 mm long; [widespread in our area] ....................... C. atlantica
10 Widest leaves 0.6-1.6 mm wide; infructescence mostly 8-20 mm long; [primarily of the Coastal Plain in our area, 
   widely scattered elsewhere] ................................................................................................................................. C. howei
A section of ca. 85 species, largely North American, but also occurring in Central and South America and Eurasia. References: Mastroguseppe et al. in FNA (2002b); Rothrock, Reznicek, & Hipp (2009); Rothrock, Reznicek, & Ganion (1997). Key closely adapted from FNA.

1 Pistillate scales uniformly as long or longer than the mature perigynia, usually concealing the beaks (though not necessarily the bodies), apex obtuse to acuminate, not awned.

2 Perigynium beak cylindrical, unwinged, lacking serrations for ca. 0.4 mm below the apex ......................................................... *C. ovalis*

3 Principal leaves stiff, more-or-less glaucous, often bearing auricles at the base, the summit of the sheaths truncate, prolonged 1-4 mm beyond the collar; flat margins of perigynia 0.5-0.8 mm wide; achenes 1.0-1.2 mm wide; [of maritime dunes and shores] .............. *C. silicea*

4 Perigynia ascending to spreading, strongly and evenly veined on the adaxial face, finely granular-papillose; spikes (3-) 7-15, the uppermost usually densely aggregated............................... *C. argyrantha*

5 Pistillate scales (excluding the awns, if present) shorter than the perigynia at least in the middle portions of the spikes, the apical portion of the pistillate scales narrower than the perigynia bracts and not completely covering them, the apex awned in some species.

6 Perigynia 2.6-4.0 × as long as wide, the bodies lanceolate, 1.2-2.0 mm wide................................................................. *C. scoparia* var. *scoparia*

7 Perigynium body obovate, often with conspicuous “shoulders”; leaves 2.5-6 mm at widest..................................................... *C. alata*

8 Perigynium body elliptic, suborbicular, or weakly obovate; leaves 1.3-4.2 mm at widest.

9 Scales with reddish-brown margins; perigynia reddish-brown, (3.8-) 4.0-5.5 mm long, conspicuously veined on the outer side

10 Beaks ascending, < ½ the length of the lance-ovate to weakly obovate perigynium body; lateral spikes with acute staminate bases mostly < 2 mm long; [of tidal marshes] ................................................................. *C. suberecta*

11 Perigynium narrowly to broadly ovate, widest below mid-body.

12 Perigynium beak appressed-asceding, triangular; pistillate scales obtuse; styles straight ................................................. *C. tribuloides* var. *sangamonensis*

13 Lower perigynia of each spike appressed-ascending to somewhat spreading (at a 30-75 degree angle); spikes subglobose to ovate-oblong; pistillate scales evident, 2.0-3.0 mm long

14 Inflorescences usually flexible, nodding at the tip, the lower spikes usually separated; perigynia usually 15-40, spreading at a 40-75 degree angle to the spike axis; leaf sheaths firm or friable at the summit ................................................................. *C. projecta*

15 Perigynia 3.0-4.0 mm long, 2.2-2.8 (-3) × as long as wide ................. *C. tribuloides* var. *tribuloides*

16 Perigynium body ovate, elliptic, or orbicular, widest towards the base or near the middle (excluding the beak).

17 Perigynium thick, winged to the base; leaf sheaths with more-or-less rounded edges, not distinctly expanded towards the apex; leaves 1-4.5 mm wide (except in *C. normalis*); vegetative shoots usually inconspicuous, with relatively few leaves clustered at the tip.

18 Perigynium beak spreading, slender; pistillate scales acute; styles sinuous at base ..................................................... *C. cristatella*

19 Achenes 0.6-0.9 mm wide; perigynia veinless or 1-3 veined; styles straight ............................................. *C. longii*

20 Achenes 0.6-0.9 mm wide; perigynium veinless or 1-3 veined on the inner face, these faint or basal only; inflorescences < 3.0 cm long ................................. *C. bebbii*

21 Perigynium ovate to broadly ovate, the wing margin 0.4-0.8 mm wide, 0-6 veined on the inner face............ *C. molestula*

22 Perigynia broadly elliptic or nearly orbicular, the wing margin 0.4-0.8 mm wide, 4-7 veined on the inner face .............. *C. normalis*

23 Inflorescences on tallest culms compact, 1.5-3 × as long as wide, erect, the spikes overlapping, the lowest internode of the inflorescence 1.6-1.7 (-2.5) mm, ¼ to ½ (-¾) of the length of the inflorescence

24 Achenes 0.9-1.3 mm wide; perigynia often 3-veined on the inner face; inflorescences 12-60 mm long

25 Perigynia broadly elliptic or nearly orbicular, the wing margin 0.4-0.8 mm wide, 4-7 veined on the inner face.............. *C. normalis*

26 Perigynium ovate to broadly ovate, the wing margin 0.25-0.45 mm wide, 4-7 veined on the inner face .............. *C. normalis*

27 Inflorescences on tallest culms compact, 1.5-3 × as long as wide, erect, the spikes overlapping, the lowest internode of the inflorescence 1.6-1.7 (-2.5) mm, ¼ to ½ (-¾) of the length of the inflorescence

28 Perigynium narrowly to broadly ovate, widest below mid-body. ................................. *C. festucacea*
23 Sheaths smooth, often whitish-mottled; perigynium beak spreading, exceeding the pistillate scales by 0.7-1.6 mm; beak and shoulders of perigynia greenish to yellowish or greenish brown at maturity. 

...C. normalis

23 Sheaths, at least some, papillose near the collar (at magnification of 30×), not prominently whitish-mottled; perigynium beak appressed or ascending in spikes, exceeding the pistillate scales by 0.0-0.8 mm; beak and shoulders of perigynia straw-colored to reddish-brown at maturity. 

...C. tenera var. tenera

11 Perigynia > 2 mm wide.

24 Spikes either shorter than 12 mm or longer and with either rounded bases or tips or both; perigynium body ovate, elliptic, orbicular, or obovate, or lanceolate (if lanceolate, then shorter than 6 mm long); vegetative culms conspicuous or not.

25 Perigynium bodies obovate, widest towards the tip; leaf sheaths green-veined adaxially nearly to the summit, or with a narrow Y-shaped hyaline area.

26 Achenes 0.75-1.2 (-1.3) mm wide.

26 Achenes 1.3-1.8 mm wide .....................................................................................................................................................

27 Inflorescences erect, 1-4.5 cm long; spikes slightly separated to congested .........................................................C. albolutescens

27 Inflorescences arching or nodding, 2.3-8.4 cm long; spikes widely separated. .........................................................C. silicea

25 Perigynium bodies lanceolate, ovate, elliptic, orbicular, or reniform, widest at the middle or towards the base; leaf sheaths various, some with prominent hyaline band near the apex adaxially.

28 Plants clumping; vegetative culms numerous, conspicuous, strongly 3-ranked, with 15-35 leaves when fully-developed; achenes 1.6-2 × as long as wide; larger spikes with 5-25 (-30) perigynia. 

...C. hyalina

28 Plants clumping; vegetative culms few, inconspicuous, usually with fewer than 15 leaves, not strikingly 3-ranked; achenes 1-1.6 (-1.7) × as long as wide; larger spikes with 15-80 perigynia.

29 Perigynia finely granular-papillose (as seen with 30× magnification), the body reniform to orbiculate, 0.6-0.9 × as long as wide; 3.5-4.5 (-4.9) mm wide; lowest peristome scale obtuse-rounded ..................C. reniformis

29 Perigynia smooth, the body broadly ovate, elliptic, orbicular, or slightly obovate, (0.7-) 0.9-1.7 × as long as wide, 1.5-6.1 mm wide; lowest peristome scales obtuse to acuminate-awned.

30 Perigynia bodies narrowly ovate adaxially near the summit; inflorescences dense to somewhat open, erect, the lowest internode usually < 8 (-12) mm long

31 Perigynia with acute bases, 2.0-2.8 mm wide; beak appressed, > 2/5 × the length of the body; broadest leaves 1.5-2.5 mm wide; [of sw. VA northward].................................C. subrecta

31 Perigynia with rounded bases, 3.0-4.4 mm wide; beak spreading, ca. ⅓ × the length of the body; broadest leaves 2-5 mm wide; [of FL] ...............................................................................................................C. vexans

32 Perigynia body narrowly ovate, greenish; pistillate scales with green midstripe, hyaline or pale margins (rarely brown tinged); leaves 2.5-6.5 mm wide, the sheaths green mottled, with mouth truncate, and prolonged to 2 mm distal to base of the leaf blades

...C. normalis

32 Perigynia body broadly ovate, broadly elliptic, or orbiculate, yellowish to tan brown; pistillate scales greenish or dark brown; leaves 1.5-4 (-5) mm wide, the sheaths usually evenly colored, with mouth concave.

33 Perigynia strongly 4-8-veined over the achene adaxially, (4.5-) 5.1-5.5 mm long; pistillate scales usually (1.0-) 1.4-2.3 mm shorter than the perigynia; anthers (2.4-) 2.8-4.2 mm long............C. bicknellii

33 Perigynia veinless or faintly 1-5 (-7)-veined adaxially. 

34 Perigynia strongly and evenly 4-8-veined over the achene adaxially, (4.5-) 5.1-5.5 mm long; pistillate scales usually 1.0-2.1 mm long.........................C. festucaea

34 Perigynia (5.6-) 6.0-7.1 mm long; beak (1.2-) 1.5-2.1 (-2.3) mm long; pistillate scales (3.6-) 3.9-5.0 mm long, obtuse to acute. 

...C. opaca

36 Achenes 2.5-4.2 mm long, 1.5-2.3 (-2.5) mm wide, mostly 2-4 (-6) veined adaxially. 

...C. festucaea

36 Achenes (1.6-) 1.7-2.2 mm long, (1.2-) 1.4-1.8 mm wide; perigynia 3.2-5.5 mm long, 2.5-3.6 mm wide, veinless or faintly 1-5 (-7)-veined adaxially.

37 Perigynia 3.2-4.8 (-5.2) mm long; beak 0.8-1.5 mm long; pistillate scales 3.3-4.0 (-4.3) mm long, acute; achenes 1.0-1.3 (1.4) × as long as wide.......................................................C. brevior

37 Perigynia (5.6-) 6.0-7.1 mm long; beak (1.2-) 1.5-2.1 (-2.3) mm long; pistillate scales (3.6-) 3.9-5.0 mm long, obtuse to acute. 

...C. opaca

38 Achenes of larger perigynia broadly oblong to nearly orbicular, 1.35-1.8 mm wide, 1.0-1.3 (1.4) × as long as wide; perigynia 3.0-3.5 (-3.8) mm wide, 1.8-2.5 mm long; pistillate scales 3-3.4 mm long, obtuse to acute. 

...C. normalis

38 Achenes of larger perigynia ellipsoid to narrowly oblong, 0.9-1.3 mm wide, 1.3-1.6 × as long as wide; pistillate scales (2.5-) 3.0-3.6 mm long, 1.4-1.7 mm wide; perigynia (2.5-) 3.0-3.5 (-3.6) mm wide, 2.0-2.5 mm long; pistillate scales 2.8-3.0 mm long, acuminate. 

...C. opaca

39 Perigynia strongly 4-6-veined over the achene adaxially, broadly ovate to broadly elliptic, (or rarely nearly orbicular), the bodies (2-) 2.3-3.2 mm long, (0.9-) 1.0-1.6 × as long as wide; pistillate scales mostly obtuse, about as long as to 0.7 (-0.9) mm shorter than the subtended perigynium (flattened and measured separately)........C. molestiformis

(add C. cumulata, C. hyalina)

[26r] Section 13 – section Phacocystis (Cryptocarpaceae and Acutae)
CYPERACEAE

A section of 70-90 species, cosmopolitan. References: Standley, Cayouette, & Bruederle in FNA (2002b); Standley (1983); Bruederle & Fairbrothers (1986); Bruederle, Fairbrothers, & Hanks (1989). Key based in part on C.

1 Lowest spike erect or ascending.
   2 Lower sheaths scabrous, reddish-brown, the sheath fronts (ventral faces) with prominent veins forming a persistent network; lower sheaths usually bladeless................................................................................................................................. C. stricta
   2 Lower sheaths glabrous, the sheath fronts (ventral faces) not forming a persistent network; lower sheaths usually with leaf blades.
      3 Perigynia evidently nerved on both faces .............................................................................................................................. C. emoryi
      3 Perigynia not nerved, or very faintly nerved.
        4 Longest bracts overtopping the spikes; perigynia flattened, elliptic to obovate; pistillate scales acute to obtuse, generally shorter than the perigynia ................................................................................................................................. C. aquatilis
        4 Longest bracts shorter than the spikes; perigynia inflated, obovate; pistillate scales acuminate, longer than the perigynia ... C. haydenii

1 Pistillate scales awnless, the sides black or deep purple-brown ................................................................................................................................. C. torta
1 Pistillate scales awned, the sides medium brown.

2 Lowest pistillate spike erect, sessile or with a peduncle up to 1 cm long; perigynia white-glaucous, rather distinctly 6-8 nerved; achenes as
   above to an abrupt beak; lowest bract of the infructescence 1.7-6.2 dm long.

2 Basal leaves with well-developed blades; basal sheaths brown; perigynia glabrous; [of moist, usually calcareous habitats of the Coastal
   Plain] ...................................................................................................................................................................................... C. chapmanii


1 Awn of the pistillate scale tapering gradually into the scale; perigynium 2-ribbed, and also distinctly and evenly nerved between the ribs; [of
   swamps and marshes] ......................................................................................................................................................... C. joorii
1 Awn of the pistillate scale emerging from a retuse notch in the apex of the scale; perigynium 2-ribbed, obscurely nerved between the ribs; [generally of acid seepages, pocosins, and blackwater situations, often associated with Pinus serotina].

2 Lowest pistillate spike drooping, on a peduncle 1-4 cm long; perigynia reddish-glaucous, lacking nerves; achenes slightly longer than wide ................................................................................................................................. C. glaucescens
2 Lowest pistillate spike erect, sessile or with a peduncle up to 1 cm long; perigynia white-glaucous, rather distinctly 6-8 nerved; achenes as
   wide as long ................................................................................................................................................................................. C. verrucosa

A section of 14 species, of temperate parts of North America and Eurasia, and montane Central America and South America. References:
Rothrock & Reznicek in FNA (2002b).

1 Perigynia with a distinct beak, 1.0-2.2 mm long.
   2 Basal leaves with well-developed blades; basal sheaths brown; perigynia glabrous; [of moist, usually calcareous habitats of the Coastal
      Plain] ...................................................................................................................................................................................... C. chapmanii
### CYPERACEAE

204

<table>
<thead>
<tr>
<th>2</th>
<th>Basal leaves reduced to bladeless sheaths; basal sheaths strongly purple; [of dry, acidic habitats of the Mountains]</th>
<th>C. polymorpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Perigynia beakless, or with an indistinct beak &lt; 0.5 mm long.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Basal sheaths with well-developed bladders; basal sheaths brown to strongly purple.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Pistillate spike 5-7 mm in diameter, with ca. 6 vertical rows of perigynia; perigynia 3.3-4.2 mm long, 2.0-2.5 mm wide; leaves 3-7 mm wide; blue green</td>
<td>C. meadii</td>
</tr>
<tr>
<td>4</td>
<td>Pistillate spike 3-4 mm in diameter, with ca. 2-3 vertical rows of perigynia; perigynia 2.5-3.5 mm long, 1.5-2.0 mm wide; leaves 2-4.5 mm wide, pale green</td>
<td>C. tetanica</td>
</tr>
<tr>
<td>3</td>
<td>Basal sheaths bladeless, or with blades to 3 cm long; basal sheaths strongly purple.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Culms to 10 dm tall, (2-) 3-5 mm in diameter near base; larger leaves ca. 5 mm wide; plants forming large clumps; [plants of shallow soils on sloping rock outcrops]</td>
<td>C. biltmoreana</td>
</tr>
<tr>
<td>5</td>
<td>Culms to 5 dm tall, ca. 1-2 mm in diameter near the base; larger leaves ca. 2-4 mm wide; plants forming small, spaced clumps, interconnected by long-creeping rhizomes; [plants of mountain slopes in more-or-less deep soils]</td>
<td>C. woodii</td>
</tr>
<tr>
<td>[add C. livida to key]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**[26bb] Section 19 – section Laxiflorae**


| 1 | Perigynia with 8-18 veins, 2-3 conspicuous, narrowly cuneate basally; perigynium beak short and usually abruptly bent; foliage dark green; bracts surpassing the staminate spike | C. leptonervia |
| 1 | Perigynium with (22-) 25-32 veins, all of which are conspicuous (the central one slightly more distinct); perigynium beak various; foliage various; bracts various. | | |
| 2 | Perigynium with a short, bent beak, usually abruptly bent to one side. | | |
| 3 | Spikes loosely flowered, most perigynia not overlapping. | | |
| 4 | Bracts very broad, 5-20 mm wide; basal leaves very wide, up to 40 mm wide; plant glaucous; basal sheaths purple or brown | C. albicans |
| 4 | Bracts narrow, 2.5-6 mm wide; basal leaves narrow, 3-8 mm wide; plant green; basal sheaths purple, often weathering to brown | C. ormostachya |
| 3 | Spikes densely flowered, the perigynia overlapping. | | |
| 5 | Basal sheaths purple when fresh, weathering to brown; uppermost bract rarely overtopping the staminate spike; staminate spike usually long-stalked | C. gracilescens |
| 5 | Basal sheaths brown; uppermost bract overtopping the staminate spike; staminate spike sessile or short-stalked | C. manhartii |
| 6 | Widest bract of the uppermost lateral spike 0.5-3.4 mm wide | C. bicornis |
| 6 | Widest bract of the uppermost lateral spike (2.9-) 3.2-8.3 mm wide | C. kraliana |
| 2 | Perigynium tapering to a straight or slightly curved beak (or a long, curved beak in C. radfordii) (note: some beaks may curve in pressing). | | |
| 7 | Perigynia beaks long (to 1.5 mm long) and excurred; basal sheaths green, white, and brownish striped; [ endemic to the escarpment gorge area near the SC-NC-GA tricorner] | C. radfordii |
| 7 | Perigynia beaks straight or slightly curved; basal sheaths either purple, wine-red, or brownish, not prominently green-and-white striped; [collectively widespread in our area]. | | |
| 8 | Basal sheaths purple or wine-red (may weather to brown in C. gracilescens). | | |
| 9 | Spikes densely flowered, the perigynia overlapping | C. gracilescens |
| 9 | Spikes loosely flowered, the spikelets not overlapping. | | |
| 10 | Mature leaf blades of sterile shoots 4.5-6 (-6) mm wide, green; culms green, chalky red at base (best seen in fresh material); pistillate spikes (3-) 5-7 (-8) flowered; staminate spike on a peduncle 0-1 cm long | C. manhartii |
| 10 | Mature leaf blades of sterile shoots (6-) 7-10 mm wide; glaucous; culms glaucous, bright red at base (best seen in fresh material); pistillate spikes (4-) 7-11 (-15) flowered; staminate spike on a peduncle 2-3 (-6) cm long | C. purpurifera |
| 8 | Basal sheaths brown, not purple or wine-red. | | |
| 11 | Mature perigynia obovoid. | | |
| 11 | Mature perigynia fusiform. | | |
| 13 | Spikelets overlapping, densely flowered; staminate spike more-or-less obscured; plant green | C. crebriflora |
| 12 | Spikes scattered, loosely flowered; staminate spike prominently exserted; plant usually glaucous | C. laxiflora |
| 12 | Spikes scattered, the staminate prominent and exceeding the uppermost bract. | | |
| 14 | Spikes densely flowered; perigynium beaks curved; lowest spike exserted on a long, arching, peduncle | C. styloflexa |
| 14 | Spikes loosely flowered; perigynium beaks straight; lowest spike on a short, erect or ascending, peduncle | C. striatula |

**[26cc] Section 20 – section Granulares**

A section of ca. 6 species, of temperate North America south through Mexico to Central America. References: Cochrane & Naczi in FNA (2002b). Key based on FNA.

| 1 | Plants with long-creeping rhizomes, the culms therefore mostly solitary; terminal spike and uppermost lateral spike usually overlapping. | | |
| 2 | Staminate scales with apex obtuse to rounded; widest leaves 1.8-3.0 (-4.4) mm wide; perigynium beak 0.1-0.3 mm long; [widespread] | C. crowei |
| 2 | Staminate scales with apex acute to awned; widest leaves 2.8-8.3 mm wide; perigynium beak 0.3-0.9 mm long; [of Panhandle FL and AL westward] | C. microdonta |
| 1 | Plants with short rhizomes, the culms therefore clumped; terminal and uppermost lateral spike usually overlapping. | | |
| 3 | Leaves green; longest bract of uppermost lateral spike 1.6-4.6 (-7.1) cm long; perigynia (1.6-) 1.9-3.6 as long as thick; [of the Coastal Plain] | C. gholsionii |
| 3 | Leaves glaucous (rarely green); longest bract blade of uppermost lateral spike 4.1-15.8 cm long; perigynia 1.4-2.2 (-2.4)× as long as thick; [widespread] | C. granularis |

1 Basal sheaths purplish, sometimes mixed with brown.

2 Widest leaf blade 3-6 mm wide; peduncles of lateral spikes usually drooping .................................................. C. austrocaroliniana

3 Bracts of middle and basal portions of culms with blades 2.1-9.2 cm long; perigynia 5.0-6.6 mm long; longest (per plant) lateral spike with 4-9 perigynia .................................................................................................................. C. careyana

4 Widest leaf blade 10-25 mm wide; peduncles of lateral spikes usually erect or spreading.

5 Basal sheaths brownish, lacking any purple coloration.

6 Foliage usually bright green; longest (per plant) terminal spike 0.6-2.0 (-2.3) cm long; widest leaf blade 5.3-8.3 mm wide .......... C. laxiculmis var. copulata

7 Terminal spikes (1.0-) 1.2-2.7 mm wide; staminate scales acute, those from the the middle region of the staminate spike 3.6-5.5 mm long; vegetative shoots shorter than or slightly taller than the culms, the tallest vegetative shoot 0.5-1.3 (-1.8) × as tall as the tallest culm.

8 Terminal spike usually surpassing the bract blade of the distalmost lateral spike; longest (per plant) peduncle of terminal spike (6.3-) 8.1-15.9 cm long; widest leaf blade 2.0-2.9 (-3.5) mm wide; each perigynium face 7-10-nerved. C. digitalis var. macropoda

9 Perigynia 2.5-3.3 mm long, the apex barely excurred .............................................................. C. digitalis var. digitalis

10 Perigynia 3.2-4.2 mm long, the apex noticeably excurred .......................................................... C. digitalis var. floridana

11 Perigynia spirally imbricate; longer lateral spikes with (6-) 8-13 perigynia; peduncles of proximal spikes usually erect, the longest (per plant) peduncle (7.0-) 15-42 (-9) mm long; bract blade of distalmost lateral spike 5.6-17 (-26) × as long as wide; loosely or densely cespitose; [primarily of the Coastal Plain in our area, though extending rarely into the Piedmont and Mountains] .................................................. C. abscondita

12 Perigynia distichously imbricate; longer lateral spikes with 4-8 (-9) perigynia; peduncles of proximal spikes usually drooping or nodding, the longest (per plant) peduncle (28-) 44-84 (-91) mm long; bract blade of distalmost lateral spike (12-) 17-51 × as long as wide; densely cespitose; [primarily of the Mountains and Piedmont] ................. C. cumberlandensis


1 Culm bases brown.

- C. hitchcockiana
- C. brysonii
- C. flaccosperma
- C. glaucodea
- C. pigra
- C. conoidea
- C. impressinervia
- C. grisea
- C. amphibola

1 Culm bases purple-red.

- C. ouachitana
- C. godfreyi
- C. grisea
- C. amphibola
- C. corrugate
- C. bulbostylis
- C. paeninsulae
- C. oligocarpa
- C. calcifugens
- C. edwardsiana
1 Perigynia tapering toward the base, obtusely trigonous in cross-section, usually pubescent proximally, the apex constructed to a distinct beak (nearly beakless in *C. planispicata*), the perigynia closely enveloping the achene at maturity.

2 Leaf-sheaths hispidulous; perigynia broadly all above the middle; basal sheaths brownish.

3 Leaves glaucous, usually papillate abaxially; pistillate scale margins entire; perigynia 3.7-5.1 mm long, 1.5-1.8 mm wide; [of the Cumberland Plateau of n. AL] .......................................................... *C. brysonii*

4 Basal sheaths greenish-white or light tan; old leaf bases persistent as brownish fibrils; perigynium beak obscure, essentially absent..........................  

5 Leaf-sheaths glabrous; perigynia broadly near the middle; basal sheaths purple, greenish-white, or light tan.

6 Widest leaf (5.1-) 6.2-11.1 (-13.5) mm wide; foliage glaucous; pistillate scales awnless or short-awned, the awns 0-0.9 (-1.9) mm long.

7 Perigynia (4.0-) 4.2-5.5 (-6.0) mm long, (2.0-) 2.1-2.7× as long as wide; achene stipes (0.2-) 0.3-0.5 (-0.6) mm long; pistillate spikes (5.0-) 5.9-8.0 (-9.6) mm wide; achene beaks vertical to slightly bent, usually bent 0-30° from the vertical .......................................................... *C. flavocarpa*  

8 Widest leaf (2.0-) 2.5-3.3× as long as wide; widest leaf (3.0-) 3.5-6.5 mm wide; achene beak (0.3-) 0.4-0.7 mm long; longest pistillate spikes with (5-) 7-14 perigynia .......................................................... *C. planispicata*  

9 Axis of inflorescence and pistillate spike peduncles glabrous; perigynia 2.5-4 mm long .......................................................... *C. conoidea*  

An axis of inflorescence and pistillate spike peduncles smooth; perigynia 3-6 mm long.  

10 Plants densely to loosely cespitose; culm purple-red coloration extending (3.5-) 4.0-9.6 cm up from base; widest leaves 2.4-6.5 mm wide; perigynia either distichously or spirally imbricate; achene stipe either 0.2-0.4 or 0.6-0.8 (-0.9) mm long.

11 Purple-red coloration extending (3.4-) 4.0-7.3 cm up from base; widest leaves 2.4-4.0 (-5.3) mm wide; perigynia spirally imbricate; achene stipe (0.2-) 0.3-0.6 mm long.  

12 Perigynia (2.5-) 2.9-4.8 (-5.2) mm long, (2.0-) 2.5-3.1× as long as wide ..........................................................  

13 Widest leaves 3.3-5.6 (-8.0) mm wide; achene stipe (0.3-) 0.4-0.6 mm long .......................................................... *C. roanensis*  

4 Leaf sheaths glabrous on the hyaline ventral portion; largest leaves 3-9 mm wide .......................................................... *C. gracilis*

1 Perigynia densely white-villosous apically, glabrous basally; achene body 2.0-2.7 mm long, long-stipitate .................................................. C. dayacarpa

[26ml] Section 27 – section Hirtifoliae


One species ................................................................................................................................. C. scabrata

Identification notes: All species of this section in our area form large clonal colonies by rhizomes.

1 Perigynium body pubescent.
   2 Culms central, with the withered remains of the previous year’s leaves at the base; basal sheaths of fertile culms not at all or only slightly reddened; [of the Coastal Plain] .......................................................... C. striata var. striata
   2 Culms lateral, with bladeless sheaths at the base; basal sheaths strongly reddened; [collectively widespread in our area].
   3 Beak of the perigynium soft, translucent, the teeth obscure; peduncle of staminate spike 0.2-2 cm long; [of the Piedmont and Coastal Plain in our area] ................................................................. C. vestita
   3 Beak of the perigynium stiff, opaque, the teeth well-developed; peduncle of staminate spike (0.8-) 2-9 cm long; [of the Mountains in our area].
   4 Leaves folded along the midrib, appearing 0.7-2.0 (-2.2) mm wide; culms obtusely trigonous, usually smooth; base of pistillate bracts often auriculate, forming a V-shaped mouth; middle staminate scales narrowly acute ........................................... C. lasiocarpa var. americana
   4 Leaves more-or-less flat or M-shaped, (1.8-) 2.2-4.5 (-6) mm wide; culms acutely trigonous, often scabrous on the angles; base of pistillate bracts with a short, truncated process at mouth; middle stamine scales obtuse and short-awned, or acute ............. C. pellita

1 Perigynium body glabrous.
   5 Widest leaves 1.5-5 (-6) mm wide; culms 8-90 cm tall; inflorescences 2.5-35 (45) cm long.
   6 Inflorescence rachis with rounded, smooth angles; lowermost pistillate spikes usually strongly overlapping; [introduced, in coastal sands] ..................................................................................................................... C. pumila
   6 Inflorescence rachis with sharp, scabrous angles; lowermost pistillate spikes overlapping not at all or slightly; [native, in acidic Coastal Plain wetlands] .......................................................... C. striata var. brevis

1 Perigynium body glabrous.
   5 Widest leaves 1.5-5 (-6) mm wide; culms 40-135 cm tall; inflorescences 15-60 cm long.
   7 Perigynia 3.0-4.5 mm long; [exotic species] ........................................................................................................ C. acutiformis
   7 Perigynia 4.8-7.8 mm long; [native species].
   8 Longest ligules 2-10 (-12) mm long, < 2 × as long as wide; culms central, with the withered remains of the previous year’s leaves at the base; perigynia obscurely 10-15-veined; [of the Coastal Plain] ................................................................. C. hyalinolepis
   8 Longest ligules 13-40 (-56) mm long, much longer than wide; culms lateral, with bladeless sheaths at the base; perigynia usually strongly 14-28-veined; [of the Mountains in our area] ................................................................. C. lacastris

[26pp] Section 29 – section Carex


1 Perigynia glabrous; leaf blades finely papillose on the lower surface (and also usually long-pubescent); vegetative culms hollow, spongy (flattened when pressed) ............................................................ C. atherodes
1 Perigynia pubescent; leaf blades glabrous or pubescent abaxially, but not papillose; vegetative culms hard.
   2 Leaf blades pubescent; [rare introduction] ................................................................................................................. C. hirta
   2 Leaf blades glabrous; [native] .............................................................................................................................. C. trichocarpa

[26qq] Section 30 – section Vesicariae [including 52 - Pseudocyperae]

A section of ca. 45 species, semicosmopolitan. Following Reznicek & Ford in FNA (2002b), this section is circumscribed to include the traditionally recognized section Pseudocyperae. References: Reznicek & Ford in FNA (2002b). Key adapted from Reznicek & Ford in FNA (2002b).

1 Pistillate scales with a prominent, scabrous awn (the body of the scale often ciliate as well).
   2 Plants extensively colonial from elongate, creeping rhizomes; staminate scales acute to acuminate, essentially smooth-margined except at the very tip; perigynia 7-11-nerved ......................................................... C. schweinitzii
   2 Plants densely to loosely cespitose, the rhizomes connecting individual culms in a clump < 10 cm long; staminate scales (at least some of them) with a distinct, scabrous awn; perigynia 6-25-nerved.  
   3 Perigynia 6-12-nerved, the nerves separate nearly to the beak apex; perigynium bodies broadly ellipsoid to more or less globose, (1.8-) 2.0-4.2 mm wide; achenes rough-papillate.
   4 Spikes 9-14 (-15) mm thick; widest leaves 2.4-4.0 (-5) mm wide; spikes usually 2.5-3.5× as long as wide; perigynia 4.8-6.6 (-7.6) mm long, the beaks usually 0.7-1.3× as long as the body.  
   4 Spikes (12-) 15-22 mm thick; widest leaves (4.0-) 4.5-13 mm wide; spikes usually < 2.5× as long as wide if < 15 mm thick; perigynia (6-) 6.5 (-10.8) mm long, the beaks 0.6-0.9× as long as the body ........................................ C. baileyi
   5 Perigynia 12-25-nerved, the nerves for 2 prominent laminars) confluent at or below the middle of the beak; perigynium bodies ellipsoid to lance-ovoid, 1.1-2.2 mm wide; achenes smooth.
   5 Mature perigynia spreading or ascending when mature; perigynia round in cross-section; teeth of the perigynium beak 0.3-0.9 mm long, straight. ......................................................................................................................... C. hysterica
   5 Mature perigynia reflexed when mature; perigynia obscurely trigonous; teeth of the perigynium beak 1.3-2.1 (-2.8) mm long, strongly outcurved ....................................................... C. comosa

1 Pistillate scales smooth-margined, obtuse to acuminate, awnless (rarely the lowermost scales awned in C. utriculata).
6 Leaves filiform-involute, wiry, (0.5-) 1-3 (-3.2) mm wide; stems round or obtusely trigonous in cross-section, smooth; [rare, in high
elevation bogs in the Mountains].

6 Leaves flat, U-, V-, or W-shaped in cross-section, the widest 1.5-12 (-15) mm wide; stems round to trigonous, often scabrous-angled;
[collectively widespread].

7 Achenes asymmetrical, deeply indented or invaginated on one face; widest perigynia (4.0-) 4.5-7 mm wide; beaks 2.4-4.8 mm long,
smooth .............................................................................................................................................................................. C. tuckermanii

7 Achenes symmetrical; widest perigynia (2-) 2.5-3.5 (-4.5) mm wide; beaks 1.4-2 (-4.8) mm long, scabrous or smooth.

8 Perigynium beaks finely scabrous (at least near the tip and on the teeth), 2.4-4.2 (-4.8) mm long; widest leaves 1.8-4.3 (-5) mm wide.

...................................................................................................................................................................................... C. bullata

8 Perigynium beaks smooth, 1-4.5 mm long; widest leaves 1.5-15 mm wide.

9 Pistillate spikes globose or short ovoid; [plants of the Coastal Plain from e. NC southward].

9 Pistillate spikes cylindric, ca. 20-150-flowered; [plants collectively of the Mountains, from nw. NC northward].

10 Bract of lowest pistillate spike (excepting isolated spikes from long-sheathing bract on the lower part of the stem) (2.5-) 3-9x
as long as the inflorescence; staminate spike often 1, slightly (if at all) elevated above the summit of the crowded pistillate
spikes; perigynia reflexed ........................................................................................................................................................... C. retorsa

10 Bract of lowest pistillate spike (excepting isolated spikes from long-sheathing bracts on the lower part of the stem) 0.5-2.5x as
long as the inflorescence; staminate spikes 2-4 (-5), well elevated above the summit of the crowded pistillate spikes; perigynia
spreading or ascending.

11 Plant colonial from long-creeping rhizomes; widest leaves (4.5-) 5-12 (-15) mm wide; ligules about as long as wide; basal
sheaths usually spongy-thickened and often tinged with reddish-purple ........................................................................................................ C. utriculata

11 Plant cespitose; widest leaves 1.8-6.5 mm wide; ligules longer than wide; basal sheaths not spongy-thickened and often
[26rr] Section 31 – section Lupidinae

A section of 6 species, of e. North America. References: Reznick & Ball (1974); Reznick in FNA (2002b); Uttal (1971). Key adapted in part
from Reznick & Ball (1974) and Reznick in FNA (2002b).

1 Sheath of uppermost leaf absent or <1.5 (-2.5) cm long; beak of perigynia 1.5-4.2 mm long; achenes with elliptic or obovate sides.

2 Perigynia rhombic-ovoid, cuneate to the base, 8-35 per spike, radiating in all directions and therefore forming a globular spike...... C. grayi

2 Perigynia lanceoloid to ovoid, convex to the base, 1-12 (-20) per spike, ascending to spreading (the lowest sometimes slightly reflexed)
and therefore forming an ovoid to obovoid spike.

3 Perigynia 3-5 mm wide at the widest point; achenes broadest above the middle, with a pronounced shoulder rounding abruptly to the
tip; [of high elevations in our area, generally in spruce-fir or northern hardwoods forests] .............................................................................................................................................................................. C. intumescens var. fernaldii

3 Perigynia 5-8 mm wide at the widest point; achenes broadest at the middle, smoothly rounded to the tip; [plants of the Coastal Plain from e. NC southward].

1 Sheath of uppermost leaf usually >1.7 cm long; beak of perigynia 4.5-10 mm long; achenes with rhombic or nearly triangular sides.

4 Achenes as wide as long or longer, widest near the middle; perigynia spreading at right angles to the rachis............. C. gigantea

4 Achenes as wide as long or longer, widest near the middle; perigynia ascending.

5 Angles of the achenes smoothly curved, not pointed or knobbed; achenes 1.7-2.6 (-2.8) mm wide, distinctly longer than wide.

6 Staminate peduncle (3-) 6-18 cm long, usually exceeding the uppermost perigynium by 2-12 cm; plants loosely colonial by long slender
rhizomes .............................................................................................................................................................................. C. lupuliformis

6 Staminate peduncle 0.5-6 (-7) cm long, shorter than to exceeding the uppermost pistillate spike by < 2 cm; plants solitary or loosely
cespitose in small clumps connected by stout, short rhizomes ........................................................................................................ C. lupulina

[26ss] Section 32 – section Rostrales (Folliculatae)

A section of 5 species, of e. North America and e. and se. Asia. References: Reznick in FNA (2002b). Key based on FNA.

1 Perigynia 6.4-10.7 mm long, 2.6-3.9x as long as wide .............................................................................................................................................................................. C. turgescens

1 Perigynia (8-) 10.5-15.6 mm long, 4.7x as long as wide.

2 Widest leaf blades 1.6-3.5 (-4.2) mm wide; bract sheaths concave at the apex; [of MD northward] .................. C. michauxiana

2 Widest leaf blades (3.5-) 5-18 mm wide; bract sheaths truncate to convex at the apex; [collectively widespread in our area].

3 Pistillate scales usually awned (rarely merely cuspidate); pistillate scales (including the awn, if present) 0.5-1.2x as long as the
perigynium; widest leaves of vegetative shoots 8-18 (-21) mm wide; pistillate spikes normally not staminate at apex (rarely with a few
staminate flowers); [primarily of the Mountains and Piedmont] .............................................................................................................. C. folliculata

3 Pistillate scales acute or long-acuminate (rarely short-awned); pistillate scales (including the awn, if present) 0.3-0.6x as long as the
perigynium; larger leaves mostly 4-12 mm wide; pistillate spikes normally staminate at apex; [primarily of the Coastal Plain] ............ C. lonchocarpa

[26tt] Section 33 – section Collinsiae


One species.............................................................................................................................................................................. C. collinsii
A section of 4 species, of e. and c. North America and temperate South America. References: Ford in FNA (2002b). Key based on FNA.

1 Terminal spike usually entirely staminate; pistillate scales with an awn equaling or surpassing the perigynium; achenes 1.2-2.1 mm long.
2 Pistillate scales 0.4-0.9 (-1.1) mm wide, the body wide and translucent; staminate scales 0.9-1.6 mm wide, tightly imbricate in the spike; plants colonial, long-rhizomatous.......................... C. aureolensis
3 Pistillate scales 0.1-0.4 mm wide, the body narrow and indistinct; staminate scales 0.3-0.8 mm wide, irregularly imbricate with spreading tips; plant cespitose, short-rhizomatous............................................................... C. frankii
1 Terminal spike gynoecandrous, mainly pistillate; pistillate scales awnless, or with a short awn not surpassing the perigynium; achenes 2.0-3.0 mm long.
3 Achene 1.9-2.5× as long as wide; style persistent, strongly kinked at the base; spikes 1-2 (-3) per stem........................................ C. squarrosa
3 Achene 1.2-1.9× as long as wide; style deciduous, straight or slightly curved; spikes (1-) 2-4 (-6) per stem.......................... C. typhina

A section of 38 species, subcosmopolitan in temperate and boreal regions. References: Crins & Rettig in FNA (2002b); Rettig (1988); Cusick (1992); Rettig & Crins (1996); Werier (2006); Sorrie et al. (in prep.); Poindexter et al. (in prep.). Key based in part on Rettig (1988), Werier (2006), C, and M.

1 Leaves of flowering stems flat, the widest 3.3-5.0 mm wide .......................................................... C. distans
1 Leaves of flowering stems channelled or involute, the widest 1.0-3.5 (-4.3) mm wide ......................................................... C. extensa
1 Leaves of flowering stems channeled or involute, the widest 1.0-3.5 (-4.3) mm wide ......................................................... C. extensa
1 Leaves of flowering stems channeled or involute, the widest 1.0-3.5 (-4.3) mm wide ......................................................... C. extensa
1 Leaves of flowering stems channeled or involute, the widest 1.0-3.5 (-4.3) mm wide ......................................................... C. extensa


1 Pistillate scales 0.4-0.9 (-1.1) mm wide, the body wide and translucent; staminate scales 0.9-1.6 mm wide, tightly imbricate in the spike; plants colonial, long-rhizomatous.......................... C. aureolensis
3 Pistillate scales 0.1-0.4 mm wide, the body narrow and indistinct; staminate scales 0.3-0.8 mm wide, irregularly imbricate with spreading tips; plant cespitose, short-rhizomatous............................................................... C. frankii
1 Terminal spike gynoecandrous, mainly pistillate; pistillate scales awnless, or with a short awn not surpassing the perigynium; achenes 2.0-3.0 mm long.
3 Achene 1.9-2.5× as long as wide; style persistent, strongly kinked at the base; spikes 1-2 (-3) per stem........................................ C. squarrosa
3 Achene 1.2-1.9× as long as wide; style deciduous, straight or slightly curved; spikes (1-) 2-4 (-6) per stem.......................... C. typhina


1 Perigynia (2.0-) 2.3-2.6 (-3.0) mm long, ovoid-ellipsoid to narrowly obovate (occasionally subglobose), distinctly papillose; pistillate scales often subequal to longer than the body of mature perigynia; lowest proximal pistillate bract shorter or longer than the staminate spike; style persistent, generally straight, or slightly curved; lowest proximal pistillate bract usually longer than the staminate spike; leaves generally exceeding the culms; [of the se. Coastal Plain] ......
.......................... C. lutea


1 Pistillate scales coppery brown; terminal (staminate) spike 6-24 mm long; pistillate spikes 2-5 per culm; culms 1-8 dm tall; [of calcareous
2 Pistillate scales yellowish green; terminal (staminate) spike 12-21 mm long; pistillate spikes (1-) 2-5 per culm; culms 1-5 dm tall; [of acid
2 Pistillate scales yellowish-green; terminal (staminate) spike 12-39 mm long; pistillate spikes 1-5 per culm; culms 1-12.5 dm tall; [either of calcareous savannas of the Coastal Plain of NC, or of acid situations in NJ and northward]


1 Spikes borne above the middle of the primary culm, but also with pistillate spikes borne on short or elongate peduncles from the sheathed base of the culm (referred to as subradical or basal spikes).
2 Culms usually delicate and flexuous; subradical pistillate spikes born on slender elongate peduncles, not densely aggregated at the base of the plant; terminal staminate spikes almost always with at least one approximate pistillate spike.
3 Perigynia (2.2-) 2.6-3.1 (-3.2) mm long, subglobose to obovoid, occasionally papillose (view at 45x); pistillate scales often shorter than the body of mature perigynia; staminate spike 3.5-5.9 (-6.7) mm long; lowest proximal pistillate bract “flag-like”, usually exceeding the staminate spike; leaves generally broader, 0.9-2.6 (-3.2) mm wide [north temperate, arctic-boreal] .............. C. deflexa var. deflexa
3 Perigynia (2.0-) 2.3-2.6 (-3.0) mm long, ovoid-ellipsoid to narrowly obovate (occasionally subglobose), distinctly papillose; pistillate scales often subequal to longer than the body of mature perigynia; lowest proximal pistillate bract shorter or longer than the staminate spike; style persistent, generally straight, or slightly curved; lowest proximal pistillate bract usually longer than the staminate spike; leaves generally exceeding the culms; [of the se. Coastal Plain] ......
.......................... C. pauciflora


1 Terminal spike gynoecandrous, mainly pistillate; pistillate scales awnless, or with a short awn not surpassing the perigynium; achenes 2.0-3.0 mm long.
3 Achene 1.2-1.9× as long as wide; style deciduous, straight or slightly curved; spikes (1-) 2-4 (-6) per stem.......................... C. typhina


1 Terminal spike gynoecandrous, mainly pistillate; pistillate scales awnless, or with a short awn not surpassing the perigynium; achenes 2.0-3.0 mm long.
3 Achene 1.2-1.9× as long as wide; style deciduous, straight or slightly curved; spikes (1-) 2-4 (-6) per stem.......................... C. typhina


1 Terminal spike gynoecandrous, mainly pistillate; pistillate scales awnless, or with a short awn not surpassing the perigynium; achenes 2.0-3.0 mm long.
3 Achene 1.2-1.9× as long as wide; style deciduous, straight or slightly curved; spikes (1-) 2-4 (-6) per stem.......................... C. typhina


1 Terminal spike gynoecandrous, mainly pistillate; pistillate scales awnless, or with a short awn not surpassing the perigynium; achenes 2.0-3.0 mm long.
3 Achene 1.2-1.9× as long as wide; style deciduous, straight or slightly curved; spikes (1-) 2-4 (-6) per stem.......................... C. typhina


1 Terminal spike gynoecandrous, mainly pistillate; pistillate scales awnless, or with a short awn not surpassing the perigynium; achenes 2.0-3.0 mm long.
4 Terminal staminate spike 6-11 (-16) mm, some culms with staminate spikes elevated above to sessile subsessile pistillate spikes; perigynia ovoid-ellipsoid to subglobose; perigynium body pubescent with short trichomes and minute papillae; lowest proximal perigynial bract usually shorter than the staminate spike; leaves shorter than to exceeding the culms; [of the Southern Appalachian Mountains and ne. US].....................................................................................................................Carex species 2

2 Culms rhizomatous; subradical pistillate spikes borne on rigid, often short peduncles and densely aggregated at the base of the plant; terminal staminate spikes often alone or associated with a pistillate spike.

5 Perigynia (2.2-) 2.3-3.2 (-3.3) mm long, beaks (0.4-) 0.5-0.9 mm long; young leaves long, thin and flexuous............................................ C. umbellata

5 Perigynia (3.0-) 3.1-4.7 mm long, beaks (0.9-) 1.0-2.1 mm long; young leaves variable.

6 Perigynium body pubescent; young leaves long, thin and flexuous ................................................................. C. rugosperma

6 Perigynium body essentially glabrous, with a few hairs on the angles of the beak; young leaves short, broad and rigid .......... C. tonsa

1 Spikes all borne close together above the middle of the primary culm (i.e., lacking additional basal spikes originating from the same sheaths); some taxa may exhibit naturally short individual culms (e.g., C. emmonsii, C. nigromarginata, C. reznickii).

7 Body of the perigynium (excluding the beak and the contracted base) subglobose to obovoid, usually about as wide as long.

8 Plants cespitose (often loosely so from thin rhizomes in C. deflexa var. deflexa); leaves 0.9-4.7 mm wide; perigynium body pubescent.

9 Perigynium occasionally papillate (mainly at the base of the beak); lowest proximal perigynial bract often exceeding the terminal staminate spike; widest leaves typically less than 3.0 mm wide................................................................. C. deflexa var. deflexa

9 Perigynium distinctly papillate; lowest proximal perigynial bract usually shorter than the terminal staminate spike; widest leaves usually more than 3.0 mm wide.

10 Perigynium 0.1-0.2 (-0.3) mm long; perigynia 2.5-4.1 mm long, (1.2-) 1.4-1.6 (-2.0) mm wide, about as long as the perigynia; plants loosely cespitose; [widely distributed].............................................................. C. communis var. amplisquama

10 Perigynium 0.1-0.2 (-0.3) mm long; perigynia 2.5-4.1 mm long, (1.2-) 1.4-1.6 (-2.0) mm wide, about as long as the perigynia; plants densely cespitose, the culms erect, arching at the tips; [of nw. SC, sw. NC, and adjacent GA].............................................................. C. communis var. communis

8 Plants with long rhizomes, forming cespitose patches; leaves 1.0-3.0 (-3.5) mm wide; perigynium body pubescent to nearly glabrous.

11 Beak of perigynium (0.2-) 0.6-1.0 (-1.2) mm long; perigynium body 2.2-3.4 mm long, 1.0-1.8 mm wide, pubescent and papillate; [widely distributed in our area]................................................................. C. pennisylvanica

11 Beak of perigynium (1.0-) 1.2-1.6 (-2.6) mm long; perigynium body 3.1-4.6 mm long, 1.0-1.3 (-1.5) mm wide, pubescent or nearly glabrous, with or without papillae; [of the Mountains of sw. VA, w. NC, and nw. SC northwards].

12 Beak of the perigynium averaging 1.5 mm long, the orifice oblique; leaves mostly 1.1-1.3 mm wide; perigynium pubescent primarily near the summit, at the base of the beak, papillae usually not distinguishable; male spikes <15 mm long; [of WV southwards]................................................................................................................................. C. lucorum var. austrolucorum

12 Beak of the perigynium averaging 1.3 mm long, the beak split more-or-less equally; leaves mostly 1.5-2.8 mm wide; perigynium pubescent over the body, papillae usually distinguishable; male spikes >15 mm long; [of MD, NJ, and PA northwards]................................................................. C. lucorum var. lucorum

7 Body of the perigynium (excluding the beak and the contracted base) ellipsoid, distinctly longer than wide or thick, often also wider than thick, and slightly trigonous.

13 Plants with conspicuously long rhizomes, forming cespitose patches; perigynia typically papillate [collectively of the Coastal Plain and, less commonly, Piedmont].

14 Achene body (1.4-) 1.5-1.7 (-2.0) mm long, biconvex, trigonous, or both; fertile culms 7-17 cm tall, usually much shorter than the leaves; basal sheaths usually very fibrillose; pistillate scales (2.7-) 3.0-3.7 (-4.2) mm long.............................................. C. floridana

14 Achene body (1.1-) 1.2-1.3 (-1.4) mm long, trigonous; fertile culms 20-43 cm tall, equaling or exceeding the leaves; basal sheaths usually not fibrillose; pistillate scales (2.3-) 2.6-3.0 (-3.4) mm long................................................................. C. physorhyncha

13 Plants cespitose (sometimes loosely so from slender rhizomes in C. novae-angliae); perigynia papillate not evident to rather conspicuous [collectively widespread in our area].

15 Pistillate scales usually shorter than the body of the mature perigynia they subtend, perigynia without easily discernable papillae, lowermost 2 pistillate spikes remote, several separated by >7 mm, staminate spike often elevated above pistillate spikes; leaves thin, delicate 0.7-1.5 mm wide................................................................................................................................. C. novae-angliae

15 Pistillate scales mostly longer than the body of the mature perigynia they subtend, perigynia with discernable papillae, lowermost 2 pistillate spikes overlapping, usually separated by <7 mm, staminate spike often closely associated with pistillate spikes; leaves various.

16 Achene body (1.3-) 1.4-1.6 (-1.7) mm long; fertile culms mostly 2-20 cm tall.

17 Culms usually variable in length, (4.5-) 6.6-38 (-51) cm tall; widest leaf (1.9-) 2.3-4.5 mm wide; at least some pistillate scales often with reddish to purplish/black color below the distal tip extending laterally from near the margin to the green or brown longitudinal mid-stripe on either side of midvein................................................................. C. nigromarginata

16 Achene body (1.3-) 1.4-1.6 (-1.7) mm long; fertile culms mostly 2-20 cm tall.

17 Culms usually variable in length, (4.5-) 6.6-38 (-51) cm tall; widest leaf (1.9-) 2.3-4.5 mm wide; at least some pistillate scales often with reddish to purplish/black color below the distal tip extending laterally from near the margin to the green or brown longitudinal mid-stripe on either side of midvein................................................................. C. nigromarginata

18 Scales of the median portion of the staminate spike with a weak to moderately prominent midrib usually not extending to the tip, and minute teeth rarely present on the midrib (visible at 15× or greater); perigynium teeth mostly 0.2-0.3 mm long; staminate spike 8.4-11.1 mm long; culms erect to ascending, equaling or exceeding the leaves, the inflorescence typically conspicuous; pistillate scales with green midrib, hyaline margins, and usually reddish-tinted; [mostly of loamy or clayey soils of the Piedmont and Mountains]................................................................. C. albicans

18 Scales of the median portion of the staminate spike either with a strong, prominent midrib extending to the tip (or even aristate), and with minute teeth usually present on the midrib (visible at 15× or greater); perigynium teeth mostly 0.15-0.25 mm long; staminate spike 5.0-8.5 mm long; culms lax or weakly ascending, often shorter than, curving under, and more-or-less hidden by the leaves; pistillate scales with green midrib, hyaline margins, and only rarely reddish-tinted; [mostly of acid, sandy soils of the Coastal Plain]......................................................................................................................... C. emmonsii
[26ddd] Section 41 – section Pictae


1 Pistillate scales short-awned................................................................................................................................. C. pedunculata
1 Pistillate scales acute .................................................................................................................................................. C. richardsonii

[26fff] Section 42 – section Mitratae (Praecoces)

A section of ca. 20 species, of Europe, e. Asia, and Australia. References: Standley in FNA (2002b).

1 Plants monoecious, with 3-8 spikes per stem; leaf blades 4-8 mm wide, glaucous on the upper surface; [of the East Gulf Coastal Plain, east to sw. GA and Panhandle FL] ...................................................................................... C. baltzellii
1 Plants dioecious, with a single unisexual spike per stem; leaf blades 2-4.5 mm wide, green on the upper surface; [of areas west of east c. TN and ne. GA] ........................................................................................................... C. picta

[26ggg] Section 43 – section Albae

A section of 4 species, north temperate. References: Ball in FNA (2002b).

One species........................................................................................................................................................................ C. eburnea

[26kkk] Section 44 – section Phyllostachyae


1 Achenes subglobose, 1-1.5× as long as wide; staminate scales more or less truncate.
   2 Tallest culm 3.2-9.1 cm high, 15-32% of plant height; terminal spike with 4-8 perigynia; wider leaves with hyaline margins 0.05-0.2 mm wide; hyaline margins of distal pistillate scales 0.05-0.3 mm wide; perigynium beak 30-38% (-43%) of perigynium length; [of calcareous glades in w. VA and north and west of our area] ................................................................. C. juniperorum
   2 Tallest culm 9.0-41 cm high, 39-86% of plant height; terminal spike with 1-4 perigynia; wider leaves with green margins; hyaline margins of distal pistillate scales 0.3-0.7 mm wide; perigynium beak 34-53% of perigynium length; [of rich forests or rocky calcareous glades and woodlands].
   3 Longest (per plant) staminate portion of terminal spike (4.9-) 5.8-13.5 mm long; proximalmost staminate scale in terminal spike 1.1-1.8 (-2.1) mm long, 13-26 (-35)% of length of staminate portion of terminal spike; perigynium beaks (1.9-) 2.3-3.9 mm long, 39-53% of perigynium length; shoot bases lacking red-purple; [of rich mesic forests widespread in our area, especially VA] ....................... C. jamesii
   3 Longest (per plant) staminate portion of terminal spike 3.4-5.6 (-6.2) mm long; proximalmost staminate scale in terminal spike (1.9-) 2.1-3.3 mm long, (35-) 44-77% of length of staminate portion of terminal spike; perigynium beaks 1.4-2.3 (-2.5) mm long, 34-44% of perigynium length; shoot bases tinged with reddish-purple; [of c. TN and c. KY and westward] ......................................................... C. timida
   1 Achenes ellipsoid, 1.5-2.0× as long as wide; staminate scales obtuse to acute.
   4 Tallest culm 0.18-0.38× as tall as plant; perigynia (7.0-) 7.5-10.8 mm long; perigynium beaks (3.6-) 4.1-6.4 mm long; culms erect; peduncles usually erect to spreading; [of the East Gulf Coastal Plain, east to sw. GA and Panhandle FL] ............................................. C. superata
   4 Tallest culm 0.41-0.87× as tall as plant; perigynia 4.5-8.0 mm long; perigynium beaks 1.7-4.3 mm long; culms erect to spreading; peduncles usually widely spreading to nodding.
   5 Longest staminate portion of terminal spikes 12.7-25.6 mm long; perigynia 5.8-8.0 mm long; perigynium beaks 2.5-4.3 mm long; achenes (2.4-) 2.6-3.4 mm long ................................................................. C. basiantha
   5 Longest staminate portion of terminal spikes 4.9-5.7 (-6.5) mm long; perigynia 4.5-5.7 (-6.5) mm long; perigynium beaks 1.7-2.6 (-2.8) mm long; achenes 1.8-2.6 mm long ................................................................. C. wildenowii

[26mmm] Section 46 – section Leptocephalae (Polytrichoidae)

A monotypic section, of North America and the West Indies. References: Cochrane in FNA (2002b).

1 Perigynia 3.4-4.9 (-5.4) mm long; pistillate scales white ................................................................. C. leptalea var. harperi
1 Perigynia 2.5-3.5 mm long; pistillate scales pale brown, with green midrib .............................................. C. leptalea var. leptalea

Section 47 – “Cymophyllus”

Carex abscondita Mackenzie. Rich bottomlands and other forests. April-June. MA south to Panhandle FL, west to TX and OK, and scattered inland. See C. magnifolia for discussion of the two taxa. Naczi (1999b) reports a chromosome number of n =
24. [<C. abscondita – RAB, K (also see C. cumberlandensis and C. magnifolia); <C. abscondita – C, G, M, S, W (also see C. cumberlandensis); <C. abscondita – FNA, WH (also see C. magnifolia); >=C. abscondita var. abscondita – F; >=C. abscondita var. rostellata Fernald – F]

*Carex acidicola* Naczi (section *Griseae*). Mesic forests. Ne. GA and c. AL south to sw. GA (Naczi, Bryson, & Cochrane 2002). [= FNA] [not yet keyed; *Griseae*]


*Carex aestivaliformis* Mackenzie. Wet meadows (VA), upland submesic forests (GA). Considered by some to be a hybrid, but with little known documentation or evidence for or against its alleged hybrid status; further study is needed. [= C, G, M = C. x aestivaliformis – F, FNA, K]


*Carex aggregata* Mackenzie. Rich forests and woodlands. May–June. NY, ON, MN, and SD, south to nc. NC, n. AL, s. MS, and OK. Other useful characters include: culms relatively smooth; pistillate scales sharp-pointed, the tip reaching to about the base of the perynium; and perigynia nerveless. [= F, FNA, K = C. sparganioides Muhlenberg ex Willdenow var. aggregata (Mackenzie) Gleason – G, C, G]


*Carex albotubusculus* Schweinitz. Low fields, bottomlands. May–June. MA, NY, WI, and MO, south to Panhandle FL and TX. [= C, F, FNA, K, W; <C. albotubusculus – RAB, G, GW, W (also see C. longii); C. striominea misapplied]


*Carex alorpoecoida* Tuckerman. Seasonally saturated situations, typically over calcareous substrates. NS west to SK, south to DC, MD, WV, KY, TN, and IA (Standley in FNA 2002b). [= FNA, K] [synonymy incomplete; not yet keyed; *Vulpinae*]

*Carex amphibola* Steudel. Moist loamy forests, bottomlands, slopes, uplands. [distribution and abundance in our area needing additional herbarium investigation] May–June. MA, s. ON, MI, IL, MO, and OK, south to GA, AL, MS, LA, and TX. [= RAB, FNA, G, M, S; = C. amphibola var. amphibola – F, K; <C. amphibola – GW]


*Carex aquatilis* Wahl. Aquatic Sedge. Mountaintop ponds (with *Dulichium arundinaceum*, *Vaccinium macrocarpon*, *Juncus canadensis*, and *Utricularia spatulata*), maerif fen at high elevation. NL (Newfoundland) west to ND, south to NJ, s. PA, OH, IN, IA, and NE; disjunct in w. VA (Augusta County) and nw. NC (Ashe County); n. Eurasia. First reported for VA by Wieboldt et al. (1998). [= G; >C. aquatilis Wahlendberg var. substricta Kükenthal – C, FNA; >C. aquatilis var. altior (Rydberg) Fernald – F; ?>C. aquatilis var. aquatilis – K; >C. substricta (Kükenthal) Mackenzie – M]
Carex arcata  W. Boott, Black Sedge, Drooping Woodland Sedge. Northern hardwood and spruce forests, bog edges. NL (Newfoundland) west to MN, south to PA, w. VA, nw. NC (Long Hope Valley, Ashe County), and OH. First reported for VA (Highland County) by Fleming & Ludvig (1996). [= FNA, K, G, K, M]

* Carex arenaria  Linnaeus, Sand Sedge. Moist to dry sandy hammocks; probably introduced from Europe. May-June. Fernald (1950) considers this plant native in se. VA, and populations of it in Carolina Beach State Park, New Hanover County, NC, certainly appear native. In North America, known from DE south to se. NC south to n. peninsular FL, Panhandle FL, west to e. TX, and north to nw. GA, c. TN, and c. AR. [= FNA, K, G, K, M]


Carex bicknellii Britton. Prairie-like openings and barrens over gabbro. ME west to SK, south to DE, OH, MO, OK, and NM; disjunct in nc. SC. First reported for South Carolina by Hill & Horn (1997). [= FNA; = C. bicknellii var. bicknellii – K; < C. bicknellii – C, F, G, (also see C. opaca)]

Carex billingsii (O.W. Knight) C.D. Kirschkbaum. Wet, boggy areas. NL (Newfoundalnd) and ON south to s. NJ (Ocean County), PA, and MI. See Kirschkbaum (2007). [= C. trisperma Dewey var. billingsii O.W. Knight – C, F, FNA, G, K, M]

Carex biltmoreana Mackenzie, Biltmore Sedge. In thin soils on medium to high elevation granitic domes and other sloping rock outcrops, often dominant in thin-soil herbaceous mats, but also occurring in adjacent woodlands under open to nearly closed canopy of Quercus spp., Fraxinus americana, Carya glabra, and Juniperus virginiana var. virginiana. May-June. Endemic to sw. NC, nw. SC, and ne. GA (Rabun and Towns counties). This distinctive endemic sedge may be recognized by its robust size (culms to a meter tall, to 5 mm in diameter at the base), habit (large clumps on sloping rock outcrops), and restricted habitat (in periodic seepage on exfoliation domes). Once considered very rare, C. biltmoreana proves to be limited to a narrow range and distinctive habitat, but regularly present and even locally dominant on the 50-100 granitic domes within 100 km of Brevard, NC. It often occurs with other endemic species, such as Houstonia longifolia var. glabra, Krigma montana, Pycnanthemum montanum, and Packera miliefolium. An excellent illustration appears in Massey et al. (1983). [= RAB, FNA, K, M, S, W]


Carex brevior (Dewey) Mackenzie ex Lunell. Dry forests and margins. May-June. MW west to BC, south to GA, c. TN, MS, TX, Tamaulipas, and AZ. [= F, FNA, G, K, W; < C. festucacea – RAB, GW; < C. brevior – C (also see C. molestiformis); < C. festucacea Schkuhr ex Willdenow var. brevior (Dewey) Fernald]

Carex bromoides Willdenow ssp. bromoides, Common Brome Sedge. Swamp forests, bogs, seeps, hydric hammocks, other wetlands. May-July. Ssp. bromoides ranges from NB west to e. MN, south to c. peninsular FL and e. TX, and disjunct in Mexico. Naczi (1999b) reports a chromosome number of n = 32-34. [= FNA, K; < C. bromoides – RAB, C, F, G, GW, M, S, W, WH]

Carex bromoides Willdenow ssp. montana Naczi, Blue Ridge Brome Sedge. Mountain bogs in the Blue Ridge, seepages in the Blue Ridge Escarpment. June-July. Ssp. montana is known only from sw. VA, w. NC, and nw. SC. This taxon needs further study in order to better understand its habitats and distribution. Naczi (1999b) provided additional evidence for its recognition, in the form of different chromosome numbers (n=30-31 for ssp. montana and n=32-34 for ssp. bromoides). [= FNA, K; < C. bromoides – RAB, C, F, G, GW, M, S, W]

Carex brunnescens (Persoon) Poiret var. brunnescens. Reported for our area by FNA. [= F; < C. brunnescens – RAB, C, G, M, S, W; = C. brunnescens ssp. brunnescens – FNA, K] [rejected; not keyed]

Carex brunnescens (Persoon) Poiret var. sphaerostachya (Tuckerman) Kükenthal, Brown Sedge. Grassy balds, bogs, moist forests at moderate to high elevations. June-July. The species is circumboreal, in North America ranging south to NJ, OH, MI, and MN, south to w. NC, nw. SC, e. TN, and n. GA. Var. sphaerostachya is apparently the only infraspecific taxon (of four) to reach our area. See Gaddy (1981) for the report of this species in SC. [= F; < C. brunnescens – RAB, C, G, M, S, W; = C. brunnescens ssp. sphaerostachya (Tuckerman) Kalela – FNA, K]

Carex breyonii Naczi, Bryson’s Sedge. Mesic forests. Endemic to the Cumberland Plateau of n. AL. See Naczi (1993) for additional information. [= FNA, K]

Carex bulbosylis Mackenzie. Moist deciduous forests. April-May. MS west to TX and OK; disjunct in sw. TN. Reports for GA in Jones & Coile (1988) are probably based on misidentifications. [= FNA, K; = Carex amphibola Steudel var. globosa (L.H. Bailey) L.H. Bailey] [add to synonymy]

Carex bullata Schkuhr ex Willdenow. Bogs. May-June. NS south to GA, primarily on the Coastal Plain, but with scattered occurrences inland (as in AR and the Eastern Highland Rim of sc. TN). [= RAB, C, F, FNA, GW, K, M, S; > C. bullata var. bullata – G; > C. bullata var. greenii (Boéckler) Fernald – G]


* Carex calcifugens  Naczi.  Rich bluff forests, evergreen maritime forests.  Se. NC south to Panhandle FL.  See Naczi, Bryson, & Cochrane (2002).  [= FNA]  [not yet keyed; synonymy incomplete; section Griseae]

Carex canescens  Linnaeus var. canescens, Silvery Sedge.  Acidic bogs, swamps, often in disturbed areas.  June.  NL (Newfoundland) west to MN, south to VA, NC, SC, OH, and IN.  [= RAB, F, G; < C. canescens – C, M; = C. canescens ssp. canescens – FNA, K]

Carex canescens  Linnaeus var. disjuncta  Fernald, Silvery Sedge.  Bogs, swamps, often in disturbed areas.  June.  NL (Newfoundland) west to MN, south to VA, NC, SC, OH, and IN.  [= RAB, F, G; < C. canescens – C, M; = C. canescens ssp. disjuncta (Fernald) Toivonen – FNA, K]

Carex careyana  Torrey ex Dewey, Carey's Sedge.  Nutrient-rich moist forests, mostly over calcareous rocks.  May-June.  NY west to MI and IA, south to sw. NC, AL and MO.  Naczi (1999b) reports a chromosome number of n = 34.  [= C, F, FNA, G, K, M, S, W]


* Carex caryophyllea  Latourrette, Spring Sedge.  Disturbed areas; native of Eurasia.  [= C, F, FNA, G, K, M]

Carex castanea  Wahlenberg, Chestnut Sedge.  Calcareous sites.  NL (Newfoundland) west to MB, south to NY, WI, MI, and MN.  The alleged disjunct occurrence in TN cited in FNA is in error.  [= C, F, FNA, G, K, M]  [rejected; not keyed]

Carex cephaloidea  (Dewey) Dewey.  Basic forests.  NB, ON, and MN south to MD, OH, IN, IL, and IA.  [= F, FNA, G, K, M; = C. sparganioides Muhlenberg ex Willdenow var. cephaloidea (Dewey) Carey – C, G]

Carex cephalophora  Muhlenberg ex Willdenow.  Deciduous forests.  May-July.  ME west to MN, south to Panhandle FL and TX.  [= F, FNA, G, K, M, S; < C. cephalophora – RAB, W (also see C. mesochorea); = C. cephalophora var. cephalophora – C, G]

* Carex chapmannii  Steudel, Chapman's Sedge.  Edges of calcareous pine savannas, calcareous slopes and bottomlands, mesic hammocks, stream terraces.  April-May.  Se. NC south to c. peninsular FL, on the Coastal Plain; allegedly disjunct in nc. TN (Chester et al. 1993).  The affinities of this species are questionable; it is usually placed in section Paniceae, but may actually belong to Laxiflorae.  [= RAB, FNA, K, S; = C. chapmannii – M, WC, orthographic variant; = C. styloflexa Buckley var. fusiformis (Chapman ex Dewey) Wieand]

Carex cherokeensis  Schweinitz, Cherokee Sedge.  Moist, rich, calcareous forests.  May-June.  Se. NC, nw. SC, sw. NC, nc. TN, se. MO, and OK, south to n. peninsular FL, Panhandle FL, and west to e. TX and se. OK; disjunct in the Mountains of VA, where perhaps introduced (Belden et al. 2004).  [= RAB, FNA, G, K, M, S, W, WH]

* Carex collinsii  Nuttall, Collins's Sedge.  White cedar (Chamaecyparis) bogs and pocosins in the Coastal Plain, bogs in the southwest mountains of NC (where associated with other Coastal Plain disjuncts).  June-July.  RI to wc. GA on the Coastal Plain, disjunct in the mountains of nw. NJ, PA, sw. NC, and possibly TN (Chester et al. 1993).  C. collinsii is a very distinctive species, the slender perigynia teeth are reflexed 180 degrees (thus appressed back against the perigynium).  [= RAB, C, F, FNA, G, K, M, S, W; = C. collinsiae – GW, orthographic error]

[= FNA, K; = *C. amplisquama* F.J. Hermann – W]

Carex communis L.H. Bailey var. communis. Dry woodlands and forests. May-June. PE west to MN, south to n. SC, c. GA (Jones & Coile 1988), and AR. [= FNA, K; = *C. communis* – RAB, C, F, G, M, S, W]

Carex comosa F. Boott, Bottlebrush Sedge, Bristly Sedge. Swamps, marshes. April-June. QC west to MN, south to s. FL and LA; also in w. North America. [= RAB, C, F, FNA, G, GW, K, M, S, WH]

Carex complanata Torrey & Hooker. Forests. May-June. NJ and s. PA south to n. peninsular FL and Panhandle FL, west to TX and MO; apparently disjunct in AZ. [= F, FNA, K, M, S; = *C. complanata* var. complanata – C, G; < *C. complanata* – RAB, GW, W, WH (also see *C. hirsutella*)]


Carex conoidea Schkuhr ex Willdenow, Field Sedge. Seepage and fen over mafic rocks (amphibolite). May-June. NL (Newfoundland) west to MN, south to nw. NC (Ashe Co. and Alleghany Co.) and MO. First found in NC by a party led by Asa Gray in 1841; recently located at a second site by D.B. Pointdexter. [= RAB, C, F, FNA, G, K, M, S]


Carex crawei Dewey, Crawe’s Sedge. Dry calcareous barrens. QC west to BC, south to NJ, w. VA, c. TN, AL, and AR. First reported for VA by Ludwig (1999). Naczi (1999b) reports a chromosome number of n = 30. [= C, F, FNA, G, K, M, S]


Carex crinita Lamarck var. brevicriniis Fernald. Swamps, wet forests. May-June. MA south to FL, west to TX, north in the interior to KY and MO. [= C, F, FNA, K; < *C. crinita* Lamarck var. crinita – RAB, G, GW; < *C. crinita* – M, S; < *C. crinita* – W (also see *C. gynandra* and *C. mitchelliana*)]

Carex crinita Lamarck var. crinita. Swamps, wet forests, bogs. May-June. NL (Newfoundland) west to MN and AB, south to GA, TN, and AR. [= C, F, FNA, K; < *C. crinita* Lamarck var. crinita – RAB, G, GW; < *C. crinita* – M, S; < *C. crinita* – W (also see *C. gynandra* and *C. mitchelliana*)]

Carex cristatella Britton, Crested Sedge. Grassy balds, bogs, wet meadows. May-June. VT west to SK, south to NC, KY, MO, and KS. See Fox, Godfrey, & Blomquist (1952) for the first report from NC. [= RAB, C, F, FNA, G, K, W]

Carex crus-corvi Shuttleworth ex Kunze, Crowfoot Sedge, Ravenfoot Sedge. Swamp forests, especially over calcareous substrates. May-June. Se. VA south to Panhandle FL, west to TX, north in the interior to IN, s. ON, MI, and MN. [= RAB, C, FNA, G, GW, K, M, S; > *C. crus-corvi* var. crus-corvi – F; > *C. bayardii* Fernald – F; > *C. crus-corvi* var. virginiana Fernald]

Carex cryptolepis Mackenzie. Acid, boggy sites. June-August. NL west to MN, south to NJ, NY, NJ. [= FNA, K]

[synonymy incomplete; section Ceratocystis]
**CYPERACEAE**

*Carex cumberlandensis* Naczi, Kral, & Bryson, Cumberland Sedge. Rich, mesic, deciduous or mixed forests. May; June. Sw. PA, s. OH, s. IL south to c. NC, c. SC, c. GA, sc. AL, e. MS, and w. TN; disjunct in nw. AR. [= FNA; < *C. abscondita* – RAB, C, G, K, M, S, W; < *C. abscondita var. abscondita* – F]

*Carex cumulata* (Bailey) Fernald. Dry to wet acid barrens and glades. NL west to SK, south to NJ, PA, IN, and IL. [not yet keyed; synonymy incomplete; not yet mapped; section *Ovales*]

*Carex dasyacarpa* Muhlenberg, Velvet Sedge. Maritime forests, hammocks, other sandy forests. May–June. E. SC south to n. peninsular FL, west to MS. Ssp. *C. dasyacarpa* var. *dasyacarpa*: rich forests; common in DE and WV. April–June. ME west to WI, south to FL and e. TX. Naczi (1999b) reports a chromosome number of n = 24. [= FNA; K; = F, FNA, G, K, M, S, W, WH (also see *C. digitalis var. floridana*)]


*Carex deflexa* Hornemann var. *deflexa*. Seepage at high elevations; rare. Greenland west to AK, south to MA, n. NY, n. MI, and n. MN; apparently disjunct in the high mountains of WV. Var. *boottii* L.H. Bailey of w. North America is of variable taxonomic treatment, included within *C. deflexa*, treated as variably distinct, or as a full species. [= FNA; < C, F, G, K, M]

*Carex diandra* Schrank, Lesser Tussock Sedge. Swamps, bogs, especially over limestone. Circumboreal, south in North America to w. MD, PA, TN, OH, IL, CO, CA; also reported from TN on the basis of a destroyed specimen. [= C, F, FNA, G, K, M]

*Carex digitalis* Willdenow var. *digitalis*. [Infraspecific taxa need separating: Cp (DE, FL), Pd (DE), Mt (WV).] [Mt, Pd, Cp (GA, NC, SC, VA): rich forests; common in DE and WV. April–June. ME west to WI, south to FL and e. TX. Naczi (1999b) reports a chromosome number of n = 24. [= FNA; K; < *C. digitalis* – RAB, C, F, G, M, S, W, WH] [not yet mapped]


*Carex distans* Linnaeus. Disturbed areas. Introduced in MD and PA; native of Eurasia. [= FNA, K]


*Carex ehrenwe F. Boott, Bristle-leaf Sedge. Calcareous cliffs, bluffs, and outcrops. May. NL (Newfoundland) west to AK, south to w. VA, w. NC, nw. SC, c. AL, n. AR, NE, s. AB, and s. BC; early reports of this species from TX are from a recently described species, *C. mckittrickii* Fernald. Sw. PA, s. OH, s. IL south to e. NC, south to SE, west to MI, south to FL and TX. Naczi (1999b) reports a chromosome number of n = 24. [= F, FNA, K; < *C. digitalis* – RAB, C, F, G, M, S, W, WH; < *C. digitalis var. asymmetrica* Fernald – F, K; < *C. digitalis* – RAB, C, G, M, S, W, WH]

*Carex flexuosa* (F. Boott) Reznicek occurs in w. North America is of variable taxonomic treatment, included within *C. deflexa*, treated as variably distinct, or as a full species. [= FNA; < C, F, G, K, M]


*Carex eburnea* Mackenzie – M, S; = *C. eburnea* var. *angustata* (Carey) Carey ex Gleason – RAB, G, misapplied; = *C. echinata* var. *echinata* – C; > *C. muricata* var. *cephalantha* (L.H. Bailey) Wiegand & Eames – G; = *C. angustifolia* Mackenzie – M, S; > *C. angustifolia* – F; > *C. cephalantha* (L.H. Bailey) Bicknell – F; < *C. muricata* – W]


*Carex elliottii* Schweinitz & Torrey, Elliott's Sedge. Bogs. May–June. E. NC south to c. pen. FL and west to s. AL. [= RAB, FNA, GW, K, M, S, WH]
**Cyperaceae**


*Carex emoryi* Dewey in Torrey. Seepages, ditches, other wetlands. May-June. NY and ND south to w. VA, s. IL, n. AR, and TX. [= F, FNA, K, M; = *C. stricta* Lamarck var. *elongata* (Böckeler) Gleason – G]

*Carex exilis* Dewey, Coastal Sedge. Peaty seepage bogs. May-June. NL (Newfoundland) and NL (Labrador) west to ON and n. MN, south to NJ, DE, MD, NY, and n. MI; disjunct southward in sc. NC and in se. MS / sw. AL. The southern occurrences are remarkably disjunct from the Canadian, northern Coastal Plain, and Great Lakes distribution. [= RAB, C, F, FNA, G, K, M]

* Carex extensa * Goodenough, Long-bracted Sedge. Salt marshes, introduced around seaports; native of Europe. [= C, F, FNA, G, K, M]

*Carex festucacea* Schkuhr ex Willdenow, Fescue Sedge. Bottomland forests. May-June. VT west to MN, south to GA, Panhandle FL, AL, MS, LA, and TX. [= C, F, FNA, K, WH; < *C. festucacea* – RAB, GW; = *C. festucacea* – G (also see *C. straminea*)]

*Carex fissa* Mackenzie var. *aristata* Hermann, Hammock Sedge. Wet savannas, roadside banks and ditches. Extreme se. SC (Jasper Co.), s. GA (Clinch County) (Carter, Baker, & Morris 2009; Sorrie 1998b) south to c. peninsular FL, west to FL Panhandle and s. MS (Bryson et al. 1996). The SC distribution is documented by a voucher (Crins 9848 & D. Brunton) at MICH. Probably a species distinct from *C. fissa*. [= FNA, GW, K, WH; < *C. fissa* – M]

* Carex fissa * Mackenzie var. *fissa*. Disturbed areas, introduced at old railroad stockyard, well-established; native of sc. United States (MO and KS south to TX). See Simmons, Strong, & Parrish (2008) for additional information about the VA occurrence. [= FNA, Gi; < *C. fissa* – M]

*Carex flaccosperma* Dewey. [distribution and abundance needing additional herbarium investigation] May-June. Se. VA south to Panhandle FL, west to TX, north in the interior to s. MO. [= FNA, G, K, M, S; < *C. flaccosperma* – RAB, C, GW, WH (also see *C. glaucodea* and/or *C. pigra*); = *C. flaccosperma* var. *flaccosperma* – F]


*Carex flexuosa* Muhlenberg ex Willdenow. Dry to moist upland forests, openings, granitic domes, rock outcrops. May-July. NL (Newfoundland) west to MN, south to VA and MO, and in the Appalachian Mountains to w. NC and e. TN. [= M, S; = *C. debilis* var. *rudgei* L.H. Bailey – RAB, C, F, G; = *C. debilis* var. *rudgei* L.H. Bailey – FNA; = *C. debilis* – GW, W]

*Carex floridana* Schweinitz, Florida Sedge. Mesic hammocks, dry hammocks, maritime forests. March-May. E. NC (se. VA?) south to c. peninsular FL, west to TX. [= FNA, K, M, S; = *C. nigromarginata* Schweinitz var. *floridana* (Schweinitz) Kükenthal – RAB, F, WH]

*Carex foenea* Willdenow, Hay Sedge. NL (Labrador) and NL (Newfoundland) west to YT, south to CT, NY, s. NJ, PA, MI, and ID. [= C, FNA; > *C. aenea* Fernald – F, M; < *C. ciccata* – G, K, misapplied; < *C. foenea* – M]

*Carex folliculata* Linnaeus. Bogs, boggy forests, high elevation forests (spruce-fir). May-July. NL (Newfoundland) west to WI, south to NC and e. TN. [= FNA, K, M, S, W; = *C. folliculata* var. *folliculata* – RAB, C, F, G; < *C. folliculata* – GW (also see *C. lomchocarpa*)]

*Carex frankii* Kunth. Bottomland forests. May-July. W. NY and s. ON west to MI and se. NE, south to GA, AR, and OK. [= FNA; < *C. frankii* – RAB, C, F, G, GW, K, M, S, W (also see *C. aureolensis*)] [not yet mapped]
Carex fraseriana Ker-Gawler, Fraser's Sedge, Lively-leaf Sedge. Cove forests, mostly rather acidic and associated with Rhododendron maximum, at moderate elevations. May-July. A Southern and Central Appalachian endemic: w. MD and s. PA south through w. VA and WV to NC, e. TN, nw. SC, and n. GA (Jones & Coile 1988). This species is a peculiar plant, often considered a relic species most closely related to Carex, but recent molecular evidence suggests that it is embedded within Carex and is best considered a component of that genus. The foliage slightly resembles some of the broader-leaved species of Carex (such as C. platyphylla or C. plantaginea) or genera of the Liliaceae; immediately distinctive, however, are the minutely undulate-scarb erulous leaf margins. The odd leaves may be derived evolutionarily from leaf sheaths (Reznicek in FNA 2002b).

Kartesz & Gandhi (1991) have shown that the Ker-Gawler's epithet fraseriana/fraserianus has priority over Andrews's fraseri. [= Cymophyllus fraserianus (Ker-Gawler) Kartesz & Gandhi – FNA, K; = Cymophyllus fraseri (Andrews) Mackenzie – RAB, C, F, G, S, W; = Carex fraseri Andrews – WV]

Carex ghoslonii Naczi & Cochrane, Gholson's Sedge. Moist calcareous forests, especially marl flats and bottomlands over coquina. E. NC south to c. peninsular FL, west to s. AL. See Naczi, Bryson, & Cochrane (2002). [= FNA, WH; presumably included in the concept of C. granularis by authors before 2002]

Carex gigantea Rudge, Giant Sedge. Swamps, bottomland forests, cypress depressions. June. DE south to s. FL, west to e. TX, north in the interior to nw. GA (Jones & Coile 1988), IN and OK. [= RAB, C, F, FNA, G, GW, K, M, S, WH]

Carex glaucescens Elliott, Blue Sedge, Southern Sedge. Blackwater swamps, pocosins, wet pine savannas, seepage bogs, depression ponds, pondcypress savannas, other acid and peaty situations. July-September. E. MD south to c. peninsular FL, west to e. TX; disjunct in nw. GA (Jones & Coile 1988) and c. TN. [= RAB, C, F, FNA, G, GW, K, M, S, WH]

Carex glaucodea Tuckerman ex Olney. [distribution and abundance needing additional herbarium investigation]. May-June. MA and ON west to s. IN and MO, south to NC, sc. TN, and AR. [= FNA, K; < C. flaccosperma – RAB, C, GW; < C. flaccosperma Dewey var. glaucodea (Tuckerman ex Olney) Kükenthal – F; < C. glaucodea – G, M, S]


Carex gracilis Steudel. Moist, nutrient-rich forests, calcareous hammocks. May-June. VT and s. QC west to WI, south to SC, AL, LA, and e. TX; disjunct in sw. GA and Panhandle FL. Naczi (1999b) reports a chromosome number of n = 17, 19, 20. [= RAB, F, FNA, K, M, S, WH; < C. gracilis – C (also see C. ormostachya); = C. laxiflora var. gracillima F. Boott – G]

Carex gracillima Schweinitz, Graceful Sedge. Moist ravine and slope forests, floodplains of rivers and large creeks. April-June. NL (Newfoundland) west to MB, south to n. GA, AL, and AR. [= RAB, C, FNA, G, K, M, W; > C. gracillima var. gracillima – F]

Carex granularis Muhlenberg ex Willdenow. Moist, nutrient-rich forests, especially bottomlands, mostly over calcareous rocks (limestone, dolostone, coquina limestone) or mafic rocks (diabase. May-June. ME and QC west to SK, south to GA, OK, and ne. TX. C. haleana Olney [= C. granularis var. haleana (Olney) Porter] is alleged to differ primarily in its more slender perigynia (1.0-1.5 mm wide vs. 1.5-2.5 mm) (see F and M for additional information). Here interpreted to include C. haleana Olney. Naczi (1999b) found little correlation between the morphological and cytological variability of C. granularis, and also little correlation of that variability with geography; he concluded that there was little support for recognition of infraspecific taxa. [= RAB, C, FNA, G, GW, K, S, W; > C. granularis var. granularis – F; > C. granularis var. haleana (Olney) Porter – F; > C. granularis – M; > C. haleana Olney – M]

Carex gravis L.H. Bailey. Fields. ON west to SK, south to TN, MS, AR, TX, and NM, rarely introduced eastward. Two varieties or species (see synonymy) are sometimes distinguished: var. gravis with perigynia 4-5 mm long, 2× as long as wide, nerveless or very obscurely nerved on the dorsal face, and var. lunelliana, with perigynia 3-4.5 mm long, 1.3-1.5× as long as wide, strongly few-nerved on the dorsal face. Steury (1999) reported var. lunelliana as new to MD (Calvert County). [= FNA; > C. gravis var. gravis – C, F, G, K; > C. gravis L.H. Bailey var. lunelliana (Mackenzie) F.J. Hermann – RAB, C, F, G, K; > C. lunelliana Mackenzie – M; > C. gravis – M]

Carex grisea Wahlenberg. {habitats, distribution and abundance in our area needing additional herbarium investigation} May-June. NB west to MN and SD, south to VA, TN, MS, LA, and TX. [= FNA, K; < C. grisea – RAB, G, M, S (also see C. corrugata and/or C. godfreyi); < C. amphibola – C, GW; ? C. amphibola var. turgida]

Carex gynandra Schweinitz. Mountain bogs, swamp forests, seepages. May-June. NL (Newfoundland) west to MN, south to WI, n. VA, w. NC, n. GA, e. TN, OH, and WI. This is the most montane and northern element of the C. crinita complex, and the usual one encountered in the Mountains of our area. [= C, FNA, K, M, S; = C. crinita Lamarck var. gynandra (Schweinitz) Schweinitz & Torrey – RAB, F, G, GW; < C. crinita – W]

Carex haydenii Dewey. Wet meadows, wet prairies. NL (Newfoundland) and QC west to SD, south to s. PA, MD (C. Frye, pers. comm. 2000), IL, and IA. [= C, F, FNA, G, K, M]

Carex hirsutella Mackenzie. Forests. May-June. ME, s. ON, and IA, south to GA and ne. TX. [= F, FNA, K, M, S; = C. complanata Torrey & Hooker var. hirsuta (L.H. Bailey) Gleason – C, G; < C. complanata – RAB, GW, W]


Carex hirtifolia Mackenzie. Nutrient-rich, though often rather dry, forests and woodlands. May-June. NB west to MN, south to MD, sw. VA, c. TN, KY, MO, and e. KS. [= C, F, FNA, G, K, M, W]

Carex hitchcockiana Dewey. Rich moist forests, especially over limestone, other calcareous, or mafic rocks. June-July. MA west to MN, south to NC, sc. TN, and AR. [= C, F, FNA, G, K, M, W]

Carex hormathodes Fernald. Freshwater and slightly brackish tidal marshes. NL (Newfoundland) south to ne. NC, along the coast. [= F, FNA, K, M; = C. straminea Willdenow ex Schkuhr var. invisa W. Boott – C, G]

Carex howei Mackenzie, Howe's Sedge. Bogs and seepages. May-June. NS west to MI and nw. IN, south to c. peninsular FL and e. TX, predominantly (but by no means strictly) on the Coastal Plain. See C. atlantica for discussion of the relationship between the two taxa. [= RAB, F, G, GW, M, S, W; = C. atlantica var. capillacea (L.H. Bailey) Cronquist – C; = C. atlantica L.H. Bailey ssp. capillacea (L.H. Bailey) Reznicek – FNA, K, WH]

Carex hystericina Muhlenberg ex Willdenow, Porcupine Sedge. Calcareous marshes and wet meadows. June-July. NB west to BC, south to w. VA, sc. TN, w. TX, and n. CA. [= C, FNA, G, K; = C. hystricina – F, M, W, orthographic variant]

Carex impressinervia Bryson, Kral, & Manhart. Moist forests. April-May. Sc. NC south to AL and west to MS, apparently very rare and widely scattered. See Bryson, Kral, & Manhart (1987) for additional information on this species. [= FNA, K]

Carex interior L.H. Bailey, Inland Sedge. Calcareous seepage areas. May-June. NL (Newfoundland) and NL (Labrador) west to s. AK, south to w. VA, n. AR, n. AZ, and n. CA; disjunct in Mexico (Chihuahua). [= C, F, FNA, G, K, M, W]

Carex intumescentes Rudge var. fernaldii L.H. Bailey. Spruce-fir forests, northern hardwood forests, grassy balds. June-July. NL (Newfoundland) west to MB, south to NY, n. PA, MI, MN, and, at higher elevations in the Appalachians, to w. VA, w. NC, and e. TN. See Uttal (1971) and Reznicek & Ball (1974) for different views on the validity of this variety. [= F, < C. intumescentes – RAB, C, FNA, G, GW, K, M, S, W]
Carex intumescens Rudge var. intumescens. Bogs, wet forests. May-July. NS west to WI, south to c. peninsular FL and e. TX. (= F; < C. intumescens – RAB, C, FNA, G, GW, K, M, S, W, WH)

Carex jamei Fernald. J. Sedge, Rudge's Sedge. Mesic forests, slightly acidic to circumneutral. MD, OH, and IN south to Panhandle FL and TX. (See Naczi, Bryson, & Cochrane (2002). [= FNA; variously included in the concepts of other species in sect. *Laxiflorae* by authors before 2002)

Carex lacustris Wildenow, Lakeshore Sedge. Marshes, swamp forests. QC west to SK, south to e. VA, w. VA, and NE. (= C, FNA, K; C. lacustris var. lacustris – G)


Carex lasiocarpa Ehrhart var. americana Fernald, Slender Sedge. In shallow water of alkaline spring seep, on hummocks in acidic basin marsh, and at high elevation fen over amphibolite. A circumboreal species; var. lasiocarpa is Eurasian, var. americana ranges from NL west to AK, south to NJ, WV, MD (C. Frye, pers. comm. 2000), VA, nw. NC, IA, CO, UT, and n. CA. First reported for VA by Wieboldt et al. (1998). Found for the first time in NC in the valley of Long Hope Creek (Ashe County, NC), in July 1999 by A.S. Weakley and P.D. McMillan. (= C, F, G, K; = C. lasiocarpa ssp. americana (Fernald) Hultén – FNA; < C. lasiocarpa – M, W)

Carex laeviculmis Schweinitz var. copulata (L.H. Bailey) Fernald. Mesic forests. April-June. VA, ON, and WI south to NC, AL, and AR. Var. copulata (L.H. Bailey) Fernald, has sometimes been considered the hybrid *C. digitalis × laeviculmis*; current evidence suggests that it is not a hybrid but is not consistently separable from *C. laeviculmis* (Manhart 1984). Naczi (1999b) reports chromosome numbers for the two varieties, n= 22, 23, 25 for var. *laeviculmis*, and n = 23-24 for var. *copulata*; normal pairing further suggests that var. *copulata* is not a hybrid. (= FNA, K; < C. laeviculmis – RAB, G, K, S, W; = C. ×copulata (L.H. Bailey) Mackenzie – F, M)

Carex laeviculmis Schweinitz var. laeviculmis. Rich slope or alluvial forests. April-June. S. ME west to s. WI and s. IA, south to NC, nw. GA (Jones & Coyle 1988), n. AL, and MO. (= FNA, K; < C. laeviculmis – RAB, G, S, W; = C. laeviculmis – F, M)

Carex laxiflora Lamarck. Bottomland and other nutrient-rich forests. May-June. Varieties have been recognized; their appropriate disposition is uncertain. Var. *laxiflora* ranges from ME and s. QC west to WI and IN, south to NC, TN, and AL; allegedly also in s. Mexico. Var. *serulata* F.J. Hermann has been reported for our area by Hill & Horn (1997). Its range is stated by F to be NY and PA to MI, IN, and TN. It differs in being distinctly scabrous (vs. smooth to scaberulous), and in having the bract sheaths with serrulate angles (vs. entire or erose angles). (= RAB, C, FNA, M, W; > C. laxiflora var. *serulata* F.J. Hermann – F, K; > C. laxiflora var. *laxiflora* – F, K; < C. laxiflora var. *laxiflora* – G; ? C. heterosperma Wahlenberg – S)


Carex lepalea Wahlenberg var. harperi (Fernald) Weatherby & Griscom. Bogs, seeps, blackwater bottomlands, usually in saturated conditions with *Sphagnum* spp. May-June. NJ south to c. peninsular FL, west to TX, inland in the interior to IN and MO. Var. *harperi* is considered to differ from the typic variety in its larger perigynia, larger spikes, more aristate pistillate scales,
and more southern range; it needs additional study.  [= F, G; < C. leptalea – RAB, C, GW, M, S, W, WH; = C. leptalea ssp. harperi (Fernald) W. Stone – FNA, K; = C. harperi Fernald]

**Carex leptalea** Wahlenberg var. leptalea.  Bogs, seeps, usually in saturated conditions with Sphagnum spp.  May-June.  NL (Labrador) west to AK, south to NC, TN, MO, SD, NM, and CA.  [= F, G; < C. leptalea – RAB, C, GW, M, S, W; = C. leptalea ssp. leptalea – FNA, K]

**Carex leptalea** (Fernald) Fernald.  Nutrient-rich forests, such as rich, seepy northern hardwoods forests.  May-June.  NL (Newfoundland) west to MN, south to NJ, PA, IN, and WI, and in the Appalachians south to NC and SC (L.L. Gaddy, pers.comm., 2009).  [= RAB, C, F, FNA, G, K, M, S, W]

**Carex lucorum** Willdenow ex Link var. austrolucorum J. Rettig, Appalachian Woodland Sedge.  Xeric to mesic wooded slopes, usually in oak forests and northern hardwood forests.  *C. lucorum* var. *austrolucorum* is endemic to the Southern Appalachians, ranging from sw. VA and s. WV south through w. NC and e. TN to nw. SC and ne. GA.  It has been reported from further north, in sc. WV (Boone County) (Cusick 1996).  Var. *lucorum* differs in having the leaves broader (mostly 1.5-2.8 mm wide vs. mostly 1.1-1.3 mm), the beak averaging shorter (1.3 mm vs. 1.5 mm), chromosome number n = 20 (vs. n = 13), and various details of flavonoid chemistry and achene micromorphology (see Rettig 1988 for details).  While the two taxa can be difficult to tell apart on morphological grounds, they are clearly separate taxa.  *C. lucorum* var. *austrolucorum* was first reported for South Carolina by Hill & Horn (1997).  [= FNA, K; < C. pensylvanica Lamarck var. distans Peck – RAB, F, G (the name misapplied as to our plants); < C. lucorum – C, M, S; < C. pensylvanica – W; = C. lucorum ssp. austrolucorum (J. Rettig) A. Haines]

**Carex lucorum** Willdenow ex Link var. lucorum.  Northern Woodland Sedge.  Moist forests.  NB west to MN, south to MD (Cecil County; C. Frye, pers. comm. based on specimen at DOV) and PA.  [= FNA, K; < C. pensylvanica Lamarck var. distans Peck – RAB, F, G (the name misapplied as to our plants); < C. lucorum – C, M, S; < C. pensylvanica – W; = C. lucorum ssp. lucorum]

**Carex lupuliformis** Sartwell ex Dewey, False Hop Sedge.  Wet forests, swamps, riverbanks, especially around ponds.  June-July.  VT and QC west to se. WI, south to s. FL and e. TX.  [= RAB, C, F, FNA, G, K, M, S, WH; < C. lupulina – GW]

**Carex lupulina** Muhlenberg ex Willdenow, Hop Sedge.  Bottomland forests.  June-September.  NS west to MN, south to ne. FL and e. TX.  [= RAB, C, FNA, G, K, M, S, WH; < C. lupulina – GW (also see C. lupuliformis); > C. lupulina var. lupulina – F; > C. lupulina var. pedunculata A. Gray – F]

Carex lutea LeBlond, Golden Sedge. Wet savannas shallowly underlain by coquina limestone, with open canopy of Taxodium ascendens, Pinus palustris, and Liriodendron tulipifera. May. Endemic to Pender and Onslow counties, NC, where associated with other narrow endemics, such as Thalictrum cooleyi and Allium species 1, and other rare species, such as Plantago sparsiflora, Parnassia caroliniana, Rhynchospora thornei, and others. See LeBlond et al. (1994) for additional information. [= FNA, K]

Carex magnifolia Mackenzie. Bogs, acid swamps. April-May. E. NC south to FL, and disjunct in mountain bogs with Coastal Plain affinities, as in Henderson County, NC. C. magnifolia differs morphologically from C. abscondita in its larger perigynia, longer leaves, and much more strongly glaucous leaves; it has a more southern distribution and occurs in wetter, boggier habitats. Manhart (1984) found that it differed chemically from C. abscondita. Further study is needed to verify its taxonomic status. [= M, S; < C. abscondita – RAB, FNA, K]

Carex manhartii Bryson, Blue Ridge Purple Sedge, Manhart's Sedge. Cove forests and montane oak-hickory forests, mostly at medium to fairly high elevations, especially over mafic rocks (such as amphibolite) and calcareous rocks (such as marble), but occurring on more acidic substrates as well. April-May. Endemic to w. NC, sw. VA, nw. SC, ne. GA, and se. TN, in the Blue Ridge Mountains. Once considered very rare, this species is now known to be locally common in portions of sw. NC and adjacent ne. GA. For more information on the Virginia occurrence, see Belden et al. (2004). [= FNA, K, W; < C. purpurifera Mackenzie – RAB, M, S]

Carex meadii Dewey, Mead's Sedge. Prairies, on low, moist clayey soils over mafic rocks (such as diabase) or calcareous rocks. May-June. NJ west to MI and SK, south to nc. NC, GA, AR, sw. LA, and TX. The species forms large clonal patches with a distinctive bluish cast at the time of flowering and fruiting. Naczi (1999b) reports a chromosome number of n = 28. [= RAB, C, F, FNA, G, K, M, S, W]


Carex michauxiana Böckeler, Michaux's Sedge. Bogs, seeps, usually in Sphagnum. NL (Labrador) and MB south to MD, MI, and MN. Closely related to an e. Asian species. [= C, F, FNA, G, K, M] {add to synonymy}

Carex microdonta Torrey & Hooker. Limestone glades, calcareous prairies. AL and Panhandle FL west to MO, KS, OK, TX, NM, and AZ. [= FNA, K, M, S]


Carex michelliana M.A. Curtis, Mitchell's Sedge. Swammy woodlands and forests. May-June. Se. MA west to PA and KY, south to Panhandle FL, n. AL, and sc. TN. This species has a scattered distribution throughout its range, and is apparently rare. Bruderle, Fairbrothers, & Hanks (1989) and Bruderle (1999) provide additional information about this species. Allozyme studies suggest that C. michelliana is less closely related to C. gynandra, C. crinita var. crinita, and C. crinita var. brevicrinis than they are to one another. [= c, F, FNA, K, M, S, WH; = C. crinita Lamarck var. michelliana (M.A. Curtis) Gleason – RAB, G, GW; < C. crinita – W]

Carex molesta Mackenzie ex Bright, Troublesome Sedge. Calcareous soils. NH west to ND, south to VA, AL, MS, and OK. [= F, FNA, G, K; < C. brevior (Dewey) Mackenzie ex Lunell – C]

Carex molestiformis Reznicek & P.E. Rothrock. {habitat}. Known distribution is w. VA, WV, KY, TN, MO, AR, and OK. [= FNA, K; < C. brevior (Dewey) Mackenzie ex Lunell – C, G] {synonymy incomplete}
Carex muehlenbergii Schkuhr ex Willdenow var. enervis W. Boott. [Habitats]. NH west to MN and NE, south to GA, AL, MS, and TX. [= FNA, K; < C. muehlenbergii – RAB, W; < C. muehlenbergii var. muehlenbergii – C; = C. muehlenbergii var. enervis – F, G, orthographic variant; = C. plana Mackenzie – M, S]

Carex muehlenbergii Schkuhr ex Willdenow var. muehlenbergii. Dry to dry-mesic hammocks, [additional habitats]. ME, ON, and MN south to Panhandle FL and TX. [= FNA, K; < C. muehlenbergii – RAB, W, WH; < C. muehlenbergii var. muehlenbergii – C (also see var. enervis); = C. muehlenbergii var. muehlenbergii – F, G, orthographic variant; = C. muehlenbergii – M; < C. muehlenbergii – S (also see C. austrina)]

* Carex muricata Linnaeus ssp. lamprocarpa Čelakovský. A European alien, with known occurrences south to e. PA (Rhoads & Klein 1993) and MD. [= FNA; < C. muricata – C, K]

Carex muskingumensis Schweinitz. Floodplain forests. ON and MN south to KY, TN, AR, and OK. [= C, F, FNA, G, K, M]

Carex nigromarginata Schweinitz, Blackedge Sedge. Dry woodlands and forests. March-May. DE and NJ west to WI, south to SC, GA, and TX. [= C, FNA, K, M, W; = C. nigro-marginata var. nigro-marginata – G; = C. nigro-marginata – S]


Carex novae-angliae Schweinitz, New England Sedge. Moist forests. NL (Newfoundland) and ON, south to e. PA, n. WV, and WI. [= C, F, G, K, M; < C. novae-angliae – FNA]

Carex oblitata Steudel. Swamps and other wet habitats. NY (Long Island) and NJ south to sc. GA, west to w. LA, mostly on the Coastal Plain, but extending much less commonly inland to the Piedmont and Mountains. [= M, S; = C. venusta Dewey var. minor Böckler – C, F, G, K; < C. venusta – RAB, FNA, GW, W]

* Carex oklahomensis Mackenzie, Oklahoma Sedge. Seepages, disturbed wetlands; probably adventive from farther west. Se. MO west to KS, south to AR, and ne. TX; disjunct (and apparently adventive) in various scattered sites east of the Mississippi River, as in AL, MS, GA, w. NC (Graham County) and w. VA (Giles County). First reported for VA by Wieboldt et al. (1998). See Bryson & Rothrock (2010) for further discussion; they consider that this species is “introduced during highway and reservoir construction or maintenance in contaminated hay, grass seeds or on construction, maintenance, and mowing equipment.” [= F, FNA, K, M; < C. stipata – S; = C. stipata Muhlenberg ex Willdenow var. oklahomensis (Mackenzie) Gleason – G]


Carex oligosperma Michaux. Bogs and seeps at high elevations. NL (Newfoundland) west to NT, south to CT, c. PA, n. IN, WI, and MN; disjunct in ne. OH, WV (Hardy County) and NC (Ashe, Avery, Mitchell, and Watauga counties). [= C, F, FNA, G, M; > C. oligosperma var. oligosperma – K]

* Carex opaca (F.J. Hermann) P.E. Rothrock & Reznicek. Introduced at old railroad livestock yard, well-established; native of sc. United States. Native range in prairies, IL and KS south to MS, AR, and OK. [= FNA; = C. bicknellii Britton var. opaca F.J. Hermann – K; < C. bicknellii – M]

Carex ormostachya Wiegand, Necklace Spike Sedge. Northern hardwood forests. S. Canada south to ME, MA, PA, w. VA (Augusta County), n. OH, MI, and WI. [= F, FNA, K, M; < C. gracilescent – C; = C. laxiflora var. ormostachya (Wiegand) Gleason – G]

Carex ouachitana Kral, Manhart, & Bryson, Ouachita Sedge. Dry to dry-mesic slope and ridge forests. Disjunct in ne. TN and sc. KY from the Ouachita Mountains of sw. AR and se. OK. [= FNA, K] {not yet keyed; synonymy incomplete; Griseae}
* Carex ovalis Goodenough. Grassy balds, disturbed areas; native of Eurasia. Known to range in North America from NL (Newfoundland) and NY south to w. NC and ne. TN. The records reported in RAB and elsewhere of C. aenea are actually misidentified material of this species (A.A. Reznicek, pers. comm. 2005). [= FNA; K = C. aenea – RAB, misapplied (based on misidentified material); < C. leporina Linnaeus = C, F, G, misapplied; ? C. tracyi Mackenzie]

Carex oxylepis Torrey & Hooker. Bottomlands, calcareous forests. May-June. VA, KY, IL, MO, and OK south to c. peninsular FL and TX. A distinction is sometimes made between var. oxylepis and var. pubescens. Var. oxylepis is widespread in the Southeast; var. pubescens is more restricted, from KY and s. IL south to AL and MS. [= RAB, C, F, FNA, G, GW, M, S, W; > C. oxylepis var. oxylepis – K; > C. oxylepis var. pubescens J.K. Underwood – K]

Carex paeninsulae Naczi, E.L. Bridges, & Orzell, Peninsula Sedge. Mesic hammocks. Endemic to FL peninsula, north into ne. FL (Suwanee and Duval counties). [= FNA] [not yet keyed; Griseae]

Carex pallescens Linnaeus, Pale Sedge. Grassy balds at high elevations, other grassy openings. June-July. Circumboreal (in ne. North America and n. Eurasia); in North America ranging from NL (Newfoundland), QC, and MN, south to w. NC, e. TN, and MI. C. pallescens is reported to occur on Big Bald, Unicoi County, TN, immediately adjacent to the NC line (Churchill et al. 1992). [= C, FNA, G, K, M, W; > C. pallescens var. neogaea Fernald – F]

Carex pauciflora Lightfoot, Few-flowered Sedge. Bogs. Circumboreal, south in North America to NY, WV (Grant, Randolph, and Tucker counties), WI, MN, and WA. [= C, F, FNA, G, K, M]

Carex pedunculata Muhlenberg ex Willdenow var. pedunculata, Longstalk Sedge. Nutrient-rich dry to mesic forests, usually over calcareous or mafic rocks. April. Var. pedunculata ranges from NL (Newfoundland), SK, and ND, south to NJ, w. VA, sw. NC, nw. GA (Dade County) (Jones & Coile 1988), n. AL, c. IN, c. II., and n. IA. Var. erythrobasis (Léveillé & Vaniot) Koyama occurs in Korea. It may well prove that these two widely disjunct taxa should be recognized at the species level. [= FNA; < C. pedunculata – C, F, G, K, M, W; = C. pedunculata ssp. pedunculata]

Carex pellita Muhlenberg. Wet meadows. NB west to BC, south to w. VA, w. TN, AR, and CA. McClintock & Waterway (1994) discuss the distinctiveness of C. pellita and C. lasiocarpa, as well as the misapplication of the name C. lanuginosa to the species now properly called C. pellita. [= C, FNA, K; = C. lanuginosa Michaux – F, M, misapplied; = C. lasiocarpa Ehrhart var. latifolia (Böckler) Gilly]

* Carex pendula Hudson, Pendulous Sedge. Disturbed areas; native of Europe. Introduced in VA (FNA, Kartesz 1999). [= FNA, K]

Carex pennsylvanica Lamarck. Dry to moist woodlands and forests, grassy balds, shale barrens, rock outcrops. April-June. ME west to s. MB and ND, south to SC, n. GA, TN, and AR. [= FNA; K = C. pennsylvanica var. pennsylvanica – RAB, C, F, G; = C. pennsylvanica – M, S, orthographic variant; < C. pennsylvanica – W (also see C. lucorum var. austrolocorum)]

Carex physorhyncha Liebmann ex Steudel, Bellow’s-beak Sedge. Dry woodlands. Se. VA south to ne. FL and FL Panhandle, west to AR, OK, TX, and Mexico. [= RAB, F, M, S, W; = C. albicans Willdenow ex Sprengel var. australis (L.H. Bailey) J. Rettig – FNA, K, WH]


Carex pigra Naczi, Lazy Sedge. Moist forests, bottomlands. May-June. Se. VA west to se. and sc. TN, south to FL, s. AL, and ne. MS. See Naczi (1997) for additional information. [= FNA; K; < C. flaccosperma – RAB, G, GW, WH; < C. flaccosperma Dewey var. glaucodea (Tuckerman ex Olney) Küchenthal – F; < C. glaucodea – S]

Carex planispicata Naczi. Rich to fairly acid mesic forests, on slopes and floodplains. C. NJ west to s. IN, se. MO, and se. OK, south to c. GA, s. MS, and se. TX. See Naczi (1999a) for additional information. [= FNA; = C. grisea Wahlenberg var. rigida (L.H. Bailey) Fernald – F, K]
Carex plantaginea Lamarck, Plantainleaf Sedge. Rich cove forests, mostly over mafic or calcareous rocks, montane alluvial forests. April-May. NB west to MN, south to MD, NJ, VA, NC, ne. GA (Jones & Coyle 1988), c. TN, c. TN, KY, and s. IN. [= RAB, C, F, FNA, G, K, M, S, W]

Carex platyphylla Carey, Broadleaf Sedge. Rich cove forests, mostly over mafic or calcareous rock. April-June. ME and s. QC west to WI, south to NC, e. TN, and MO. Naczi (1999b) reports a chromosome number of n = 35. [= RAB, C, FNA, G, K, M, S, W]

Carex polymorpha Muhlenberg, Variable Sedge. Dry, acidic ridgetop forests. May-June. ME south to MD, VA, and WV. Standley, Dudley, & Brueulerle (1991) studied genetic variability in this species. [= C, FNA, G, K, M]

* Carex praegracilis W. Boott, Freeway Sedge. Medians of interstate highways; native of w. North America. May-June. This species is apparently spreading through ne. North America as the result of the winter salting of highways. [= C, FNA, G, K, M]

Carex praeria Dewey ex Wood, Prairie Sedge. Calcareous wetlands. QC west to YT, south to NJ, w. VA, OH, NE, MT, and BC. [= C, FNA, G, K, M]

Carex prasina Wahlenberg. Rich forests, especially in seepage. May-June. ME, ON, and WI south to GA, MS, and AR; in nearly all TN counties adjacent to NC and VA. [= RAB, C, F, FNA, G, GW, K, M, S, W]

Carex projecta Mackenzie. Moist forests. May-June. NL (Newfoundland), NL (Labrador), and SK south to NC, IN, IL, and IA. [= RAB, C, F, FNA, G, K, M]

* Carex pumila Thunberg. Open disturbed sand flats; native of Asia. May. See Reznicek (1993) for additional information. [= FNA, K; > C. hirta – RAB, misidentification]

Carex purpurifera Mackenzie, Limestone Purple Sedge. Moist, rich cove forests, at low elevations, over calcareous or mafic rocks. May-June. W. VA and KY south to n. GA and n. AL, mostly west of the Blue Ridge Mountains, but with scattered disjunct populations on calcareous or mafic sites in the Blue Ridge. Naczi (1999b) reports a chromosome number of n = 17-19. [= C, FNA, K, W; < C. purpurifera – RAB, M, S (also see C. manhartii); = C. laxiflora var. purpurifera (Mackenzie) Gleason – G]

Carex radfordii Gaddy, Radford’s Sedge. Very nutrient-rich, moist cove forests in the Blue Ridge Escarpment region, over calcareous or mafic rocks (especially along the Brevard Fault). May-June. Endemic to the Blue Ridge Escarpment of sw. NC, nw. SC, and ne. GA. See Gaddy (1995) for additional information. Naczi (1999b) reports a different chromosome number for C. radfordii (n = 23) than for the related C. purpurifera (n = 17, 18, 19). [= FNA, K]

Carex radiata (Wahlenberg) Small. Mesic to wet-mesic forests. May-June. NS west to MB, south to SC, AL, LA, and OK. [= C, FNA, K; < C. rosea – RAB, G, W; = C. rosea – F, M, S, misapplied]

Carex reniformis (L.H. Bailey) Small, Kidney Sedge. Floodplain forests (including blackwater), marshes, ditches, other wet areas. VA, IL, and OK south to FL Panhandle and TX. [= RAB, C, F, FNA, G, GW, K, S, WH]

Carex retroflexa Muhlenberg ex Willdenow. Dry to mesic forests. ME, MI and IA, south to n. peninsular FL and TX. See Downer & Hyatt (2003). [= F, FNA, K, M, S; < C. retroflexa – RAB, W (also see C. texensis); = C. retrosa var. retroflexa – C, G]

Carex retrorsa Schweinitz. Bottomland forests and nutrient-rich moist forests. NB and BC, south to n. NJ, sc. PA, IL, UT; reported, apparently erroneously, for DE and MD. [= C, FNA, G, K, M] [not yet mapped]

Carex reznicekii Werier, Reznicek’s Sedge. Moist, forested slopes. RI, NY, PA, KY, and MO, south to SC, sw. GA, se. AL, n. MS and AR. To be expected in Panhandle FL and in WV. See Werier (2006) for detailed information. [add to synonymy; section Acrocystis]
Carex richardsonii R. Brown, Richardson’s Sedge. Dry, rocky forests. VT west to AB, south to DC, MD, OH, IN, IA, and SD. This species ranges south to DC (according to C). [= C, FNA, G, K, M]

Carex roaensis F.J. Hermann, Roan Mountain Sedge. Cove forests, moderate to high elevation oak forests, northern hardwood forests. May-June. Sw. PA, w. VA, and e. WV south through e. KY, e. TN, w. NC to se. TN and nw. GA (Smith & Waterway 2008; Smith et al. 2006). See Smith & Waterway (2008), Smith et al. (2006), and Hermann (1947) for additional information; closely related to C. virescens. First reported for VA by Wieboldt et al. (1998). [= FNA, K, W]

Carex rosea Schkuhr ex Willdenow, Rosy Sedge. Dry to dry-mesic hardwood forests. May-June. NS west to MB, south to FL, Panhandle and TX. [= C, FNA, K; < C. rosea – RAB, G, W, WH (also see C. appalachica and C. radiata); = C. convoluta Mackenzie – F, M, S; ? C. flaccidula Steudel]

Carex rugosperma Mackenzie, Parachute Sedge. Old fields, shallow soils of rock outcrops, exposed forest margins. {Distribution and habitats in our area obscure} PE west to MN, south to MD, VA, IN, IL, and MO. See C. umbellata for discussion. Reported for South Carolina by Hill & Horn (1997). [= G, M; < C. umbellata – RAB, C, W; = C. umbellata – F, misapplied; = C. tonsa (Fernald) Bicknell var. rugosperma (Mackenzie) Grass – FNA, K]


Carex sartwellii Dewey, Sartwell’s Sedge. Wetlands. QC west to BC, south to MD, PA, OH, IN, IL, MO, CO, and ID. [= FNA, C, F, G, M; > C. sartwellii var. sartwellii – K]


Carex schweinitzii Dewey ex Schweinitz, Schweinitz's Sedge. Bogs. June. VT west to n. MI, south to NJ (and MO?); disjunct in NL (Newfoundland). The distribution of this species is local and fragmented. The alleged occurrences of C. schweinitzii in w. NC are based on misidentification of C. utriculata. [= C, F, FNA, G, K, M, S]

Carex scoparia Sckuhr ex Willdenow var. scoparia. Bogs, swamp forests, marshes, seepy ledges, ditches. May-June. NL (Newfoundland) west to BC, south to GA, MS, and CA. Var. tesselata Fernald & Wiegd is endemic to NB and ME. [= F, FNA, K; < C. scoparia – RAB, C, G, GW, W]

Carex seorsa Howe. Acidic swamp forests. May-June. MA south to GA and Panhandle FL in the Coastal Plain, scattered inland westward to NY, OH, MI, IN, AR, and TN. [= RAB, C, FNA, G, GW, K, M, S, W]

Carex shortiana Dewey, Short's Sedge. Calcareous bottomlands and meadows. May-June. PA, s. ON, IL, and IA, south to w. VA, e. TN, AR, and OK. [= F, FNA, G, K, M, W]

Carex siccata Dewey, Bronze Sedge. Dry upland habitats. May-July. ME and NT south to NJ, OH, IL, MN, and AZ. [= C, FNA, G, M; < C. siccata – k (also see C. foenea); = C. foenea Willdenow – F, misapplied]

Carex silicea Olney, Seabeach Sedge. Beaches and shores. NL (Newfoundland) south to VA, along the coast. [= C, F, FNA, G, K]

Carex socialis Mohlenbrock & Schwegman. Blackwater and brownwater swamp forests and bottomlands. Se. and sc. NC south to e. GA, west to e. TX, and north in the interior to s. IN, s. IL, and sc. MO. [= C, FNA, K]

**Carex species 1**, Canebrake Sedge. Canebrakes and acid swamps. February-May. Coastal Plain, from se. VA to Panhandle FL, west to w. LA. [C. nova-angliae Schweinitz – FNA; = Carex "austrodeflexa", in prep.] (section Acrocystis)

**Carex species 2**, Blue Ridge Sedge. Seepages over various substrates along the Blue Ridge Escarpment, including opn fen-like wetlands. Early April-early June. A Southern Blue Ridge endemic, from sw. VA through w. NC to ne. GA (Rabun County). Under study by D.B. Poindexter and T.F. Wieboldt. (section Acrocystis)

**Carex species 3**, Smoky Mountain Sedge. Seepages at moderate to high elevations. Endemic to the Great Smoky Mountains National Park. Under study by D. Estes. (not yet keyed; section Phacocystis)

*Carex spicata* Hudson. Fields and lawns; native of Europe and w. Asia. Reported as south to s. NJ, n. DE, c. MD. VA reports said to be erroneous in FNA. [= C, F, FNA, G, K, M]
Carex suberecta (Olney) Britton, Prairie Straw Sedge. Fens, calcareous wetlands. ON and MN south to sw. VA, WV, OH, IN, IL, AR, and TX. \[= C, F, FNA, G, K\]

Carex superata Naczi, Reznicek, & B.A. Ford. Calcareous forests and woodlands. April-June. Sc. NC, nc. SC, sw. VA, sc. KY, and ne. MS, south to Panhandle FL and s. AL. Reported for sw. VA (as C. wildefnii var. megarrhyncha) by Wieboldt et al. (1998). \[= FNA, K, WH; < C. wildefnii – RAB, F; < C. wildefnii – C, G, M, S (also see C. baviantha and C. wildefnii) and orthographic variant; < C. wildefnii Schkuhr ex Willdefnii var. megarrhyncha Hermann\]

Carex swanii (Fernald) Mackenzie. Nutrient-rich forests, woodlands, and openings. May-June. NS, s. MI, s. WI, south to nw. SC and ne. AR. \[= RAB, C, F, FNA, G, K, M, S, W\]

* Carex sylvatica Hudson. Pastures, lawns; native of Europe. \[= C, F, FNA, G, K, M\]

Carex tenax Chapman. Longleaf pine sandhills. May-June. Sc. NC south to Panhandle FL, west to MS; also in sw. LA and se. TX. \[= RAB, FNA, K, M; ? C. validior Mackenzie – S\]

Carex tenera Dewey var. tenera, Slender Sedge. Low forests. NS west to BC, south to VA, NC, n. GA, ne. TN, MO, KS, WY, and OR. Var. echinodes (Fernald) Wiegand is restricted to the northern Midwest. \[= F, FNA; < C. tenera – RAB, C, G, K\]

Carex tetanica Schkuhr, Rigid Sedge. Moist forests. May-June. MA west to MN, NE, and AB, south to NJ, VA, and NC. \[= RAB, C, F, FNA, K, M; = C. tetanica var. tetanica – G\]


Carex thornei Naczi (section Griseae). Mesic deciduous forests, often in the upper floodplain. Endemic to the drainage of the Apalachicola/Chattahoochee and Flint in s. GA and s. AL south to Panhandle FL. See Naczi, Bryson, & Cochrane (2002). \[= FNA\] {not yet keyed}

Carex timidula Naczi & B.A. Ford. Calcareous, dry to mesic woodlands and forests. East to AL, TN, and KY. Related to C. jamesii and C. juniperorum, from which it was separated by Naczi & Ford (2001). \[= FNA; < C. jamesii – C, F, G, K, M\]

Carex tonsa (Fernald) Bicknell, Shaved Sedge. Xeric disturbed areas, old fields. \{distribution and habitats in our area obscure\}. QC west to AB, south to VA, IN, and WI. See C. umbellata for discussion. \[= F, G, K, M; < C. umbellata – RAB, C, W; = C. tonsa var. tonsa – FNA, K\]


Carex triangularis Böckler. Moist forests, ditches, other wet sites. April-June. SC and GA west to KS and TX. \[= RAB, F, FNA, G, K, M, S; < C. vulpinoida var. vulpinoida – C; < C. vulpinoida – GW\]

Carex tribuloides Wahlenberg var. sangamonensis Clokey. Bottomland forests. May-June. OH, IL, and KS, south to SC, AL, LA, and TX. \[= FNA, G, K; < C. tribuloides – RAB, C, F, GW, W\]

Carex tribuloides Wahlenberg var. tribuloides. Bottomland forests. May-June. NB west to MN and NE, south to c. peninsular FL, GA, TN, MO, and KS. \[= FNA, G, K; < C. tribuloides – RAB, C, F, GW, W\]

Carex trichocarpa Muhlenberg ex Willdenow. Wet meadows, marshes. May-July. QC west to MN, south to DE, nw. NC, WV, IN, and MO. \[= RAB, C, F, FNA, G, K, M\]

Carex trisperma Dewey. Three-seeded Sedge. Bogs and swamps at high elevations (in NC and VA), usually growing in living Sphagnum, in shaded situations under shrubs or trees in montane wetlands, northward in bogs at low elevations. June. NL (Labrador) west to SK, south to NJ, MD, OH, n. IN, IL, and MN; and in the mountains to w. NC and WV. See Kirschbaum
(2007) for additional information about \( C. \) trisperma and \( C. \) billingsii. \([= C. \) trisperma var. trisperma – C, F, FNA, G, K, M; < C. trisperma – RAB, W]\)

**Carex tuckermanii** F. Boott. Calcareaous swampy forests and wet meadows. NB and MN south to WV, sc. PA, NJ, MD, and IL. A reported for Alleghany County, NC appears to be erroneous. \([= C, F, FNA, K; = C. \) tuckermani – G, M, orthographic variant]\)

**Carex turgescens** Torrey, Pinebarren Sedge. Sandhill seepage bogs, streamhead pocosins, pocosin-sandhill ecotones, canebrakes, cypress domes and stringers, in highly acidic, sandy-peaty soils. May-June. Sc. NC south to Panhandle FL, west to se. LA, a Southeastern Coastal Plain endemic. \([= \) RAB, FNA, GW, K, M, S, WH]\)


**Carex umbellata** Schkuhr ex Willdenow, Parasol Sedge. Old fields, other habitats. \{distribution and habitats in our area obscure. NL (Newfoundland) west to SK, south to VA, TN, IL, and MN. It seems very possible that southern members of the \( C. \) umbellata complex may not correspond to the taxa "distinguished" in the northeastern United States. \( C. \) tonsa, \( C. \) rugosperma, and \( C. \) umbellata are circumscribed by various authors in different ways. This group needs critical study. \([= \) FNA, G, K, M; < \( C. \) umbellata – RAB, C, W (also see \( C. \) rugosperma and \( C. \) tonsa); = \( C. \) abdita Bicknell – F]\)

**Carex utriculata** F. Boott, Beaked Sedge. Wet meadows. Boreal American, ranging south to DE, w. VA, nw. and sw. NC, ne. TN (Johnson County), IN, NE, NM, and CA. Recently verified for NC. \([= \) C, FNA, K; = \( C. \) rostrata Stokes var. utriculata (F. Boott) L.H. Bailey – G; < \( C. \) rostrata – M, misapplied as to our material; = \( C. \) schweinitzii – RAB, by misidentification]\)

**Carex venusta** Dewey. Bay swamps, peat bogs, mossy wetlands, and other wet habitats. Se. VA south to Panhandle FL, on the Coastal Plain. \([= \) M, S; = \( C. \) venusta var. venusta – C, F, G, K; < \( C. \) venusta – RAB, FNA, GW, W, WH (also see \( C. \) oblitata)]\)

**Carex verrucosa** Muhlenberg. Pocosins, wet pinelands, pond cypress ponds, domes, and stringers. July-September. Se. NC south to south to s. FL, west to w. LA and e. TX. \([= \) RAB, FNA, GW, K, M, S, WH; = \( C. \) glaucescens Elliott var. androgyna M.A. Curtis]\)

**Carex vesicaria** Linnaeus, Inflated Sedge. Bogs. Circumboreal, ranging south in North America to DE, w. VA, nw. NC, KY, IN, MO, NM, and CA. \([= \) FNA, G; > \( C. \) vesicaria var. vesicaria – C, F, K; > \( C. \) vesicaria var. monile (Tuckerman) Fernald – F, K; > \( C. \) vesicaria – M; > \( C. \) monile Tuckerman]\)

**Carex vestita** Willdenow. Low forests. April-May. S. ME south to se. VA and nc. NC. \([= \) RAB, C, F, FNA, G, K, M]\)

**Carex vexans** F.J. Hermann, Florida Hammock Sedge. Marshes, distches, swamps, hydric hammocks. E. Panhandle FL south to s. FL. \([= \) FNA, K, WH; < \( C. \) alata – S]\)

**Carex virens** Muhlenberg ex Willdenow. Nutrient-rich forests, woodlands, and openings. May-June. S. ME, NY, and s. MI, south to e. VA, w. NC, nw. SC, and MO. \([= \) RAB, C, F, FNA, G, K, M, S, W]\)

**Carex vulpinoidea** Michaux. Wet sites. NL (Labrador) west to BC, south to FL, TX, Sonora, and CA. \([= \) RAB, F, FNA, G, M, S, W; < \( C. \) vulpinoidea var. vulpinoidea – C, K; < \( C. \) vulpinoidea – GW (also see \( C. \) annectens and \( C. \) triangularis)]\)

**Carex wildenowii** Schkuhr ex Willdenow. Calcareaous mesic forests, but also in more acidic dry-mesic upland oak forests. May-June. MA, VT, NY, s. ON, and c. IN, south to nc. SC, n. AL, and s. IL; disjunct in c. AR. Naczi (1999b) reports chromosome numbers of \( n = 31, 39. \) \([= \) FNA, K; < \( C. \) wildenowii – RAB, F, W (also see \( C. \) basiantha and \( C. \) superata); < \( C. \) wildenovii – C, G, M, S (also see \( C. \) basiantha and \( C. \) superata) and orthographic variant]\)
**Cyperaceae**

*Cyperus* Linnaeus 1753 (Umbrella Sedge)

A genus of about 500-550 species, herbs, of tropical and warm temperate areas. References: Goetghhebeur in Kubitzki (1998b); Tucker, Marcks, & Carter in FNA (2002b). [also see *Kyllinga*]

This treatment is closely adapted from Tucker, Marcks, & Carter in FNA (2002b) and other sources. It needs substantial customization and revision prior to publication. Key lead 4 in the main key is problematic.

1 Inflorescences unbranched (the spikes sessile); spikelets 1-2-flowered; rachilla not or only slightly elongate; scales conspicuously keeled; lowest 2 scales of spikelet greatly reduced .......................................................... [see *Kyllinga*]

2 Stigmas 2; achenes lenticular.

3 Achenes dorsiventrally flattened, borne with a flattened face toward the rachilla; [subgenus *Juncellus*] .................................................. Key A

4 Spikelets borne in digitate clusters (rarely singly), or in umbellate or glomerulate heads; [subgenus *Pychnostachys*] .......................... Key C

5 Rachilla articulate at the base of each scale, the mature spike therefore disarticulating into segments consisting of a scale, an achene, and a cartilaginously thickened section of the rachilla (and its wings); [subgenus *Diclidium*] ............................................................. Key D

6 Rachilla continuous, or articulate only at the base; [subgenus *Cyperus*] .................................................................................................... Key E

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**Carex** Dewey, Wood's Sedge. Moist slopes and cove forests over mafic rocks (such as amphibolite), ultramafic rocks (such as olivine), or felsic rocks. May-June. NY west to MB, south to NC, nw. SC, n. GA, and MO. This species forms clonal patches reminiscent of *C. pensylvanica*, but has perigynia glabrous and filled by the achene at maturity; the foliage also has a paler green cast. It has probably been much overlooked in the past. Naczi (1999b) reports chromosome numbers of n = 22, 26. [= RAB, C, F, FNA, K, M, W; = *C. tetanica var. woodii* (Dewey) Wood – G]

**Cladium** P. Browne (Sawgrass, Twig-rush)


1 Plants 1-3 m tall, coarse, from short rhizomes, forming dense tussocks; leaves 3-15 dm long, 5-12 mm wide, stiff and flat (or broadly V-shaped), the margins and midrib (beneath) harshly serrate (saw-toothed); inflorescence a narrow panicle 3-9 dm long, the branches bearing several fascicles of spikelets; achene base broadly rounded to truncate; [of tidal freshwater to brackish marshes or outer coastal plain calcareous savannas] .................................................................................................................................................................C. jamaicense

2 Stigmas 3; achenes trigonous.

3 Achenes laterally flattened, borne with an edge toward the rachilla; [subgenus *Pycreus*] ................................................................. Key A

4 Spikelets borne in spikes on a conspicuous rachis.

5 Rachilla articulate at the base of each scale, the mature spike therefore disarticulating into segments consisting of a scale, an achene, and a cartilaginously thickened section of the rachilla (and its wings); [subgenus *Diclidium*] ............................................................. Key D

6 Rachilla continuous, or articulate only at the base; [subgenus *Cyperus*] .................................................................................................... Key E

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**Cladium jamaicense** Crantz, Sawgrass. In circumneutral to alkaline situations, including brackish marshes, and rarely somewhat inland in savannas underlain by coquina limestone. July-October. Se. VA south to s. FL, west to e. TX, and in the West Indies. This is, of course, the famous sawgrass which dominates many square miles in the Everglades of s. FL (where somewhat inland in savannas underlain by coquina limestone, with scattered and disjunct occurrences southward in VA, NC, SC, GA, and a cartilaginously thickened section of the rachilla (and its wings); [subgenus *Diclidium*] .......................... Key D

5 Rachilla continuous, or articulate only at the base; [subgenus *Cyperus*] .................................................................................................... Key E
Key A – subgenus Juncellus – stigmas 2; achenes lenticular; achenes dorsiventrally flattened, borne with a flattened face toward the rachilla

1 Plants 1-3 (-6) dm tall; leaf blades 0-7 cm long ....................................................................................................................... C. laevigatus
1 Plants to 10 dm tall; leaf blades 20-40 cm long ....................................................................................................................... C. serotinus

Key B – subgenus Pycreus – stigmas 2; achenes lenticular; achenes laterally flattened, borne with an edge toward the rachilla

1 Scales 2-keeled in the lower third to half (bicarinate).
2 Scales folded in half their entire length (conduplicate).

1 Scales with excurved awn 0.3-0.5 mm long; stamens 0-2; achenes ca. 0.6 mm long ........................................................................ C. pumilus
3 Achenes oblong with a truncate apex, subcylindric, only slightly compressed laterally.
4 Scales firm, oblong, closely imbricate, thus the spikelets appearing smooth-margined to the unaided eye; perennial or annual, 5-75 cm tall.
5 Scales 1.5-2.4 mm long, 1.0-1.4 mm wide; achenes 0.8-1.2 mm long, 0.4-0.6 mm wide ............................................................... C. polystachyos
6 Scales 2.5-3.0 mm long, 1.6-1.9 mm wide; styles 0.3-0.5 mm long; stigmas 2.2-3.1 mm long .............................................................. C. diandrus

Key C – subgenus Pyenostachys – stigmas 3; achenes trigonous; spikelets borne in digitate clusters (rarely singly), or in umbellate or glomerulate heads

1 Scales folded in half their entire length (conduplicate).
2 Plant a perennial.
3 Achenes with a granular or papillose surface; leaves often bladeless; bracts 2 (-3).
4 Scales 2.5-3.0 mm long, 1.6-1.9 mm wide; styles 0.6-1.0 mm long; stigmas 1.0-1.5 mm long .............................................................. C. bipartitus
5 Achenes with a smooth surface; leaves with blades; bracts 3-5.
6 Scales yellow or yellowish brown; culms 15-75 cm tall ............................................................................................................. C. lanceolatus
7 Plants perennial from slender rhizomes ............................................................................................................................... C. sanguinolentus
8 Leaves bladeless; inflorescence bracts ca. 20, borne horizontally; stamens 3 ................................................................. C. involucratus
9 Leaves with leaf blades; inflorescence bracts 2-10, borne variously; stamens 1 (-2).
10 Scales sharply 3-angled, the faces concave, the angles harshly scabrous; leaf blades and inflorescence bracts with conspicuous cross-veins.
11 Plants from fibrous roots.  

12 Achenes narrowly ellipsoid to linear, about 3-6× as long as wide.
14 Longest bract erect (appearing as a continuation of the culm); spikelets red-tinged ................................................................. C. reflexus
15 Achenes linear, 1.2-1.4 mm long, 0.2 (0.3) mm wide, about 5-6× as long as wide; style 0.5-0.8 mm long; stigmas 0.6-1.0 mm long ....................... C. pseudovegetus
13 Achenes broadly ellipsoid, about 2-2.5× as long as wide (the stipe or cuneate base typically conspicuous).
16 Annual; longest inflorescence bract erect or strongly ascending; anther ca. 0.5 mm long .......................................................... C. acuminatus
17 Scales declined 3-45 degrees from the rachilla; achenes with a stipe ...................................................................................... C. eragrostis
18 Scales declined (45-) 60-90 degrees from the rachilla; achenes cuneate at the base ................................................................. C. ochraceus
Key D – subgenus *Diclidium* – stigmas 3; achenes trigonous; spikelets borne in spikes on a conspicuous rachis; rachilla articulate at the base of each scale, the mature spike therefore disarticulating into segments consisting of a scale, an achene, and a section of the rachilla (including its wings)

1  Tip of each scale not reaching above the base of the next distal scale on the same side of the rachilla, and usually ending short of it; achene linear oblong, 1.5-2.0 mm long, about 3× as long as wide.......................................................... *C. odoratus* var. *engelmannii*
1  Tip of each scale reaching above the base of the next distal scale on the same side of the rachilla; achenes ellipsoid, obovoid-oblong, or slenderly obovoid, 1-1.5 mm long, about 2× as long as wide .......................................................... *C. odoratus* var. *odoratus*

Key E – subgenus *Cyperus* – stigmas 3; achenes trigonous; spikelets borne in spikes on a conspicuous rachis; rachilla continuous, or articulate only at the base

1  Upper scales of the spikelet with a straight or excruciating mucronate or cuspidate apex 0.4-1.2 mm long.
2  Floral scales persistent, appressed, 2.6-3.9 mm long; spikelets nearly cylindrical in ×-section; rachilla winged.......................... *C. retroflexus*
2  Floral scales deciduous, spreading, mostly < 3 mm long; spikelets quadrangular in ×-section; rachilla wingless, or wings < 0.4 mm wide.
3  Plant a rhizomatous perennial, culms single.......................................................... *C. schweinitzii*
3  Plant an annual, culms several, cespitose.
4  Achenelets linear, 0.8-1.6 (-1.9) mm wide.
5  Spikelet 1.2-1.6 mm wide; scales deciduous; rachilla persistent, wingless or very narrowly winged, not clasping achenes ......... *C. distans*
6  Spikelet 0.8-1.3 (-1.9) mm wide; scales persistent; rachilla breaking into segments with a scale and achene attached, the wing prominent and clasping the achenes
9  Tip of each scale not reaching above the base of the next distal scale on the same side of the rachilla, and usually ending short of it; achene linear oblong, 1.5-2.0 mm long, about 3× as long as wide .......................................................... *C. odoratus* var. *engelmannii*
9  Tip of each scale reaching above the base of the next distal scale on the same side of the rachilla; achenes ellipsoid, obovoid-oblong, or slenderly obovoid, 1-1.5 mm long, about 2× as long as wide .......................................................... *C. odoratus* var. *odoratus*
7  Spikelets linear, 0.8-1.6 (-1.9) mm wide.
8  Spikelet 1.2-1.6 mm wide; scales deciduous; rachilla persistent, wingless or very narrowly winged, not clasping achenes ......... *C. distans*
8  Spikelet 0.8-1.3 (-1.9) mm wide; scales persistent; rachilla breaking into segments with a scale and achene attached, the wing prominent and clasping the achenes
9  Tip of each scale reaching above the base of the next distal scale on the same side of the rachilla, and usually ending short of it; achene linear oblong, 1.5-2.0 mm long, about 3× as long as wide .......................................................... *C. odoratus* var. *engelmannii*
9  Tip of each scale reaching above the base of the next distal scale on the same side of the rachilla; achenes ellipsoid, obovoid-oblong, or slenderly obovoid, 1-1.5 mm long, about 2× as long as wide .......................................................... *C. odoratus* var. *odoratus*
7  Spikelets oblong-ovate to linear-oblong, (1.5-) 2.0-3.0 (-4.0) mm wide.
10 Spikelets strongly compressed, >2× as wide as thick (in cross-section); scales spreading or appressed.
11 Scales obovate-oblanceolate, notched at the tip; styles < 0.1 mm long.
12 Rachilla wingless; scales scarcely mucronate .......................................................... *C. iria*
12 Rachilla narrowly winged; scales distinctly mucronate .......................................................... *C. microiria*
13 Scales elliptic to oblong or ovate, acute to obtuse, not notched at the tip; styles 0.3-1.3 mm long.
13 Rachilla with hyaline, whitish, or straw-colored wings 0.2-0.5 mm wide.
14 Culms terete (at least toward the base), nodose-septate; inflorescence bracts 2 (-4), all erect; leaf blades generally absent ........
.................................. *C. articulatus*
14 Culms trigonous, not nodose-septate; inflorescence bracts 3-7, horizontal, ascending, or reflexed; leaf blades present.
15 Scales persistent; rachilla persistent; elongate stolons up to 15 cm long present, bearing tubers.
16 Scales purplish red to reddish brown, with green midveins; base of culm indurate; stolons wiry, springy when dried ........
.................................. *C. rotundus*
16 Scales yellowish brown to brown; base of culm soft; stolons spongy, flexible when dried.
17 Style and stigma combined < 4.2 mm long .................. *C. articulatus* var. *levanticus*
17 Style and stigma combined > 4.2 mm long .......................................................... *C. articulatus* var. *macrostachyus*
18 Scales deciduous; rachilla deciduous; rhizomes up to 5 cm long present, not bearing tubers.
19 Achenes coarsely punctate; spikelets borne in spikes on a conspicuous rachis; rachilla continuous, or articulate only at the base
22 Rachis (to which the spikelets are attached) glabrous; achenes 1.5-2.0 mm long; spikes subglobose to broadly ovoid; [of upland sites, of NC northward] .......................................................... *C. houghtonii*
23 Anthers 0.3-0.6 mm long. 24 Spikelets with 5-22 scales .......................................................... *C. pilosus*
23 Anthers 0.8-1.0 mm long .......................................................... *C. filiculmis*
24 Spikelets 2.5-3.8 mm long, usually fitting loosely over the mature achenes, the margins spreading or loosely clasping it; spikelet with 5-22 scales .......................................................... *C. pilosus ssp. lupinus*
24 Spikelets 1.8-2.5 mm long, usually fitting tightly over the achenes, the margins tightly clasping it; spikelets with 3-7 scales .......................................................... *C. pilosus ssp. macilentus*
10 Spikelets subterete or quadrangular, 1-1.5× as wide as thick (in cross-section); scales appressed.
25 Scales deciduous; rachillas persistent; rachilla wings deciduous, but remaining firmly attached at the base even after the achenes fall; spikelets with (6-) 12-20 (-40) scales ......................................................... C. erythrorhizos
25 Scales persistent; rachillae either deciduous (the mature spikelets generally falling as a single unit from the rachis) or persistent; rachilla wings persistent; spikelets with 2-8 scales.
26 Spikelets reflexed (some of the uppermost spreading to ascending).
27 Culms glabrous; leaves and inflorescence bracts nearly glabrous ................................................................. C. hystricinus.
27 Culms (at least the upper portion) scaberulous or puberulent; leaves and inflorescence bracts puberulent on the upper surface.
28 Inflorescence rays scaberulous; leaves and inflorescence bracts pubescent on the upper and lower surfaces; culm obtusely trigonous to nearly terete............................ C. plukenetii
28 Inflorescence rays smooth (or with a very few hairs); leaves and inflorescence bracts pubescent on the upper surface and on the midvein only on the lower surface; culm sharply 3-angled.............................................................. C. retrofractus
26 Spikelets ascending to spreading (some of the lowermost reflexed).
29 Spikelets cylindrical, 2-5× as long as wide.
30 Spikelets ellipsoid, 2-3× as long as wide; spikelets with 1-2 (-3) fertile scales......................................................... C. aggregatus
30 Spikelets lancilobate to linear, 4-10× as long as wide; spikelets with 3-8 fertile scales.
31 Scales greenish to light brown, the tips overlapping the lower 1/4 to 1/3 of the next scale ................................ C. strigosus
31 Scales reddish brown or tawny, the tips barely reaching the base of the next scale ............................................. C. thyrsiflorus
29 Spikelets ovoid, globose, or obovoid, 1-2× as long as wide.
32 Scales >4 mm long; achenes >2 mm long.
33 Spikelets ellipsoid to obovoid. ........................................................................................................................................
C. echinatus
33 Spikelets subquadangular, the terminal scale elongate, forming a subulate tip to the spikelet; leaves and inflorescence bracts 3-6 mm wide, smooth............................................... C. hystricinus
34 Spikelets subterete, the terminal scale not elongate, the spikelet therefore acute; leaves and inflorescence bracts mostly >10 mm wide, scabrous on the upper surfaces.
35 Spikelets dense, with 50-90 spikelets, each with 3-6 (-7) fertile scales; achenes conspicuously falcate-curved, 3-4× as long as wide ................................................................. C. lancastriensis
35 Spikelets loose, of 13-75 spikelets, each with 4-8 (-11) fertile scales; achenes straight, 5-6× as long as wide
...................................................................................................................... C. refractus
32 Scales <4 mm long; achenes <2 mm long.
36 Spikelets with parallel sides, mostly > 25 mm long; spikelets quadrate.
37 Spikelets narrowly ellipsoid, 1.5-2.0 mm wide ........................................................................................................ C. tetragonos
37 Spikelets linear, 0.5-1.0 mm wide ...................................................................................................................... C. thyrsiflorus
36 Spikelets with curved (convex) sides, mostly < 20 mm long; spikelets compressed.
38 Scales ascending; achenes oblong-fusiform, gradually narrowed to both ends ................................................... C. ovatus
38 Scales pressed; achenes elongate, abruptly constricted at the tip.
39 Spikelets tight, globose, oblong, or oblong-cylindrical; spikelets subterete in cross-section, with 1-3 (-4) fertile scales; scales straw-colored or brown on the sides.
40 Scales (3.5-) 4.0-7.0 mm long; spikelets subterete in cross-section, with 3-8 (-9) fertile scales; scales straw-colored or brown on the sides.
41 Spikelets club-shaped, the terminal scale elongate, forming a subulate tip to the spikelet; leaves and inflorescence bracts 3-6 mm wide, smooth............................... C. echinatus
41 Spikelets obtuse-rounded or subquadangular, the terminal scale elongate, forming a subulate tip to the spikelet; leaves and inflorescence bracts 3-6 mm wide, smooth.
42 Spikelets subterete, the terminal scale not elongate, the spikelet therefore acute; leaves and inflorescence bracts mostly >10 mm wide, scabrous on the upper surfaces.
43 Spikelets dense, with 50-90 spikelets, each with 3-6 (-7) fertile scales; achenes conspicuously falcate-curved, 3-4× as long as wide ................................................................. C. lancastriensis
43 Spikelets loose, of 13-75 spikelets, each with 4-8 (-11) fertile scales; achenes straight, 5-6× as long as wide
...................................................................................................................... C. refractus
39 Spikelets linear, 0.5-1.0 mm wide ...................................................................................................................... C. thyrsiflorus
40 Spikelets oblong to oblong-cylindrical; spikelets 2.2-4.0 (-4.5) mm long; scales firm, brown or straw-colored, 1.8-2.6 mm long; achenes 1.2-2.0 mm long ................ C. retrorsus

Cyperus acuminatus Torrey & Hooker ex Torrey. Wetlands, especially over limestone. IL west to ND, south to w. LA, TX, and n. Mexico; disjunct from WA to s. CA; disjunct eastward at scattered localities in VA, NC, GA (Eechols 2007), TN, KY, and OH (where probably native), and NY and NH (where probably introduced). [= C, F, FNA, G, GW, K, W]

Cyperus aggregatus (Willdenow) Endl.ich. Disturbed areas in ports, apparently introduced on ballast, perhaps only a waif and no longer present; native of tropical America. [= FNA, K, WH; = C. cayennensis (Lamarck) Britton – S; = C. flavus (Vahl) Nees; = C. huarmensis (Kunth) M.C. Johnston, misapplied]

Cyperus alopecuroideus Rottboll. Disturbed wet areas; native of Old World tropics. Reported for FL in FNA and for MS in Kartesz (2010). [= FNA, WH] [not yet keyed]

Cyperus articulatus Linnaeus. Marshes, especially tidal. July-September. Se. SC south to s. FL west to e. TX, and south into tropical America. [= RAB, FNA, GW, K, S, WH]

Cyperus bipartitus Torrey. Low fields, ditches, marshes, along streams. July-October. ME and QC west to MN and WA, south to FL (Wakulla County) (Kunzer et al. 2009), GA, LA, TX, NM, AZ, and CA. [= C, FNA, GW, K, W; ? C. rivularis Kunth – RAB, F, G, S, WV]

Cyperus compressus Linnaeus. Sandy fields, disturbed areas. July-September. Pantropical and warm temperate, north in North America to s. NY, s. OH, s. IL, and e. TX. [= RAB, C, F, FNA, G, GW, K, S, W, WH]

Cyperus croceus Vahl. Savannas, pine flatwoods, disturbed areas. July-October. NJ and MO south through the New World tropics. [problems in circumscription; check specimens] [= C, FNA, WH; = C. globulosus Aublet – F, G, GW, W, misapplied; >
Cyperus cuspidatus Kunth. Sandy fields, disturbed areas. July. S. SC south to FL, west to LA; New World tropics. [= RAB, FNA, GW, K, S, WH]

Cyperus dentatus Torrey. Toothed Flatsedge. Low sandy areas. July-October. NS and QC south to e. SC; disjunct inland in WV, s. TN, and nw. IN. [= RAB, C, F, FNA, G, GW, K, S, W]

Cyperus diandrus Torrey. [Habitat]. ME west to ND, south to VA, c. TN, n. AL, IL, MO, and IA. [= C, F, FNA, G, GW, K, S, W]


Cyperus digitatus Roxburgh. Disturbed wet areas. Pantropical, north in North America to FL Panhandle, LA, and TX. [= FNA] {not yet keyed; add to synonymy}

* Cyperus distans Linnaeus. Marshes; probably introduced from tropical America. July-September. [= RAB, FNA, K, S, WH]

Cyperus distinctus Steudel. Marshes, wet flatwoods, wet hammocks, ditches. July-September. E. SC south to Panhandle FL and s. FL; se. LA; Bahamas (New Providence Cay). [= RAB, FNA, GW, K, WH]

Cyperus drummondii Torrey & Hooker in Torrey. Flatwoods ponds, savannas, coastal prairies, ditches, disturbed depressions. June-September. SC south to Panhandle FL, west to e. TX; West Indies; Central America; South America. Reported for several counties in the GA Coastal Plain (Carter, Baker, & Morris 2009). Reported for SC, GA, FL, AL, MS, LA, and TX (USDA Plants 2009). [= FNA, WH; = C. virens Michaux var. drummondii (Torrey & Hooker in Torrey) Kükenthal; < C. virens – GW, K, RAB, S]

Cyperus echinatus (Linnaeus) Wood. Sandy woodlands, forests, and fields. July-September. CT and NY west to s. OH, IL, and se. KS, south to n. FL, TX, and ne. Mexico. [= C, FNA, K, WH; = C. ovariis (Michaux) Torrey – RAB, G, GW, S, W, WV; > C. ovariis var. ovularis – F; > C. ovariis var. sphaericus Böckler – F]

Cyperus elegans Linnaeus. Royal Flatsedge. FL. July-August. FL, AL, MS, TX, and NM, south to South America. [= FNA, WH] {not yet keyed; add to synonymy}

* Cyperus enteririanus Böckler. Bottomland hardwood forests, coastal grasslands, marshes, vacant lots, disturbed areas; native of temperate South America. Established from E. GA south to s. FL and west to e. and s. TX. Rosen, Carter, & Bryson (2006) and Carter, Baker, & Morris (2009) discuss the spread of this noxious weed in the Southeastern United States. [= FNA, K, WH]


Cyperus filiculmis Vahl. Sandy or rocky woodlands, forests, and fields. July-October. Se. MD south to s. peninsular FL, west to e. TX. [= FNA, RAB, WH; < C. lupinus ssp. lupinus – K (also see C. lupinus]


**Cyperus fraternus** Kunth. Disturbed depressions, ditches. Reported for several counties in the GA Coastal Plain (Carter, Baker, & Morris 2009). [C. reflexus – FNA; = *C. reflexus* Vahl var. *fraternus* (Kunth) Kunze] [add synonymy; not yet keyed; not yet mapped]


**Cyperus granitophilus** McVaugh, Granite Flatsedge. Granitic flatrocks, rarely on diabase flatrocks and Altamaha Grit glades. Sc. VA south to ec. AL in the Piedmont; disjunct in se. and c. TN on sandstone and limestone and in sc. GA on Altamaha Grit. [= FNA, GW, K; < *C. aristatus* Rottbøll – G, RAB, W; < *C. inflexus* Muhlenberg – F, S]

**Cyperus grayi** Torrey. Dry soils. July-September. NH south to GA and Panhandle FL (Liberty County) (Sorrie & LeBlond 2008). [= RAB, C, FNA, K, W; = *C. grayii* – G, orthographic variant; > *C. grayii* – F; > *C. filiculmis* var. *oblitus* Fernald & Griscom – F]


**Cyperus houghtonii** Torrey, Houghton's Flatsedge. Dry upland sites. July. MA, VT, and QC west to MN, south to w. VA, WV, ne. NC, and nw. IN. [= RAB, C, F, FNA, G, K, W]

**Cyperus hystricinus** Fernald. Dry woodlands and forests. July-September. NJ south to n. FL, west to e. TX, mostly on the Coastal Plain. [check specimens of this and relatives – discrepancy between mapped and stated ranges] [= C, FNA, K, S, WH; < *C. retrofractus* – RAB, W, misapplied; = *C. retrofractus* (Linnaeus) Torrey var. *hystricinus* (Fernald) Kükenthal – F, G]


**Cyperus laevigatus** Linnaeus. Brackish marshes; native of sw. North America and New World tropics. [= RAB, FNA, K; > *C. laevigatus* – S; > *C. careyi* Britton – S]

**Cyperus lancastriensis** Porter ex A. Gray. Dry woodlands, forests, and fields. July-September. NJ west to WV, OH, and MO, south to GA and AR. [= RAB, C, F, FNA, G, K, S, WH, WV]

**Cyperus lanceolatus** Poiret. Wet places. Se. GA and ne. FL west to LA and c. TX (?), south into the Neotropics; also Africa. [= FNA, GW, K, WH; ? *C. densiflorus* Link – S]

**Cyperus lanceolatus** Porter ex Steudel. Limestone ponds, low pinelands. July-September. Se. NC south to s. FL, west to w. LA. Sorrie (1998b) reports it for e. GA (Glynn County). [= RAB, FNA, GW, K, S, WH]

**Cyperus ligularis** Linnaeus, Swamp Flatsedge. Brackish marshes, beaches, disturbed wetlands. FL and AL south into Mexico, Central America. South America; Africa. [= FNA, WH] [not yet keyed; add to synonymy]
**Cyperus lupulinus** (Sprengel) Marcks var. *lupulinus*. Dry sterile soils. MA and VT west to MN, south to NC, n. SC, TX; disjunct in ID, WA, and OR. [= *C. lupulinus* ssp. *lupulinus* – FNA, K; < *C. filiculmis* Vahl – RAB, W; < *C. lupulinus* – C, WH; = *C. filiculmis* Vahl var. *filiculmis* – F, G, WV; > < *C. filiculmis* – S; > *C. martindalei* Britton – S]

**Cyperus lupulinus** (Sprengel) Marcks var. *macilentus* (Fernald) A. Haines. Dry sterile soils. ME, QC, and MN south to w. VA, w. NC, nw. GA, and MO. [= *C. lupulinus* ssp. *macilentus* (Fernald) Marcks – FNA, K; < *C. filiculmis* Vahl – RAB, S, W; = *C. filiculmis* Vahl var. *macilentus* Fernald – F, G, WV; > < *C. lupulinus* – C]


**Cyperus ochraceus** Vahl. Marshes, ditches, wet disturbed areas. Se. GA (Jones & Coile 1988), s. FL, s. AL, s. MS, LA, TX, south into Mexico, Central America, and South America. [= FNA, GW, K, S, WH]

**Cyperus odoratus** Linnaeus var. *engelmannii* (Steudel) R. Carter, S.D. Jones, & J. Wipff. Alluvial and other damp to wet soils. July-October. North-central and northeastern North America, MA west to s. ON, MN and NE, south to se. NC and MO. Distribution in our region is poorly known. [= *C. engelmannii* Steudel – RAB, F, G, GW; < *C. odoratus* – C, WH; > *C. ferruginescens* Böckler – RAB, F; > *C. ferax* L.C. Richard – S; > *C. longispicatus* J.B.S. Norton – S; > *C. speciosus* Vahl – S]

* Cyperus ovatus* Baldwin. Sandy beaches, maritime forests, and pinelands. July-October. Se. NC south to s. FL, west to s. AL. [= FNA, K; ? *C. retrorsus* Chapman var. *cylindricus* (Elliott) Fernald & Griscom; > *C. retrorsus* var. *deeringianus* (Britton ex Small) Fernald ex Griscom – RAB, F, G, GW, S; < *C. odoratus* – C, WH; > *C. retrorsus* var. *deeringianus* (Britton ex Small) Britton ex Small – S]

* Cyperus oxylepis* Nees ex Steudel. Disturbed wet areas, marshes, salina areas; native of South America. See Bryson et al. (1996). [= FNA, GW, K, WH]


**Cyperus planifolius** L.C. Richard. Brackish marshes. Se. GA (Jones & Coile 1988) south to s. FL; West Indies; Central and South America. [= FNA, GW, K, WH; ? *C. brunneus* Swartz – S]

**Cyperus pluekenetii** Fernald. Sandhills, sandy woodlands, and dry, disturbed areas. July-October. NJ, KY, MO, and se. OK, south to c. peninsular FL and e. TX. [= RAB, C, F, FNA, K, W, WH; = *C. retrofractus* var. *retrofractus* – G, misapplied; = *C. retrofractus* – S, misapplied]


* Cyperus prolifer* Lamarck. Pond shores, marshes; native of tropical e. Africa. July-August. Also reported for se. VA (Kartesz 2010). [= FNA, WH; ? *C. isocladus* Kunth]

**Cyperus pseudovegetus** Steudel, Marsh Flatsedge. Marshes, ditches, depressions. July-October. NJ and MA, west to s. IL, s. MO, and OK, south to FL and TX. [= RAB, C, FNA, G, GW, K, S, WH; = *C. virgenes* – F, misapplied]

* Cyperus pumilus* Linnaeus. Disturbed wet areas; native of the Old World, occurring in n. FL and se. GA. [= FNA, GW, K, WH]

* Cyperus reflexus* Vahl. Disturbed wet areas; native of sw. United States south to tropical America. July-August. [= FNA, WH]

Cyperus retroflexus Buckley. Cropped fields, damp disturbed areas. July-September. AL west to NM, south to Mexico. [= FNA, K]

Cyperus retrofractus (Linnaeus) Torrey. Dry sandy or rocky woodlands and fields. July-September. NJ west to s. OH, and se. MO, south to GA. AL, and AR. [= C, FNA, K, WH; = C. dipsaciformis Fernald – RAB, F, S, W; = C. retrofractus (Linnaeus) Torrey var. dipsaciformis (Fernald) Kükenthal – G]

Cyperus rotundatus Buck. Pinebarren Flatsedge. Dry woodlands, forests, and rock outcrops. July-October. S. NY south to FL, west to TX, mostly on the Coastal Plain, but north in the interior to KY and se. OK. [= C, FNA, G, GW, W, WH; = C. rotundatus Buck var. rotundatus – RAB, K; > C. rotundatus Buck var. rotundus – F; > C. rotundatus Buck var. nashii (Britton) Fernald – F; > C. retrofractus – S; > C. nashii Britton – S; > C. retrofractus – S]


* Cyperus sanguinolentus Vahl. Ditches, disturbed wet areas; native of Asia, known in North America from e. GA west to LA. See Carter & Bryson (2000) for detailed information. [= FNA; > Cyperus louisianensis Thieret – K]

Cyperus schweinitzii Torrey, Sand Flatsedge. Sandy soils. VT, MA, MN, and Albert, south to s. NJ, e. PA, n. KY, OH, MO, TX, NM, UT, and Mexico. It occurs in se. PA (Rhoads & Klein 1993) and NJ. [= FNA, C, F, G, K]


Cyperus surinamensis Rottboll. Marshes, pond edges, disturbed wet areas. September-October. Se. SC south to s. FL, west to KS, OK, TX, and south into Mexico and tropical America. [= RAB, FNA, GW, K, S, WH]

Cyperus tetragonos Elliott, Four-angled Flatsedge. Maritime forests and dunes, edges of brackish marshes. July-September. E. NC south to s. FL; FNA treats C. pringlei of AZ and NM as conspecific, but this seems unlikely. [= RAB, FNA, K, S, WH]

Cyperus thyrsiflorus Junghuhn. Swamps and streambanks. Se. GA and FL peninsula west to se. TX; West Indies; South America. [= FNA, K, WH; = C. hermaphroditus Jacquin Standley – S, misapplied]

Cyperus virens Michaux. Marshes and ditches. July-September. Se. NC south to c. peninsular FL, west to TX; Mexico to Argentina. [= FNA, WH; < C. virens – GW, K, RAB, S]

Dulichium Persoon (Threeway Sedge)

**Identification notes:** The combination of the distichous *Cyperus*-like spikelets and numerous, distinctly 3-ranked, short, caulin leaves makes *Dulichium* distinctive.


**Eleocharis** R. Brown 1810 (Spikerush)
[by Bruce A. Sorrie and Alan S. Weakley]


**Identification notes:** "Scale" refers to the flower scales. "Sheath" refers to leaf sheaths. "Bristle" refers to perianth bristles.

**subgenus Eleocharis**
section *Eleocharis*  
series *Eleocharis*  
subseries *Eleocharis*  
subseries *Truncatae*  
subseries *Albidae*  
subseries *Melanocarpae*  
subseries *Rostellatae*  
subseries *Temissimae*  
subseries *Chaetariae*  
section *Eleogenus*  
series *Ovatae*  
series *Maculosae*  
subseries *Ocretaceae*  
subseries *Rigidae*  
section *Parvulae*  
parvula

**subgenus Limnochloa**
section *Limnochloa*  
subseries *cellulosa*, elongata, equisetoides, interstincta, quadrangulata, robbinsii

**subgenus Scirpidium**
section *Scirpidium*  
acicarius, radicans

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1 Culms producing vegetative proliferations rather than normal fertile spikelets ................................................................. **Key A**

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Achenes with several distinct longitudinal ribs or low ridges, the intervening spaces with abundant, very narrow, horizontally elongate cells; [subgenus *Scirpidium*] ........................................................................................................................................ **Key C**

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Achenes without longitudinal ribs, the surface smooth, granular, or honeycomb-like (*E. tortilis* and *E. tuberculosa* have indistinct ribs, but intervening cells are honeycomb-like, not thin horizontally; *E. tricosata* has 3 keel-like ribs, but achene surface appears granular).  
4 Achenes lenticular or biconvex; styles 2-branched ................................................................................................. **Key D**  
4 Achenes trigonous or nearly terete; styles 3-branched ................................................................................................. **Key E**

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**Key A** – spikerushes proliferating vegetatively, with no fertile spikelets present

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1 Each culm producing secondary or tertiary whorls.

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Achenes lenticular or biconvex; styles 2-branched ................................................................................................. **Key D**  
4 Achenes trigonous or nearly terete; styles 3-branched ................................................................................................. **Key E**
1 Culm transversely nodose-septate (appearing jointed), about 5-9.5 mm in diameter.

2 Achenes with longitudinal rows of enlarged linear cells separated by obscure longitudinal lines; perianth bristles narrow and weak, rudimentary to equaling achene; [widespread in our area]........................................................................................................................................E. equisetoides

2 Achenes with longitudinal rows of enlarged rectangular cells separated by distinct longitudinal lines; perianth bristles broad and stout, exceeding achene; [of Panhandle FL and s. AL]........................................................................................................................................E. interstincta

1 Culms not transversely nodose-septate, 1-5.5 mm in diameter.

3 Spike 3-5 mm in diameter, to 5 cm long, rounded to obtuse at the tip, densely flowered, the flowers (scales) 50-100 per spike, arranged in obvious spiral rows; culm 2-5 mm in diameter; [of estuarine and riverine marshes, or brackish interdune swale ponds on barrier islands].

4 Culms 2-4 mm in diameter, sharply 3-4-angled when fresh; tube base confluent with the summit of the achene.................E. elongata

4 Culms 2-4 mm in diameter, sharply 3-4-angled when fresh; tube base distinctly constricted, forming a "waist"..............E. quadrangulata

3 Spike 1-2 mm in diameter, to 2.5 cm long, sharply pointed at the tip, loosely flowered, the flowers (scales) 10-25, few enough that the spiral arrangement is not readily apparent; culm 0.5-1.5 (-2) mm in diameter; [of limesink (doline) ponds and Carolina bay lakes of the mainland].

5 Achenes body 0.8-1.5 mm long; scales mostly ca. 3.5 mm long; culms terete when fresh .........................................................E. margaretiae

5 Achenes body 1.5-2.5 mm long; scales mostly ca. 5 mm long; culms 3-angled when fresh .........................................................E. robusta
Cyperaceae

**Eleocharis bicolor**

MO; disjunct in DE. [= F, FNA, K, S; Carolina by Hill & Horn (1997). = C, F, FNA, G, GW, K, S; Newfoundland, NU, and AK south to GA, TX, CA; Mexico, Central America, n. South America, Eurasia. Reported for South Carolina by Hill & Horn (1997).]

Torrey, White Spikerush. Brackish marshes. July-September. MD south to s. FL, west to TX and CA; Mexico, Central America, South America, Asia, Africa. Reported for South Carolina by Hill & Horn (1997).

**Eleocharis albida**

Svenson ex Small. Bogs, pine savannas. NC south to FL, west to TX, north in the interior to TN and MO; disjunct in DE. [= F, FNA, K, S; = E. microcarpa Torrey – RAB, C, G, GW]

**Eleocharis brittonii**

Svenson ex Small. Bogs, pine savannas. NC south to FL, west to TX, north in the interior to TN and MO; disjunct in DE. [= F, FNA, K, S; = E. microcarpa Torrey – RAB, C, G, GW]
**Eleocharis cellulosa** Torrey. Cp (GA, NC, SC): fresh to brackish interdune swale ponds on barrier islands; rare (NC Rare). July-September. E. NC south to s. FL, west to TX and Mexico; also in the West Indies, Bermuda, and Central America (Nicaragua). See Gaddy & Rayner (1980) for the report of this species in SC and Carter, Baker, & Morris (2009) for discussion of its occurrence in GA. [= RAB, FNA, GW, K, S]


**Eleocharis confervoides** (Poiret) G. Tucker. Cp (GA): submersed in lakes and ponds; rare. GA and FL; West Indies; Central and South America; Asia; Africa; n. Australia. This taxon, often segregated into the monotypic genus Websteria, is widely distributed in tropical and subtropical regions of both hemispheres. Its retention in Eleocharis is supported by a molecular phylogenetic study (Roalson & Friar 2000). [= Websteria confervoides (Poiret) S. Hooper – FNA, GW, K; = Websteria submersa (C. Wright) Britton – Scirpus confervoides Poiret]

**Eleocharis elliptica** Kunth. Mt (VA, WV): calcareous prairies, fens, shores, riverside scours; rare. NL (Labrador) west to BC, south to PA, NJ, WV, TN, IA, and ID. [= F, FNA, K, WV; = E. tenuis (Wildenow) J.A. Schultes var. borealis (Svenson) Gleason – C, G]

**Eleocharis elongata** Chapman. Cp (GA, NC): quiet waters of limesink (doline) ponds; rare (NC Rare). July-August. Sc. NC south to FL, west to s. AL, s. MS, and TX (Sorrie & Leonart 1999); Jamaica, Mexico, Central America, South America. [= FNA, GW, K, S]

**Eleocharis engelmannii** Steudel, Engelmann Spikerush. Cp (DE, NC, SC, VA), Pd (DE, GA, NC, VA), Mt (VA, WV): freshwater shores, marshes, disturbed wet places; uncommon (rare in WV)). July-September. MA, ON, and British Clumbia south to GA, MS (Sorrie & LeBlond 2008), TX, and CA. [= RAB, F, FNA, G, K, S, WV]

**Eleocharis equisetoides** (Elliott) Torrey, Horsetail Spikerush. Cp (DE, GA, NC, SC, VA): quiet waters of limesink (doline) ponds, natural lakes, borrow pits, ditches, artificial millponds; uncommon (rare in DE and VA). June-September. MA south to e. peninsular FL, west to se. TX; also near the Great Lakes from NY west to MI and MO. [= RAB, C, F, FNA, G, GW, K; < E. equisetoides – C]

**Eleocharis erythropoda** Chapman. Cp (GA, NC, VA), Pd (DE, GA, NC, VA), Mt (VA, WV): streambanks, marshes, ponds, swamps; rare. July-September. NS and AK south to NC, MS, TX, AZ, and OR. [= RAB, FNA, GW, K; < E. palustris – C; > E. calva Torrey – F, G, S, WV, invalid name]


**Eleocharis flavescens** (Poiret) Urban. Cp (DE, FL, GA, NC?, SC?, VA?): Coastal Plain ponds, pools; rare. June-September. DE or VA (?) south to FL, west to se. OK and TX; also scattered in the Rocky Mountain states; West Indies; South America. [= K; > E. flavescens var. flavescens – C, FNA, G; > E. flavescens – RAB, F, GW]

**Eleocharis geniculata** (Linnaeus) Roemer & J.A. Schultes. Cp (SC), [GA?, NC?,]: marshes; rare. July. Widespread but scattered across much of the United States; West Indies, Central America, South America, Asia, Africa. [= F, FNA, G, GW, K; > E. caribaea (Rottboll) S.F. Blake – RAB, C, S]

**Eleocharis halophila** (Fernald & Brackett) Fernald. Cp (DE, NC, VA): brackish marshes; rare. July. NL (Newfoundland) to NC, along the coast. [= RAB, F, G, K; < E. palustris – C; < E. uniglumis (Link) Schultes – FNA; = E. uniglumis var. halophila Fernald & Brackett]

**Eleocharis intermedia** J.A. Schultes, Matted Spikerush. Mt (VA, WV): muddy calcareous seepage areas; rare. NS west to MN, south to VA, TN, and IL. The fruiting culms are of widely different lengths, the lowermost sprawling and much shorter than the longer. [= C, F, FNA, G, K, WV]

**Eleocharis interstincta** (Vahl) Roemer & J.A. Schultes. Ponds, borrow pits. May-September. S. AL and Panhandle FL south to s. FL and west (interruptedly) to OK and TX; Bahamas and West Indies; Mexico, Central America, e. South America. [= FNA, GW, K; < E. equisetoides – S]

**Eleocharis melanocharpa** Torrey, Black-fruited Spikerush. Cp (DE, GA, NC, SC, VA), Mt (VA): Coastal Plain ponds, cypress meadows, sinkhole ponds in the Shenandoah Valley; uncommon (rare in DE, NC, and VA). July-September. MA south to n. peninsular FL, west to s. MS; disjunct in e. TX, s. MI, and n. IN (Sorrie & Leonart 1999). [= RAB, C, F, FNA, G, GW, K, S]
Eleocharis microcarpa


Eleocharis microcarpa Torrey var. microcarpa. Cp (SC): wet pine savannas, Coastal Plain bogs; rare. June-September. SC south to FL, west to LA; West Indies. [= F, FNA; < E. microcarpa – RAB, C, G, GW, K; = E. microcarpa – S]


Eleocharis nigrescens (Nees) Steudel. Cp (SC): pond margins, flatwoods; rare. SC to FL; West Indies, Mexico; South America; Africa. [= FNA, GW, K; ? E. setifolia (A. Richard) Raynal; < E. microcarpa – RAB, ? E. carolina Small – S]


Eleocharis olivacea Torrey var. reductiseta (Schuyler & Ferren) Schuyler & Ferren. Tidal rivers. Endemic to s. NJ (as far as is known). [= K; < E. flavescens (Poiret) Urban var. olivacea (Torrey) Gleason – C, FNA, G; < E. olivacea – F]

Eleocharis palustris (Linnaeus) Roemer & J.A. Schultes, Small's Spikerush. Cp (DE, VA), Pd (DE, VA), Mt (NC, WV), {SC}: marshes; common (uncommon in VA and WV, rare in NC). June-September. NL (Labrador) west to AK, south to FL, TX, CA, and Mexico; Eurasia. As discussed by Smith et al. in FNA (2002b), variable in geographically correlated ways and probably warranting recognition of varieties or segregate species. E. smallii is sometimes separated as the eastern North American member of the north temperate E. palustris complex. [= FNA, G, K; < E. palustris – RAB, C; > E. smallii Britton – F, GW, WV; > E. palustris var. palustris – F; > E. palustris var. major Donder – F]

Eleocharis parvula (Roemer & J.A. Schultes) Link ex Bluff, Nees, Little-spike Spikerush. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (VA): tidal brackish and freshwater marshes, shallow waters of managed impoundments; common (rare in GA, NC, SC, and VA). July-September. NS, NL (Newfoundland), and MI south to FL and LA; BC south to CA; Mexico, Central America, South America, Eurasia, Africa. [= RAB, FNA, G, GW, K; = E. parvula var. parvula – C, F]


Eleocharis radicans (A. Dietrich) Kunth, Rooting Spikerush. Cp (VA), Mt (WV): {habitat}; rare (VA Rare). Widely scattered in North America; n. Mexico, West Indies, Central America, South America. [= C, F, FNA, G, GW, K]

Eleocharis robbinisi Oakes, Robbins Spikerush. Cp (DE, GA, NC, SC, VA), Mt (VA): quiet waters of limesink (doline) ponds, natural lakes; uncommon (rare in GA, NC, SC, VA). July-August. NS and NB west to ON, south to s. MS (Gorrie & Leonard 1999); also near the Great Lakes, from NY west to IN, WI, and MN. [= RAB, C, F, FNA, G, GW, K]

Eleocharis rostellata (Torrey) Torrey, Beaked Spikerush. Cp (DE, NC, VA), Mt (WV)?, {GA?, SC}: brackish and freshwater tidal marshes; uncommon (rare in NC and VA). July-September. ME, ON, and BC south to FL, TX, CA and Mexico; West Indies. Reported for WV (Harmon, Fort-Werntz, & Grafton 2006). [= RAB, C, F, FNA, GW, K]

Eleocharis tenuis (Willdenow) J.A. Schultes var. pseudoptera (Weatherby ex Svenson) Svenson. Pd (DE), {NC, VA}: bogs; common (rare in NC and VA?). June-September. NS, QC and IN south to NC, GA, and LA. [= C, F, FNA, GW, K; < E. tenuis – RAB; = E. elliptica Kunth var. pseudoptera (Weatherby ex Svenson) L. Harms; = E. capitata (Linnaeus) R. Brown – S]


Eleocharis tortilis (Link) J.A. Schultes, Twisted Spikerush. Cp (DE, GA, NC, SC, VA): wet pine savannas, Coastal Plain seepage bogs, seeps, pocosin ecotones; common. July-September. NJ south to FL, west to TX, inland to TN and AR. [= RAB, C, F, FNA, GW, K]


**Eriophorum** Linnaeus (Cottongrass, Cottonsedge, Bogwool)


1. Foliaraceous bracts (subtending the head of spikelets) 2 or 3, spreading, the inflorescence therefore appearing terminal.
2. Blade of the uppermost leaf on the stem much shorter than its sheath ........................................................................................................ E. gracile
3. Blade of the uppermost leaf on the stem as long as the sheath or longer .......................................................................................... E. tenellum
1. Foliaraceous bract (subtending the head of spikelets) solitary, erect, appearing as a continuation of the culm, the inflorescence therefore appearing lateral.
3. Scales (subtending the flower) prominently 3-7-nerved ................................................................................................................ E. virginicum
3. Scales (subtending the flower) 1-nerved ................................................................................................................................ E. viridicarinatum

**Eriophorum gracile** W.D.J. Koch ex Roth, Slender Cottongrass. Bogs and open swamps. Circumboreal, in North America from NL (Labrador) west to AK, south to s. PA (Rhoads & Klein 1993), s.NJ, w. MD (C. Frye, pers comm. 2000), DE (McAvoy & Bennett 2001), OH, IN, IL, MN, CO, UT, NV, and CA. [= C, F, FNA, G; > E. gracile var. gracile – K]

**Eriophorum tenellum** Nuttall, Conifer Cottongrass. Bogs. June-September. NL (Newfoundland) west to MN, south to s. NJ, se. PA (Rhoads & Klein 1993), IL, and MI. [= C, FNA, G, K; > E. tenellum var. tenellum – F]

**Eriophorum virginicum** Linnaeus, Tawny Cottongrass. Peaty sites, limited in habitat throughout the region, occurring in the Mountains in bogs and fens, in the Piedmont (formerly) in bogs, in the fall-line sandhills in burned-out pocosins, in the Coastal Plain in pocosins, acidic seeps, and peat-burn pools. June-September. NL (Labrador) and NL (Newfoundland) west to ON and MN, south to se. NC, sw. NC, e. KY; disjunct in se. GA at Okefenokee Swamp. Very variable in size, from 5-15 dm tall, with heads ranging from 1-6 cm in diameter, the larger plants primarily in the Coastal Plain and the smaller in the Mountains. [= RAB, C, F, FNA, G, GW, K, S, W, WV]

**Eriophorum viridicarinatum** (Engelmann) Fernald, Darkscale Cottongrass. Bogs. May-August. NL (Newfoundland and Labrador) west to AK, south to s. NJ, PA, OH, IN, IL, MN, ND, WY, ID, and WA; reported by Small (1933) for further south, apparently in error. [= C, FNA, K; = E. viridi-carinatum – F, G, orthographic variant]
Cyperaceae

3 Plants diminutive annuals, the culms 1-6 (-15) cm tall.
4 Achene cylindrical, 2-4× as long as wide, curved like a tiny banana; inflorescence bracts 1-2 cm long. F. perpusilla
5 Plants small to large annuals or perennials, the culms 6(+) 15-150 cm tall.
6 Achene obovate, 1-1.5× as long as wide, not curved; inflorescence bracts 4-10 cm long. F. vahlii

7 Plants to medium-sized or robust perennial, the culms generally 5-15 dm tall, either cespitose, with a hardened base, and deeply set in the substrate, or rhizomatous, the rhizomes either slender or thick
8 Plant cespitose, lacking rhizomes; bases of leaves hard, leathery, dark brown, deeply set in the substrate, the base of the plant generally 5-15 cm below the ground surface; achene (1.3-) 1.5-2 mm long. F. castanea
9 Plant rhizomatous, the rhizomes either thick and knotty or slender and scaly (rarely with both); bases of leaves often somewhat thickened, hardened, and brownish, the base of the plant not especially deeply set; achene 0.8-1.2 (-1.3) mm long.
10 Plant a robust perennial to 15 (-20) dm tall, with elongate, slender, scaly, pale-to-reddish rhizomes (excavate carefully); leaves usually flat or keeled, 2-5 mm wide; stem usually flattened and scabrous-edged above; ligule a line of short, pale hairs. F. caroliniana
11 Plant a medium-sized perennial to 10 dm tall, rhizomatous, the rhizomes short, thick, and knotty (rarely also with slender rhizomes); leaves usually involute, ca. 1 mm wide; stem usually terete or oval in cross-section, smooth; ligule absent or poorly developed. F. puberula
12 Plant small to medium-sized annual or perennial, the culms to 8 dm tall, neither rhizomatous (except F. breviginata) nor with a hardened base deeply set in the substrate.
13 Spikelets pale, usually solitary (-3) on the scape (and thus appearing somewhat like an Eleocharis). F. schoenoides
14 Spikelets dark, usually in a compact inflorescence. F. tomentosa
15 Face (one side) of the achene with 15 or more longitudinal rows of rounded pits, the achene margin noticeably paler. F. dichotoma
16 Face (one side) of the achene with 13 or fewer longitudinal rows of rectangular pits, the achene margin not noticeably paler.
17 Plant a perennial; leaves spreading, 2-5 mm wide; achenes lacking warts. F. dichotoma
18 Plant a perennial; leaves spreading, 1-4 mm wide; achenes with or without warts. F. annua
19 Achenes with a few low warts on the edges; primary rays of umbel spreading or ascending, the inflorescence generally longer than broad; leaves relatively soft. F. decipiens
20 Achenes lacking warts or with warts scattered over the entire surface; primary rays of umbel spreading or ascending, the inflorescence therefore often as broad as long or broader; leaves relatively hard, broad (averaging 2 mm wide), and spreading subdistichously. F. annua

3. *Fimbristylis annua* (Allioni) Roemer & J.A. Schultes. Wet, disturbed areas, thin soils of rock outcrops; variously interpreted as entirely alien or partly native. July-September. SE. PA, WV, s. IN, s. IL, MO, e. KS, south to n. peninsular FL, s. TX, s. AZ, and south through Mexico to Central and South America; West Indies; Eurasia, Africa, etc. [= C, FNA, G, GW, K, W, Z; F. dichotoma – RAB; F. baldwiniana (J.A. Schultes) Torrey – F, S]

3. *Fimbristylis autumnalis* (Linnaeus) Roemer & J.A. Schultes. Moist to wet disturbed areas. June-October. ME west to MN and SD and south to s. FL and TX; New World tropics. [= RAB, C, FNA, G, GW, K, W, Z; > F. autumnalis var. autumnalis – F, S; > F. autumnalis var. macrorhiza (Michaux) Fernald – F, W; > F. autumnalis var. galdens (Nees) Kunth – s]


3. *Fimbristylis caroliniana* (Lamarck) Fernald. Brackish or alkaline sands of marsh edges and dune swales, less typically in savannas or pine flatwoods. July-September. NJ south to s. FL and west and south to TX and the Yucatan Peninsula; West Indies. This species often grows in proximity to *F. castanea*, which, however, occupies the brackish marsh itself. [= C, FNA, G, GW, K, W, Z; < F. spadicea (Linnaeus) Vahl – RAB; > F. harperi Britton ex Smillie – S]

3. *Fimbristylis castanea* (Michaux) Vahl. Brackish marshes and dune swales. July-September. NY (Long Island) south to s. TX and adjacent Mexico; Yucatan peninsula; West Indies. Replaced in most of the New World tropics by the related *F. spadicea*. [= C, F, FNA, G, GW, K, S, Z; < F. spadicea (Linnaeus) Vahl – RAB]

3. *Fimbristylis decipiens* Kral. Wet, disturbed areas. July-September. E. NC south to n. FL and west to e. TX. [= FNA, GW, K, Z]

* *Fimbristylis dichotoma* (Linnaeus) Vahl. Wet, disturbed areas; presumably introduced, probably native of Asia. July-September. The species is now pantropical and subtropical. [= FNA, GW, K, Z; < F. dichotoma – RAB (also see *F. annua* and *F. tomentosa*); F. diphylla (Retzius) Vahl – S]

* *Fimbristylis littoralis* Gaudichaud. Disturbed wet ground; native of Asia. July-September. Kral (1971) suggests that it may have been introduced into se. United States early, in association with rice. In North America, now ranging from Central America and the West Indies north to NC, KY, and AR. The name *F. miliacea* has been rejected as a nomen ambiguum (Brummitt 2005). [= K; = F. miliacea (Linnaeus) Vahl – RAB, C, FNA, GW, S, W, Z, misapplied?]

* *Fimbristylis perpusilla* R.M. Harper ex Small & Britton, Harper's Fimbry. Drawdown zones of natural depression ponds or exposed banks of blackwater rivers. July-September. The "range" consists of geographically scattered and "irregularly apparent"
populations, usually on the drawdown zones of natural ponds or rivers, in the Coastal Plain from DE and e. MD south through e. VA, se. NC, and ne. SC, to sw. GA, disjunct in the Cumberbland Plateau of se. TN (Wofford & Jones 1988) and KY (Boone & Chester 2009). See Leonard (1981a, 1981b, 1987) for the first reports of the species in SC and NC. The species characteristically occurs on dry to moist banks exposed in summer by falling water levels, often with other diminutive annuals, such as Hemicharpa micrantha, Oldenlandia uniflora, Juncus repens, Lindernia dubia, Eleocharis baldwinii, and Eragrostis hypnoides. At known locations it does not appear every year; presumably it is present in a seedbank which germinates only under favorable hydrologic (and other?) conditions. [= C, FNA, GW, K, S, Z]

_Fimbristylis puberula_ (Michaux) Vahl var. _puberula_. Savannas, pine flatwoods, bogs, wet meadows or prairie-like areas, granite outcrops. July-September. Var. _puberula_ ranges from Long Island, NY south to s. FL and west to TX, KS, and NE; var. _interior_ (Britton) Kral ranges from NE south to TX and west to NM and AZ. [= C, FNA, K, Z; < _F. spadicea_ (Linnaeus) Vahl – GW, W; ? _F. drummondii_ (Torrey & Hooker) Böckler – F; > _F. puberula_ – GW, S; > _F. anomala_ Böckler – S)

* _Fimbristylis schoenoides_ (Retzius) Vahl. Disturbed wetlands; native of Asia. Reported for sw. GA (Jones & Coile 1988) and also occurs in se. GA (B. Sorrie, pers. comm.). Also recently reported for Ocracoke Island, Hyde County (Sorrie & LeBlond 2008). [= FNA, GW, K]

1 Sheaths of leaves glabrous, the largest leaf blades 0-2 (-5) cm long; plant strongly rhizomatous, the culms usually about 10 cm apart. 
2 Blades of culm leaves <5 cm long; spikelets mostly lance-ovoid, sessile in terminal clusters and also often with additional sessile or peduncled clusters lower on the culm; involucral bract longer than the spikelets. _F. pumila_ (Torrey) Sprengel, Dwarf Umbrella-sedge. Depression ponds, savannas, ditches, other wet habitats. July-September. Ranging north to NC, e. TN, and AR. [= FNA, GW, K; < _F. dichotoma_ – RAB]

* _Fimbristylis vahlii_ (Lamarck) Link. On exposed silty or clayey sediments. July. Primarily from MO south to MS and e. TX, but with scattered outliers as far away as NJ, SC (?), IL, and KS; also in western United States, Mexico, Central America. Note that the basis of the SC record is uncertain, and may be based on a misidentification of _F. perpusilla_. [= RAB, C, F, FNA, G, GW, K, S, Z]

_Fuirena_ Rottbøll (Umbrella-sedge)


1 Sheaths of leaves sparsely to densely hirsute, the largest leaf blades 10-15 cm long; plant more-or-less cespitose, annual or perennial, if perennial the rhizomes short and cornlike, the culms usually arising together.
2 Perianth bristles no longer than the achene stipe (not nearly reaching halfway up the achene body), without barbs (sometimes very finely toothed, the teeth ascending); blades of the perianth scales with a blunt or short-apiculate apex. _F. breviseta_ (Coville) Coville, Chapman's Umbrella-sedge. Pond margins. Panhandle FL and sw. GA west to e. TX. Possibly a hybrid derivative of _F. breviseta_ and _F. scirpoidea_. [= FNA, GW, K, S, Z]

_Fuirena breviseta_ (Coville) Coville in R.M. Harper, Short-bristled Umbrella-sedge. July-October. Carolina bays, savannas, ditches, other wet habitats. A Southeastern Coastal Plain endemic: se. VA south to s. FL and west to e. TX, primarily in the outer Coastal Plain. [= C, F, FNA, G, GW, K, S; < _F. squarrosa_ – RAB]

_Fuirena longa_ Chapman, Chapman's Umbrella-sedge. Pond margins. Panhandle FL and sw. GA west to e. TX. Possibly a hybrid derivative of _F. breviseta_ and _F. scirpoidea_. [= FNA, GW, K, S, Z]

_Fuirena pumila_ (Torrey) Sprengel, Dwarf Umbrella-sedge. Depression ponds, savannas, ditches, other wet habitats. July-October. Primarily a species of the Southeastern Coastal Plain, ranging from se. MA south to s. FL and west to TX, and also disjunct in the lowlands around the Great Lakes (as in n. IN and s. MI). [= RAB, C, F, FNA, G, GW, K, Z; = _F. squarrosa_ – S, misapplied]
**Fuirena scirpoidea** Michaux, Southern Umbrella-sedge. Natural lakes, pineland depression ponds, wet savannas. July-October. A Southeastern Coastal Plain endemic: se. GA (Jones & Coile 1988; Carter, Baker, & Morris 2009) and FL, west to se. TX, also in Cuba and apparently disjunct (or introduced?) in ne. NC and s. IL. Kral's (1978a) report of this species from ne. NC, where disjunct from the main body of the range in the deep South, needs further investigation. [= C, FNA, G, GW, K, S, Z]

**Fuirena simplex** Vahl var. *aristulata* (Torrey) Kral. Moist open areas. July-October. MO and NE south to w. KY, e. LA, and c. TX. [= FNA, K, Z; < *F. simplex* – GW]

**Fuirena squarrosa** Michaux, Hairy Umbrella-sedge. Savannas, seepages, streamhead pocosins, ditches, bogs, other wet habitats. July-October. NY (Long Island) south to n. FL, west to c. TX, inland to w. NC, w. TN, KY, s. AR, and se. OK, mainly on the Coastal Plain, but less strictly limited to it than our other species. [= C, F, FNA, G, GW, K, W, Z; < *F. squarrosa* – RAB; = *F. hispida* Elliott – S]

**Isolepis** R. Brown (Club-rush)

A genus of about 60 species, herbs, subcosmopolitan in distribution. Since *Isolepis* is more closely related to *Cyperus* than to *Scirpus*, in which it has often been included, its separation from *Scirpus* is clearly warranted. The generic delimitation of *Isolepis* in relation to *Ficinia* and *Scirpoides* is uncertain. References: Smith in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Achenes 1.0-1.5 mm long; scales in middle of spikelet 1.8-2.0 mm long, with a short awn ................................................................. 1. carinata
1 Achenes 0.7-0.9 mm long; scales in middle of spikelet 1.0-1.2 mm long, mucronate ................................................................. 1. pseudosetacea

**Isolepis carinata** Hooker & Arnott ex Torrey. Moist soils adjacent to granitic flatrocks, seepage areas, ephemeral pools, moist sandy sites, low fields, ditches. May-June. C. NC, TN, and se. KS south to Panhandle FL and c. TX; also in CA. [= FNA, K; = *Scirpus koilolepis* (Steudel) Gleason – RAB, C, F, G, GW, WH; = *S. carinatus* (Hooker & Arnott ex Torrey) A. Gray – S (not *S. carinatus* Sm.); = *I. koilolepis* Steudel]

**Isolepis pseudosetacea** (Daveau) Gandoger. Altamaha grit outcrops, moist soils. E. GA (Carter, Baker, & Morris 2009) west to sw. MO, AR, and c. TX. This species often grows intermixed with *I. carinata* and may be more widespread in our area. [= FNA; ? *Isolepis molesta* (M.C. Johnston) S.G. Smith – K; ? *Scirpus molestus* M.C. Johnston]

**Isolepis setacea** (Linnaeus) R. Brown. On waste and ballast at Camden, NJ and Philadelphia, PA in the 1800s. [= FNA, K] {not keyed or mapped}

**Kyllinga** Rottbøll (Greenhead Sedge)


1 Scale keel winged, laciniate; anthers ca. 2 mm long ................................................................. **K. squamulata**
1 Scale keel smooth or denticulate; anthers 0.2-1.1 mm long.

2 Plant a rhizomatous perennial, mat-forming, the culms arising singly along the rhizome; anthers 0.8-1.1 mm long.  
3 Achenes 1.0-1.2 (-1.3) mm long; scale keel denticulate or smooth; stamen 2 (rarely 1); longest inflorescence bract erect .......... **K. brevifolia**
3 Achenes 1.5-1.8 mm long; scale keel smooth; stamens 2-3; longest inflorescence bract horizontal to slightly reflexed .......... **K. gracillima**

2 Plant a cespitose annual or perennial, the culms arising clumped; anthers 0.2-0.5 mm long.

4 Mature achene purple black, with stipe and apiculus contrasting light in color; achene obovate, 0.7-0.8 (-0.9) mm wide; scale keel denticulate or smooth .............................................................................................................. **K. odorata**
4 Mature achene uniformly tan or light brown, not bicolor; achene oblong, 0.4-0.6 (-0.7) mm wide; scale keel denticulate (very rarely smooth) ................................................................................................................................. **K. pumila**

**Kyllinga gracillima** Miquel, Asiatic Greenhead Sedge. River sand bars, tidal marshes, tidal shores, moist soils of pastures and ditches; apparently introduced and native of e. Asia. See Bryson et al. (1996). *K. gracillima* Miquel (1866) appears to be the oldest valid combination in the genus *Kyllinga*, predating *K. brevifolioides* (Thieret & Delahoussaye) Tucker. Its distribution in North America is still somewhat obscure (because of confusion with *C. brevifolia*), but it is currently known from scattered locations in NC, SC, VA, CT, PA, MD, TN, AL, GA, NJ, DE, AR, MS, and KY. Reported for SC by Hill & Horn (1997), as *K. brevifolioides*.


1 Spikes 2.5-10 (-12) mm long; anther ca. 0.5 mm long; stigmas 3................................................................. *L. maculata*

1 Spikes 2-5 (-8) mm long; anther 0.1-0.25 mm long; stigmas 2.

2 Culms 7-35 cm long; longest involucral bract spreading to reflexed; achenes 3.5-5× as long as wide........................................ *L. microcephala*

2 Culms 1-20 cm long; longest involucral bract more or less erect; achenes 1.5-2.5× as long as wide.

3 Scales about as long as the achene, with long awns.............................. *L. aristulata*

3 Scales reduced, shorter than the achene, awnless........................................ *L. micrantha*

**Lipocarpha R. Brown**


**Oxycaryum Nees**

**Cyperaceae**

*Rhyzchospora* Vahl 1805 (Beaksedge, Beakrush)

(by Richard J. LeBlond)


**Identification notes:** Measurements and descriptions of the achene are of the achene body only, not including the tubercle, unless otherwise indicated.

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### Key to groups

1. Spikelets 2-4 mm long, borne several to many in clusters, none of the spikelets on slender stalks; achene 1.3-2.2 mm long, 0.9-1.7 mm wide

   2. Inflorescence bracts several, foliaceous, basally bright white, reflexed to horizontally spreading; [subgenus Diplstylae; section Polycestae, section Longirostres and Polycephalae]

   3. Spikelets in 1-4 globose clusters; tubercle 3-5 mm long; leaf blades 2-8 mm wide; [section Polycestae] ................................................................. R. tracyi

   4. Spikelets in > 4 paniculate or corymbose clusters; tuberol 10-23 mm long; leaf blades 6-20 mm wide; [section Longirostres].

   2. Longest bristles shorter than the achene.

   3. Achene 5.0-6.0 mm long, 2.8-3.3 mm wide ................................................................. R. corniculata var. corniculata

   4. Achene 4.5-5.3 mm long, 2.4-2.8 mm wide ................................................................. R. corniculata var. interior

   5. Longest bristles longer than or equaling the achene.

   4. Plants cespitose; primary clusters with 10-50 (rarely 7 or fewer) densely clustered spikelets; achene (4.5- 5-6 mm long ................. R. macrostachya

   5. Plants rhizomatous; primary clusters with 1-6 loosely clustered spikelets; achene (3.5-) 4.0-4.8 mm long.

   6. Bristles 2-8 mm long, the central bristle longest on one face, shortest or absent on the other........................................ R. careyana

   7. Bristles 7-12 mm long, essentially of equal length.................................................. R. inundata

### Key B - beaksedges with basally-white bracts (White-bracted Sedges) [subgenus Diplstylae; section Diplostylae; section Dichromena]

1. Inflorescence bracts 3-6 (-7); basal bract (1.4-) 2-5 mm wide, the white portion (2.5-) 9-25 mm long, tapering gradually into the green portion; rhizomes slender, straight, (0.6-) 0.7-1.7 (-2.1) mm in diameter; achene 1.0-1.2 mm wide; tubercle broadly truncate on achene........... R. colorata

   1. Spikelets 2-10 mm long, borne several to many in clusters, none of the spikelets on slender stalks; achene 1.3-2.2 mm long, 0.9-1.7 mm wide

   2. Leaves 2-4 mm wide, slightly involute (V-shaped in ×-section); achene 2.0-2.2 mm long; [FL only] ........................................ R. pinetica

   3. Leaves 0.8-1.5 mm wide, strongly involute (and often appearing superficially terete); achene 1.3-1.8 mm long; [more widespread] ............ R. plumosa
Key D - beaksedges with bristles retrorsely barbed (at least distally) or antrorsely barbed and straplike (flattened) [subgenus Diplistylole; section Albae]

1 Bristles 8-25, retrorsely barbed distally, antrorsely barbed proximally; spikelets white, turning tan with age.  
2 Spikelets with 2-3 florets; bristles 6-12; achene 1.6-2.1 mm long, 0.9-1.3 mm wide. ............................................................... R. alba
3 Spikelets 1-fruited, the solitary achene terminating the axis; clusters 1-7, globose to turbinate.  
4 Clusters globose to turbinate; achene (measured from base of bristles) 1.3-1.8 mm long, 0.65-0.95 mm wide; tubercle 0.7-1.6 mm long.  
5 Clusters turbinate to hemispheric (rarely subglobose), the lowest spikelets usually spreading-ascending to spreading; larger leaves < 2 mm wide; achene 1.6-1.8 mm long; tubule 1.0-1.6 mm long. ................................................................. R. chalarocephala
6 Clusters globose to subhemispheric, the lowest spikelets usually reflexed; larger leaves > 2 mm wide; achene 1.3-1.6 mm long; tubercle 0.7-1.2 mm long. ................................................................. R. microcephala
7 Clusters globose to hemispherical; achene (measured from base of bristles) 1.8-2.6 mm long, 1.1-1.8 mm wide; tubercle 1.4-2.4 mm long.  
8 Achene 1.1-1.2 mm wide, 1.8 mm long. ........................................................................ R. cephalantha var. attenuata
9 Achene 1.2-1.8 mm wide, 2.1-2.6 mm long. ........................................................................ R. cephalantha var. cephalantha

Key E - beaksedges with bristles smooth, or antrorsely barbed and filiform, or absent, the achene surface smooth, minutely pitted, or finely striate  [subgenus Diplistylole; sections Chapmaniae, Fasciculares, and Fuscae]

1 Bristles 12; [section Fasciculares] ...................................................................................... R. baldwinii
2 Bristles 6 or fewer.  
3 Leaves with a short taper at the tip, blunt to acute, but not long-acuminate; achene surface minutely pitted near the margin; [section Chapmaniae].  
4 Basal leaves 4-6 mm wide, ciliate, rosulate; scales acuminate, the midrib ciliate; bristles 6, < ½ the length of the achene ........ R. ciliaris
5 Largest basal leaves 2.5-3 mm wide, ciliate, not rosulate; scales aristate, the midrib eciliate; bristles 3-4, 1 or more equaling or exceeding the tubercle ........................................................................ R. solitaria
6 Leaves long-acuminate at the tip; achene surface smooth or finely striate.  
7 Bristles absent or 1-3 rudimentary; scales white to pale tan (or pale reddish-brown in R. brachychaeta); [section Chapmaniae].  
8 Inflorescence composed of (1-) 2-3 tubinate to ellipsoid clusters; spikelets pale reddish-brown, (2.7-) 3-3.5 mm long; achenes usually 2 per spikelet. ........................................................................................... R. brachychaeta
9 Inflorescence composed of 1 (-2) hemisphaerically to broadly turbinate cluster(s); spikelets white to pale brown, either 2-2.5 (-3) mm or (3.5-) 4-5.5 mm long; achenes 1 per spikelet.  
10 Base of plant not bulb-like, not enclosed in bladeless sheaths; spikelets 2-2.5 (-3) mm long; achene 1.0-1.2 mm long, 0.8-1.0 mm wide ................................................................. R. chapmanii
11 Base of plant bulb-like, enclosed in bladeless sheaths; spikelets (3.5-) 4-5.5 mm long; achene 1.4-1.8 mm long, 1.2-1.5 mm wide ................................................................. R. pallida

4 Bristles present (if rudimentary, then 4-6); scales tan, rufous, or brown.  
5 Achene 0.6-1.1 mm wide, pyriform, obovoid, or narrowly elliptic, pale to dark brown but not blackish; tubercle margin setose (smooth in R. species 1).  
6 Inflorescence of 1 (-2) hemisphaerically to broadly turbinate cluster(s); spikelets white to pale brown, either 2-2.5 (-3) mm or (3.5-) 4-5.5 mm long; achenes 1 per spikelet.  
7 Achene narrowly elliptic or narrowly obovoid, 1.2-1.5 mm long by 0.6-0.7 mm wide, twice as long as wide; tubercle 0.8-1.2 mm long. ........................................................................................... R. curtissii
8 Achene broadly elliptic to obovoid or pyriform, < 2½ as long as wide; tubercle 0.4-1.5 mm long.  
9 Leaves 2-4 (-5) mm wide; stipe subtending achene 0.5-1.0 mm long ................................................................. R. crinitiss
10 Leaves 0.2-1.5 (-2) mm wide; stipe subtending achene < 0.4 mm long.  
11 Leaves to 1.5 (-2) mm wide; achene 1.0-1.7 mm long, 0.9-1.1 mm wide; tubercle 0.5-1.5 mm long.  
12 Culms solitary to loosely cespitose by slender rhizomes; terminal internode straight; clusters turbinate to ovoid; achene 1.0-1.3 mm long, uniformly medium to dark brown; tubercle 0.7-1.5 mm long; bristles usually of two lengths, some equaling the tubercle, and some equaling or shorter than the achene. ................................................................. R. fusca
13 Culms solitary to cespitose, without slender rhizomes; terminal internode often arched; clusters corymbose to hemispheric; achene 1.3-1.7 mm long, pale to reddish-brown, often translucent centrally, with a distinctly thickened wire-like margin; tubercle 0.5-1.0 mm long; all bristles more-or-less equaling the tubercle ................................................ R. harperi
11 Leaves filiform, <1 mm wide; achene 0.8-1.3 mm long, 0.6-0.9 mm wide; tubercle 0.4-0.8 mm long.
13 Culms without rhizomes; spikelets 2.5-4 mm long; achene translucent centrally; tubercle 0.4-0.6 mm long...R. filifolia
13 Culms with delicate rhizomes; spikelets 5-7 mm long; achene uniformly opaque; tubercle 0.6-0.8 mm long......R. pleiantha
6 Achene > 1 mm wide (except 0.8 mm wide in R. fernaldii with a blackish surface), suborbicular or broadly ellipsoid; tubercle margin smooth or roughened but not setose; [section Fasciculares].
14 Achene 0.8 mm wide, 0.9-1.0 mm long, blackish..................................................R. fernaldii
14 Achene 1.1-1.7 mm wide, 1.3-2.0 mm long, brown to dark brown.
15 Tubercle 1.0-2.6 mm long, long-attenuate to subulate..............................................R. gracilenta
15 Tubercle 0.2-0.8 mm long, triangular to triangular-attenuate or with a strap-like beak.
16 Bristles rudimentary to ½ as long as the achene body.
17 Larger leaves to 4.5 mm long; floral fascicles 1-2; tubercle 0.2-0.5 mm long......R. debilis
17 Larger leaves 2-4 mm wide; mature culms to 13 dm long; floral fascicles (1-2) 2-4; tubercle 0.4-0.7 mm long..............R. fascicularis
6 Bristles > ½ as long to exceeding the achene body.
18 Basal leaves filiform to (rarely) 1.3 mm wide, the longer approaching length of culm; tubecele narrowed above the base into a strap-like beak.................................................................R. wrightiana
18 Basal leaves 1.3-4 mm wide, all much shorter than the culm; tubecele triangular to triangular-attenuate.
19 Longer bristles equaling to exceeding the achene body; achene body elliptic, 1.1-1.3 mm wide; tubecele triangular-attenuate; larger basal leaves 1.3-2.5 mm wide....................................................R. distans
19 Longer bristles < ½ as long to rarely exceeding achene body; achene suborbicular, 1.2-1.5 mm wide; tubecele triangular; larger basal leaves 2-4 mm wide..............................................................R. fascicularis

Key F – beaksedges with bristles smooth, or antrorsely barbed and filiform, or absent,
the achene surface transversely ridged, rugose, or honeycombed-reticulate
[subgenus Diplolystylae; sections Globulares, Harveyae, Mixtae, Psilocarya, Pusillae, Rariflorae]

1 Brusters absent (or apparently so at 10x); achene 0.5-0.7 mm wide; tubecele 0.1-0.2 mm long, skull-cap like; [section Pusillae].
2 Achene including tubecele 1.0-1.2 mm long, the achene surface evidently reticulate and obscurely transversely ridged, the body ellipsoid;
bristers present, white, barely visible at 20x, the longest shorter than the achene body ........................................R. thorpei
2 Achene including tubecele 0.6-0.9 mm long, the body obovoid; bristers absent.
3 Achene surface smooth, faintly reticulate, not transversely ridged...............................................................R. divergens
3 Achene surface rough, distinctly transversely ridge..........................................................R. pusilla
1 Bristers present or absent; if absent, then the achene > 1 mm long or > 0.7 mm wide, and tubecele triangular to subulate.
4 Culms and leaves filiform.
5 Achene including tubecele 1.0-1.2 mm long; tubecele minute, skull-cap-like; [section Pusillae]............................R. thorpei
5 Achene including tubecele 1.5-2.9 mm long; tubecele triangular to triangular-acuminate; [section Rariflorae].
6 Brusters subequaling to exceeding the tubecele; tubecele 0.75-1.4 mm long.........................................................R. stenophylla
6 Brusters shorter than the achene body; tubecele 0.3-1.0 mm long.
7 Achene 1.3-1.6 mm long, 0.9-1.4 mm wide; tubecele 0.3-0.6 (-0.75) mm long; bristers 1-3/2/4-5/ as long as achene body...........R. rariflora
7 Achene 1.6-1.8 mm long, 1.35-1.5 mm wide; tubecele 0.6-1.0 mm long; bristers 2/3 to nearly as long as achene body.............R. species 2
4 Culms stouter; leaves wider, not filiform.
8 Achene faces flat or concave; when one face is concave, the opposite face is sometimes slightly convex (slightly biconvex R. decurrens
and R. microcarpa are keyed here for convenience).
9 Achene at least twice as long as wide, elliptic-oblong; tubecele subulate, 0.8-1.2 mm long; [section Mixtae]..............R. inexpansa
9 Achene < twice as long as wide, obovate; tubecele triangular, 0.2-0.9 mm long.
10 Longer bristers exceeding the achene body.
11 Achene ±2.2 mm long, ±1.8 mm wide; tubecele ±0.9 mm long; [section Globulares].............................................R. punctata
11 Achene 0.8-1.2 mm long, 0.7-1.2 mm wide; tubecele 0.2-0.5 mm long; [section Mixtae].
12 Larger leaves (3-) 4-6 mm wide; bristers exceeding tubecele; achene faces flattened..............................R. elliottii
12 Larger leaves 1-3 (-4) mm wide, bristers half as long as achene to equaling tubecele; achene faces slightly convex........R. microcarpa
10 Longer bristers shorter than to equaling achene body, or absent.
13 Larger leaves 4-5 mm wide; achene 1.4-1.6 mm wide; tubecele 0.6-0.8 mm long, abruptly rising from a flaring basal collar;
[section Globulares]..................................................................................................................R. compressa
13 Larger leaves 1-3 (-4) mm wide; achene 0.7-1.3 mm wide; tubecele 0.15-0.5 mm long, without a flaring basal collar; [section Mixtae].
14 Bristers rudimentary or absent..........................................................R. perplexa
14 Bristers one-half as long to equaling achene.
15 Achene 1.3-1.8 mm long, 0.9-1.2 mm wide, the faces flat with 10-12 transverse ridges.................................R. torreyana
15 Achene 0.8-1.4 mm long, 0.7-1.2 mm wide, the faces slightly biconvex with 6-12 transverse ridges.
16 Clusters elongate; achene 1.0-1.4 mm long, 0.8-1.0 mm wide, narrowly obovate to elliptic, averaging 8-12 transverse
ridges; most tubercle bases convexly seated on the achene summit and somewhat decurrent along the achene margins,
the tubercle surface often whitish-waxy........................................R. decurrens
16 Clusters usually compact; achene 0.8-1.2 mm long, 0.7-1.2 mm wide, suborbicular to elliptic, averaging 6-7 transverse
ridges; most tubercle bases flat across the achene summit, not decurrent, the tubercle surface usually dark, not waxy......R. microcarpa

8 Achenes biconvex or tumid.
17 Achene 1.4-4.2 mm long, 1.2-3.6 mm wide, the summit with a thickened bony to crustaceous rim surrounding the base of the
tubecele; [section Harveyae].
18 Achene lenticular and transversely ridge, ±1.4 mm long, ±1.2 mm wide

19 Leaves 4-8 mm wide; achene 3.0-4.2 mm long, 3.0-3.6 mm wide

19 Leaves 2-4 mm wide; achene < 2.7 mm long and < 2.5 mm wide

20 Achene 2.0-2.7 mm long, 2.0-2.5 mm wide

20 Achene 1.5-1.8 mm long, 1.4-1.7 mm wide

17 Achene 0.7-1.8 mm long, 0.7-1.5 mm wide, the summit without a textured rim surrounding the base of the tubercle (if the base of the tubercle is rim-like, then it is distinguished from the summit of the achene by a constriction or articulation).

21 Bristles absent; achene 0.7-1.0 mm long; [section Psilocarya].

22 Scales broadly ovate, obtuse to sub-acute; achene strongly transversely ridged; tubercle depressed, broader than long; style not persistent

22 Scales lance-ovate, acute; achene weakly transversely ridged; tubercle triangular-lanceolate, as long as broad or longer; style usually persistent

21 Bristles present (occasionally detached in R. decurrens and R. milacea with achenes 1.0-1.4 mm long).

21 Bristles not exceeding the achene body.

24 Cluster branches flexuose; bristles one-half as long as the equaling the achene (or longer in R. microcarpa); achene slightly biconvex, 0.8-1.4 mm long, 0.7-1.0 (-1.2) mm wide; [section Mixtue].

25 Clusters elongate; achene narrowly obovate to elliptic, averaging 8-12 transversed ridges; most tubercle bases convexly seated on the achene summit and somewhat decurrent along the achene margins, the tubercle surface often whitish-waxy.

25 Clusters usually compact; achene suborbicular to elliptic, averaging 6-7 transversive ridges; most tubercle bases flat across the achene summit, not decurrent, the tubercle surface usually dark, not waxy

21 Bristles exceeding the achene body.

24 Cluster branches stiff; bristles ⅔ or less as long as the equaling the achene (or longer in R. microcarpa); achene slightly biconvex, 1.0-1.6 mm wide; tubercle conical-attenuate, the edges somewhat concave; [section Globulares].

26 Larger culm leaves to 5 mm wide; achenes (1.2-)avg. 1.45 (-1.85) mm long, (1.1-) avg. 1.4 (-1.75) mm wide; achene surface alveoli longitudinally narrow; tubercle 0.3-0.7 mm long, base 0.6-1.0 mm wide

26 Larger culm leaves to 3 mm wide; achenes (1.0-)avg. 1.3 (-1.5) mm long and wide; if achene surface alveoli longitudinally narrow, then tubercle 0.2-0.4 mm long and base 0.5-0.7 mm wide (R. globularis).

27 Longer bristles ⅔-⅓× the length of the achene; achene surface alveoli longitudinally narrow (typically 0.02-0.05 mm wide between the longitudinal walls), the latitudinal walls raised into horizontal ridges; tubercle 0.2-0.4 mm long, the base 0.5-0.7 mm wide

27 Longer bristles ½-⅓× the length of the achene; achene surface alveoli nearly as wide as long (typically 0.05-0.1 mm wide between the longitudinal walls); the latitudinal walls obscurely or not at all raised into horizontal ridges; tubercle 0.35-0.7 mm long, the base 0.7-0.9 mm wide

28 Primary branches of the inflorescence spreading at right angles from the culm, each spikelet or small cluster on slender spreading or reflexed stalks; [section Mixtue].

29 Spikelets 6-9 mm long; [section Mixtue]

29 Spikelets < 5 mm long.

30 Tubercle 0.4-0.8 mm long, the edges setose or uneven with waxy or crusty irregular protuberances; [section Mixtue].

31 Achene obovate to suborbicular, 1.2-1.6 mm wide, latitudinal alveoli walls strongly raised into transverse ridges

31 Achene slenderly obovoid, 0.8-1.0 mm wide, latitudinal alveoli walls weakly or not at all raised into transverse ridges

30 Tubercle 0.2-0.5 mm long, the edges smooth.

32 Spikelets 3.5-4 mm long; bristles exceeding the tubercle; achene 1.3-1.5 mm long, 1.2-1.3 mm wide; [section Globulares]

32 Spikelets 2.5-3 mm long; longer bristles about equaling the tubercle; achene 0.8-1.2 mm long, 0.7-1.2 mm wide; [section Mixtue].

33 Inflorescence occupying the upper ⅓-⅔ of the culm, the lowest 2-4 nodes barren

33 Inflorescence occupying ⅔-⅔ of the length of the culm, the lowest pair of nodes above the base

Rynchospora alba (Linnaeus) Vahl, Northern White Beaksedge. Mountain bogs and fens, peaty situations in the Coastal Plain, such as low pocosins in peat domes or large Carolina bays, and floating peat mats in limesink (doline) ponds and bay lakes, possibly also in seepage bogs with abundant Sphagnum, generally occurring in the most open, harshest, and peatiest areas. July-October. Circumboreal, in North America from NL (Labrador) west to AK, south to SC, TN, IL, SK, ID, and CA; disjunct in se. GA (Charlton Co., at the Okefenokee Swamp) (Williges & Loftin 1995), s. AL (Escambia Co.; specimen at CLEMS), and the mountains of Puerto Rico. [= C, F, FNA, G, GW, K, RAB, W, WV, Y, Z = Rynchospora alba – S]

Rynchospora baldwinii A. Gray, Baldwin's Beaksedge. Wet savannas, seepages. July-August. Se. NC south to s. FL and west to LA. [= C, FNA, K, GW, RAB, WH, Y, Z = Rynchospora baldwinii – S]

Rynchospora brachychaeta C. Wright. Cypress ponds, other depressions. E. SC south to Panhandle FL and s. AL and s. MS; Cuba. Reported for SC (McMillan 2007). Kral in FNA considers this species possibly adventive, but McMillan (2007) provides good reasons for considering it native in our area. [= FNA, K, Y, Z = Rynchospora brachychaeta – S] [not yet keyed]

Rynchospora caduca Elliott, Angle-stem Beaksedge. Savannas, hardwood swamps, other wet areas. July-September. E. and c. VA south to s. FL and west to TX, OK, and AR, north in the interior to sc. TN. This species is found at a few sites in the mountains of GA. See notes under R. milacea. [= C, F, FNA, G, GW, K, RAB, W, WH, Y, Z = Rynchospora caduca – S; > Rynchospora pattula A. Gray – S]

Rynchospora capillacea Torrey. Calcareous wetlands. NL (Newfoundland) west to SK, south to sw. VA, ne. TN, and n. AR. [= C, F, FNA, G, K, Y, Z]
Rhynchospora capitellata (Michaux) Vahl, Brownish Beaksedge. Bogs and fens, seepages, and wet rock outcrops in the Mountains and upper Piedmont, also in wet habitats in the Coastal Plain of ne. NC and e. VA. July-September. Widespread in e. North America, south to ne. GA. The only common beaksedge in the Mountains of our area. A somewhat similar species, R. knieskernii, occurs north of our area, but should be looked for here; they are discussed at the end of this genus. Sorrie (2000) has clarified the relationships and distinctions of this taxon with R. leptocarpa. [= C, F, G, W, WV, Y; < R. capitellata – FNA, GW, K, RAB, Z; = Rhynchospora capitellata – S]

Rhynchospora careyana Fernald, Carey's Horned Beaksedge. Limesink (doline) depression ponds and in intermittently flooded depression meadows. July-September. Apparently ranging from se. NC south to FL, but the range poorly known because of confusion with R. inundata, from which it is perhaps not specifically distinct. [= FNA, K, Y; < R. inundata – RAB, WH; < R. corniculata – GW (listed in synonymy under R. corniculata in GW, but would actually key to R. inundata); = Rhynchospora careyana – S]

Rhynchospora cephalantha A. Gray var. attenuata Gale, Small Bunched Beaksedge. Savannas, sandhill seeps, openings in streamhead pocosins. July-October. The range of this variety is poorly known; is reported by Z from NC, SC, AL, and MS. Recent collections from MD and VA extend the range. See discussion in Sorrie et al. (1997). [= Y; < R. cephalantha – C, FNA, GW, K, RAB; = Rhynchospora axillaris – S]

Rhynchospora cephalantha A. Gray var. cephalantha, Common Bunched Beaksedge. Savannas. July-October. S. NJ south to s. FL and west to LA. Often weedy, this species occurs commonly along wet roadsides, powerline corridors, and the like. [= Y; < R. cephalantha – C, FNA, GW, K, RAB, WH; > R. cephalantha var. cephalantha – F, G, Z; > R. cephalantha var. pleiocephala Fernald & Gale – F, G, Z; = Rhynchospora axillaris (Lamarck) Britton – S]


Rhynchospora chapmanii M.A. Curtis, Chapman's Beaksedge. Savannas, seepage bogs, sandy margins of limesink (doline) ponds, and other wet, acid habitats. July-September. Se. NC south to s. FL and west to e. LA; Belize, Nicaragua. [= FNA, GW, K, RAB, WH, Y, Z; = Rhynchospora chapmanii – S]

Rhynchospora ciliaris (Michaux) C. Mohr, Fringed Beaksedge. Savannas, sandhill seeps. July-September. Se. NC south to s. FL and west to LA. [= FNA, GW, K, RAB, WH, Y, Z; = Rhynchospora ciliaris – S]

Rhynchospora colorata (Linnaeus) H. Pfeiffer, Narrowleaf Whitetop Sedge. Wet savannas, ditches, dune swales. May-September. Primarily a Southeastern Coastal Plain endemic: se. VA south to FL and west to TX; Mexico (Tabasco, Chiapas, Yucatán), West Indies, Belize, Guatemala, Costa Rica, Venezuela. [= C, FNA, K, WH, Y; = Dichromena colorata (Linnaeus) H. Pfeiffer – F, G, GW, RAB, S]

Rhynchospora compressa Carey ex Chapman. Savannas. S. SC south to Panhandle FL, west to e. LA. This species was reported for SC (Kartesz 1999), based on the South Carolina Plant Atlas (http://cricket.biol.sc.edu/herb); McMillan (pers. comm.) states that the record is in error, based on a misidentified specimen. The species occurs in sc. GA (Jones & Coile 1988) and has since been found in SC by McMillan (2003). [= FNA, GW, K, WH, Y, Z; = Rhynchospora compressa – S]

Rhynchospora corniculata (Lamarck) A. Gray var. corniculata, Short-bristle Horned Beaksedge. Pondcypress savannas in Carolina bays, swamp forests, other wetlands. July-September. Var. corniculata ranges from DE south to FL and west to LA, extending north into KY and MO; also in the West Indies. Var. interior, possibly not worth recognition, is distinguished by a shorter and narrower achene, the summit barely broader than the base of the tubercle, and occurs in the Mississippi drainage. [= C, F, G; < R. corniculata (Lamarck) A. Gray – FNA, GW, K, RAB, WH, Y; < Rhynchospora corniculata – S]

Rhynchospora crinipes Gale, Alabama Beaksedge. Sand-clay bars and peaty stream banks of blackwater streams. July-September. Sc. NC (Sorrie et al. 1997) through sc. GA to FL Panhandle, west to s. AL; very scattered in occurrence. This very rare species is related to R. filifolia, but is a coarser plant, readily distinguishable by characters of the achene, culm, and leaves. Anderson (1988) discusses its systematics, habitat, and rarity. [= FNA, GW, K, WH, Y, Z]

Rhynchospora curtissii Britton. Pine flatwoods and bogs. An East Gulf Coastal Plain endemic, in Panhandle FL, AL, and s. MS (Sorrie & Leonard 1999); also reported from SC by Kral (1996) and for NC and SC by Kartesz (1999), but specimens so annotated are misidentified. [= FNA, GW, K, WH, Y, Z; = Rhynchospora smallii – S]

Rhynchospora debilis Gale, Savanna Beaksedge. Savannas, sandhill seeps. July-September. Se. VA south to n. peninsular FL and west to se. TX (Brown & Marcus 1998). Like a small version of R. fascicularis, often with several ascending, cespitose culms, each terminated by a single glomerule. [= C, F, FNA, GW, K, RAB, WH, Y, Z]

Rhynchospora decurrens Chapman, Swamp-forest Beaksedge. Swamp forests and river marshes, especially along blackwater rivers. July-August. Se. NC south to c. peninsular FL and west to s. MS (Sorrie & Leonard 1999). [= FNA, GW, K, RAB, WH, Y, Z; = Rhynchospora decurrens – S]

Rhynchospora distans (Michaux) Vahl. Savannas and limesink ponds. June-September. Se. VA south to s. FL and west to s. MS (Sorrie & Leonard 1999); West Indies. Appearing to merge with R. wrightiana on the outer Coastal Plain of NC. [= Y; = Rhynchospora fascicularis (Michaux) Vahl var. distans (Michaux) Chapman – F, K, Z; < R. fascicularis – FNA, G, GW, RAB, WH; = Rhynchospora distans – S]

Rhynchospora divergens Chapman ex M.A. Curtis, White-seeded Beaksedge. Wet savannas, especially in exposed sands. May-September. Se. NC south to s. FL and west to se. TX; Bahamas, Mexico (Chiapas), Belize. R. divergens, R. pusilla, and R. thornei are all small, grass-like plants, very similar in appearance to one another. [= FNA, GW, K, RAB, WH, Y; = Rhynchospora divergens – S]

Rhynchospora elliottii A. Dietrich, Elliott's Beaksedge. Savannas, ditches, other wet habitats, often weedy. July-September. Se. NC south to c. peninsular FL and west to e. TX. The achenes are typically flat or concave on one face, and flat or slightly convex on the other. See note under R. microcarpa. [= FNA, GW, K, WH, Y; = R. schoenoides (Elliott) Wood – RAB, Z; = Rhynchospora schoenoides – S]

Rhynchospora fascicularis (Michaux) Vahl, Fascicled Beaksedge. Savannas, limesink ponds, ditches. June-September. Se. VA south to s. FL and west to se. TX; West Indies. [= Y; = Rhynchospora fascicularis (Michaux) Vahl var. fascicularis – F, K, Z; < R. fascicularis – FNA, G, GW, RAB, WH; = Rhynchospora fascicularis – S]

Rhynchospora fernaldii Gale, Fernald’s Beaksedge. Pine flatwoods. S. GA south to s. FL, west to s. MS. [= FNA, GW, K, WH, Y, Z]

Rhynchospora filifolia A. Gray, Threadleaf Beaksedge. Sandy shores of limesink (doline) depressions, especially at the lower margin, savannas. July-September. S. NJ south to c. FL and west to e. TX; Cuba, Mexico (Tabasco), Belize, Nicaragua. [= C, F, FNA, G, K, RAB, WH, Y, Z; < R. filifolia – GW; = Rhynchospora filifolia – S]


Rhynchospora galeana Naezi, W. Knapp, & Gerry Moore, Short-bristle Beaksedge. Wet savannas. July-September. Se. NC south to s. FL and west to s. MS; West Indies. This species will colonize disturbances (roadsides, powerline corridors), but not aggressively. The leaf tips of R. galeana are acute and minutely serrulate, while those of the closely related R. oligantha are blunt and smooth; these characters are, however, often difficult to determine. See Naezi, Knapp, and Moore (2010) for discussion of the need to replace the name R. breviseta because of an earlier-named Asian species. [= R. breviseta (Gale) Channell – FNA, GW, K, RAB, WH, Y (later homonym); < R. oligantha – F; < Rynchospora oligantha – S; = R. oligantha A. Gray var. breviseta Gale – Z]

Rhynchospora globularis (Chapman) Small, Globe Beaksedge. Sandy or peaty depressions, wet ditches, powerline corridors, savannas. June-September. Apparently ranges from DE south to s. FL and west to c. TX and OK; north in the interior to nc. TN; also allegedly in n. CA. Both R. globularis and R. pinetorum tend to produce shorter plants with smaller glomerules than R. recognita. Occasional achenes of R. globularis exhibit the wide alveoli of R. pinetorum near the base or summit, with little or no horizontal ridging, but centrally have narrow alveoli with pronounced horizontal ridges. The opposite condition occasionally occurs in R. pinetorum achenes, with narrow alveoli and horizontal ridging basally or at the summit, but wide alveoli and little or no ridging centrally. [= Y; < R. globularis – RAB, W; = C, F, FNA, G, K, WH, Z; < R. globularis var. globularis – GW; = Rynchospora globularis – S]
Rhynchospora glomerata (Linnaeus) Vahl var. glomerata. Clustered Beaksedge. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): savannas, bogs, other wet habitats; common (in Piedmont, rare in DE). July-September. Var. glomerata ranges from s. NJ south to ne. FL, FL Panhandle, and west to e. TX, and inland in KY, TN, AR, and KS. Var. angusta Gale occurs in AR, LA, and e. TX. It is distinguished primarily by a narrower and longer gynophore. [= Y, Z; < R. glomerata – C, F, FNA, G, GW, K, RAB, W, WH; < Rhynchospora glomerata – S]

Rhynchospora gracilenta A. Gray, Slender Beaksedge. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): savannas, bogs; uncommon (rare in Piedmont and Mountains). July-September. NJ south to ne. FL, FL Panhandle, and west to e. TX, north in the inland to nc. TN and AR; Cuba, Mexico (Chiapas), Belize, Nicaragua. [= C, F, FNA, G, GW, K, RAB, W, WH, Y, Z; = Rhynchospora gracilenta – S]


Rhynchospora harperi Small, Harper's Beaksedge. Cp (DE, FL, GA, NC, SC): peaty limesink depression ponds (dolines), from standing water to the upper margins of the pond-shore; rare. July-September. Se. NC south to sc. peninsular FL and west to s. AL and s. MS (Sorrie & Leonard 1999); disjunct in DE and MD; disjunct in Belize. See Nelson (1993) for first SC record, and LeBlond (1997) for additional information on the species, especially its distribution. [= FNA, K, WH, Y, Z; < R. filifolia – GW; = Rhynchospora harperi – S]

Rhynchospora harveyi W. Booth, Harvey’s Beaksedge. Cp (FL, GA, NC, SC, VA), Mt (GA, NC), Pd (NC): savannas in the Coastal Plain, seepage bogs in the Sandhills, bogs in the Mountains and Piedmont; rare. July-August. Se. VA south to ne. FL, FL Panhandle, and west to TX and OK, and north in the interior to nc. TN and MO. [= C, F, G, GW, K, RAB, W, Y, Z; = R. harveyi var. harveyi – FNA; = Rhynchospora harveyi – S; < R. harveyi – WH]

Rhynchospora indianolensis Small. Cp (AL): roadside ditches; rare. Coastal Plain of TX; recently also found in s. AL. Kral in FNA mentions that R. indianolensis may be conspecific with the Cuban R. scutellata. [= FNA; = Rhynchospora indianolensis; < R. scutellata Grisebach] [add to synonymy; not yet keyed]

Rhynchospora inexpansa (Michaux) Vahl, Nodding Beaksedge. Wet savannas, streamhead pocosins where frequently burned, usually in peaty situations, often weedy, colonizing disturbances. July-September. Se. VA south to ne. FL, FL Panhandle, and west to e. TX and AR; West Indies. [= C, F, FNA, G, GW, K, RAB, WH, Y, Z; = Rhynchospora inexpansa – S]

Rhynchospora inundata (Oakes) Fernald, Narrow-fruit Horned Beaksedge. In water of limesink dolines and clay-based Carolina bays; usually found in shallow water or at the lower margins of pond-shores, typically producing large colonies. July-September. Apparently ranging from e. MA south to s. FL and west to e. TX (the range, however, obscured by confusion with R. careyana) (Singhurst, Mink, & Holmes 2010). The relation of this species to R. careyana and to more northern entities of R. inundata remain unresolved. [= C, F, FNA, G, GW, K, RAB, WH; = Rhynchospora inundata – S]

Rhynchospora knieskernii Carey. Pinelands. Moist sandy/peaty swales. Endemic in NJ and DE. It has been reported, in error, from SC. [= C, F, FNA, G, K, Y, Z]

Rhynchospora latifolia (Baldwin ex Elliott) W.W. Thomas, Broadleaf Whitetop Sedge. Wet savannas. May-September. A Southeastern Coastal Plain endemic: se. NC south to s. FL and west to se. TX; disjunct in sc. TN (Coffee County). [= FNA, K, Y; = Dichromena latifolia Baldwin ex Elliott – GW, RAB, S]

Rhynchospora leptocarpa (Chapman ex Britton) Small. Seepage bogs, pocosins, especially in openings. E. NC south to ne. FL, Panhandle FL, west to se. LA. In the Coastal Plain. It appears that R. leptocarpa is a valid species, a southeastern Coastal Plain relative of the more northern and montane R. capitellata (Sorrie 2000). Its occurrence in NC is reported by Sorrie et al. (1997). (= WH, Y; < R. capitellata – FNA, GW, K, RAB, WH, = Rhynchospora leptocarpa – S)

Rhynchospora macra (C.B. Clarke) Small, Southern White Beaksedge. Sphagnum bogs in frequently-burned streamhead pocosins, and in sandhill seepage bogs. July-September. Sc. NC south to ne. FL, FL Panhandle, and west to se. TX; Nicaragua, Puerto Rico. R. macra is a robust southern relative of R. alba. Like R. alba and R. pallida, it has scales which are at first bright white, “fading” in age to a medium tan or light brown. These three species are thus superficially most distinctive (from other Rhynchospora) in June, July, and August. The occurrence of this species in NC and SC is discussed by Sorrie et al. (1997). [= FNA, GW, K, WH, Y, Z; = Rhynchospora macra – S]
Rynchospora macrostachya Torrey ex A. Gray, Tall Horned Beaksedge. Marshes, swamps, upland depression ponds, other wetlands. July-September. E. MA south to ne. FL and west to e. TX, north in the interior to sc. TN, s. MI, MO, and KS; disjunct (historically) in s. ME. This is most readily distinguished from R. corniculata, R. inundata, and R. careyana by the large glomerules composed of numerous spikelets. The recognition of varieties does not seem to be warranted. [= C, FNA, G, GW, K, RAB, WH, Y; > R. macrostachya var. colophophila Fernald & Gale – F; > R. macrostachya var. macrostachya – F; = Rynchospora macrostachya – S]


Rynchospora microcarpa Baldwin ex A. Gray, Southern Beaksedge. Swamp forests, clay-based Carolina bays. July-August. E. NC south to s. FL and west to TX; West Indies (Cuba, Puerto Rico), Bahamas, Belize. This species is easily confused with R. elliottii and R. perplexa. R. elliottii is distinguished by leaves 4-6 mm wide, bristles longer than the tubercle, flattish achene faces, and a tubercle that is longer than broad. R. microcarpa and R. perplexa have leaves 1-3 mm wide and tubercles as broad as long or broader. In R. microcarpa, the achene is biconvex and the bristles are half as long as the achene to equaling the tubercle. In R. perplexa, the achene faces are flattish and the bristles are absent or rudimentary (< \( \frac{1}{2} \) as long as the achene). [= F, FNA, GW, RAB, WH, Y, Z; < R. microcarpa – K (also see R. sulcata); > Rynchospora edisoniana Britton in Small – S; > Rynchospora microcarpa – S]

Rynchospora microcephala (Britton) Britton ex Small, Small-headed Beaksedge. Savannas, sandhill-pocosin ecotones. July-October. S. NJ south to s. FL and west to MS; Cuba. [= C, F, FNA, G, GW, K, RAB, WH, Y, Z; = Rynchospora microcephala – S; = R. cephalantha A. Gray var. microcephala (Britton) Kükenthal]

Rynchospora milieicola (Lamarck) A. Gray, Millet Beaksedge. Swamp forests, including maritime swamp forests. July-August. Se. VA south to s. FL and west to LA; West Indies. The inflorescence branches of R. mixta and (less commonly) R. caduca can spread at right angles from the culm, superficially resembling R. milieicola. The three can be separated by tubercle length: the tubercle of R. milieicola is 0.2-0.4 mm long, while those of R. mixta and R. caduca are 0.4-0.9 mm long. [= C, F, FNA, G, GW, K, RAB, WH, Y, Z; = Rynchospora milieicola – S]


Rynchospora nitens (Vahl) A. Gray, Short-beak Beaksedge. Wet savannas, limesink (doline) ponds, ditches, disturbed wet areas, often weedy. July-August. Primarily a Coastal Plain endemic: MA south to s. FL and west to se. TX; lowlands around the Great Lakes; West Indies, Belize, Nicaragua. [= C, FNA, K, WH, Y; = Psilocarya nitens (Vahl) Wood – F, G, GW, RAB, S]


Rynchospora oligantha A. Gray, Feather-bristle Beaksedge. Wet savannas, sandhill-pocosin ecotones, sandhill seepage bogs, sea-level fens, usually in rather peaty, acid places. July-August. S. NJ south to ne. FL, Panhandle FL, and west to se. TX; Belize, Nicaragua. The leaf tips of R. oligantha are blunt and smooth, while those of the closely related R. galeana are acute and minutely serrulate; these characters are often difficult to determine, however. Considered to be absent between NC and NJ prior to its discovery in e. VA (Fleming & Ludwig 1996). [= C, FNA, GW, K, RAB, WH, Y; < R. oligantha – F, G (presumably including R. galeana); < Rynchospora oligantha – S; = R. oligantha var. oligantha – Z]

Rynchospora pallida M.A. Curtis, Pale Beaksedge. Savanna-pocosin and sandhill-pocosin ecotones, peaty seepage bogs, usually growing in or near Sphagnum. July-September. Long Island, NY south through NJ to nc. SC, primarily in NJ and NC. Like R. alba and R. macroa, it has scales which are at first bright white, “fading” in age to a medium tan or light brown. These three species are thus superficially most distinctive (from other Rynchospora) in June, July, and August. The bristle characters separate the three species easily. See Nelson (1993) for first SC record. [= C, F, FNA, G, GW, K, RAB, Y, Z; = Rynchospora pallida – S]

Rynchospora perplexa Britton in Small, Pineland Beaksedge. Savannas, sandhill seepage bogs. July-September. E. NC south to ne. FL, FL Panhandle, and west to TX, and north in the interior to ec. TN; West Indies. Var. virginiana Fernald, alleged to be endemic to se. VA, is alleged to differ in several characters, including larger spikelets (2.5-3.0 mm long vs. 2.0-2.5), the
achene tubercles broadly rounded at the tip (rather than deltoid and acute). Also see note under *R. microcarpa.* [= C, FNA, G, GW, K, RAB, WH, Y, Z; > *R. perplexa* var. *perplexa* – F; > *R. perplexa* var. *virginiana* Fernald – F; > *Rynchospora perplexa* – S]

*Rynchospora pinetorum* C.B. Clarke, Pinebarren Beaksedge. Sandhills, scrub, other dry sandy pinelands. May-November. Ne. FL and e. Panhandle FL south to s. FL; Cuba. [= FNA, K, Y; = *Rynchospora intermedia* (Chapman) Britton – S; = *Rynchospora intermedia* (Chapman) Britton – WH, Z]

*R. globularis* – WH

*R. perplexa* – F

R. globularis

*R. globularis* – WH

*R. perplexa* – F

*Rynchospora pinetorum* Small, Small’s Beakrush. Wet calcareous savannas, maritime wet grasslands. June-September. FL west to MS (Sorrie & Leonard 1999) and LA, apparently disjunct to se. NC and ne. SC, and also in the West Indies. See note under *R. globularis.* [= Y; = *R. globularis* (Chapman) Small var. *pinetorum* (Small) Gale – FNA, GW, K, Z; = *Rynchospora pinetorum* – S; < *R. globularis* – WH]

*Rynchospora pleiantha* (Kükenthal) Gale, Coastal Beaksedge. Sandy margins of limesink depression ponds (dolines), typically in shallow water or at the lower margins of pond-shores. July-September. Se. NC south to c. peninsular FL, and Panhandle FL, west to se. AL; also in Cuba. [= FNA, GW, K, RAB, WH, Y, Z; = *Rynchospora fusca* – S, misapplied]

*Rynchospora plumosa* Elliott, Plumed Beaksedge. Savannas, sandhill-pocosin ecotones, especially where the sandy surface dries out in summer (on spodosols such as the Leon soil series). July-August. NC south to s. FL and west to se. TX; West Indies (Cuba), Belize, Honduras, Nicaragua. *R. semiplumosa* of s. GA and n. FL needs additional evaluation but is included here. [= FNA, GW, K, RAB, WH, Y; > *Rynchospora plumosa* – S; > *Rynchospora semiplumosa* A. Gray – S] [add Z synonymy]

*Rynchospora punctata* Elliott, Pineland Beaksedge. Wet savannas, pitcherplant bogs. S. GA south to ne. FL. [= FNA, GW, K, WH, Y, Z; = *Rynchospora punctata* – S]

*Rynchospora pusilla* Chapman ex M.A. Curtis, Dwarf Beaksedge. Wet savannas, especially in exposed wet sands of disturbed ground, such as roadsides. June-September. E. NC south to s. FL and west to e. TX; West Indies, Mexico (Tabasco, Chiapas), Belize, Guatemala, Nicaragua. *R. pusilla, R. divergens,* and *R. thornei* are all small, grass-like plants, very similar in appearance to one another. [= FNA, GW, K, WH, Y; = *R. intermixta* C. Wright – RAB; = *Rynchospora intermixta* – S]

*R. globularis* – WH

*R. perplexa* – F

*R. globularis* – WH

*R. perplexa* – F

*Rynchospora pinetorum* Small, Small’s Beakrush. Wet calcareous savannas, maritime wet grasslands. June-September. FL west to MS (Sorrie & Leonard 1999) and LA, apparently disjunct to se. NC and ne. SC, and also in the West Indies. See note under *R. globularis.* [= Y; = *R. globularis* (Chapman) Small var. *pinetorum* (Small) Gale – FNA, GW, K, Z; = *Rynchospora pinetorum* – S; < *R. globularis* – WH]

*Rynchospora pleiantha* (Kükenthal) Gale, Coastal Beaksedge. Sandy margins of limesink depression ponds (dolines), typically in shallow water or at the lower margins of pond-shores. July-September. Se. NC south to c. peninsular FL, and Panhandle FL, west to se. AL; also in Cuba. [= FNA, GW, K, RAB, WH, Y, Z; = *Rynchospora fusca* – S, misapplied]

*Rynchospora plumosa* Elliott, Plumed Beaksedge. Savannas, sandhill-pocosin ecotones, especially where the sandy surface dries out in summer (on spodosols such as the Leon soil series). July-August. NC south to s. FL and west to se. TX; West Indies (Cuba), Belize, Honduras, Nicaragua. *R. semiplumosa* of s. GA and n. FL needs additional evaluation but is included here. [= FNA, GW, K, RAB, WH, Y; > *Rynchospora plumosa* – S; > *Rynchospora semiplumosa* A. Gray – S] [add Z synonymy]

*Rynchospora punctata* Elliott, Pineland Beaksedge. Wet savannas, pitcherplant bogs. S. GA south to ne. FL. [= FNA, GW, K, WH, Y, Z; = *Rynchospora punctata* – S]

*Rynchospora pusilla* Chapman ex M.A. Curtis, Dwarf Beaksedge. Wet savannas, especially in exposed wet sands of disturbed ground, such as roadsides. June-September. E. NC south to s. FL and west to e. TX; West Indies, Mexico (Tabasco, Chiapas), Belize, Guatemala, Nicaragua. *R. pusilla, R. divergens,* and *R. thornei* are all small, grass-like plants, very similar in appearance to one another. [= FNA, GW, K, WH, Y; = *R. intermixta* C. Wright – RAB; = *Rynchospora intermixta* – S]

*R. globularis* – WH

*R. perplexa* – F

*R. globularis* – WH

*R. perplexa* – F

*Rynchospora pinetorum* Small, Small’s Beakrush. Wet calcareous savannas, maritime wet grasslands. June-September. FL west to MS (Sorrie & Leonard 1999) and LA, apparently disjunct to se. NC and ne. SC, and also in the West Indies. See note under *R. globularis.* [= Y; = *R. globularis* (Chapman) Small var. *pinetorum* (Small) Gale – FNA, GW, K, Z; = *Rynchospora pinetorum* – S; < *R. globularis* – WH]

*Rynchospora pleiantha* (Kükenthal) Gale, Coastal Beaksedge. Sandy margins of limesink depression ponds (dolines), typically in shallow water or at the lower margins of pond-shores. July-September. Se. NC south to c. peninsular FL, and Panhandle FL, west to se. AL; also in Cuba. [= FNA, GW, K, RAB, WH, Y, Z; = *Rynchospora fusca* – S, misapplied]

*Rynchospora plumosa* Elliott, Plumed Beaksedge. Savannas, sandhill-pocosin ecotones, especially where the sandy surface dries out in summer (on spodosols such as the Leon soil series). July-August. NC south to s. FL and west to se. TX; West Indies (Cuba), Belize, Honduras, Nicaragua. *R. semiplumosa* of s. GA and n. FL needs additional evaluation but is included here. [= FNA, GW, K, RAB, WH, Y; > *Rynchospora plumosa* – S; > *Rynchospora semiplumosa* A. Gray – S] [add Z synonymy]

*Rynchospora punctata* Elliott, Pineland Beaksedge. Wet savannas, pitcherplant bogs. S. GA south to ne. FL. [= FNA, GW, K, WH, Y, Z; = *Rynchospora punctata* – S]

*Rynchospora pusilla* Chapman ex M.A. Curtis, Dwarf Beaksedge. Wet savannas, especially in exposed wet sands of disturbed ground, such as roadsides. June-September. E. NC south to s. FL and west to e. TX; West Indies, Mexico (Tabasco, Chiapas), Belize, Guatemala, Nicaragua. *R. pusilla, R. divergens,* and *R. thornei* are all small, grass-like plants, very similar in appearance to one another. [= FNA, GW, K, WH, Y; = *R. intermixta* C. Wright – RAB; = *Rynchospora intermixta* – S]
Rhynchospora species 3. Mt (GA): Coosa Valley prairies; rare. Under study by Jim Allison. {not yet keyed or mapped}


Rhynchospora thornei Kral, Thorne’s Beaksedge. In open sands in savannas underlain by marl, and nearby roadsides, moist limestone barrens and prairies (GA). Known from about 35 locations, in Coastal Plain of NC, SC, GA, ne. FL, Panhandle FL, and AL; also in Ridge and Valley region of AL and GA, and Black Belt region of AL. R. thornei, R. divergens, and R. pusilla are all small, grass-like plants, very similar in appearance to one another, and they frequently co-occur. Recently discovered in SC (Georgetown Co.) by McMillan (2003). [= FNA, K, WH, Y]


Rhynchospora tracyi Britton, Tracy's Beaksedge. Cypress savannas and graminoid-dominated depressions, in small, clay-based Carolina bays or shallow limesink ponds (dolines), typically in shallow water or at the lower margins of pond-shores. June-September. A Southeastern Coastal Plain endemic: s. NC south to s. FL, west to s. MS (Sorrie & Leonard 1999); disjunct in sw. LA; West Indies, Belize. [= FNA, K, GW, RAB, WH, Y; < R. tracyi – S]

Rhynchospora wrightiana Böckler, Wright's Beaksedge. Wet savannas. July-September. Se. VA south to c. FL and west to s. AL; West Indies. Appearing to merge with R. fasciculardis var. distans on the outer Coastal Plain of NC. Leaves are most frequently filiform and < 1 mm wide; rarely flat and to 1.3 mm wide. [= FNA, GW, K, RAB, WH, Y, Z; < R. wrightiana – S (also see R. brachychaeta)]

Schoenoplectus (Reichenbach) Palla 1888 (Bulrush)

A genus of about 50 species, herbs, cosmopolitan in distribution. Micromorphologic and anatomic studies have confirmed earlier opinions based on morphology that Schoenoplectus is not closely related to Scirpus (Strong 1994, Smith 1995, Schuyler, pers. comm.). Most investigators now also favor the separation of Bolboschoenus from Schoenoplectus (Pignotti & Mariotti 2004). References: Strong (1994)=Z; Smith (1995)=Y; Smith in FNA (2002b); Goetghebeur in Kubitzki (1998b); Pignotti & Mariotti (2004). [also see Bolboschoenus]

1 Main involucral bracts 2-8, spreading and foliaceous (the inflorescence thus appearing terminal); rhizomes bearing ovoid tubers; bristles persistent on the achene; achenes 2.5-5.5 mm long (including body and apiculus) .........................................................[Bolboschoenus]

1 Main involucral bract 1 (rarely with an additional 1-2 lateral bracts), erect or terete or triangular, appearing as a continuation of the culm (the inflorescence thus appearing lateral, though in some species the longer inflorescence branches may overtop the bract); rhizomes not bearing tubers; bristles falling from the achene; achenes 1.0-4.5 mm long (including body and apiculus).

2 Spikelets on stalks of varying lengths, at least some clearly not sessile.

3 Culms distinctly triangular in cross-section, more sharply so above than below, nearly terete near the base; [section Malacogeton] \[
\]

3 Culms terete throughout, or obscurely triangular above; [section Schoenoplectus].

4 Spikelets appearing dull gray-brown, the scales copiously covered with red-brown dots (as seen at 10×) 6-15 mm long; lower and middle scales (3.0-) 3.5-4.0 mm long; culms firm, not easily compressed .........................................................S. etuberculatus

4 Spikelets appearing reddish-brown, the scales not obviously dotted (as seen at 10×), 6-11 mm long; lower and middle scales (2.0-) 2.5-3.0 (-3.5) mm long; culms soft, easily compressed.

5 Perianth bristles plumose; spikelets acute; culms obscurely triangular near the inflorescence ........................................S. californicus

5 Perianth bristles retrorsely barbed; spikelets obtuse; culms terete throughout their length ........................................S. tabernaemontani
2 Spikelets all sessile, in a cluster at one point (rarely with 1 or 2 short branches to 5 mm long).
6 Spikelet solitary; leaves numerous; plant usually aquatic, the culms and leaves flaccid, supported by the water; [section Malacogoton]...
8 Spikelets (1-)2-several; leaves 1-4; usually of wet places, but the culms stiff and erect, not floating.
7 Rhizomatos perennial; culms triangular in cross-section, usually 5-20 dm tall
8 Leaves elongate, > ½ as long as the culms; achenes trigonous; styles 3-branched; [section Malacogoton]..............S. torreyi
8 Leaves short, < ½ as long as the culms; achenes plano-convex; styles 2 (-3) branched; [Schoenoplectus pungens complex of section Schoenoplectus].
9 Sides of the culm strongly concave, wing-angled; culms 3-10 mm in diameter; main involucral bract 1-2.5- (6) cm long; spikelet scale with apical notch 0.1-0.4 mm deep..............................................S. americana
9 Sides of the culm flat, slightly concave, or slightly convex; culms 1.5-6 mm in diameter; main involucral bract (1-)3-20 cm long; spikelet scale with apical notch (0.3-)0.5-1.0 mm deep.
10 Spikelets 3-35; achenes 1.9-2.6 mm long, biconvex; styles 2-fid.................................................................S. deltarum
10 Spikelets 1.5-10(-10); achenes (2.0-)2.5-3.5 mm long, biconvex or trigonous; styles 2-3-fid........S. pungens var. pungens
7 Cespitose annual or perennial; culms terete, 1.5-6 dm tall.
11 Perianth bristles absent; achenes 1.2-1.5 mm long, transversely rugose; [section Supini].
12 Achenes biconvex to obscurely trigonous, the faces convex..........................S. erectus ssp. raynalli
12 Achenes biconvex with a planar or concave area on the adaxial surface .....................................................S. hallii
13 Culms 2-3 mm thick, acutely triangular in ×-section.
13 Culms 1.2-2 mm thick, cylindrical in ×-section.
14 Achenes 1.75-2.0 mm long, unequally biconvex (rounded on both faces, but less so on one than the other), rounded-ovobate, broadly cuneate at the base, rounded at the apex..........................S. purshianus
14 Achenes 1.5-1.8 mm long, planoconvex (nearly flat on 1 face), obovate, cuneate at the base, subtruncate at the apex..............S. smitii


*Schoenoplectus americanus* (Persoon) Volk ex Schinzian & R. Keller, Olyn Threesquare. Tidal freshwater to brackish marshes. Late May–June; June–September. NS west to WA, south to South America. Schuyler (1974) discusses the need to replace the name *S. olneyi* (as traditionally applied) with *S. americanus*, traditionally applied to what must now be called *S. pungens*. Because of this nomenclatural change, the interpretation of much some information and records is now uncertain. [= FNA, K, Z; = Scirpus americanus Persoon – C, WH; = Scirpus olneyi – RAB, F, G, GW, S]

*Schoenoplectus californicus* (C.A. Meyer) Soják, Giant Bulrush, Southern Bulrush, Tule. Marshes. SC south to s. FL, west to TX, and extending s. into the New World tropics; on the west coast, from CA southward. [= FNA, K; = Scirpus californicus (C.A. Meyer) Steudel – GW, S, WH]

*Schoenoplectus deltarum* (Schuyler) Soják, Delta Bulrush. Brackish marshes and other wetlands. AL and FL west to KS and TX. [= FNA, K; = Scirpus deltarum Schuyler]

*Schoenoplectus erectus* (Poiret) Pallal ex J. Raynal ssp. raynalli (Schuyler) K. Lye. Sandy or peaty, seasonally wet soils (such as on pond shores). September–October. Apparently ranging from SC south to c. peninsular FL and sw. GA; also in the tropics of both hemispheres. [= FNA, K: < Scirpus hallii A. Gray – RAB, misapplied; ? Scirpus erismaniae Schuyler – GW; = Scirpus erectus Poiret var. raynalli (Schuyler) B.F. Hansen & Wunderlin – WH; < Scirpus erectus Poiret]

*Schoenoplectus etuberculatus* (Steudel) Soják, Swamp Bulrush, Canby’s Bulrush. Beaver ponds, on peat in small depression ponds, in flowing blackwater streams. July–August; August–September. DE south to c. peninsular FL and west to e. TX (the distribution rather discontinuous); substantially more disjunct in s. MO and RI. The hybrid *S. etuberculatus × subterminalis* has been collected in Hoke Co, NC and Lexington County, SC; it has sterile, malformed achenes. [= FNA, K, Z; = Scirpus etuberculatus (Steudel) Kuntze – RAB, C, F, G, GW, S, WH]

*Schoenoplectus hallii* (A. Gray) S.G. Smith, Sharpshale Bulrush. Pond shores in peaty sands. It has also been reported for our area by RAB, and is apparently included in our area by C, as Scirpus supinus Linnaeus var. hallii (A. Gray) A. Gray, and by others; at least some of these reports are misidentifications of the similar *S. erectus*. It is reported for sw. GA by Jones & Coile (1988) and Smith in FNA (2002b). It is very similar to *S. erectus*, differing in having the spikelet scales yellow brown (vs. reddish brown) and achenes concave on the ventral surface (vs. bulging on the ventral surface). [= FNA, K; = Scirpus supinus Linnaeus var. hallii (A. Gray) A. Gray – C; = Scirpus hallii A. Gray]

*Schoenoplectus heterochaetus* (Chase) Soják, Slender Bulrush. Fresh marshes and lakes. June–August. VT and QC west to AB, south to NY, PA, w.KY, TX, and CA. [= FNA, K; = Scirpus heterochaetus Chase – C, F, G]

* *Schoenoplectus mucronatus* (Linnaeus) Pallal, Rough-seed Bulrush. Ponds, ditches, ricefields, disturbed wet ground; native of Eurasia. Weed (native of Eurasia in rice fields and other disturbed situations, known from old collections in PA, NJ, NY and more recently from VA (Virginia Botanical Associates 2009), KY, and TN. [= FNA, K; = Scirpus mucronatus Linnaeus]
**Schoenoplectus pungens** (Vahl) Palla var. pungens, Common Threesquare, Chairmaker's Rush, Swordgrass. Marshes, rocky river beds. Mid May-June; June-September. The species is circumboreal, ranging in North America from NL (Newfoundland) west to AK, south to South America; var. pungens is widespread. This taxon has traditionally had the name *Scirpus americanus* applied to it; this name, however, is properly applied to the traditional *Scirpus olneyi*. *Schoenoplectus pungens* (or *Scirpus pungens*) becomes the correct name for this plant (Schuyler 1974). [= FNA, K, Y; < *Scirpus americanus* – RAB, F, G, GW, S, W, WV, misapplied; = *Scirpus pungens* Vahl var. pungens – C; < *Scirpus pungens* – WH; < *Schoenoplectus pungens* – Z]

*Schoenoplectus purshianus* (Fernald) M.T. Strong, Bluntscale Bulrush. Marshes. Late June-August; July-October. ME west to MN, south to NJ, DE, ne. VA, PA, n. OH, and IL. Reported from mountains of sw. VA. The varieties recognized by Smith in FNA (2002b) are of uncertain value; all three are in or approach our area. Var. smithii (south to DE, NJ, and PA) has perianth bristles absent or rudimentary. Var. levisetus (with a historic occurrence in VA) has 1-4 perianth bristles, much shorter than to equaling the achene, the bristles smooth or sparsely retrorsely barbed. Var. setosus (with records from NC, DE, and MD) has 4-6 perianth bristles, as long as or longer than the achene, and densely retrorsely barbed. [= K, Z; = *Scirpus smithii* A. Gray – C, F; ? *Scirpus smithii* var. smithii – G; > *Schoenoplectus smithii* var. smithii – FNA; > *Schoenoplectus smithii* var. setosus (Fernald) S.G. Smith – FNA; > *Schoenoplectus smithii* var. levisetus (Fernald) S.G. Smith – FNA]

*Schoenoplectus subterminalis* (Torrey) Soják, Swaying Rush, Water Bulrush. Beaver ponds, bogs, blackwater creeks, in highly acid water. May-June; June-August. NL (Newfoundland) west to s. AK, south to se. NC, nc. SC, MO, UT (?), and n. CA (the distribution discontinuous, especially southwest). The hybrid *S. etuberculatus × subterminalis* has been collected in Hoke Co, NC and Lexington County, SC; it has sterile, malformed achenes. [= FNA, K, Z; = *Scirpus subterminalis* Torrey – RAB, C, F, G, GW, S, W]


*Schoenus Linnaeus 1753* (Blacksedge, Bogrush)

A genus of about 100 species, herbs, mainly of Australia and Malesia. References: Goetgheweir in Kubitzki (1998b). **Schoenus nigricans** Linnaeus, Blacksedge, Black Bog-rush. Marshes, calcareous bogs, wet flatwoods, always with either calcareous or saline influence. April-July. Panhandle FL, TX, CA and AZ south into Mexico; West Indies; Old World tropics and subtropics. [= FNA, GW, K, S, WH]

*Scirpoides* Scheuchzer ex Séguier (Round-headed Bulrush)


*Scirpoides holoschoenus* (Linnaeus) Soják, Round-headed Bulrush. Ore piles; probably only a waif, native of Eurasia. [= J; = *Scirpus holoschoenus* Linnaeus]
A genus of about 20 species, herbs, of circumboreal distribution, also with species in Australia, Malaysia, and South America. The complex of species including *S. atrovirens, S. georgianus, S. hattorianus, S. flaccidifolius* are difficult to identify, and some have doubted their validity. Although further work on this group is needed, they do generally appear to behave as biological species despite their morphological similarity. Schuyler (1967) writes that "the remaining species in the key differ in minute characteristics and often the most satisfactory means of identification is by carefully comparing specimens of them. Despite the close morphological similarity of these species, their characteristics are reasonably constant even in areas where they coexist and occasionally hybridize." References: Whittmore & Schuyler in FNA (2002b); Schuyler (1967)=Z; Strong (1994)=Y. Key adapted from C, FNA, GW, and Z. [also see Bolboschoenus, Isolepis, Oxycaryum, Schoenopectus, and Trichophorum]
**Cyperaceae**

**Scirpus ancistrochaetus** Schuyler, Northeastern Bulrush. Mountain ponds. July-September. VT, MA, and NY south to PA, e. WV, and w. VA. See Bartgis (1992) and Schuyler (1962) for additional information on this species. [= FNA, K, Z; < S. atrovirens var. atrovirens – C]

**Scirpus atrovirens** Fernald. Bogs, wet meadows. Late June-early July. NL (Newfoundland) and NL (Labrador) west to NT and BC, south to n. NJ, WV (Grant, Hampshire, Harrison, Pendleton, Pocahontas, Randolph, and Tucker counties), IL, IA, SD, WY, and WA. [= FNA, F, K, WV; < S. cyprium (Linnaeus) Kunth – C, G]

**Scirpus atrovirens** Willdenow, Black Bulrush. Marshes. July-September. NL (Newfoundland) west to MN, south to GA and TX; disjunct in AZ. [= FNA, K, Z; < S. atrovirens – RAB, GW, S, W; < S. atrovirens var. atrovirens – C, F, G, WV]

**Scirpus cyprium** (Linnaeus) Kunth, Woolgrass Bulrush. Marshes, ditches, beaver ponds, disturbed wet ground. (July-) August-September. NL (Newfoundland) west to BC, south to c. peninsular FL, e. TX, and OR. The varieties may be worthy of recognition. [= RAB, FNA, GW, K, W, WH; < S. cyprium – C; > S. cyprium var. cyprium – F, WV; > S. cyprium var. pelius Fernald – F, WV; > S. rubricosus Fernald – F, WV; > S. rubricosus Wildenow – G, S; > S. eriophorum Michaux – S, S]

**Scirpus divaricatus** Elliott. Swamp forests. July-September. Se. VA south to Panhandle FL, west to e. TX, s. TN, and s. MO. [= RAB, C, F, FNA, G, GW, K, S, WH, Z]


**Scirpus flaciddifolius** (Fernald) Schuyler, Reclining Bulrush. Bottomlands. July-September. Endemic to se. VA and ne. NC. Ludwig (1993) found the following characters to be most useful in distinguishing *S. flaciddifolius* from *S. georgianus* growing in the same region: bristles 1.2-1.4 mm long (vs. absent or mostly < 0.2, rarely to 1.0 mm long in *S. georgianus*), spikelets 1.5-2.1 mm wide (vs. 1.1-2.2 mm wide), spikelets 3-9 (-12) per glomerule (vs. 4-23), and inflorescence rays 5.5-17.9 cm long (vs. 3.5-13.5 cm long). Bristle length was the only character which consistently separated the 2 species; other characters showed overlapping values of possibly statistical value. [= FNA, K, Z; < S. atrovirens var. atrovirens – C; = S. atrovirens Wildenow var. flaciddifolius Fernald – F]


**Scirpus hattorianus** Makino, Northern Bulrush. Seepages, ditches, marshes, mostly at moderate to high elevations. July-September. NL (Newfoundland) to w. ON and WI, south to MD, NC, OH, and IN. [= FNA, K, Z; < S. atrovirens – RAB, GW, W; < S. atrovirens var. atrovirens – C, F, G, WV]

**Scirpus lineatus** Michaux. Swamp forests over coquina limestone ("marl"). May-July. Se. VA south to c. peninsular FL, west to LA. Reported for a single county (Tucker County) in WV (Harmon, Ford-Wernitz, & Grafton 2006). [= C, FNA, GW, K, WH, Z; = S. fontinalis R.M. Harper – RAB, F, S; > S. fontinalis var. virginiana Fernald – G]

**Scirpus longii** Fernald. Marshes. NS south to s. NJ. Also reported as occurring in e. NC by Radford, Ahles, & Bell (1968) and Fernald (1950); this report is in error. [= FNA, C, F, G, K]

**Scirpus microcarpus** J. & K. Presl. Marshes. NL (Newfoundland) and NL (Labrador) west to AK, south to n. NJ, e. WV (Monongalia, Pocahontas, Randolph, and Tucker counties), KY, IL, IA, NE, NM, AZ, and CA. [= FNA, C, K; > S. rubrotinctus Fernald – F, G, WV]

**Scirpus pallidus** (Britton) Fernald, Cloaked Bulrush. Marshes. ON west to BC, south to WI, MO, TX, NM, AZ, OR; apparently disjunct (probably introduced) in se. PA (Rhoads & Klein 1993) and NJ (Kartesz 1999). [= F, FNA, K; = S. atrovirens Wildenow var. pallidus Britton – C, G]

**Scirpus pedicellatus** Fernald. Marshes. NL (Newfoundland), ON and MN south to n. NJ, OH, c. KY, and MO. [= F, FNA, K; < S. cyprium (Linnaeus) Kunth – C, G]

**Scirpus pendulus** Muhlenberg. Mt (GA, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, FL, NC, SC, VA): wet ground over limestone, diabase, or other circumneutral rocks; rare. June-July. ME west to MN, SD, and CO, south to NC, ne. FL, NM, and n. Mexico. [= C, FNA, GW, K, W, WH, Z; = S. lineatus – RAB, F, G, S, WV, misapplied]
**Cyperaceae**


**Scleria** P.J. Bergius 1765 (Nutrush)

(by Richard J. LeBlond)

A genus of about 250 species, herbs, pantropical, and locally extending into warm temperate regions. This treatment attempts to recognize the stablist and most distinctive *Scleria* entities. Intermediate and otherwise difficult-to-classify specimens are occasionally encountered within some species groups, suggesting hybridization or incomplete speciation. This is particularly true within the *S. ciliata/pauciflora* group (here boldly treated as four species and two varieties). This complex genus likely will continue to challenge and exasperate those who study it. References: Kessler (1987)=Z; Fairey (1967)=Y; Reznicek, Fairey, & Whittemore in FNA (2002b); Core (1936); Goethgebeur in Kubitzki (1998b).

**Identification notes**: *Scleria* superficially resembles *Rhynchospora* in the field, but mature specimens are readily recognized by the terete white, gray, or black bony achenes. Hardened achenes are necessary for reliable identification to species. In the key, achene length includes hypogynium when present. The scale character applies only to the ultimate bracteate structure clasping the achene.

1 Base of achene without hypogynium (a circular, angular, lobed, or tuberculate disk differing in texture and structure from the achene body), the achene base constricted, pitted, and/or ribbed, but appearing as a continuation of the achene body.

2 Inflorescence of 2-9 sessile clusters along an axis up to 13 cm long, the individual spikelets 2-5 mm long; bracts (at least above proximal cluster) setaceous.

3 Plants perennial with rhizomes; leaf blades usually pubescent, 1.5-5 mm wide; bract and scale margins long-ciliate; spikelets 4-5 mm long; achenes smooth .......................................................... *S. distans

4 Plants annual with fibrous roots; leaf blades glabrous, 0.5-2 mm wide; bract and scale margins ciliate; spikelets 2-3 (-4) mm long; achenes reticulate-papillate to reticulate-verrucose .......................................................... *S. verticillata

5 Inflorescence of a single cluster, the individual spikelets 4-10 mm long; bracts foliaceous.

6 Triangular base of achene lacking pits in the three concave sides; achene 3-4 mm long .......................................................... *S. baldwinii

7 Triangular base of achene with a pair of pits on each of the three sides; achene 2-3 mm long .......................................................... *S. georgiana

1 Base of achene with hypogynium.

5 Achenes body smooth (often longitudinally ribbed); hypogynium with 0, 8, or 9 tubercles.

6 Hypogynium with 8 or 9 minutely papillate tubercles ................................................................................................................ *S. oligantha

7 Minutely papillate portion of hypogynium continuous, not divided into separate tubercles.

8 Plants cespitose to short-rhizomatous; sheaths brown or straminous to reddish, glabrous to glabrate on the ventral surface except for a pubescent and usually thickened summit; inflorescences terminal and lateral; achenes 2.0-3.3 mm long; (1.12-)1.25 (-1.38)× as long as wide; hypogynium with flat and apically rounded papillae; [of wet to mesic pinelands] .......................................................... *S. triglomerata

9 Plants long-rhizomatous or cespitose; sheaths purple to reddish, the ventral surface uniformly pubescent; inflorescences terminal only or terminal and lateral; achenes 2.5-4.0 mm long; (1.35-)1.45 (-1.54)× as long as wide; hypogynium surface with laterally flattened and apically triangular-acute to acuminate papillae; [often on coastal hammocks, oak woods near saltwater, and blackwater swamps] .......................................................................................................................... *S. flaccida

10 Plants usually cespitose; inflorescence terminal and lateral (a few culms in a clump can be terminal only); hypogynium surface with laterally flattened and apically triangular-acute to acuminate papillae; often resembling shards of glass or porcelain; [of coastal hammocks, oak woods near saltwater, and blackwater swamps] .......................................................................................................................... *S. triglomerata

11 Plants usually long-rhizomatous; inflorescence terminal only; hypogynium surface with laterally and apically rounded papillae; [mostly of dry to dry-mesic pinelands and barrens] .......................................................................................................................... *S. nidda

5 Achenes body smooth, rarely pubescent (most often from apparent abortion or abnormal development); hypogynium with 3 tongue-shaped lobes, or 3 or 6 tubercles.

10 Hypogynium of 3 tongue-shaped lobes appressed to the underside of the achene (appearing nearly bract-like); achene reticulate, the pits generally squarish or rectangular and arranged regularly in rows, rarely smooth (apparently by abortion or anomalous development).

11 Achenes pubescent (occasionally becoming glabrate); lower lateral inflorescences on long, filiform, usually drooping peduncles; bract of the uppermost lateral inflorescence usually reaching from 1/3-3/4 the length of the terminal internode; terminal internode 6-30 cm long .......................................................... *S. mucilenbergii

12 Achenes glabrous; lower lateral inflorescences sessile or on short-erect peduncles; bract of the uppermost lateral panicle usually reaching 3/4 the length of to exceeding the terminal internode; terminal internode 3-8 cm long .......................................................... *S. reticulatis

13 Achenes 1.5-2 mm long, the hypogynium with 6 paired but distinctly separate tubercles.

14 Culms, leaves, and bracts copiously villous-ciliate with spreading hairs 0.5-1 mm long .......................................................... *S. pauciflora* var. *caroliniana

15 Culms, leaves, and bracts glabrous or sparsely hirtellous, but not copiously villous-ciliate .......................................................... *S. pauciflora* var. *pauciflora*

12 Achenes 2.0-3.6 mm long, the hypogynium with 3 tubercles, these often 2-lobed, the lobes united (becoming separate in *S. distans* 1 with achenes smooth and > 2.5 mm long).

13 Achenes 2.0-2.5(-3) mm long; 1.5-2.0(-2.3) mm wide; larger leaves 1-3.5 mm wide; culms, sheaths, blades, and bracts glabrous to moderately pubescent or ciliate.

14 Culms and/or sheaths hairy; blades and bracts ciliate; plants of loamy sands (e.g., ultisols) .......................................................... *S. ciliata* var. *ciliata*

15 Culms, sheaths, blades, and bracts glabrous; plants of sandy soils (e.g., spodosols) .......................................................................................................................... *S. ciliata* var. *grabra*

14 Achenes 2.6-3.6 mm long, 2.0-2.6 mm wide; larger leaves 3-7 mm wide; culms, sheaths, blades, and bracts moderately to densely pubescent and/or ciliate; plants usually of loamy soils (e.g., ultisols and alfisols).

16 Herbage pubescent between as well as along primary sheath and adaxial leaf surface nerves and culm angles; most pistillate scales pubescent with appressed hairs 0.1 (-0.2) mm long, the keel similarly pubescent or ciliate with hairs (0.1-)0.2 mm long;
Scleria baldwinii (Torrey) Steudel, Baldwin's Nutrush. Cp (FL, GA, NC, SC): wet savannas, under Pinus serotina, P. palustris, and/or Taxodium ascendens; uncommon (rare in GA, NC, and SC). June-July. Se. NC south to s. FL and west to se. TX; also in Cuba and the Bahamas (Sorrie & LeBlond 1997). S. baldwinii is a more robust plant, with larger achenes, than S. georgiana. [= RAB, FNA, K, GW, WH]

Scleria ciliata Michaux var. ciliata, Hairy Nutrush. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC), (FL): wet to dry sandy thickets and flatwoods, typically on sandy soil; frequent, rare in the mountains, rare in VA (VA Rare). May-August. VA south to FL, west to MO and TX, and in the West Indies, Mexico, and Central America. [= FNA, S, Y, < S. ciliata – RAB, C, F, G, GW, W; < S. ciliata var. ciliata – K, WH] [not yet mapped]

Scleria ciliata Michaux var. glabra (Chapman) Fairey, Smooth Nutrush. Savannas and flatwoods. NC south to FL, west to TX. S. ciliata var. curtissii (Britton) Kessler (= S. pauciflora Muhl. ex Willd. var. curtissii (Britton) Fairey) is currently of uncertain taxonomic standing. It is distinguished by its reticulate, non-papillose achenes, but such a condition has been observed in achenes with the hypogynium lobing of both S. ciliata and S. pauciflora (as suggested by the synonymy), and may only represent a form or condition. [= FNA, K; > S. brittonii Core ex Small – S; < S. ciliata – RAB, C, F, G, GW, W; < S. ciliata var. glabra – K, WH; > S. ciliata var. curtissii (Britton) Kessler – Z; > S. pauciflora Muhl. ex Willd. var. curtissii (Britton) Fairey – K] [not yet mapped]

Scleria distans Poiret in J. Lamarck et al., Riverswamp Nutrush. Moist sandy or peaty soil of pine savannas and flatwoods, boggy areas, and wet openings along roads. May-October. GA south to s. FL west to TX; West Indies; Mexico, Central and South America; Africa. [= FNA, WH; < S. nitida – GW, K, S, Y, Z, misapplied]

Scleria elliottii Chapman, Broad-leaved Hairy Nutrush. Savannas, flatwoods, pine-oak woodlands, meadows, bogs, and clay-based Carolina bays, typically on loamy sands. May-September. VA south to FL, west to TX, MO, OK. The descriptions of S. elliottii in S and of S. ciliata Michaux var. elliottii (Chapman) Fernald in F do not include the entity here treated as S. species 1. [= S; < S. ciliata Michaux var. elliottii (Chapman) Fernald – F, FNA, Y; < S. ciliata var. ciliata – K, WH; < S. ciliata – RAB, C, G, GW, W] [not yet mapped]

Scleria flaccida Steudel, Flaccid Nutrush. Blackwater swamps, coastal hammocks, oak woods and thickets near saltwater. Scattered along the outer Coastal Plain from se. VA to s. FL and west to LA. This is a poorly known species, with more locations likely to be found upon re-examination of S. triglomerata and S. nitida specimens. The often pendulous and capillary lateral peduncles suggest S. oligantha, another swamp species. S. oligantha is most readily separated by its 8-9-lobed hypogynium with minute rounded papillae. [= F; < S. triglomerata Michaux – RAB, C, F, G, GW, K, S, WH; < S. nitida – G]

Scleria georgiana Core, Georgia Nutrush. Pine savannas, cypress savannas, depression meadows, mostly on the outer Coastal Plain. June-August. E. NC south to s. FL, west to TX; and in the West Indies, Central and South America. See note under S. baldwinii. [= RAB, FNA, GW, K, WH; < S. gracilis Elliott – S (name preoccupied)]

Scleria lithosperma (Linnaeus) Swartz. Wet pine savannas. S. FL and s. LA south into Mexico, Central America and South America; West Indies; tropical Asia and Africa. [= FNA, GW, S, WH] [not yet keyed]


Scleria muehlenbergii Steudel, Pitted Nutrush. Open wet sand, pine savannas and flatwoods, depression meadows, cypress savannas, limesink ponds, bogs. June-September. NY (Long Island), NJ, and NC south to FL, west to TX, north in the interior to MO and IN; also in the West Indies, Bahamas (Sorrie & LeBlond 1997), Mexico, and Central America. S. muehlenbergii is adapted to a variety of freshwater wetland habitats, while S. reticularis is primarily restricted to the drawdown zones of limesink (doline) ponds and clay-based Carolina bays. Also see notes under S. reticularis. In normal specimens, the achene reticulation ridges are sharp-edged and steeply sloped (compare S. reticularis). The achene pubescence is often tawny, and achenes
appearing superficially glabrous often have a tawny residue under magnification. [= FNA, K; \( S. reticularis \) Michaux – RAB, C, GW, W, WH; \( S. muehlenbergii \) – F, orthographic variant; \( S. reticularis \) var. pubescens Britton – G; \( S. setacea \) Poiret – S]

**Scleria nitida** Willdenow, Shining Nutrush. Cp (DE, FL, NC, SC, VA), Mt (NC, SC, VA), Pd (DE, NC, SC, VA) {FL, GA?}: dry sandy or rocky soil of pine/scrub oak woodlands, ridgetop forests at lower elevations in the Mountains such as pine/oak heaths, and heath balds; uncommon (rare in DE). May-October. MA, VA, and KY south to FL, west to LA and MO (also see note under \( S. triglomerata \)). [= F; < \( S. nitida \) – G; < \( S. triglomerata \) Michaux – RAB, C, FNA, GW, K, S, W, WH] [not yet mapped]

**Scleria oligantha** Michaux, Few-flowered Nutrush. Dry to moist forests and woodlands, swamp forests. June-September. NJ and MO south to c. peninsular FL and TX, also in Puerto Rico, Mexico, and Central America. The long, filiform, arching lateral peduncles are distinctive. [= RAB, C, F, FNA, G, GW, K, S, WH]

**Scleria pauciflora** Muhlenberg ex Willdenow var. caroliniana A. Wood, Carolina Nutrush. Cp (GA, NC, SC, VA?): savannas; uncommon. June-September. NH west to MI, south to n. FL, TN, and MO. [= F, FNA, G, K; < \( S. pauciflora \) – RAB, C, GW, S, WH] [not yet mapped]

**Scleria pauciflora** Muhlenberg ex Willdenow var. pauciflora, Papillose Nutrush. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): wet to dry pine flatwoods, pine savannas, depression meadows; common (rare in WV). June-September. NJ west to KS, south to FL and TX, also in Cuba. Typification of \( S. pauciflora \) is controversial and unresolved at this time (Fairey & Whittemore 1999). [= F, FNA, G, K; < \( S. pauciflora \) – RAB, C, GW, S, WH] [not yet mapped]

**Scleria reticularis** Michaux, Netted Nutrush. Limesink ponds, clay-based Carolina bays. June-September. MA south to FL, west to TX, north to IN, MI, and WI. Reports from Mexico are based on \( S. muehlenbergii \). See notes under \( S. muehlenbergii \). In normal specimens, the achene reticulation ridges are soft-edged and obliquely sloped. Occasional stipitate-capitate fungal growth on the achene has been mistaken for pubescence (a condition perhaps restricted to herbarium specimens), apparently contributing to the unwarranted agglomeration of this distinctive taxon and \( S. muehlenbergii \). There is controversy about typification of the name \( S. reticularis \) (Camelbeke, Reznicek, & Goetghhebeur 2003). [= F, FNA, K, S; < \( S. reticularis \) – RAB, C, GW, S, WH] (also see \( S. muehlenbergii \)) = \( S. reticularis \) var. reticularis – G]

**Scleria species 1**, Smooth-seeded Hairy Nutrush. Wet savannas shallowly underlain by coquina limestone in the Coastal Plain, and apparently in diabase glades and barrens in the Piedmont. May-September. Currently known only from Granville, Onslow, and Pender counties, NC. In the Coastal Plain, it is associated with other narrow endemics such as *Thalictrum cooleyi*, *Allium species 1*, and *Carex lutea*.

**Scleria triglomerata** Michaux, Tall Nutrush. Wet to mesic flatwoods, savannas, and hardwood forests. May-September. VT and ON west to MN, south to s. FL and TX. \( S. triglomerata \) sensu lato also occurs in Puerto Rico and Mexico, and may include \( S. nitida \) and \( S. flaccida \). [= F, G; < \( S. triglomerata \) – RAB, C, FNA, GW, K, S, WH, WV]

**Scleria verticillata** Muhlenberg ex Willdenow, Savanna Nutrush. Wet calcareous savannas of the outer coastal plain, freshwater marshes and maritime wet grasslands on barrier islands influenced by salt spray and shell deposits, wet calcareous or mafic fens or seepages in the mountains, calcareous grasslands. July-September. MA and ON west to MN, south to FL and TX, also in the West Indies, Mexico, Central and South America. This species is a distinct calciphile, with only scattered occurrences in most of our area. The roots are strongly fragrant. [= RAB, C, F, FNA, GW, K, S, WH]

**Trichophorum Persoon (Deergrass)**

A genus of about 10 species, herbs, primarily circumboreal, but with disjunct occurrence in montane tropical Asia and montane tropical South America. *Trichophorum* has long been recognized as distinct from *Scirpus* by many authors (especially in Europe and Asia). Molecular and other studies have clearly confirmed that these species are more closely allied to *Eriophorum* than to *Scirpus*, and their removal from *Scirpus* creates a more natural classification (Strong 1994). *Trichophorum* resembles *Eriophorum* in most morphologic characters, and shares with it a generally boreal and north temperate distribution. *Trichophorum alpinum* (Linnaeus) Persoon demonstrates previous confusion over the affinities of the group; it has been variously treated (by those who do not recognize *Trichophorum*) as *Eriophorum alpinum* Linnaeus or *Scirpus hudsonianus* (Michaux) Fernald. References: Crins in FNA (2002b); Strong (1994)=Z; Goetghhebeur in Kubitzki (1998b).

1 Culms terete or nearly so, smooth; [in our area] of moderate to high elevation cliffs

1 Culms sharply triangular in cross-section, the angles scabrous; [plants of low to moderate elevation forests, woodlands, and bluffs]
and on alpine summits, disjunct (from NY) to about a dozen sites in the Southern Appalachians of w. NC, e. TN, sw. SC, and ne. GA (Jones & Coile 1988). The disjunct southern occurrences are certainly relics of a more widespread distribution during the Pleistocene. Reported for South Carolina by Hill & Horn (1997) and Hill (1999). [<*Trichophorum cespitosum* – K; > *Scirpus cespitosus* var. *callosus* Bigelow – RAB, F, G; < *Scirpus cespitosus* Linnaeus – C, W; < *Trichophorum cespitosum* – FNA, orthographic variant; < *Scirpus cespitosus* – S; ? *Baeothryon cespitosum* (Linnaeus) A. Dietrich].

*Trichophorum planifolium* (Sprengel) Palla. Woodlands, bluffs, forests. ME west to ON, south to sc. VA, e. WV, KY, OH, and se. MO. See Crins (1989a) for an interesting discussion of this species. [= FNA, K, Z; = *Scirpus verecundus* Fernald – C, F, G, W; WV; = *Scirpus clintonii* – S, misapplied]

106. **POACEAE** (R. Brown) Barnhart 1895 or **GRAMINEAE** A.L. de Jussieu 1789 (Grass Family) [in POALES]

A family of about 670 genera and 10,000 species, herbs (and some shrubs and trees), cosmopolitan. References: Flora of North America Editorial Committee (2003a, 2007a)=FNA; Hitchcock and Chase (1950)=HC; Blomquist (1948). Key to genera adapted in large part from FNA.

[note: only a small portion of the key to genera complete]

### Key to tribes

1 Plant a shrub or tree (the culms perennial, woody, to 25 m tall), with complex branching systems from the upper nodes; leaves strongly dimorphic, those of the main culm sheathing, those of the branches or culm tips pseudopetiolate ........................................... **Key A**: **Bambuseae**

1 Plant an herb (the culms annual, not truly woody, to 5 m tall), lacking complex branching systems from the upper nodes; leaves not dimorphic, none of them pseudopetiolate.

4

5 ........................................................................................................................................................................... Key P: **tribe Paniceae**

5 ........................................................................................................................................................................... Key Q: **tribe Andropogoneae**

4

6 ........................................................................................................................................................................... Key N: **tribe Aristideae**

6

7

8 ........................................................................................................................................................................... Key C: **tribe Brachyelytreae**

8

9 ........................................................................................................................................................................... Key B: **tribe Oryzeae**

9

10 ........................................................................................................................................................................ Key L: **tribe Cynodonteae**

10

7 [to be continued]

#### Key A – **tribe Bambuseae**

Key based on Stapleton (2007).

1 Rhizomes pachymorph, having root-bearing internodes thicker than the culm; culms usually in single clumps .................. **Bambusa**

1 Rhizomes leptomorph, root-bearing internodes thinner than the culm; culms solitary or in many connected clumps.

2 Mid-culm branches consistently 2, unequal, rarely with a smaller central third branch .................. **Phyllostachys**

2 Mid-culm branches not consistently 2, initially 1-9.

3 Dwarf bamboos, < 1(-1.5) m tall.

4 Leaf blade margins more or less bleached in winter, terminal blade often angled from shoot axis, blades usually not variegated ........

4 Leaf blade margins not or only slightly bleached in winter, terminal blade parallel to shoot axis, blades often variegated...........

.......................................................... [**Sasa**]

.......................................................... [**Pleioblastos**]

3 Medium-stature to tall bamboo, > 1 m tall.

5 Mid-culm branches initially 5-9 ................................................. **Pleioblastos**

5 Mid-culm branches initially 1-3(-5).

6 Mid-culm branches (1-)2-7; branches and leaves small to medium relative to culm size; [native] ........................................... **Arundinaria**

6 Mid-culm branches 1(-3); branch and leaves often very large relative to culm size; [alien].

7 Leaf blade margins bleached in winter, terminal blade often deflexed from shoot axis; culm buds initially closed .......... [**Sasa**]

7 Leaf blade margins not bleached in winter, terminal blade parallel to shoot axis; culm buds initially open or closed ...........

.......................................................... [**Pseudosasa**]
**Key B – tribe Oryzeae**

1. Lemma margins free; plants perennial.
2. Plants either < 1 m tall or a floating aquatic with lax stems to 1.5 m long ................................................................. *Luziola*
3. Plants 1-4 m tall, emergent, the stems stout, not lax ................................................................. *Zicianiopsis*
4. Spikelets either pistillate or staminate, the upper branches of the panicle with pistillate spikelets, the lower branches with staminate spikelets; caryopses terete ................................................................. *Zizania*
5. Spikelets bisexual; caryopses laterally flattened.
6. Glumes absent and also lacking glume-like sterile florets subtending the floret; lemmas and paleas pectinately ciliate-hispid on the margins; [native] ................................................................. *Leersia*
7. Glumes absent or greatly reduced, glume-like sterile florets subtending the fertile floret; lemmas and paleas glabrous or pubescent, but not pectinately ciliate hispid on the margins; [introduced] ................................................................. *Oryza*

**Key C – tribe Brachelytreae**

One genus ............................................................................................................................................................................................................ *Brachelytrum*

**Key D – tribe Diarrheneae**

One genus ............................................................................................................................................................................................................ *Diarrhena*

**Key E – tribe Meliceae**

1. Lemmas awned, the awns 8-15 mm long; calluses hairy; [of VA, WV, KY, and northward] ................................................................. *Schizachne*
2. Lemmas unawned; calluses glabrous; [collectively widespread in our area] ................................................................. *Glyceria*
3. Lower glumes 3-7-veined; [plants of mesic to dry habitats] ................................................................. *Melica*
4. Lower glumes 1-veined; [plants of wetlands] ................................................................. *Piptatherum (racemosum)*
5. Lower glumes 2-8 mm wide, not twisted at the base; awns 50-120 mm long ................................................................. *Nassella (necessana)*
6. Lower glumes 5-12 mm long; awns 7-15 mm long ................................................................. *Oryzopsis*
7. Lower glumes 8-10 mm wide; the base twisted so that the abaxial surface is uppermost; awns 7-15 mm long ................................................................. *Piptochaetium*
8. Lower glumes 1-3 mm wide; awns 15-120 mm long; expanded at the base; convolute and wrapping around the caryopsis such that the margins strongly overlap; awns 15-120 mm long ................................................................. *Piptatherum (canadense)*

**Key F – tribe Stipeae**

1. Plants not cespitose, the main leaves cauline ............................................................................................................................................................................................................ *Zizania*
2. Plants cespitose, the leaves basally disposed.
3. Leaves > 4 mm wide; awns either 7-15 or 40-120 mm long.
4. Leaves 4-10 mm wide, the base twisted so that the abaxial surface is uppermost; awns 7-15 mm long ................................................................. *Oryzopsis*
5. Leaves 2-8 mm wide, not twisted at the base; awns 50-120 mm long ................................................................. *Nassella (necessana)*
6. Leaves < 4 mm wide; awns 5-120 mm long ................................................................. *Piptaderum (racemosum)*
7. Palea flat, shorter than or equal to the lemma; lemma margin convolute or not overlapping; [alien and native species, rare in our area] ................................................................. *Melica*
8. Palea grooved, longer than the lemma; lemma margins involute, fitting into the paleal groove; [native species, collectively widespread in our area] ................................................................. *Glyceria*
9. Lemmas smooth, the margins separated and parallel their entire lengths at maturity; awns 5-25 mm long; [native species, of WV northward] ................................................................. *Piptatherum (canadense)*
10. Lemmas papillose and also often pubescent, particularly on the veins, convolute and wrapping around the caryopsis such that the margins strongly overlap; awns 15-120 mm long ................................................................. *Nassella (necessana)*

**Key G – tribe Brachypoideae**

One genus ............................................................................................................................................................................................................ *Brachypodium*

**Key H – tribe Bromaeae**

One genus ............................................................................................................................................................................................................ *Bromus*

**Key I – tribe Triticeae**

1. Spikelets 2-7 at all or most nodes.
2. Spikelets 3 at each node ............................................................................................................................................................................................................ *Hordeum*
3. Spikelets 1 at each node ............................................................................................................................................................................................................ *Secale*
4. Spikelets 3 at all or most nodes.
Agropyron, Elymus, Pascopyrum, Aegilops, Triticum, Thinopyrum

Key J – tribe Pooeae


Key K – tribe Arundineae

Molinia, Phragmites, Arundo

Key L – tribe Cynodonteae

Uniola, Distichlis (incl. Monanthochloe), Tridens, Triplasis, Leptochloa, Dinebra, Eragrostis, Eleusine, Dactyloctenium, Sporobolus, Calamovilfa, Muhlenbergia, Chloris, Eustachys, Gymnopogon, Cienium, Cynodon, Spartina, Bouteloua, Tragas, Zoysia

Key M – tribe Danthonieae

Cortaderia, Danthonia

Key N – tribe Aristideae

One genus............................................................................................................................................................................................................Aristida

Key O – tribe Centothecae

One genus.............................................................................................................................................................................................................Chasmanthium

Key P – tribe Paniceae

[partial key only]

1 First glume 5-7.5 mm long, nearly as long as sterile lemma; fertile lemma 1/3 length of sterile lemma .........................Phanopyrum
2 First glume shorter, or if this long, then at most 3/4 length of sterile lemma; fertile lemma > ½ the length of the sterile lemma.

2 Sterile palea indurate and expanding the spikelet at maturity, as long as sterile lemma; outer surface of the distal palea with compound papillae ..................................................................................Steinchisma
3 Sterile palea membranous, not expanding the spikelet at maturity, usually shorter than sterile lemma or absent; outer surface of the distal palea lacking compound papillae ................................................................................Panicum

Digitaria, Anthenantia, Allotherops, Amphicarpum, Opismenues, Echinochloa, Saciolepis, Dichanthellium, Panicum, Megathysus, Phanopyrum, Brachiaria, Melinis, Urochloa, Eriochloa, Pennisetum, Cenchrus, Setaria, Stenotaphrum, Steinchisma, Asnoquus, Paspalum, Reimarochloa

Key Q – tribe Andropogoneae

Add to genus key: Elionurus, Hackelochloa.

1 Leaves ovate-lanceolate, 2-10 cm long, 2.5-7× as long as wide; plants weak-stemmed annuals, branching, decumbent, rooting at the lower nodes; [alien weeds].
2 Leaves cordate-clasping at base; spikelets not paired, unaccompanied by a vestige ..........................................................Arthraxon
3 Leaves tapering to a broadly cuneate base; spikelets paired (one of the pair sometimes vestigial) ........................................Microstegium
4 Spikelets embedded in the thickened rachis (the inflorescence thus like an ear of corn), or fitting into grooves in the thickened rachis (the inflorescence thus cylindrical and resembling a rat's tail), or the pistillate inflorescences enclosed in a hard, beak-like, pearly-white, modified bract.
5 Spikelets unisexual, with male and female spikelets in separate inflorescences or in different parts of the same inflorescence.
6 Internode narrower than and more-or-less enclosed by the female spikelet. .................................................................Coix
7 Internode broader than and more-or-less enclosing the female spikelet.
8 Racemes of mixed sex (female below, male above) ............................................................................................................Tripsacum
9 Racemes of single sex .................................................................................................................................................................Zea
10 Spikelets, or at least one of each pair, bisexual.
POACEAE

270

7  Pedicels fused to the internode; [coarse alien grass of disturbed habitats].......................... Rottboellia
7  Pedicels free from the internodes; [either a native coarse grass of pinelands or prairie-like areas, or a short alien grass of lawns and disturbed areas].
8  Sessile spikelet smooth or pitted; culms 50-200 cm tall; [native grass of pinelands or prairie-like areas].................. Coelorachis
8  Sessile spikelet with pectinate margins; culms 5-40 cm tall; [alien grass of lawns and disturbed areas]..................... Eremochloa
3  Spikelets not embedded or fitting into grooves in the rachis, the rachis slender (the spikelets visibly separate and often pedicelled).
9  Pedicelled spikelet similar to the sessile spikelet, both fertile.
10 Spikelets falling in pairs together with sections of the disarticulating rachis................................................................. Saccharum
10 Spikelets falling separately from the persistent rachis.
11 Panicle contracted, spikeletile; glumes membranous................................................................................................. Imperata
11 Panicle loose; glumes cartilaginous or coriaceous ........................................................................................................ Miscanthus
9  Pedicelled spikelet differing from the sessile in shape and sex (sometimes represented only by a pedicel).
12 Spikelets awned, the awn 10-20 cm long.
13 First glume lacking glands; panicle open, the branches 5-8 cm long................................................................. Chrysopegon
13 First glume with a row of punctate, concave glands; panicle contracted, spikeletile .................................................................................................................................................. Heteropogon
12 Spikelets awned or not, if awned the awn < 5 cm long.
14 Inflorescence a panicle, the branches not subtended by sheaths.
15 Pedicelled spikelet represented by pedicel only; apex of sheath bearing 2 auricles 1-10 mm long; [native].......... Sorghastrum
15 Pedicelled spikelet present, staminate; apex of sheath truncate; [alien]................................................................. Sorghum
14 Inflorescence of 1-13 digitate (whorled) racemes borne at the summit of a peduncle, the peduncle subtended by a raceme sheath.
16 Racemes 1 per peduncle and raceme sheath ................................................................................................................ Schizachyrium
16 Racemes 2-13 per peduncle and raceme sheath.
17 Pedicels of the pedicelled (reduced or absent) spikelets terete or slightly flattened and grooved on one side only........
........................................................................................................................................................................................... Andropogon
17 Pedicels of the pedicelled (reduced or absent) spikelets strongly flattened and grooved on both sides, the central portion thin or membranous......................................................... Bothriochloa

Aegilops Linnaeus 1753 (Goatgrass)


Aegilops cylindrica Host, Jointed Goat Grass. Disturbed areas; native of Mediterranean Europe and w. Asia. [= C, F, FNA, G, HC, K, Z]


* Aegilops triuncalis Linnaeus var. triuncalis, Barbed Goatgrass. Disturbed areas; native of Mediterranean Europe east to w. and c. Asia. Known from MD. [= FNA; < A. triuncalis – HC, K]

* Aegilops ventricosa Tausch, Swollen Goatgrass. Disturbed areas; native of Mediterranean Europe. Known from DE. [= FNA]

Agropyron Gaertner 1770 (Crested Wheatgrass)


Agrostis Linnaeus 1753 (Bentgrass)
A genus of about 220 species, primarily temperate. References: Harvey in FNA (2007a); Tucker (1996) – Z. [also see Lachnagrostis and Polygroen]

1 Palea 1/2-3/4 as long as the lemma, 0.6-1.2 mm long; plants introduced, often (though not always) in disturbed habitats; plants flowering June-October; [subgenus Agrostis.]

2 Ligule mostly 0.5-2 mm long, truncate; panicle branches naked towards the base, diffuse when in fruit, the spikelets well-separated. [subgenus Agrostis.]

2 Ligule mostly 2.5-6 mm long, acute, rounded, or truncate; panicle branches (some of them) with spikelets near the base, the spikelets usually agglomerated.

3 Leaves 3-8 mm wide; inflorescence triangular-ovoid, the branches widely spreading at maturity, usually reddish; plant with rhizomes, without stolons. [subgenus Agrostis.]

4 Leaves mostly 1-3 mm wide; inflorescence narrowly ovoid, the branches ascending at maturity, usually tan; plant without rhizomes, with or without stolons. [subgenus Agrostis.]

1 Palea < 2/5 as long as the lemma, 0-0.5 mm long; plants native, typically in more or less natural habitats; plants flowering March-November; [subgenus Y.]

4 Lemma usually awned (sometimes unawned), the awn inserted near the tip, 4-10 mm long, straight, very delicate and flexuous; annual, flowering April-June. ................................................. A. eliottiana

4 Lemma awned or not, the awn (when present) inserted either near the middle of the lemma or near the apex, 0-6 mm long, straight or bent, neither delicate nor flexuous; perennial, flowering March-November.

5 Lemma with a (2-) 3-5 mm long, geniculate awn.

6 Anthers 1.0-1.5 mm long; spikelets 1.7-3.0 mm long; plant loosely cespitose, with stolons to 25 cm long. [subgenus P.]

6 Anthers 0.5-0.8 mm long; spikelets 2.0-4.0 mm long; plant densely cespitose. [subgenus P.]

5 Lemma awnless or with a 0-3 mm long awn, this often straight (rarely geniculate in A. scabra).

7 Spikelets 1.2-2 mm long; anthers 0.3-0.6 mm long; lemma never awned; plants flowering March-July. ................................................. A. hyemalis

7 Spikelets 1.8-3.5 (-3.7) mm long; anthers 0.3-1.5 mm long; lemma awnless or awned; plants flowering June-November.

8 Leaves (at least the basal) mostly involute, 1-2 (-3) mm wide; panicle branches mostly forking well beyond the middle; anthers 0.4-0.8 mm long. ................................................. A. scabra

8 Leaves flat, 2-6 mm wide; panicle branches mostly forking at or below the middle; anthers 0.3-1.2 mm long.

9 Lemma 1.8-3 mm long, minutely but copiously scabrous (at 20× or more); anthers 0.7-1.2 mm long; spikelets 2.3-2.7-3.5 (-3.7) mm long, usually clustered near the tips of the branchlets; panicle branches scabrous; culms to 15 dm tall; [of wet savannas and other wet habitats of the Coastal Plain] ................................................. A. altissima

9 Lemma 1.4-2 mm long, glabrous; anthers 0.3-0.6 mm long; spikelets (1.8-) 2.2-2.7 (-3.2) mm long, usually not clustered near the tips of the branchlets; plant glabrous to scabrous; culms to 10 dm tall; [of various habitats, nearly throughout our area] ................................................. A. perennans


Agrostis eliottiana J.A. Schultes, Elliot's Bentgrass, Southern Bentgrass. Dry soils of barrens, fields, and rock outcrops. April-June. MD west to s. OH, and e. KS, south to Panhandle FL (Gadsden County) and c. TX. [= RAB, C, F, FNA, G, HC, K, S, W, WH, Z]

Agrostis exarata Triunis, Spike Bentgrass. Disturbed areas; native of w. North America, a waif in e. North America. Reported for very widely scattered sites in e. North America, including Leslie County, KY (Kartesz 2010). [= FNA] [not keyed or mapped]


Agrostis hyemalis (Walter) Britton, Sterns, & Poggenburg, Ticklegrass, Small Bentgrass. Roadside, other disturbed habitats. March-July. ME west to WI, south to FL and TX. [= F, FNA, K, WH, WV, Z; < A. hyemalis – RAB (also see A. scabra); = A. hyemalis var. hyemalis – C, G; = A. hiemalis – GW, HC, orthographic variant; < A. hiemalis – S, W, orthographic variant (also see A. scabra var. scabra)] (FL)


Agrostis perennans (Walter) Tuckerman, Upland Bentgrass. Woodlands, forests, roadsides. August-October. NL (Newfoundland) west to MN, south to n. FL and TX; c. Mexico south to c. South America. [= HC, WV, Z; < A.


*Aira* Linnaeus 1753 (Hair Grass)


1. Panicle dense and spike-like, 0.5-4.1 cm long, 0.3-0.7 cm wide, the branches short and appressed to ascending. ................................................. *A. praecox*
2. Pedicels usually 1-2× as long as the spikelets; lemma of the lower floret and the upper floret with an awn 2-4 mm long ............................................. *A. caryophyllea*

* *Aira caryophyllea* Linnaeus, Silver Hair Grass. Fields, roadides, disturbed areas; native of Europe. May. [= RAB, C, G, HC, WH, Z; = Arias caryophyllea var. caryophyllea – FNA; = Aspris caryophyllea (Linnaeus) Nash – S]

*Aira elegans* Willdenow ex Kunth, Elegant Hair Grass. Fields, roadsides, disturbed areas; native of Europe. May-June. [= RAB, G, HC, K; = *Aira elegans* var. elegans Schar – C, Z; = *Aira caryophyllea* var. caryophyllea (Mertens & W.D.J. Koch) Mutel – FNA; = Aspris caryophyllea (Host) A.S. Hitchcock – S]

* *Aira praeox* Linnaeus, Early Hair Grass, Spike Hairgrass. Fields, roadsides, disturbed areas; native of Europe. Reported for NC by Burk (1961), and recently collected in the NC Sandhills (B. Sorrie, pers.comm. 2004). [= C, G, HC, K, Z]

**Alloteropsis** J. Presl 1828

A genus of 5-8 species, annuals and perennials, native of tropical Asia and Australia. References: Hall in FNA (2003a).

* *Alloteropsis cimicina* (Linnaeus) Stapf, Bugseed Grass. Disturbed areas; native of se. Asia. Naturalized in FL Panhandle and ne. FL. [= FNA, WH]

Linnaeus 1753 (Foxtail Grass)


1. Glumes 4-6 mm long, acute or acuminate.
2. Glumes with hairs < 1.0 mm long on the keel, merely scabrous towards the tip. ................................................................. *A. myosuroides*
3. Glumes with hairs 1.0-1.5 mm long on the keel, including towards the tip. ................................................................. *A. pratensis*


*Alopecurus aequalis* Sobolewski var. aequalis, Short-awn Foxtail Grass. Wet swales, wet meadows, ditches, shores. Circumboreal, south in North America to NJ, w. VA, IN, MO, and CA. [= F, K; < *A. aequalis* – C, G, HC]

*Alopecurus arundinaceus* Poiret, Creeping Meadow Foxtail. Pastures, disturbed areas. Native of Eurasia. Reported for Bell County, KY (Kartesz 2010). [= FNA] (not keyed or mapped)
**Alopecurus geniculatus** Linnaeus, Water Foxtail Grass. Disturbed areas; native of Eurasia. [= C, F, G, HC; > A. geniculatus var. geniculatus – K]

**Alopecurus myosuroides** Hudson, Slender Foxtail Grass. Moist fields; native of Europe. April-May. [= RAB, C, F, G, HC, K, S, WV, Z]


**Ammophila** Host 1809 (Beach-grass)


1 Ligule 10-35 mm long ........................................................................................................ .......................
2 Ligule 1-4.6 mm long ........................................................................................................ .......................................

**Ammophila arenaria** (Linnaeus) Link, European Beach-grass. Dunes, disturbed areas; native of Europe. Introduced in MD and PA (Kartesz 1999). [= C, F, FNA, HC, K]

**Ammophila breviligulata** Fernald, American Beach-grass. Dunes. August-September. NL (Newfoundland) south to about Cape Hatteras, Dare County, NC, and on shores around the Great Lakes; planted further south. As a native grass, Ammophila ranged south only to NC, where it was rare; it is now commonly planted ("sprigged") in the Carolinas as a sand-binder and is now common south into SC. [= K; < A. breviligulata – RAB, F, G, HC, S; = A. breviligulata ssp. breviligulata – FNA; ? A. breviligulata – C, Z]

**Amphibromus** Nees 1843


**Amphibromus scabrivalvis** (Trinius) Swallen var. scabrivalvis, Rough Amphibrome. Disturbed areas; native of South America. Established in Tangipahoa Parish, LA. [= FNA; < Amphibromus scabrivalvis – K; < Helictotrichon scabrivalve (Trinius) G. Tucker]

**Amphicarpum** Kunth 1829 (Peanut-grass)


1 Leaf blades hirsute with pustular-based hairs on both surfaces, the margins ciliate (and also slightly cartilaginous-thickened; [of moist to wet, peaty or sandy-peaty soils]) ............................................................................................................ A. amphicarpon
2 Leaf blades glabrous, the margins cartilaginous-thickened; [of seasonally flooded natural ponds] ................................................................................. A. muhlenbergianum

**Amphicarpum amphicarpon** (Pursh) Nash, Pinebarrens Peanut-grass. Wet, peaty, open soils, especially peat-burns in pocosin edges, primarily in the outer Coastal Plain, responding strongly to fire. August-October. An Atlantic Coastal Plain endemic, scattered and rather rare, from e. MA to GA. If one carefully excavates young plants in spring or summer, they will generally be found to be connected to the remnants of the previous year’s subterranean spikelet. [= FNA; = Amphicarpum pusillii Kunth – RAB, C, F, G, GW, HC, K; = Amphicarpum amphicarpon (Pursh) Nash – S]
Amphicarpum mühlenbergianum (J.A. Schultes) Hitchcock, Florida Peanut-grass, Blue Maiden-cane. Natural depression ponds, flatwoods ponds, clay-based Carolina bays. August-October. A Southeastern Coastal Plain endemic: FL and s. AL north to se. NC, rare north of s. GA. First found in NC in the late 1980's by M. Boyer. [= RAB, FNA, GW, HC; = A. mühlenbergianum – K, orthographic variant; = Amphicarpum floridanum Chapman – S]

Andropogon Linnaeus 1753 (Broomedge, Bluestem)

A genus of about 100-110 species, mainly tropical. [also see Bothriochloa and Schizachyrium]

The difference between this treatment and that in RAB may cause some users to react with skepticism, dismay, or alarm, but I am confident that it represents a much truer description of the genus. Campbell's work (1983, et seq.) has greatly clarified the taxonomy of Andropogon in e. North America. Great confusion and disagreement were previously the rule in dealing with the A. virginicus-A. glomeratus complex. Campbell's careful morphologic work has provided workable technical characters which distinguish the taxa he recognizes.

I have generally followed Campbell (1983, et seq.) in his circumscriptions of taxa. I disagree, however, with his strongly morphologic species concept and the basis for his decisions regarding the rank of the taxa (species, variety, and "variant," an informal, English name for a subvarietal entity). Campbell bases the rank recognition of taxa on their "morphologic distance" from one another, as determined by the sum of non-matching characters out of 33 characters analyzed. In general, he regards species as separated by a morphologic distance of 9 or more, varieties by 6 or more, and variants by 3 or more. Such an approach fails to take into account additional evidence of the ecological preferences, geographic distributions, reproductive isolation, evolutionary pathways, and population biology of the taxa.

Evidence presented by Campbell (1983) is useful in determining a more meaningful assignment of taxonomic rank. For instance, he states that "there are ample opportunities for gene flow between taxa because they frequently grow together and flower at the same time of day and (mostly) at the same time of year. I have observed two taxa growing within one to three meters of one another over our hundred years. In only five of these opportunities for hybridization were there plants whose intermediate morphology suggested that they were hybrids. In the rare instances where hybridization does take place, there are few mature hybrid individuals. I have found only twelve putative hybrid individuals in the five localities where hybridization is suspected. The parents outnumber these hybrids by between five and one hundred or more to one." In discussing A. virginicus var. glaucus (here treated as A. capillipes) he states "the drylands variant ... produces generally shorter raceme sheaths, racemes, and spikelets; its flowers are more frequently chasmogamous, and unlike the wetlands variant, it has no hairs below the raceme sheath. In addition, it grows in better-drained soil and has a narrower geographic range ... I have seen these taxa growing within one to three meters of one another at three localities in northwestern Florida. At only one of these was there difficulty in classifying any individual: a single plant on a slope between a bog inhabited by the wetlands variant and a roadside lined with the drylands variant..."

Some additional examples would be Campbell's discussion of several closely related taxa in the A. glomeratus complex.

"Andropogon glomeratus var. glomeratus and the robust variant of var. pumilus have inflorescences so similar in shape that most previous workers have united them and have overlooked the differences between them. The robust variant is taller, usually with rather smooth sheaths and with shorter, more ciliate, and darker ligules, narrower raceme sheaths, and lower glume keels that are scabrous below the middle. Although both taxa grow in wet sites, the robust variant is weedyer, shows a greater tolerance for drier conditions and various soil types, and has a wider geographic range." His discussion of A. glomeratus var. glaucopis and var. hirsutior is also worth repeating. "Often the two grow together in populations of thousands of individuals. Because they grow together so frequently and are morphologically so alike, the possibility that they are not distinct taxa but merely genetic segregates of one another has been carefully considered. Based on observations of several hundred seedlings grown from seeds from both taxa (growing together in nature), there is no evidence for [mere] genetic segregation. The glaucousness/greenness and pubescence/glabrousness of the stem sheaths are discernible in the seedlings within a few weeks of germination."

Taxa differing in numerous morphologic characters, with different (though overlapping) geographic ranges, with different ecological preferences (often rather narrowly segregated by hydrology), and (when they do occur in proximity to one another) showing little or no sign of introgression or hybridization are probably better treated as biological species. Thus, I have treated a number of Campbell's varieties as species. Several of his "variants" also seem to warrant taxonomic recognition, at varietal or specific rank; in fact, he subsequently elevated several (Campbell 1986). References: Campbell (1983)=Z; Campbell in FNA (2003a). Key adapted in part from Z.

Identification notes: A thorough understanding of the architecture of the inflorescences of Andropogon is necessary in order to identify them successfully. The parts will be described, beginning from the apex of a branch of the inflorescence. Spikelets occur in pairs, the sessile spikelet (usually just referred to as the spikelet) and the pedicellate spikelet, which is usually vestigial or absent (except in A. gerardii) and sterile (except in A. gerardii, where it is staminate). The first or lower glume of the sessile spikelet has two keels, and the presence and location of antorse prickles (scabrousness) is an important character in the A. glomeratus complex. The length of the sessile spikelet is an important character; it should be measured exclusive of theawn, borne at the apex of the lemma. Awn length is also a useful taxonomic character. The pedicellate spikelet is borne on the pedicel, which is attached at the base of the sessile spikelet and typically angles away from it at about a 45 degree angle. The rachis internode extends from the base of one sessile spikelet to the next sessile spikelet above, breaking apart (upon dehiscence) just below the next spikelet and remaining attached to the sessile spikelet below. The dispersal unit consists of a sessile spikelet sitting in the V shape
formed by (on one side) the pedicel and pedicelled spikelet; sessile spikelets > 7 mm long; [section Andropogon] A. gerardii

1 Pedicellate spikelet stamine, as large as the sessile, fertile spikelet; sessile spikelets > 7 mm long; [section Leptopogon]

2 Leaves strongly glaucous (often near ly white with a powdery wax that can be rubbed off on the fingers), glabrous.

2 Leaves green (to somewhat glaucous, but never powdery white), pubescent or glabrous.

3 Ligules (0.9-) 1.5 (-2.0) mm long, with ciliations 0-0.2 mm long; leaf blades usually (33-) avg. 40 (-75) cm long; pubescence beneath raceme sheaths moderate to dense; raceme sheaths (2.0-) 2.4-3.6 (-4.4) cm long, (1.3-) 2.0-2.5 (-3.0) mm wide..............A. glaucopsis

3 Ligules (0.2-) 0.4 (-0.5) mm long, with ciliations 0.3-1.2 mm long; leaf blades (12-) avg. 19 (-38) cm long; pubescence beneath raceme sheaths absent to dense; raceme sheaths (2.1-) 2.9-4.3 (-6.0) cm long, (2.7-) 3.1-3.8 (-5.5) mm wide.

4 Summit of branchlet below attachment of raceme sheath pubescent with hairs 2-4 mm long; raceme sheaths (2.4-) 3.2-4.8 (-6.0) mm long; spikelets (3.0-) 3.5-3.9 (-4.4) mm long; racemes (1.5-) 2.0-3.0 (-4.0) cm long; leaves 2.5-6.5 mm wide, averaging 5 mm; upper floret lemma awn 0.2-2.1 mm long, averaging 1.4 mm.......

4 Summit of branchlet below attachment of raceme sheath glabrous; raceme sheaths (2.1-) 2.6-3.8 (-4.9) cm long; spikelets (2.6-) 3.2-3.5 (-3.9) mm long; racemes (1.4-) 1.7-2.4 (-3.2) cm long; leaves 2-5 mm wide, averaging 3.5 mm; upper floret lemma awn 0.6-1.5 mm long, averaging 1.1 mm..........................A. capillipes var. 2 ["dryland variant"]

5 Many or all peduncles longer than the subtending raceme sheaths before senescence (but in some forms with the raceme sheaths strongly exserted); culms mostly > 1 m tall (to 1.4 m tall).........................A. elliottii

5 Upper culm sheaths distinctly broadened and strongly overlapping, often largely hiding the raceme sheaths before senescence (but in some forms with the raceme sheaths strongly exserted; culms mostly > 1 m tall (except A. perangustatus, A. tracyi, and small forms of A. virginicus).

6 Many or all peduncles longer than the subtending raceme sheaths at maturity, racemes then fully exserted above the apex of the raceme sheath.

7 Inflorescence branches arching outwards in pronounced curves; racemes (1.2-) 1.5-2.1 (-2.6) cm long; awn (0.2-) avg. 0.7 (-1.1) cm long; spikelets (4.1-) 4.4-4.6 (-5.0) mm long..............................A. brachystachyus

7 Inflorescence branches erect; racemes (2.2-) 2.6-6.0 cm long; awn 0.5-2.0 cm long; spikelets (4.3-) 4.9-6.5 (-7.5) mm long.

8 Lower glumes more or less folded; stamens 1; racemes (2.2-) 2.6-4.5 (-6.3) cm long; awn (0.5-) avg. 0.8 (-1.6) cm long; spikelets (4.3-) 4.9-5.4 (-6.1) mm long..............................A. arctatus

8 Lower glumes flat; stamens 3; racemes 3-6 cm long; awn 1-2 cm long; spikelets (4.5-) 5-6.5 (-7.5) mm long......................................A. ternarius var. ternarius

9 Inflorescences with (2-) 4-7 (-13) racemes; raceme sheaths (4.1-) 5.3-8.0 (-10-1) mm wide; hairs of the rachis internode and pedicel yellow-tawny when dry...

9 Inflorescences with 2-5 (-7) racemes; raceme sheaths (1.5-) 2.0-4.8 (-6.3) mm wide; hairs of the rachis internode and pedicel gray to whitish when dry.

10 Postflowering peduncles < 10 mm long.

11 Culm sheaths antirously scabrous (often hisrate as well); leaf blades usually > 35 cm long.

12 Ligules (0.6-) 0.8 (-1.3) mm long (usually < 1 mm long), with ciliations 0-2.9 mm long; raceme sheaths (1.5-) 2.0-2.5 (-3.0) mm wide (usually < 2.5 mm wide); keels of first glume often scabrous below the middle..............A. tenue

12 Ligules (0.6-) 1.2 (-2.2) mm long (usually > 1 mm long), with ciliations 0-3.0 mm long; raceme sheaths (2.0-) 2.4-3.4 (-4.7) mm wide (usually > 2.5 mm wide); keels of first glume scabrous only above the middle, smooth below.

13 Inflorescences oblong to obpyramidal; spikelets (3.8-) 4.1-4.4 (-5.0) mm long; anthers usually not marcescent within spikelet; mature peduncles (4-) 11-35 (-60) mm long (usually some of them > 10 mm long)...........................................A. glomeratus var. glomeratus

13 Inflorescences (linear to oblong; spikelets (3.4-) 3.6-3.8 (-4.6) mm log; anthers usually marcescent within spikelets; peduncles (2-) 3-5 (-8) mm long...........................................A. glomeratus var. hirsutior

11 Culm sheaths not scabrous (often hisrate); leaf blades < 35 cm long (except in A. glomeratus var. pumilus).

14 Leaves glabrous.

15 Ligules (0.8-) 1.1 (-1.5) mm long, with ciliations 0-0.1 mm long; basal leaves often filiform, < 1.5 mm wide, strongly erect........................A. perangustatus

15 Ligules (0.2-) 0.5 (-0.8) mm long, with ciliations 0.2-1.3 mm long; basal leaves usually > 2 mm wide, soon arching.
Andropogon arctatus Chapman, Florida Bluestem. Pinelands, rarely moist disturbed ground. This curious record from Pamlico County, NC (the specimen at GH, collected by Randolph and Randolph in 1922, annotated as A. arctatus by Campbell) is likely a waif. The species is native to pinelands from n. FL west to w. Panhandle of FL and adjacent s. AL, south to s. FL. [= FNA, HC, K, S, orthographic variant]

Andropogon brachystachyus Chapman, Shortspike Bluestem. Moist to wet pinelands, natural pond margins, bogs, disturbed roadsides. Se. SC (McMillan et al. 2002) south to FL, south to e. FL. Panhandle. A. brachystachyus is considered by some to range north to NC. [= FNA, K, Z; = A. brachystachyus – GW, HC, S, orthographic variant]

Andropogon capillipes Nash var. 1. Wetland White Bluestem. Wet savannas, ditches adjacent to savannas, depressional wetlands. September-October. S. NJ south to s. FL and west to e. TX; also in the Bahamas (Sorrie & LeBlond 1997). Campbell (1983) informally describes two "variants" of this species (which he treats at the varietal level, as A. virgínicus var. glaucus). A. capillipes is clearly a species distinct from A. virgínicus; moreover, the substantial morphological and ecological differences between Campbell’s two "variants" (which he describes as nearly always sharply distinct, even when growing in close proximity) warrant recognition as good species, or at least as varieties. [<A. virgínicus – RAB; < A. virgínicus var. glaucus Hackel – F, FNA; < A. capillipes – GW, HC, K, S; = A. virgínicus var. glaucus "wetlands variant" – Z; = A. virgínicus var. dealbátus Mohr ex Hackel]

**Andropogon floridanus** Scribner, Florida Bluestem. Longleaf pine sandhills. September-October. S. GA west to FL Panhandle, south to s. FL. Reported for e. and s. GA (FNA, Jones & Coile 1988).  [= FNA, HC, K, S]  [not yet keyed]

**Andropogon gerardii** Vitman, Big Bluestem, Turkeyfoot. In a wide variety of habitats, usually rather dry, such as sandhills, glades, cliffs, and rock outcrops, in the Piedmont in woodlands, former prairie-like sites, woodlands, open forests, and river-scour grasslands, in the Mountains in glades, riverside scour areas, and rarely in grassy balds, ascending to at least 1600 m over mafic rocks (on Old Field Bald, Watauga and Ashe counties, NC). July-October. QC west to SK, south to FL and AZ. Some favor treating eastern taxon should be known as taxon should be recognized at the specific level, but the appropriate combination has not been made.  [= FNA, K, Z; A. glomeratus (Walter) Britton, Sterns, & Poggenburg]

**Andropogon glaucopsis** Elliott, Chalky Bluestem. Wet savannas, pine flatwoods, ditches, wet disturbed sites. September-October. Se. VA south to c. peninsular FL and west to e. TX. The extent of the western Gulf Coastal Plain distribution (to the West Gulf Coastal Plain of w. LA and e. TX) is based on specimens (at BRIT) and sight records (B. Sorrie, pers. comm.). Although sometimes included in the past in either A. glomeratus or A. virginiensis, this species is distinctive and easily recognized in the field (even from a car at 60 m.p.h.) by the combination of blue color, height of well over 1 m (taller than the other glaucous bluestems), and semi-bushy inflorescence.  [= GW, K; < A. virginicus – RAB; = A. virginicus var. glaucopsis (Elliott) A.S. Hitchcock – F, HC; = A. glomeratus var. glaucopsis (Elliott) A.S. Hitchcock – FNA, Z; < A. glomeratus - S]

**Andropogon glomeratus** (Walter) Britton, Sterns, & Poggenburg var. glomeratus. Swamps, wet savannas, pine flatwoods, wet disturbed sites. September-October. S. MA south to c. peninsular FL and west to s. MS, primarily on the Coastal Plain, but scattered inland to w. PA, WV, c. KY, c. TN and AR.  [= FNA, K, Z; < A. virginicus – RAB; = A. virginicus var. abbreviatus (Hackel) Fernald & Griscom – C, F, G, GW, WV; < A. glomeratus – HC, S, W]

**Andropogon glomeratus** (Walter) Britton, Sterns, & Poggenburg var. hirsutior (Hackel) C. Mohr. Wet savannas, pine flatwoods, adjacent ditches, other wet disturbed sites. September-October. E. MD south to c. peninsular FL west to se. LA. This taxon should be recognized at the specific level, but the appropriate combination has not been made.  [= FNA, K, Z; < A. virginicus – RAB; 7. A. virginicus var. glaucopsis (Elliott) A.S. Hitchcock – G, misapplied; = A. virginicus var. hirsutior (Hackel) A.S. Hitchcock; < A. glomeratus – HC, S]

**Andropogon longiberbis** Hackel, Longbeard Bluestem. Dry sandy soils of sandhills and dunes. September-October. Se. NC south to s. and w. FL, and in the Bahamas.  [= FNA, HC, K, S, Z]


**Andropogon perangustatus** Nash, Narrow-leaved Bluestem. Clay-based Carolina bays and boggy wetlands. August-October. E. VA south to c. peninsular FL, east to e. TX. Growth form, general appearance, and habitat (dense bluish tussocks with very narrow leaves and long ligules, growing in wet areas such as clay-based Carolina bays) make A. perangustatus readily recognizable.  [= HC, S; = A. gyrans Ashe var. stenophyllus (Hackel) C.S. Campbell – FNA, K, Z; = A. elliottii Chapman var. stenophyllus (Hackel) D.B. Ward]

**Andropogon tenuispatheus** (Nash) Nash. Maritime wet grasslands, brackish marsh edges, moist disturbed sites. September-October. Se. VA and c. OK south to s. FL and w. TX, also south into Central America and the Caribbean.  [< A. virginicus – RAB; = A. glomeratus (Walter) Britton, Sterns, & Poggenburg var. pumilus Vasey ex Dewey – FNA, K, Z ("robust variant"); < A. glomeratus – HC, S]

**Andropogon ternarius** Michaux var. ternarius, Splitbeard Bluestem. Dry to moist soils. September-October. Var. ternarius ranges from DE west to KY and s. MO, south to FL and TX. Var. cabanisii (Hackel) Fernald & Griscom is endemic in s. and c. peninsular FL.  [= FNA, K, Z; < A. ternarius – RAB, C, G, W; > A. ternarius var. ternarius – F; > A. ternarius var. glaucescens (Scribner) Fernald & Griscom – F; = A. ternarius – HC, S]

**Andropogon tracyi** Nash, Tracy's Bluestem. Dry sandy or clayey soils of sandhills, disturbed sites. September-October. E. NC south to s. FL and west to MS.  [= FNA, HC, K, S, Z]

**Andropogon virginicus** Linnaeus var. virginicus, Old-field Broomstraw, Broomsedge, "Sedge Grass", "Sage Grass". Old fields, roadbanks, disturbed sites. September-October. MA west to MI and e. KA, south to FL and e. TX, and in the Caribbean and Central America. Campbell (1983) recognized 3 "variants" within *A. virginicus var. virginicus*; the "deceptive variant" he later (1986) described formally as var. *decipiens* (see above). The "old-field variant" is the common "variant" in our area, occurring abundantly throughout the state. It has green stem internodes and the leaves usually pubescent, at least on the margins near the collar. The "smooth variant" is known only from the Coastal Plain and is apparently rare in our area, known from NC and SC (Berkeley and Marion counties; P. McMillan, pers. comm.). It has glaucous stem internodes and glabrous leaves. It is unclear whether the "smooth variant" warrants taxonomic recognition. [= FNA, K, Z ("oldfield variant" and "smooth variant"); < A. virginicus – RAB, S, W; < A. virginicus var. virginicus – C, WV; < A. virginicus var. virginicus – G, HC (also see var. *decipiens*); >= A. virginicus var. virginicus – F; >= A. virginicus var. tetrastachyus (Elliot) Hackel – F]

**Anthenantia** Palisot de Beauvois 1812 (Silkyscale)


1 Leaves weakly if at all geniculate and auriculate at junction of blade and sheath, ascending to erect (lacking a sharp bend outward at the summit of the sheath), medium green; blade (3-) 4-8 (-10) mm wide, the proximal margins glabrous or sometimes ascending pilose-ciliate; pigmentation of leaves, spikelets and their trichomes variously reddish or purplish; fertile lemma red-brown to nearly black, leaf tip with a very short taper to a blunt or rounded apex; lower sheaths crowded and keeled (therefore distichous) ......................................................**A. rufa**

2 Hairs on the apex of the bisexual florets < 0.5 mm long, or sometimes with some longer hairs and then these distributed only near the midrib .................................................................**A. hirtum**

3 Annual, geniculate; ligules 0.5-2 mm long; glumes glabrous; leaves 1-2 mm wide .................................................................**A. nitens**

1 Leaves strongly geniculate and auriculate at junction of blade and sheath, spreading, usually squarrose (with a sharp bend outward at the summit of the sheath), yellowish green; blade 4-10 (-15) mm wide, the proximal margins ciliate at least basally with ascending strumose-hirsute cilia; pigment of leaves, spikelets and their trichomes usually with little or any red; fertile lemma brown; leaf tip with a long taper to a sharp apex; lower sheaths not crowded, keeled, or distichous .................................................................**A. villosa**

**Anthenantia rufa** (Nuttall) J.A. Schultes, Purple Silkyscale. Wet savannas in the outer Coastal Plain, seepage bogs and moist sandhill-pocosin ecotones in the fall-line sandhills. September-October. Se. NC south to n. FL and west to w. LA. *A. rufa* inhabits much wetter habitats than the similar *A. villosa*, and is more typical of the outer Coastal Plain. Plants without culms are reminiscent of the Liliaceae. [= FNA, Y; = *Anthaenantia rufa* – RAB, GW, HC, K, S, Z, orthographic variant]

**Anthenantia villosa** (Michaux) Palisot de Beauvois, Green Silkyscale. Sandhills, especially in submesic swales. September-October. Se. NC south to s. FL and west to e. TX. *A. villosa* is found in drier habitats than *A. rufa*, most typically in upland swales in the sandhills. Kral (2004) has segregated a new species, *A. texana* Kral, of the w. Gulf Coastal plain, previously confused with *A. villosa*. [= Y; < *Anthoenantia villosa* – RAB, HC, K, S, Z, orthographic variant; < *Anthenantia villosa* – FNA]

**Anthoxanthum** Linnaeus 1753 (Vernal Grass)

A genus of about 50 species (as here circumscribed to include *Hierochloe*), perennials and annuals, of temperate, boreal, and arctic regions. Tucker (1996), Soreng et al. (2003), and Allred & Barkworth in FNA (2007a) all include *Hierochloe* into a more broadly circumscribed *Anthoxanthum*. References: Allred & Barkworth in FNA (2007a); Tucker (1996)=Z; Soreng et al. (2003)=Y.

1 Glumes subequal; lowest 2 florets stamine

2 Hairs on the apex of the bisexual florets< 0.5 mm long, or sometimes with some longer hairs and then these distributed only near the midrib .................................................................**A. nitens**

1 Glumes unequal, the lower shorter than the upper; lowest 2 florets sterile.

3 Annual, erect; ligules (1-) 2-3 mm long; glumes villose throughout or at least on the keel; leaves 2-5 mm wide ..................................................**A. odoratum**

Anthoxanthum hirtum (Schrank) Y. Schouten & Veldkamp, Hairy Holygrass, Sweetgrass, Vanilla Grass. Fens, wet calcareous meadows, high elevation pastures and openings, saltmarsh edges (DE). April-August. A circumboreal species and subspecies, widespread in n. Eurasia and n. North America, ranging south in North America to NJ, MD, PA, OH, IN, IL, IA, SD, CO, UT, NM, and CA, with several disjunct occurrences in North Carolina, in Long Hope Valley, Ashe County, the Nantahala River Bogs, Macon County, and Pond Mountain, Ashe County. The report by S ("recorded by Chapman from Statesville, N.C.") can be discounted; the record reflects a collection made in the mountains by Mordecai E. Hyams, a botanist and herb trader based in Statesville. Belden et al. (2004) document the first occurrence in Virginia. The sweet, vanilla-like odor of this grass is responsible for various folk uses – by Native Americans for making fragrant baskets, in Scandinavia strewn on church floors on festival days. [= FNA; < Hierochloe odorata (Linnaeus) Palisot de Beauvois – C, F, G, HC, WV; > H. hirta (Schrank) Borbás ssp. arctica (J. Presl) G. Weimarck – K; < Torresia odorata (Linnaeus) A.S. Hitchcock – S; < Anthoxanthum nitens (Weber) Y. Schouten & Veldkamp – Z; ? Anthoxanthum nitens (Weber) Y. Schouten & Veldkamp spp. nitens – Y; > H. odorata var. fragrans (Willdenow) Richter (the North American plants)] {revise Y and Z synonymy}

Anthoxanthum nitens (Weber) Y. Schouten & Veldkamp spp. nitens, Vanilla Sweetgrass. Wet meadows, marshes, roadsides; sometimes interpreted as native in ne. North America and sometimes as an introduction from Europe. NL (Labrador) south to DE; n. Europe. [= FNA; < Hierochloe odorata (Linnaeus) Palisot de Beauvois – C, F, G, HC] [add Y and Z synonymy]


Apera Adanson 1763 (Windgrass)


Identification notes: The awns must be dry and relatively mature to assume their characteristic positions (immature awns and moist mature awns are erect and parallel). It is sometimes useful to dry a collection unpreserved. Beware, however, that drying followed by dispersal can take place very quickly under the right conditions (such as the dashboard of a hot car)!

1 Plant a perennial, forming dense tussocks, the leaves primarily basal, usually very numerous, mostly > 3 dm long, 0.5-1.5 mm wide, almost always tightly involute; flowering only in the growing season following fire.

2 Base of blade and collar (and often the upper sheath) with conspicuous tuft of woolly to villous pubescence (sometimes deciduous on foliage more than a year old); leaves usually glabrous above the basal 2 cm of the blade; [of s. SC south] .......... A. beyrichiana

2 Base of blade, collar, and upper sheath lacking a conspicuous tuft of woolly to villous pubescence; leaves with 2 lines of villous pubescence on either side of the midrib on the lower surface extending nearly or entirely the length of the blade (sometimes deciduous on foliage more than a year old); [of n. SC and NC] .................................................................................................................... A. stricta

1 Plant an annual or perennial, forming small tufts (or solitary), the leaves primarily cauline, usually few, mostly < 3 dm long (if as long as 3 dm then > 2 mm wide), flat to slightly folded, but not wiry; flowering not strongly triggered by fire.

3 First glume 3-7 nerved.

4 Central awn of the lemma (8-) 12-65 (-70) mm long, the lateral awns as long or nearly so .......................................................... A. oligantha

4 Central awn of the lemma (9-) 12-25 (-30) mm long, the lateral awns 1-4 mm long (or even lacking) ................................................. A. ramosissima

3 First glume 1-2-nerved.

5 Central awns spirally coiled at the base (above the awn column), like a corkscrew, 1/3 to 3 full turns (when dry).

6 Lateral awns 5-13 mm long, spreading ...................................................... A. basiramea

6 Lateral awns 1-4 mm long, erect

7 First glume 1/2 to 2/3 as long as the second glume; lemma 6-11 mm long, glabrous to scaberulous ................................................. A. curtissii

5 Central awns straight to curved (or contorted at the base).
8  Lateral awns < \( \frac{1}{3} \) as long as the central awn.  
9  Inflorescences 15-25 cm wide; loosely cespitose perennial, unbranched upwards.  
A. patula  
9  Inflorescences 1-6 cm wide; annuals, much branched above the base.  
A. adscensionis  
10  Awns terete at the base.  
A. basiramea  
11  Lemmas 8-22 mm long; central awn curved ca. 180 degrees at the base.  
A. ramosissima  
11  Lemmas 2.5-10 mm long; central awn curved ca. 90 degrees at the base.  
A. longespica var. geniculata  
12  Central awn (8-) 12-27 mm long; lateral awns 10-18 mm long.  
A. longespica var. longespica  
12  Central awn mostly 1-10 (-14) mm long; lateral awns 0.5-8 (-10) mm long.  
A. longespica var. geniculata  
8  Lateral awns > \( \frac{1}{3} \) as long as the central awn.  
13  Sheaths lanose or floccose (the hairs kinked and intertwined); nodes of the panicle axis with tufts of lanose or floccose hairs.  
A. lanosa  
13 Sheaths glabrous to pilose (the hairs straight and usually appressed, not intertwined); nodes of the panicle axis glabrous or pilose.  
A. spiciformis  
14  Awn column (the connivent awns twisted together) or lemma beak (slender, narrowed, and twisted portion of lemma body below the awns) 7-30 mm long; lemma body (including the beak, if present) separated from the awns (or awn column) by an articulation zone, the awns (or awn column) disarticulating at maturity from the lemma.  
15  Panicle spiciform, broadest near the middle, dense, the spikelets overlapping strongly; awns (10-) 20-30 mm long, borne at the summit of a twisted lemma beak 7-30 mm long; culms simple or with very few branches; plants perennial.  
A. tuberculosa  
16  Panicle almost corymbiform, broadest above the middle, open, the spikelets overlapping only slightly; awns 30-40 mm long, not including the 8-15 mm long column formed by the twisting together of the 3 awn bases; culms often much-branched; plants annual.  
A. gynes  
17  Plants tufted, not rhizomatous; basal sheaths not shredding into persistent fibers; [collectively of various habitats].  
18  Spikelets borne singly at each node of the main axis, the inflorescence thus a spike or raceme.  
A. mohrii  
18  Spikelets 2 or more per node of the main axis at most nodes (a few nodes may have single spikelets), often with side branches present as well, the inflorescence thus a panicle (less commonly a raceme).  
A. virgata  
19  First glume 1/3-\( \frac{1}{2} \) the length of the second glume.  
A. gyrans  
19  First glume > \( \frac{1}{3} \) the length of the second glume.  
A. purpurascens  
20  Central awn 15-40 mm long; first glume prominently 2-keeled, (8-) 9-14 mm long when mature.  
A. palustris  
20  Central awn 8-25 mm long; first glume either 1-keeled and 6-14 mm long, or weakly 2-keeled and 5.5-9 (-10) mm long when mature.  
21  Central awn about 2× as thick as the lateral awns, divergent to reflexed; first glume 1-keeled or weakly 2-keeled; [moist to wet habitats].  
22  Basal internode of the culm 0.3-0.6 mm wide; most nodes of the inflorescence with 1-2 spikelets; all awns spreading, the central spirally twisted basally and often contorted by as much as 180 degrees (best seen in fresh material); central awn 15-20 mm long, lateral awns 11-16 mm long, the ratio of the lateral:central awn length 0.69-0.80; lemma callus beard 0.6-1.0 mm long.  
23  Culms 5-8 (-10) dm tall and 1-4 mm in diameter near the base; awns 8-15 mm long; panicle branches > 4 cm long; callus ca. 1.0 mm long.  
A. condensata  
23  Culms mostly > 10 dm tall and 3-6 mm in diameter near the base; awns 8-15 mm long; panicle branches > 4 cm long; callus ca. 1.0 mm long.  
A. basiramea var. basiramea – C  
24  First glume 1-4 mm longer than the second glume (rarely about equal to it); awns 15-25 mm long, straight or slightly contorted at the base; leaf blades 1-3 mm wide, usually curling.  
A. purpurascens  
24  First glume shorter than or about equal to the second glume; awns 12-18 mm long, spirally contorted at the base; leaf blades about 1 mm wide, usually not curling.  
A. tenusiptica  

* Aristida adscensionis Linnaeus, Sixweeks Three-awn. {habitat in our area unknown}; native of w. United States. Reported for SC (FNA). {further investigate}  
* Aristida basiramea Engelmann ex Vasey, Forktip Three-awn. Sandy soils; probably introduced, native of msw. United States. ME and ON south to SC (FNA), FL (Wunderlin & Hansen 2003), AL, TX, and CO (FNA).  
* Aristida beyrichiana Trinius & Ruprecht, Southern Wiregrass. Sandhills, savannas, from very dry to seasonally saturated soils. September-November. S. SC south to s. FL, west to s. MS. See Peet (1993) for discussion of the taxonomy and ecology of this species; also see comments under A. stricta, which also apply here. Ward (2001) proposes varietal status for A. stricta and A. beyrichiana.  
* Aristida condensata Chapman, Big Three-awn. Dry sandy soils of sandhills. August-October. Sc. NC south to s. FL, west to s. MS (Sorrie & Leonard 1999).  
* Aristida curtissii (A. Gray ex S. Watson & Coulter) Nash, Curtiss's Three-awn. Roadsides, disturbed areas, bare eroding soil. August-October. ME west to WY, south to n. FL, AR, OK, and CO, perhaps largely or entirely adventive in our area. See Z for a discussion of the rationale for reducing A. curtissii to a variety of A. dichotoma. C reduces it to a variety of the more western A. basiramea Engelmann ex Vasey. For now, and for simplicity, I prefer to retain the two as species.

Aristida gyrans Chapman, Corkscrew Three-awn. Dry pinelands. E. GA and w. Panhandle FL, south to s. FL. In Bryan, Long, and Montgomery counties in e. GA (Sorrie 1998b), and in wc. GA (J. Allison, pers. comm.). [= FNA, HC, K, S]


Aristida oligantha Michaux, Prairie Three-awn. Roadsides, fields, disturbed areas. August-October. VT west to SD, south to FL and TX, scattered elsewhere as a weed. [= FNA, GW, HC, K, S]


Aristida patula Chapman ex Nash, Tall Three-awn. Dry to moist sandy soils of pond margins, pinelands, dunes. Endemic to FL Panhandle (Dixie, Franklin, Gadsden, Leon, Taylor, and Wakulla counties) (Wunderlin & Hansen 2006) and peninsula. [= FNA, GW, HC, K, S]

Aristida purpurascens Poiret, Arrowfeather. Dry habitats, especially in dry sandy soils. August-October. MA west to WI and KS, south to FL and TX. In the Sandhills occurring in two forms, one green, the other strongly glaucous-blue. [= RAB, C, G, HC, S, W, WV; > A. purpurascens var. purpurascens – F; > A. purpurascens var. minor Vasey – F; = A. purpurascens var. purpurascens – FNA, K, Z]

* Aristida purpurea Nuttall var. longiseta (Steudel) Vasey, Red Three-awn. Disturbed areas; adventive from further west. August-October. Also reported from NC, but the collection is from a Soil Conservation Service test nursery, and there is no evidence of naturalization. [= C, FNA, K, Z; > A. longiseta var. robusta Merrill – F; = A. longiseta Steudel – G, HC]

Aristida rhizomorpha Swallen, Florida Three-awn. Wet pine flatwoods. FL endemic, north to Baker, Duval, and Nassau counties. [= FNA, HC, K]
**Aristida simpliciflora** Chapman, Southern Three-awn, Chapman's Three-awn. Wet pine savannas. Sw. GA west through the FL Panhandle and c. AL to s. MS (Sorrie & Leonard 1999), and south into c. peninsular FL; also in se. NC, where apparently disjunct (it should be searched for in SC). *A. simpliciflora* was believed to be a Gulf Coastal Plain endemic until found by R. LeBlond in 1999 in wet savannas in se. NC (Green Swamp savannas, Brunswick County; Old Dock Savanna, Columbus County; and The Neck Savanna, Pender County). It is reported for sw. GA (Jones & Coile 1988, Kartesz 1999). Harper also reports it for c. GA. [= FNA, HC, K, S, Z]

**Aristida spiciformis** Elliott, Bottlebrush Three-awn, Spike Three-awn. Wet pine savannas and seepage areas. August-October. E. SC (McMillan et al. 2002) south to FL, west to MS. Allred (1986) also reports this species from NC, but the documentation is unknown to me. [= RAB, FNA, HC, K, S, Z]

**Aristida stricta** Michaux, Carolina Wiregrass, Pineland Three-awn. Coastal Plain pinelands of nearly all sorts, ranging from the driest white-sand sandhills to seasonally saturated pine savannas dominated by a mixture of longleaf pine and pond pine, largely or entirely replaced in the wettest savannas by *Sporobolus teretifolius*, *Sporobolus pinetorum*, *Muhlenbergia expansa*, *Ctenium aromaticum*, and *Calamovilfa breviflora*; also in Piedmont areas adjacent to the Coastal Plain and formerly supporting fire-maintained longleaf pine woodlands. September-November. Ne. NC (south of Albemarle Sound and the Roanoke River), south to ne. SC (Lee and Kershaw counties). *A. stricta* was the keystone species of much of the upland Coastal Plain of the Carolinas. Its flammable foliage facilitated the spread of lightning-set fires that maintained the biologically rich pine savanna, sandhill, and pine flatwood ecosystems once widespread in our area. Though still locally common in parts of the Sandhill region and in portions of Brunswick, Pender, Onslow, and Carteret counties, NC, *A. stricta* is much rarer than formerly. The conversion of vast acreages of former pinelands to agriculture, pine tree farms, and developed areas has taken its toll over the years. In the twentieth century, suppression of fire has also led to the destruction of *A. stricta*. More recently, pine-straw raking is leading to the serious decline of *A. stricta* in its few remaining strongholds on public lands. *A. stricta* has little tolerance for ground disturbance. See Peet (1993) for discussion of the taxonomy and ecology of this species. Ward (2001) proposes varietal status for *A. stricta* and *A. beyrichiana*. [= K, Y; < *A. stricta* – RAB, FNA, GW, HC, S, V, Z (also see *A. beyrichiana*); = *A. stricta* var. stricta – X]

**Aristida tenuispica** A.S. Hitchcock, Southern Arrowfeather. Sandy habitats. August-October. NC south to FL and west to MS. [= HC, S; = *A. purpurascens* Poiret var. tenuispica (A.S. Hitchcock) Allred – FNA, K, Z]

**Aristida tuberculosa** Nuttall, Seabeach Needlegrass. Sandhills, coastal dunes (in VA), other dry, sandy habitats such as sandy roadsides. August-October. Se. NH south to NJ and disjunct in e. VA in the outer Coastal Plain; from sc. NC south to Panhandle FL and west to s. MS (Sorrie & Leonard 1999), mostly in the inner Coastal Plain; and also near the Great Lakes in sw. MI, n. IN, n. IL, s. WI, se. MN, and e. IA. The curious trimodal distribution is unexplained. [= RAB, C, F, FNA, G, HC, K, S, Z]

**Aristida virgata** Trinius. Moist to wet savannas, mountain bogs (Henderson Co., NC), other moist habitats. August-October. S. NJ south to FL, west to TX, primarily on the Coastal Plain. [= RAB, C, F, G, GW, HC, S; = *A. purpurascens* Poiret var. virgata (Trinius) Allred – FNA, K, Z]

Allred (1986) reports the collection of several additional non-native species from our area, including *A. divaricata* Willdenow from sw. United States (from a Soil Conservation Service test nursery in Chapel Hill, NC) and uncertainly identified material of an Australian species (from a wool-combing mill at Jamestown, Berkeley County, SC). There is no evidence that either are naturalized.

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**Arrhenatherum** Palisot de Beauvois 1812 (False Oatgrass)

A genus of about 6 species, perennials, of the Mediterranean region and e. Asia. References: Hatch in FNA (2007a); Tucker (1996)–Z.

1 Base of culm consisting of a series of adjacent (moniliform) corms 5-10 mm in diameter ............................................*A. elatius* var. bulbosum
1 Base of culm not swollen or cormose, 2-4 mm thick ........................................................................................................*A. elatius* var. elatius

* **Arrhenatherum elatius** (Linnaeus) J. & K. Presl var. bulbosum (Willdenow) Spenner, Tuber Oatgrass, Onion Couch. Habitat in our area not known; native of Europe. This variety was apparently cultivated for the edible tubers in Bronze Age


**Arthroxan** Palisot de Beauvois 1812 (Basket Grass)


Identification notes: Sometimes confused (especially before flowering) with *Microstegium*, but *Arthroxan* has distinctly cordate-clasping leaves, which *Microstegium* lacks. Also very similar to *Oplismenus*.

* Arthroxan hispidus (Thunberg) Makino var. hispidus, Basket Grass. Moist ditches, bottomlands, disturbed areas; native of se. Asia. September-October. Like *Microstegium*, *Arthroxan* appears to be steadily increasing its abundance in our area. [= FNA, Y; < A. hispidus – C, GW, K, Z; > A. hispidus var. cryptatherus (Hackel) Honda – RAB, F, G, HC, W]

**Arundinaria** Michaux 1803 (Cane)

A genus of 3 species, woody grasses (bamboos), native of se. United States. *Arundinaria* was much reduced by the foraging of free-range livestock in the eighteenth and early nineteenth centuries and by fire suppression in the late nineteenth century and throughout the twentieth century. "Canebrakes," large areas dominated by cane, were described in many historical accounts and apparently occupied large parts of the landscape of the Coastal Plain, also occurring in the Piedmont and low Mountains. References: Ward (2009c)=V; Clark & Triplett in FNA (2007a); Tucker (1988)=Y; McClure (1973)=Z; McClure (1963); Judziewicz et al. (2000)=X; Triplett, Weakley, & Clark (2006)=Q. The key is adapted from Q.

1 Primary branches with 0-1 compressed basal internodes (in the basalmost 1 cm or so); culm internodes usually sulcate (with a groove extending upwards from the node, sometimes partly obscured by the branch); culm leaves deciduous; culms to 10 m tall; rhizomes lacking air canals; foliage leaf blades 0.8-1.3 cm wide.................................................................A. gigantea

1 Primary branches with 2-5 compressed basal internodes (in the basalmost 1 cm or so); culm internodes usually terete; culm leaves persistent to tardily deciduous; culms to 4 m tall; rhizomes with or without longitudinal air canals (visible in cross-section as a cylinder of hollow canals 1 mm or less from the outer surface); foliage leaf blades 0.8-2 cm wide.

2 Foliage blades chartaceous, deciduous, abaxial surfaces pilose or glabrous, weakly tessellate; primary branches usually < 35 cm long, basal nodes of primary branches not developing secondary branches; top knot blades 12-22.5 cm long; rhizomes with or without air canals............................................................................................................................................A. appalachiana

2 Foliage blades coriaceous, persistent, abaxial surfaces densely pubescent or glabrous, strongly tessellate; primary branches usually > 50 cm long, basal nodes of primary branches developing secondary branches; top knot blades 20-30 cm long; rhizomes with air canals..........

............................................................................................................................................A. tecta

**Arundinaria appalachiana** Triplett, Weakley, & L.G. Clark, Hill Cane. Dry to moist forests on slopes. Noted as distinctive as long ago as 1900 by R.M. Harper, W.C. Coker, W.W. Ashe, and C.D. Beadle, this distinctive plant of the Appalachians has only recently been described as a species (Triplett, Weakley & Clark 2006). The short plants (often only knee-high, though sometimes head-high) on mountain slopes south of Asheville are autumn-deciduous, whereas both our other species are evergreen. [= FNA, Q, V; < A. gigantea (Walter) Walter – RAB, GW; < A. gigantea ssp. tecta (Walter) McClure – K, X, Z; < A. tecta – HC, S, Y; = A. tecta var. decilia Beadle in L.H. Bailey]

**Arundinaria gigantea** (Walter) Muhlenberg, Giant Cane, River Cane. Swamps, floodplain. April-July. S. OH south to FL and e. TX. There has been much confusion about the recognition of one, two, or several taxa of cane in the Southeastern United States. This species reaches heights of 6-7 (-10) m and is supposed to flower only once every 40-50 years. *A. macrospora* Michaux is controversial, sometimes considered to be a synonym of *A. gigantea* or to represent hybridization or introgression between *A. gigantea* and *A. tecta*. [= F, FNA, HC, K, S, WV, Y; < A. gigantea – RAB, C, GW (also see A. tecta); = A. gigantea ssp. gigantea – K, Z; > A. gigantea ssp. gigantea – X; > A. gigantea (Walter) Muhlenberg ssp. macrospora (Michaux) McClure – X; = A. macrospora (Michaux – V)]

**Arundinaria tecta** (Walter) Muhlenberg, Switch Cane, Small Cane. Savannas, pocosins, canebrakes, generally (but not solely) in wetlands. April-July. Primarily a Southeastern Coastal Plain endemic: e. MD to FL and s. AL. *A. tecta* is a smaller plant than *A. gigantea* (normally 1-2 m tall, but reaching heights of up to 4 m where fire-suppressed), and flowers more frequently, supposedly every 3-4 years (Tucker 1988), probably actually in response to fire. [= FNA, Q; < A. gigantea (Walter) Muhlenberg – RAB, C, GW; < A. tecta – F, HC, S, Y; < A. gigantea ssp. tecta (Walter) McClure – K, X, Z; = A. gigantea (Walter) Muhlenberg – V]
**Arundo** Linnaeus 1753 (Giant Reed)


* **Arundo donax** Linnaeus, Giant Reed. Disturbed areas; native of the Old World. September-October. Horticultural forms with leaves transversely striped white and green have been treated as var. versicolor, but are better considered as only a form or cultivar. [= RAB, F, FNA, K, S; > *A. donax* var. *donax* – HC; > *A. donax* var. versicolor (P. Miller) Stokes – HC]

**Avena** Linnaeus 1753 (Oats)


1 Florets disarticulating from the glumes at maturity (the glumes remaining attached to the plant); lemmas pubescent with brown hairs; lemmas with long bent awns; callus bearded with hairs up to ¼ as long as the lemmas.................................................................**A. fatua**

1 Florets not disarticulating from the glumes at maturity; lemmas glabrous or scabrous (rarely sparsely strigose); lemmas unawned or with relatively straight awns; callus glabrous ......................................................................................................................................................**A. sativa**

* **Avena fatua** Linnaeus, Wild Oats. Disturbed areas; native of Europe and c. Asia. {needs herbarium checks; no records shown on VA Atlas}. [= C, F, FNA, G, HC, K]

* **Avena sativa** Linnaeus, Oats. Fields and disturbed areas, commonly cultivated; native of Middle East. May-June. An important crop, but apparently only a weed until transported from the Middle East to the moister central Europe, where cultivated beginning about 3000 BP (Hancock 2004). [= RAB, FNA, G, HC, K, S, W, Z; > *A. sativa* var. orientalis (Schreber) Alefeld – F; > *A. sativa* var. *sativa* – F]

**Avenella** Koch ex Steudel 1840 (Hairgrass)


**Avenula** (Dumortier) Dumortier 1868


* **Avenula pubescens** (Hudson) Dumortier, Downy Oatgrass. Disturbed areas; native of Eurasia. [= *Avenula pubescens* ssp. pubescens – FNA; > *Avenula pubescens* ssp. laevigata (Schur) Holub – FNA; = *Helictotrichon pubescens* (Hudson) Bess. ex Pilger – C, HC, K; = *Avena pubescens* Hudson – F, G]

**Axonopus** Palisot de Beauvois 1812 (Carpet Grass)

A genus of ca. 100 species, primarily tropical and subtropical. Phylogenetic studies suggest that *Axonopus* may be included in *Paspalum*. References: Barkworth in FNA (2003a).

1 Spikelets 4-6 mm long……………………………………………………………………………………………………………………………………**A. furcatus**

1 Spikelets 1.5-2.8 mm long.

2 Spikelets 1.5-2.2 mm long; leaf blades mostly 8-10 mm wide……………………………………………………………………………………**A. compressus**

2 Spikelets 2.2-2.8 mm long; leaf blades mostly 2-4 (-6) mm wide…………………………………………………………………………**A. fissifolius**
Axonopus compressus (Szwarcz) Palisot de Beauvois, Southern Carpet Grass. Lawns; probably introduced. Reported for VA by HC. Sometimes used as a lawn grass in the deep South. [= FNA, HC, K, S; Paspalum]

Axonopus fissifolius (Raddi) Kuhl., Common Carpet Grass. Sandy forests, roadides, lawns. June-October. VA south to FL, west to TX and OK, and extending into tropical America. [= FNA, K; ? A. affinis Chase – RAB, GW, HC, W; = Paspalum fissifolium Raddi]

Axonopus furcatus (Flügge) A.S. Hitchcock, Big Carpetgrass. Sandy forests, bottomlands, roadides, lawns. July-October. Se. VA south to FL, west to TX and AR. [= RAB, C, F, FNA, G, GW, HC, K, S; = Paspalum furcatus Flügge]

Bambusa Schreber 1789 (Bamboo)

A genus of ca. 100 species, trees and shrubs, native to tropical and subtropical Asia. References: Stapleton in FNA (2007a).

1 Culm leaves with auricles absent or very small and rounded; basal internodes not swollen, not much longer than those above. .................................................................................................. B. vulgaris

* Bambusa multiplex (Loureiro) Raeuschel ex Schultes & Schultes, Hedge Bamboo, Dwarf Bamboo. Disturbed areas; native of se. Asia. Reported as naturalized or persistent in portions of the southeastern United States, including GA, FL Panhandle, and FL peninsula. [= FNA, HC]

* Bambusa vulgaris Schrad ex J.C. Wendland, Common Bamboo. Disturbed areas; native of tropical Asia. Reported for SC (Kartesz 1999). (investigate) [= FNA, HC, K]

Bothriochloa Kunze 1891 (Beardgrass, Cane Bluestem)


1 Sessile spikelets 4.5-8.5 mm long

2 Rachises 5-10 cm long, with many branches ......................................................... B. barbinodis

2 Rachises usually < 5 cm long, with 3-8 branches ..................................................... B. hyrida

3 Sessile spikelets 3.4-5.4 mm long.

3 Pedicellate spikelets much shorter than the sessile spikelets.

4 Panicles reddish when mature; hairs below the sessile spikelets sparse and ca. ¼ as long as the spikelets, not obscuring the spikelets. .................................................................................................................................................. B. bladhii

4 Panicles silvery-white or tannish when mature; hairs below the sessile spikelets dense and > ½ as long as the spikelets, somewhat obscuring the spikelets

5 Panicles 9-20 cm long; sessile spikelets 3-4× as long as thick; leaves basally disposed; culm usually < 2 mm in diameter. .............................................. B. laguroides ssp. torreyana

5 Panicles 4-12 (-14) cm long; sessile spikelets 4-6× as long as thick; leaves evenly distributed on the culm; culm usually 2-4 mm in diameter.......................................................... B. longipaniculata

3 Pedicellate spikelets about as long as the sessile spikelets.

6 Rachises longer than the branches .............................................................................. B. bladhii

6 Rachises shorter than the branches.

7 Lower glumes of the sessile spikelets with a dorsal pit ........................................... B. pertusa

7 Lower glumes of the sessile spikelets without a dorsal pit ....................................... B. ischaemum var. songarica

* Bothriochloa barbinodis (Lagascay Segura) Herter, Cane Bluestem, Pinhole Bluestem. Disturbed areas; native of w. United States. [= FNA, K; > Bothriochloa perforata (Trinius ex E. Fournier) Herter – Z; = Andropogon barbinodis Lagasca y Segura – HC; > Bothriochloa barbinodis (Lagascay Segura) Herter var. perforata (Trinius ex E. Fournier) Gould; > Andropogon perforatus Trinius ex E. Fournier]

* Bothriochloa bladhii (Retzius) S.T. Blake, Australian Bluestem. Disturbed areas; native of subtropical Asia and Africa. Reported from e. TN (according to specimen cited by FNA and Z) and Alachua County, FL (immediately south of our area). [= FNA, K, WH, Z] (synonymy incomplete)


* Bothriochloa longipaniculata* (Gould) Allred & Gould, Longspike Silver Bluestem. Disturbed areas; native of LA to TX, south to Mexico and Panama. [= FNA, K]

* Bothriochloa pertusa* (Linnaeus) A. Camus, Pitted Bluestem. Disturbed areas; native of Eurasia. Introduced at scattered sites in e. North America, including FL, LA, MD, and MS (FNA, Kartesz 1999). [= FNA, K, Z; = *Andropogon pertusus* (Linnaeus) Willdenow – HC] [FL] [synonymy incomplete]

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**Bouteloua** Lagasca y Segura 1805 (Gramina)


1 All spikelets unisexual, plants usually dioecious; [introduced species].......................................................... *B. dactyloides*

2 Panicle branches deciduous; disarticulation occurring at the base of the branch (the branch therefore falling whole); spikelets 2-3 per branch, appressed to the branch; [native species of limestone habitats, also with introduced populations]; [subgenus *Bouteloua*] ..........

3 Panicle branches extending beyond the base of the terminal spikelets ...................................................... *B. gracilis*

**Bouteloua curtipendula** (Michaux) Torrey var. *curtipendula*, Side-oats Grama. Dry rocky slopes and bluffs over calcareous rocks (such as limestone) or ultramafic rocks (such as serpentine), limestone glades. July-September. S. CT west to MT, south to VA, e. TN, nw. GA, AL, Panhandle FL (Gadsden County), TX, AZ, and CA; also in Central and South America. The older literature refers to *B. curtipendula* as introduced in SC, but the single specimen documenting its occurrence there appears to be from experimental plantings at Clemson University; there is apparently no evidence of its establishment. *B. curtipendula* occurs on serpentine in the Piedmont of GA (Allison, pers. comm.). Var. *caespitosa* Gould & Kapadia is cespitose rather than rhizomatous and occurs in sw. United States. [= C, FNA, K, Y; < *B. curtipendula* – RAB, F, G, HC, S, W, WV]


**Brachyelytrum** Palisot de Beauvois 1812 (Shorthusk)


1 Lemmas hirsutulous or minutely scabrous, the longest hairs (0.06-) 0.08-0.14 (0.2) mm long (not evident at 10×); lemma (0.7-) 0.8-1.2 (-1.4) mm wide; widest leaf blade (8-) 10-14 (-16) mm wide; second glume (0.6-) avg. 1.2 (-3.0) mm long; [Mountains] .................. *B. aristosum*

2 Lemmas hirsute with hairs (0.2-) 0.4-0.8 (0.9) mm long (easily seen at 10×); lemma (0.8-) 1.1-1.5 (-1.8) mm wide; widest leaf blade (9-) 11-17 (-20) mm wide; second glume (0.2-) avg. 2.2 (7.0) mm long; [widely distributed in our area] ...................... *B. erectum*

**Brachyelytrum aristosum** (Michaux) Trelease in Branner & Coville, Northern Shorthusk. Moist forests, mostly at moderate to high elevations, such as northern hardwoods and spruce-fir. July-August. NL (Newfoundland), QC, ON, and MN south to n.

* Brachypodium sylvaticum (Hudson) Palisot de Beauvois ssp. sylvaticum, Slender False Brome. Roadside and yards; native of Europe. [= FNA; < B. sylvaticum – HC, K]

Briza Linnaeus 1753 (Quaking Grass)


1 Plant perennial; ligules ca. 0.5 mm long...................................................................................................................... B. media
1 Plant annual; ligules 3-13 mm long............................................................................................................................... B. maxima
2 Spikelets 10-20 mm long............................................................................................................................................. B. minor
2 Spikelets 2-7 mm long................................................................................................................................................ B. minor

* Briza maxima Linnaeus, Greater Quaking Grass. Disturbed areas; native of the Mediterranean region. Reported in e. GA (Jones & Coile 1988). [= FNA, KI] [synonymy incomplete]


Bromus Linnaeus 1753 (Brome-grass)


1 Lemmas compressed and strongly keeled (the whole spikelet thus strongly laterally flattened); first glume 3-9-nerved; [section Ceratochloa] . ................................................................................................................................................................. B. kalmii
1 Lemmas rounded or weakly keeled (the whole spikelet therefore terete to somewhat laterally flattened); first glume either 3-5-nerved or 1-3-nerved.
2 First glume 3-5 nerved (at least 3 nerves well-developed).
   3 Lemma awn 2-3 mm long; plant perennial; [native species of dry woodlands]; [section Bromopsis] ................................................................................................................................................................................ B. commutatus
   3 Lemma 3-12 mm long or (0-6 mm long in B. secalinus); plant annual; [introduced species of disturbed habitats]; [section Bromus].
   4 Panicle compact, the lateral branches erect or ascending, the pedicels < 10 mm long (shorter than the spikelets)
   5 Lemmas 3-5 mm wide; inflorescence ovoid in outline .................................................................................................. B. hordeaceus ssp. hordeaceus
   5 Lemmas 1.5-2 mm wide; inflorescence obvoid in outline .................................................................................................. B. scoparius
   4 Panicle relatively open, the lateral branches erect, ascending, or spreading, the pedicels > 15 mm long (longer than the spikelets)
   6 Margins of the lemmas involute in fruit, wrapping around the grain, exposing the rachilla ............................................................................................................................................................................. B. secalinus
   6 Margins of the lemmas gaping, overlapping in fruit.
   7 Panicle branches erect or ascending, relatively stiff and straight ................................................................................... B. racemosus
   7 Panicle branches spreading (at least the lower), either relatively stiff and straight, or flexuous and lax.
   8 Panicle branches stiff; lemma awns 5-12 mm long, straight ...................................................................................... B. commutatus
   8 Panicle branches flexuous and lax; lemma awns 7-15 mm long, flexuous ................................................................................... B. japonicus
2 First glume 1 (-3) nerved (only 1 nerve well-developed).
POACEAE

9 Longer lemma awns 10-60 mm long; plants annual; [introduced species of disturbed habitats]; [section Genea].
10 Panicle dense, spikelet-like .................................................. *B. rubens*
10 Panicle open, not spikelet-like.
11 First glume 13-20 mm long; second glume 20-30 mm long; lemma awns 35-60 mm long ...................... *B. rigidus*
11 First glume 5-14 mm long; second glume 8-17 mm long; lemma awns 10-30 mm long.
12 First glume 7-14 mm long; second glume 9-17 mm long; lemma awns 18-30 mm long .......................... *B. sterilis*
12 First glume 5-7 mm long; second glume 8-11 mm long; lemma awn (7-) 10-17 mm long .................... *B. tectorum*
9 Longer lemma awns 1-6 (8-) mm long; plants perennial; [native and introduced species, collectively disturbed and natural habitats]; [section Bromopsis].
13 Plants with creeping rhizomes, forming clonal colonies; both surfaces of leaves glabrous or glabrescent ............... *B. inermis*
13 Plants not strongly rhizomatous, the stems solitary or tufted; surfaces of leaf blades usually pubescent (sometimes sparsely so).
14 Pedicels erect or ascending, mostly shorter than the spikelet; leaves 2-3 mm wide; [introduced, of disturbed habitats] ....... *B. erectus*
14 Pedicels ascending at first, later arching-drooping, mostly longer than the spikelet; leaves 4-15 mm wide; [native, mostly of forests]
15 Lemmas glabrous (or very minutely pubescent) on the back, hairy along the lower margins with long hairs ........... *B. ciliatus*
15 Lemmas uniformly hairy over the entire back-surface (or rarely entirely glabrous).
16 Culms with 10-20 leaves, often weak and leaning or reclining; junction of sheaths and base of leaf blades with 2 well-developed flanges prolonged into auricles or divergent spurs; second glume primarily 5-nerved; flowering late, with anthesis August-October ................................................................. *B. laitiglumis*
16 Culms with 6-10 leaves, erect; junction of sheaths and base of leaf blades lacking flanges or auricles; second glume primarily 3-nerved; flowering earlier, anthesis from May-August.
17 Underleaf surfaces lacking a conspicuous satiny sheen; summit of sheath opposite the ligule lacking a conspicuous tuft of hairs .................................................................................................................. *B. nottowayanus*
17 Underleaf surfaces lacking a conspicuous satiny sheen; summit of sheath opposite the ligule lacking a conspicuous tuft of hairs .................................................................................................................. *B. pubescens*

* **Bromus arvensis** Linnaeus. Disturbed areas; native of Europe. Reported as introduced for nc. GA (Jones & Coile 1988), for VA, MD, PA, and NJ (Kartesz 1999), and for KY (Campbell 2007). [= C, F, FNA, HC, K] {not yet keyed}


* **Bromus ciliatus** Linnaeus. Fringed Brome. Seepage areas, edges of fens, moist areas near high elevation creeks, grassy balds, high elevation woodlands, mostly over mafic or calcareous rocks. July-August. Widespread in n. North America: NL (Labrador) to AK, south in the east to PA, and in the mountains to NC. Known in NC only from Bluff Mountain and Long Hope Valley, Ashe and Watauga counties, and Roan Mountain, Mitchell County. [= RAB, C, FNA, G, HC, S, W, WV, X, Y; > Bromus ciliatus var. ciliatus – F, K; = Bromopsis ciliata (Linnaeus) Holub]

* **Bromus commutatus** Schrader. Hairy Chess, Meadow Brome. Disturbed areas; native of Europe. May-June. The relationship and relative distribution of this species and *Bromus racemosus* is poorly known for our area. See *Bromus racemosus* for further comments. [= C, F, FNA, HC, K, S, WV, X, Y; < Bromus commutatus – RAB (also see *Bromus racemosus*); < Bromus racemosus – G, W]

* **Bromus erectus** Hudson. Short-branchered Brome. Disturbed areas; native of Europe. [= C, F, FNA, G, HC, K, S, WV, X; = Bromopsis erecta (Hudson) Fourrier]


* **Bromus inermis** Leysser, Smooth Brome, Hungarian Brome. Disturbed areas; native of Europe. June-July. [= RAB, C, FNA, G, HC, S, W, WV, X, Y; > Bromus inermis var. inermis – F; > Bromus inermis ssp. inermis var. inermis – K; = Bromopsis inermis (Leysser) Holub]
POACEAE


* **Bromus kalmii** A. Gray, Kalm Brome, Canada Brome. Forests and woodlands, shale woodlands and barrens, grassy ridgetop oak forests. ME west to SD, south to VA, and IA. Distinctive for its few leaves (usually 3-4) clustered near the base, the spikelets large and approximate to one another in a narrow, nodding panicle. [= C, F, FNA, G, HC, K, X]  

* **Bromus latiglumis** (Shear) A.S. Hitchcock, Riverbank Brome, Auricled Brome, Hairy Woodbrome. Alluvial soils along rivers. August-October. Widespread in NE North America, from ME to MT, south to NC and OK. Flowering many weeks later than co-occurring *B. pubescens*. In NC apparently only along large rivers flowing west through the Appalachians into the Mississippi River drainage, notably the New and the French Broad. [= F, FNA, G, HC, K, X; < *Bromus purgans* Linnaeus – RAB; = *Bromus altissimus* Pursh – C; < *Bromus latiglumis* – Y (also see *Bromus nottowayanus*)]

* **Bromus nottowayanus** Fernald, Satin Brome, Nottoway River Brome, Virginia Brome. Moist forests, especially along small stream bottoms. June-August. The range of this species is poorly known, owing to confusion between it, *B. pubescens* and *B. latiglumis*. It is apparently known from MD, VA, and NC, west to TN, IL, IN, MO, and AR. McKenzie & Ladd (1995) report on the biology and taxonomy of this species. [= C, F, FNA, HC, K, X; < *Bromus purgans* Linnaeus – RAB; < *Bromus latiglumis* – Y; = *Bromopsis nottowayana* (Fernald) Holub]

* **Bromus pubescens** Muhlenberg ex Willdenow, Common Eastern Brome, Canada Brome. Mesic forests, generally on rocky slopes. May-August. Widespread in e. North America: s. ON west to AB, south to FL and AZ. [= C, FNA, K, W, X, Y; < *Bromus purgans* Linnaeus – RAB; < *Bromus latiglumis* – Y, misapplied (also see *Bromus nottowayanus*); = *Bromus purgans* Linnaeus – F, G, WV, misapplied; > *Bromus purgans* var. *purgans* – HC; > *Bromus purgans* var. *laeviglumis* (Scribner ex Shear) Swallen – HC; = *Bromus laeviglumis* – S, misapplied (?); = *Bromopsis pubescens* (Muhlenberg ex Willdenow) Holub]

* **Bromus racemosus** Linnaeus, Smooth Brome. Disturbed areas; native of Europe. May-June. The relative distribution, abundance, and habitats in our area of this species and *B. commutatus* poorly understood. Additional characters are as follows (from Stace 2010): lemmas 7-9 mm long (vs. 7.5-11 mm long in *B. commutatus*), anthers 1.5-3.5 mm long (vs. 1.3-2.5 mm long), spikelets 10-18 mm long (vs. 15-30 mm long), all panicle branches <4 cm long (vs. some panicle branches > 4 cm long). [= C, F, FNA, HC, K, X; < *Bromus commutatus* – RAB; < *Bromus racemosus* – G, W (also see *Bromus commutatus*)] [not yet mapped]


* **Bromus rubens** Linnaeus, Foxtail Chess, Red Brome. Waste areas near wool-combing plants, other disturbed areas; native of Mediterranean Europe. The SC occurrences come from areas around wool-combing plants, and were likely introduced on wool from w. United States, where this European species is well-established. Reported introduced in VA and MD (Kartesz 1999) as *B. madritensis*. [= C, FNA, G, X; ? *Bromus madritensis* Linnaeus – F, misapplied; < *B. rubens* – K; < *B. madritensis* Linnaeus – K; = *Bromus madritensis* ssp. *rubens* (Linnaeus) Husnot]

* **Bromus scoparius** Linnaeus, Broom Brome. Disturbed areas; native of s. Europe. [= FNA, K] [add to synonymy]


* **Bromus squarrosus** Linnaeus, Squarrose Brome. Reported for KY and NJ (Kartesz 1999). Native of Eurasia. [= FNA, K] [not yet keyed]


Calamagrostis Adanson 1763 (Reed-grass)

A genus of about 230 species, north and south temperate. References: Marr, Hebd, & Greene in FNA (2007a); Tucker (1996)=Z; Greene (1980). Key based on FNA.

1 Callus hairs > 1.3× as long as the lemma; rachilla prolonged beyond the palea; [rare introduction from s. NJ northwards] .............................................. *C. epigejos*

1 Callus hairs < 1.2× as long as the lemma; rachilla not prolonged beyond the palea; [natives, sometimes weedy, widespread].

2 Awns attached on the upper 2/5 of the lemmas, 0.5-2 mm long, straight .......................................................................................... *C. coarctata*

2 Awns attached on the lower 1/5 of the lemmas, 0.9-6 mm long, straight or bent.

3 Awns usually exerted, (2.8-) 3-6 mm long; callus hairs 0.3-0.7× as long as the lemma.

4 Leaves (1-) 2-3 (-4) mm wide; plant densely tufted, delicate, culms 10-55 (-60) cm tall, with 2-3 nodes; [high elevation rock outcrops and glades] .......................................................................................... *C. cainii*

4 Leaves (2-) 3-8 (-12) mm wide; plant rhizomatous or loosely tufted, coarse, culms (60-) 75-120 cm tall, with 3-5 nodes; [low to moderate elevation forests and woodlands].

5 Leaves glaucous above and below, leaf collars glabrous ........................................................................................................... *C. porteri* ssp. insperata

5 Leaves glaucous above, dark green below; leaf collars with prominent tufts of hairs ........................................................................... *C. porteri* ssp. porteri

3 Awns usually not exerted, 0.9-3.1 (-4) mm long; callus hairs (0.5-) 0.7-1.2 (-1.5)× as long as the lemma.

6 Callus hairs < 1 mm long, 0.2-0.3× as long as the lemma ........................................................................................................... *C. pickeringii*

6 Callus hairs > 1 mm long, (0.5-) 0.7-1.2 (-1.5)× as long as the lemma

7 Glumes smooth (or scabrous on the keel only); awns stout, readily distinguished from the callus hairs ........................................................................................................... *C. stricta* ssp. inexpansa

7 Glumes scabrous on the keel and often also the surface; awns delicate, difficult to distinguish from the callus hairs.

8 Spikelets 2.5-4 mm long; lemmas usually shorter than the glumes; glumes rounded to broadly keeled, with raised midveins; glume apices usually acute, rarely acuminate .......................................................... *C. canadensis* var. canadensis

8 Spikelets 2-3 mm long; lemmas usually about as long as the glumes; glumes rounded, midveins not raised; glume apices acute ........................................................................................................... *C. canadensis* var. macouniana

Calamagrostis cainii A.S. Hitchcock, Cain's Reed-grass. High elevation rocky summits. July-September. Endemic to a few mountain-tops in the Southern Appalachians, *C. cainii*, once thought to be endemic to Mount LeConte, TN, was discovered at two sites in NC in 1989 and 1990 – Mount Craig, Yancey County, and Craggly Pinnacle, Buncombe County (Wiser 1991). This species is more likely to be mistaken (especially superficially) for an *Agrostis* than for any of the other *Calamagrostis* in our area, but is distinguishable by its larger spikelets (5-6 mm long, rather than 1.3-2 mm) and the presence of a callos beard. [= FNA, HC, K, W, Z]

Calamagrostis canadensis (Michaux) Palisot de Beauvois var. canadensis, Bluejoint, Canada Reed-grass. Wet meadows along streams, high elevation openings, such as grassy balds and cliff bases. August. Widespread and common across n. North America, reaching its southern limit in the east in w. NC, e. TN (Chester et al. 1993), and ne. GA (Rabun Bald, Rabun County). [= FNA, G, HC, K; < C. canadensis – RAB, C, S, W, WV, Z; > C. canadensis var. canadensis – F; > C. canadensis var. robusta Vasey – F]

Calamagrostis canadensis (Michaux) Palisot de Beauvois var. macouniana (Vasey) Stebbins. Bottomlands. NL (Newfoundland) and AB south to NJ, PA, VA?, OH, w. KY, IL, MO, NE, WY, OR. Reported for VA (FNA), the documentation unknown. Reported south to NJ and KY only (Kartesz 1999). [investigate] [= F, FNA, G, HC, K; < C. canadensis – C, Z; = C. macouniana (Vasey) Vasey]

Calamagrostis coarctata Eaton, Nuttall's Reed-grass. Savannas, bogs, and other wet sites. July-October. ME and NY south to n. GA (Jones & Coile 1988), AL, and LA, primarily on the Coastal Plain. The replacement of the familiar name *C. cinnoides* is necessary for nomenclatural reasons (Kartesz 1999); a proposal may be made to conserve the name *C. cinnoides* (Barkworth, pers. comm., 2009). [= K; = C. cinnoides (Muhlenberg) W.P.C. Barton – RAB, C, F, FNA, G, GW, HC, S, W, WV, Z; = C. coarctata Eaton – K]

* Calamagrostis epigejos (Linnaeus) Roth, Bushgrass, Feathertop. Disturbed areas; native of Eurasia. [= C, G, FNA; = C. epigejos – HC; > C. epigejos var. epigejos – F, K2; > C. epigejos var. georgica (K. Koeh) Grisebach – F, K2]

Calamagrostis pickeringii A. Gray, Pickering's Reed-grass. Bogs. NL west to ON, south to NY and s. NJ. [= C, F, FNA, G, HC]
POACEAE

Calamagrostis porteri A. Gray ssp. porteri. Porter’s Reed-grass. Dry to dry-mesic forests, forest edges, cliff bases. NY to AL, in the Appalachians, with disjunct populations s. MO and w. AR; it was first reported from NC by Ware (1973). This species is typically sterile unless disturbed by fire or mechanically; it is therefore probably more common than collections indicate. In addition to the key characters above, it can be distinguished from C. canadensis by its having leaf sheaths pubescent at the summit (Matthews & Radford 1985). [= FNA, K; = C. porteri – C, HC, W, WV; ? C. porteri – G, Z]

Calamagrostis porteri A. Gray ssp. insperata (Swallen) C.W. Greene. Rock outcrops; rocky woodlands. OH and MO south to TN and AR. [= FNA, K; = C. insperata Swallen – C, HC]

Calamagrostis stricta (Timm) Koeler ssp. inexpansa (A. Gray) C.W. Greene. Mt (WV): [habitat]. NL (Newfoundland) and NL (Labrador) west to AK, south to NY, OH, n. WV (Preston and Randolph counties), IA, AZ, and CA; ne. Asia. [= FNA, K; < C. stricta – C; ? C. neglecta (Ehrhart) Gaertner, Mey., & Scherb. var. neglecta – F; = C. inexpansa A. Gray – G, HC]

Calamovilfa (A. Gray) Hackel ex Scribner & Southworth 1890 (Sandreed)

A genus of 5 species, of e. and c. North America. Reeder & Ellington (1960) studied various anatomic features of Calamovilfa, and determined that its closest relative was Sporobolus. A molecular phylogenetic study of Sporobolus and closely related genera suggests that Calamovilfa should be included in Sporobolus (Ortiz-Diaz & Culham 2000). References: Thieret in FNA (2003a); Thieret (1966)=Z. Key based in part on Thieret in FNA (2003a).

Identification notes: Superficially somewhat similar to Sporobolus pinetorum, S. floridanus, and S. curtissii (herbarium specimens of the two species have been regularly confused), Calamovilfa is distinguished by its leaves tapered to either end and long-acuminate (vs. parallel-margined and abruptly acute in Sporobolus) and tendency to form larger, clonal patches (Sporobolus forms wiregrass-like bunches or clumps). In flower or fruit, the Calamovilfa can be distinguished by characters of the spikelet, by vegetative characters, or by its coarser, generally taller culms, with the panicle branches usually spreading (rather than always ascending in Sporobolus). The three have very similar bases, unlike any other grasses in our area — the lower leaf sheaths are indurated and shiny, forming a hard, polished, knotty, and fire-proof covering over the short-creeping rhizome. Aristida stricta has a somewhat similar base, but less indurated, less creeping, and with an unpolished appearance. Calamovilfa brevipilis also has a cartilaginous, pale yellow annulum surrounding the outer (abaxial) surface of the juncture of the sheath and leaf, a structure not visible in the other species. Positive identification in sterile condition is not difficult.

1 Panicles narrow, the branches appressed-ascending; [Coastal Plain of FL] ............................................................................................... C. curtissii
1 Panicles broad, the branches ascending-spread; [either of the Coastal Plain of SC northwards, or of the interior].

2 Spikelets 6.0-7.4 mm long; glumes acute to acuminate, usually arcuate; lemmas 5.5-7.0 mm long, usually arcuate; [river scour areas in the rocky inland parts of the South] ........................................................................................................................................................... C. arcuata
2 Spikelets 4.0-5.8 mm long; glumes acute, straight; lemmas 4.0-5.4 mm long, straight; [pineland habitats of the Coastal Plain of SC northwards] ........................................................................................................ C. brevipilis

Calamovilfa arcuata K.E. Rogers, Cumberland Sandreed. Riverside scours. Ouachita Mountains of w. AR and e. OK; Cumberland Plateau of TN (Morgan and Cumberland counties), KY (McCrea County), and AL (Blount County). [= FNA, K]

Calamovilfa brevipilis (Torrey) Scribner, Pinebarren Sandreed. Savanna-pocosin ecotones, sandhill seepage bogs, pocosins, boggy powerline rights-of-way. June-October. A "bimodal endemic", with two areas of distribution: Pine Barrens of NJ and the Coastal Plain (very rarely lower Piedmont) of e. NC, n. SC, and s. VA. Var. heterolepis Fernald, no longer considered valid, refers to the NC-SC-material; var. calvipes Fernald, no longer considered valid, refers to the VA material. Like Aristida stricta, this grass is dependent on fire for flowering (it will also sometimes flower in response to mowing or other disturbance). Suppression of the natural fire regime has led to its substantial decline and the severe contraction of its range in the Southeast, since fire exclusion in its seepage or ecotone habitat leads to rapid invasion by shrubs and competitive elimination of Calamovilfa and many other herbs. [= RAB, C, FNA, G, GW, K, S, Z; > C. brevipilis var. brevipilis – F, HC; > C. brevipilis var. heterolepis Fernald – HC; > C. brevipilis var. calvipes Fernald – F, HC]

Calamovilfa curtissii (Vasey) Scribner, Curtiss’s Sandreed. Moist pinelands and edges of natural ponds. FL Panhandle and e. peninsular FL. C. curtissii is a closely related sibling species of C. brevipilis. [= FNA, GW, HC, K, S, Z]
POACEAE

Cenchrus Linnaeus 1753 (Burgrass, Sandspur)

A genus of about 16 species, primarily tropical and subtropical. References: Stieber & Wipff in FNA (2003a); Ward (2010b)=Y; Crins (1991)=Z. Key based in part on FNA.

Identifications note: Spikelets of Cenchrus are subtended by an involucre of spines and/or bristles which are (in most of our species) fused into a bur. Bristles are narrow-based and somewhat flattened (not terete) in cross-section, at least basally.

1 Panicle branches short, erect or ascending; spikelets 5-18 mm long, with 2-8 (-11) flowers.
2 Spikes in a single whorl, subtended by numerous smaller, narrower, free outer bristles.
3 Spines fused at the base only, the lower surfaces with 1-3 grooves..........................Cenchrus bisonii
4 Rachis internodes 0.8-1.7 mm long; most of the outer bristles equal to or slightly longer than the flattened inner bristles (spines)..........................Cenchrus echinatus
5 Rachis internodes 2-4 mm long; most of the outer bristles much shorter than the flattened inner bristles (spines)..........................Cenchrus longispinus
6 Rachis internodes 0.8-1.7 mm long; the lower surfaces not grooved.
7 Spines slender, 45-75, 3.5-7 mm long; spikelets 6-8 mm long..............................C. incertus
8 Spines stout, 6-10 (-40), 2-5 mm long; spikelets 3.5-6 mm long..............................C. nitidum
9 Spikes slender, 4-12 mm long, 2-3 mm wide; spikelets 6-8 mm long..............................C. latifolium

* Cenchrus biflorus Roxburgh, Indian Sandbur. Disturbed areas, ballast; native of Africa and s. Asia. Reported from ballast in Mobile, AL; perhaps only a waif. [= FNA, HC]
*? Cenchrus brownii Roemer & J.A. Schultes. Disturbed areas, maritime grasslands. Se. United States (NC, GA, AL, and FL); West Indies, Central America, n. South America. The sole known NC specimen was collected in 1885 by Gerald McCarthy in NC “in locis navalibus et vastis.” [= FNA, K, WH, Y; ? C. viridis Sprengel – HC, S, misapplied]
Cenchrus echinatus Linnaeus, Southern Sandspur, Bristly Sandspur, Hedgehog Grass. Fields, roadsides, disturbed areas. June-October. NC (and DC?) south to FL, west to CA, south into the tropical America. The basis for the record for w. VA in FNA is not clear. [= RAB, C, FNA, HC, K, S, WH, Y, Z]
Cenchrus gracillimus Nash, Sandhill Sandspur. Longleaf pinelands, other sandy habitats. N. FL, s. and e. GA, s. AL, and s. MS; West Indies (Cuba, Jamaica). [= FNA, HC, K, S, WH, Y]
Cenchrus incertus M.A. Curtis, Coastal Sandspur. Fields, roadsides, disturbed areas. July-October. VA south to FL, west to AR and KS, south into tropical America. Ward (2010b) argues convincingly that the name C. spinifex is very uncertainly applied to our species and should not be taken up. [= RAB, C, F, G, HC, S, Y, Z; = C. spinifex Cavanilles – FNA, K]
Cenchrus longispinus (Hackel) Fernald, Northern Sandspur, Common Sandspur. Fields, roadsides, disturbed areas, lawns. June-October. ME west to OR, south to FL, TX, and CA. [= RAB, C, F, FNA, K, W, Z; = C. pauciflorus Bentham – G, HC, S, WV, misapplied]
* Cenchrus myosuroides Kunth. Roadsides, disturbed areas; native of further south. December. SC south to FL, west to TX, south into the West Indies and other parts of tropical America. [= RAB, FNA, HC, K, S, W, WH, Y, Z]

Chasmanthium Link 1827 (Spanglegrass, Spikegrass)


1 Panicle branches elongate, pendulous; spikelets (15-) 20-40 mm long, with 6-20 flowers..........................C. latifolium
2 Fully-developed spikelets 12-18 mm long, 8-12 mm wide.
3 Axils of the spikelets and panicle branches glabrous; empty lemmas 9 (-12); [se. NC south to c. peninsular FL and e. FL Panhandle]..........................C. nitidum
3 Axils of the spikelets and panicle branches with a tuft of long hairs; empty lemmas 2-4; [w. FL Panhandle west to e. LA (Florida parishes)] ............................................................................................................................................................................................  C. ornithorhynchum

2 Fully-developed spikelets 4-9 mm long, 3-7 mm wide.

4 Collar (junction of leaf and sheath) glabrous or nearly so; leaves 3-7 mm wide .................................................. C. laxum

4 Collar (junction of leaf and sheath) pilose; leaves 6-12 mm wide.

5 Inflorescence with divergent branches; [outer Coastal Plain calcareous sites from SC southwards] .....................  C. sessiliflorum var. 1

5 Inflorescence with appressed branches; [more widespread in our area] .................................................. C. sessiliflorum var. sessiliflorum

Chasmanthium latifolium (Michaux) Yates, River Oats, Fish-on-a-pole. Riverbanks, streambanks, bottomland forests, seepages and glades over mafic or calcareous rock, usually in nutrient-rich soils. June-October. NJ, OH, IL, and KS south to FL and TX. [= C, FNA, GW, K, W, Z; = Uniola latifolia Michaux – RAB, F, G, HC, S, WV]

Chasmanthium laxum (Linnaeus) Yates, Slender Spikegrass. Savanna-pocosin ecotones, sandhill-pocosin ecotones, moist hardwood swamps, other moist habitats. June-October. Widespread in se. North America, north to s. NY, KY, and OK. See C. sessiliflorum for comments on the suggestion that these two taxa are only varietally distinct. [= C, FNA, GW, K, W, Z; = Uniola laxa (Linnaeus) Britton, Sterns, & Poggenburg – RAB, F, G, HC, S; = Chasmanthium laxum var. laxum]

Chasmanthium nitidum (Baldwin) Yates, Shiny Spanglegrass. Blackwater swamp forests. September-November. A Southeastern Coastal Plain endemic: se. NC south to c. FL and west to se. AL. [= FNA, GW, K, Z; = Uniola nitida Baldwin – RAB, HC, S]

Chasmanthium ornithorhynchum (Steudel) Yates, Birdbill Spikegrass. Blackwater swamp forests. S. AL and w. FL Panhandle west to e. LA (Florida Parishes). Also reported for NC and SC (FNA 2003a). {investigate} [= FNA, GW, K, W, Z; = Uniola ornithorhyncha Steudel – S]

Chasmanthium sessiliflorum (Poiret) Yates var. 1, Coastal Hammock Longleaf Spikegrass. Calcareous hammocks. August-October. An additional taxon warrants recognition: it is characterized by divergent panicle branches and occurs in outer Coastal Plain calcareous sites (J. Allison, pers. comm.). [< Chasmanthium sessiliflorum (Poiret) Yates – C, FNA, GW, K, Z; < Uniola sessiliflora Poiret – RAB, F, G, HC; < Uniola longifolia Scribner – S; < Chasmanthium laxum (Linnaeus) Yates var. sessiliflorum (Poiret) L. Clark]

Chasmanthium sessiliflorum (Poiret) Yates var. sessiliflorum, Longleaf Spikegrass. Moist hardwood forests, swamps, other moist habitats. August-October. Widespread in se. North America, north to se. VA, TN, AR, and OK. This species and C. laxum are morphologically somewhat similar, but their treatment as varieties of a single species is completely unwarranted. They frequently co-occur (especially on the Gulf Coastal Plain), growing side by side, and show no sign of intergradation. [< Chasmanthium sessiliflorum – C, FNA, GW, K, W, Z; < Uniola sessiliflora Poiret – RAB, F, G, HC; < Uniola longifolia Scribner – S; < Chasmanthium laxum (Linnaeus) Yates var. sessiliflorum (Poiret) L. Clark]

Chloris Swartz 1788 (Finger-grass, Chloris)

A genus of 55-60 species, annuals or perennials, mainly tropical and Southern Hemisphere. References: Barkworth in FNA (2003a). [also see Eustachys]. Key based partly on C.

1 Inflorescence verticillate, typically the panicle branches in 2-5 verticils; perennial; fertile lemma inconspicuously appressed-pilose; spikelets not imbricate ............................................................................................................................................................................................  C. verticillata

1 Inflorescence digitate, the panicle branches in a single verticil at the apex of the culm; annual; lemma conspicuously long-ciliate; spikelets imbricate .......................................................................................................................................................................................................................  C. virgata

* Chloris barbata Swartz, Swollen Windmill-grass. Cp (SC): disturbed areas, waste areas near wool-combing mills; rare, native of West Indies, e. Mexico, Central America, and South America. [= FNA, K1, K2] [FL] [not yet keyed]

* Chloris verticillata Nuttall, Windmill-grass. Cp (DE), Mt (VA, WV), {SC}: disturbed areas, bottomland fields; uncommon (rare in SC, VA, and WV), native of further west. [= C, F, G, HC, K]

* Chloris canterae Arechavaleta var. canterae, Paraguayan Windmill-grass. Cp (GA): disturbed ground; rare, native of Paraguay. The epithet was originally spelled “canterae,” but should be corrected to the genitive “canterae” by the provisions of the ICBN. [= K2; = C. canterei Arechavaleta var. canterae – K1; < C. canterae – HC, orthographic variant] [not yet keyed]

* Chloris canterae Arechavaleta var. grandiflora (Rosengurtt & Izaguirre deArtucio) D.E. Anderson, Paraguayan Windmill-grass. Cp (SC): waste areas near woof-combing mills; rare, perhaps only a waif, native of Paraguay. [= K2; = C. canterei Arechavaleta var. grandiflora (Rosengurtt & Izaguirre deArtucio) D.E. Anderson – K1; < C. canterae – HC, orthographic variant] [not yet keyed]

* Chloris coccullata Bisch. Cp (FL, SC): waste areas near woof-combing mills, other disturbed areas; rare, perhaps only a waif, native of sc. United States and Mexico. [= K1] [not keyed]

* Chloris divaricata R. Brown. Cp (SC): waste areas near woof-combing mills; rare, perhaps only a waif, native of {}. [= K1] [not keyed]

* Chloris gayana Kunth, Rhodes Grass. Cp (FL, SC): waste areas near wool-combing mills, other disturbed areas; rare, perhaps only a waif, native of Africa. [= F, HC, K1, S] [not keyed]

* Chloris pectinata Bentham. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of {}. [= HC, K1] [not keyed]

* Chloris truncata R. Brown, Stargrass. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of Australia. [= HC, K1] [not keyed]

Chrysopegon Trinius 1820 (Goldbeard)

A genus of about 26 species, tropical and subtropical, all species except C. pauciflorus native to the Old World. References: Hall & Thieret in FNA (2003a); Veldkamp (1999).

Chrysopegon pauciflorus (Chapman) Bentham ex Vasey, Florida Goldbeard, Florida Rhaphis. Cp (FL, NC): sandhill; rare (NC Watch List), perhaps only introduced. FL and Cuba; its occurrence in se. NC (at Carolina Beach State Park) is plausible either as a native, disjunct occurrence or as an introduction. [= FNA, HC, K; = Rhaphis pauciflorus (Chapman) Nash – S]

Cinna Linnaeus 1753 (Woodreed)


1 Spikelets (3.5-) 4-6 (-7.5) mm long; glumes firm, subherbaceous, rather dull, hyaline only narrowly and marginally, the upper glume prominently 3-nerved.---------------------------------------------------------------C. arundinacea

1 Spikelets (2-) 2.5-4 (-5) mm long; glumes (at least the first and sometimes the second as well) glistening, hyaline except the midrib, the upper glume 1-nerved (very rarely 3-nerved) ........................................................................................................C. latifolia


Coelorachis Bronnriottie 1831 (Jointgrass)

A genus of about 20 species, widespread in the Old World and New World tropics and subtropics. Generic circumscription has been controversal and uncertain. References: Allen in FNA (2003a); Veldkamp, Koning, & Sosef (1986)–Z.

1 Culms round in cross-section ..............................................................................................................................................................C. cylindrica

1 Culms compressed-keeled in cross-section.

2 Lower glume with rectangular pits ...................................................................................................................................................C. tesselata

2 Lower glume smooth or with transverse ridges.

3 Lower glume smooth. ......................................................................................................................................................................C. tuberculosa


Coelorachis rugosa (Nuttall) Nash, Wrinkled Jointgrass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA): limesink ponds (dolines), depression meadows, clay-based Carolina bays, wet savannas, disturbed areas (such as seeps in powerline rights-of-

* Coix lacryma-jobi Linnaeus, Job's-tears, reported for se. PA by Rhoads & Klein (1993), TN (Thieret in FNA 2003a), and NJ (Kartesz 1999). [= FNA, K]

Coleataenia Grisebach 1879


1 Glumes and sterile lemmas not keeled along midvein; apices of fertile lemmas glabrous; panicle < 1 cm wide, 3-12 cm long; leaf blades 4-19 cm long, 1-4 mm wide, involute at maturity; culms wiry................................................................. C. tenera
2 Plants with rhizomes; fertile lemma 1.6-4 mm long.
3 Rhizomes short, usually < 3 cm long; leaves 20-50 cm long, 4-18 mm wide; spikelets 2.5-3.9 mm long, acuminate; first glume with 3-5 green nerves......................................................................................................................... C. anceps ssp. anceps
4 Rhizomes elongate, often > 4 cm long; leaves 10-30 (40) cm long, 2-10 mm wide; spikelets 2.2-2.8 mm long, acute to short-acuminate; first glume with 1-3 green nerves.............................................................. C. anceps ssp. rhizomata
2 Plants with hard crowns, lacking rhizomes; fertile lemma 1.2-1.6 mm long.
4 Ligule of white hairs 0.5-3 mm long; culms to 1 m long; cauline blades 2-8 mm wide, usually pilose adaxially near the base; spikelets 2.0-4.0 mm long.
5 Ligules 1-3 mm long; spikelets 2.0-2.7 mm long, 2.5-4× as long as wide, often obliquely set on the pedicels................................................ C. longifolia ssp. longifolia
6 Ligules 0.5-1.5 mm long; spikelets 2.4-4.0 mm long, 3.5-5× as long as wide, erect on the pedicels............. C. longifolia ssp. combsii
3 Plants with hard crowns, lacking rhizomes; fertile lemma 1.6-4 mm long.
5 Ligules 1-3 mm long; spikelets 2.0-2.7 mm long, 2.5-4× as long as wide; leaf blades 4-12 mm wide, usually glabrous; spikelets 1.6-2.8 mm long.
6 Spikelets 2.4-2.8 mm long, long-acuminate, usually < 0.7 mm wide; fertile lemma often conspicuously stipitate................................................ C. species 1 ssp. elongata
7 Culms to 1 m long; mature panicle ½ to nearly as wide as long, the branches ascending to spreading; spikelets 1.6-2.2 mm long........ C. species 1 ssp. rigidula
6 Spikelets 1.6-2.5 mm long, short-acuminate, usually > 0.7 mm wide; fertile lemma estipitate to short stipitate.
7 Culms to 1 m long; mature panicle ½ to nearly as wide as long, the branches ascending to spreading; spikelets 2.0-2.5 mm long........ C. species 1 ssp. 1

Coeleataenia anceps (Michaux) Soreng ssp. anceps, Beaked Panic Grass. Mt (NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, FL, NC, SC, VA), [GA]; moist sandy woods, swamps, sloughs, roadside, fields, waste places; common. June-October. NJ w. to IL, s. to FL and TX. The sheaths of ssp. anceps are glabrous to pilose, while those of ssp. rhizomata are often villous; the leaves of ssp. rhizomata also tend to be hairy. [= V; = Sorengia anceps (Michaux) Zuloaga & Morrone ssp. anceps – X; = Panicum anceps Michaux var. anceps – RAB, F, G, Z; = P. anceps – C, GW, K, W; = P. anceps ssp. anceps – FNA; = P. anceps – HC, S, WV]


Coeleataenia longifolia (Torrey) Soreng ssp. combsii (Scribner & C.R. Ball) Soreng, Combs Panic Grass. Cp (DE, FL, GA, NC, SC, VA); pond shores, depression meadows, cypress savannas, marshes, low woods; uncommon (rare in DE and VA). July-October. Scattered on the outer Coastal Plain from se. MA, NJ, se. VA, se. NC, c. SC, c. GA, and FL, west to se. LA. First glumes of ssp. combsii typically are longer than 1.5 mm long, while those of ssp. longifolia are shorter than 1.5 mm long. [= V; = Sorengia longifolia (Torrey) Zuloaga & Morrone ssp. combsii (Scribner & C.R. Ball) Zuloaga & Morrone – X; = Panicum longifolium Torrey var. combsii (Scribner & C.R. Ball) Fernald – RAB, F, G; = P. rigidulum Bosc ex Nees ssp. combsii (Scribner & Ball) Freckmann & Lelong – FNA; = P. rigidulum Bosc ex Nees var. combsii (Scribner & C.R. Ball) Lelong – K, Z; < P. longifolium – C; = P. combsii Scribner & C.R. Ball – HC, S]
POACEAE

Coleataenia longifolia (Torrey) Soreng ssp. longifolia, Long-leaved Panic Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): wet sandy or peaty soils of bogs, savannas, pond shores, depression meadows; common (uncommon in Piedmont, rare in Mountains). July-October. NS, NH, MA, PA, and IN south to FL, west to TX. See note under ssp. combusi. [= V; = Sorengia longifolia (Torrey) Zuloaga & Morrone ssp. longifolia – X; = Panicum longifolium Torrey var. longifolium – RAB, G; = P. rigidulum Bosc ex Nees ssp. pubescens (Vasey) Freckmann & Lelong – FNA; = P. rigidulum Bosc ex Nees var. pubescens (Vasey) Lelong – K, W, Z; < P. longifolium – C, GW; = P. longifolium var. longifolium – F; > P. longifolium var. pubescens (Vasey) Fernald – F]

Coleataenia species 1 in prep. spp. in prep., Dense Panic Grass. Cp (DE, FL, GA, NC, SC, VA): marshes, meadows, low woods, ditches, stream and pond shores, freshwater tidal shores; uncommon. September-October. Coastal Plain south from se. MA to FL, west to se. TX and AR; West Indies. Usually readily identified by its tall stature and compact inflorescence, somewhat resembling a large MA to FL, west to se. TX and AR; West Indies. Usually readily identified by its tall stature and compact inflorescence, somewhat resembling a large


Cortaderia Stapf 1897 (Pampasgrass)


Crypsis Aiton (Pricklegrass)


Ctenium Panzer 1813 (Toothache Grass)

1 Spikelets with numerous glands in rows on the back of the second glume; plant short-rhizomatous (nearly eesiposite); [widespread in the Coastal Plain].......................................................... Ctenium aromaticum

1 Spikelets with very few or no glands on the back of the second glume; plant rhizomatous (the rhizomes slender and scaly); [see GA and ne. FL]........................................................................................................ Ctenium floridanum

Ctenium aromaticum (Walter) Wood, Toothache Grass, Orange Grass. Cp (FL, GA, NC, SC, VA): wet savannas, pocosin-savanna ecotones, seepage bogs, sandhill-pocosin ecotones, sandhill seeps; common (rare in VA). June-August (or later in response to late summer fires). Southeastern Coastal Plain endemic: se. VA south to FL and west to LA and e. TX (Singhurst, Keith, & Holmes 2005). The entire plant is aromatic and numbs the mouth, tongue, and lips when chewed, hence the specific epithet and common names. Like many species of the longleaf pine ecosystem, toothache grass generally flowers only following
fire (MacRoberts & MacRoberts 1992). Sterile clumps can be recognized by the rather broad, bicolor leaves (bluish on the upper surface, bright green on the lower surface). [= RAB, C, F, FNA, G, GW, HC, K; = Campulus aromatics (Walter) Trinius – S]


Cynodon L.C. Richard 1805 (Bermuda Grass)

A genus of ca. 9 species, native to the tropical Old World. References: Barkworth in FNA (2003a).


Cynosurus Linnaeus 1753 (Dogtail)


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Dactylis Linnaeus 1753 (Orchard Grass)


* Dactylis glomerata Linnaeus, Orchard Grass, Cock's-foot. Mt (GA, KY, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Ip (KY), Cp (DE, FL, KY, NC, SC, VA): pastures, fields, woodland edges, roadsides; common (rare in FL, uncommon in NC, SC, and GA Coastal Plain), native of Europe. May-October. In Europe there are various chromosome races, often accorded subspecies or species status. Their status in North America has been little investigated. See various references cited in Tucker (1996) for further information about these taxa in Europe. [= RAB, C, FNA, G, HC, S, W, WV; > D. glomerata var. detonsa Fries – F; > D. glomerata var. ciliata Petermann – F; > D. glomerata ssp. glomerata – F; > D. glomerata ssp. aschersoniana (Graebner) Thellung – K; > D. aschersoniana Graebner]

Dactyloctenium Willdenow 1809 (Crowfoot Grass)


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<tr>
<td>Panicle branches 1.5-6 cm long, well-separated from each other at their tips ................................................................. D. aegyptium</td>
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Danthonia A.P. de Candolle 1805 (Oat-grass)

A genus of about 20 species, of North America, Europe, and the Americas, but the generic limits are unclear. References: Darbyshire in FNA (2003a).

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POACEAE

2 Lemma awn 4-10 mm long; glumes 9-13 mm long.......................... D. compressa

2 Lemma awn 11-18 mm long; glumes 11-19 mm long.

3 Sheaths villous; lemmas membranaceous in texture, villous on the back and sides; awn twisted at base several times, forming an awn column 2-5 mm long ............................................................... D. sericea

3 Sheaths glabrous; lemmas membranaceous in texture, villous only on the margins and towards the base; awn twisted at base a single time, forming a loose awn column 0.5-1.5 mm long.......................... D. epilis


Danthonia epilis Scribner, Bog Oat-grass. Cp (NC, SC, VA), Mt (AL, GA, NC, TN, VA?), Pd (NC): peaty bogs in the Coastal Plain and Mountains, seeps around rock outcrops in the Piedmont and Mountains, granitic domes; rare. April-June. The range is apparently bogs in pinelands from NJ to SC, in mountain bogs in NC, VA (?), and GA, in seepage in the Cumberland Plateau and Blue Ridge of TN and AL. This taxon appears to be valid, with a distinct range, habitat, and variety of morphologic characters separating it from D. sericea, but further study is needed. Material from the mountains seems to differ from Coastal Plain material. RAB’S description of the habitat as “dry woods, rare; pied. of N.C.” appears to be in error. Blomquist listed the taxon (as a variety) for bogs in the mountains of SW. NC. It has since been found in bogs in the Sandhills region of NC and in seepage bogs in the adjacent Piedmont. [= F, HC, K, S; = D. sericea var. epilis (Scribner) Blomquist – RAB, C; < D. sericea Nuttall – FNA]

Danthonia sericea Nuttall, Silky Oat-grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, TN, VA), Ip (KY, TN): dry woodlands, especially common in sandy soils in the Coastal Plain, dry oak, oak-pine, and pine forests in the Piedmont and low Mountains; common (uncommon in the Mountains and Interior Low Plateau, rare in DE). April-June. Primarily a Coastal Plain species northwards, ranging from e. MA south to FL and west to LA. [= F, HC, K, S, W; = D. sericea var. sericea – FNA] [AL, LA, MS]


Deschampsia Palisot de Beauvais 1812 (Hairgrass)

A genus of about 20-40 species, perennials and annuals, north and south temperate. References: Barkworth in FNA (2007a); Tucker (1996)=Z. [also see Avenella]

1 Awn 4-8 mm long, geniculate, exserted beyond the tips of the glumes; lemmas minutely scabrous, dull; leaf blades involute, appearing filiform (rounded in cross-section); ligule 0.5-3 (-5) mm long; [section Avenaria] .................................................................................. [see Avenella]

1 Awn 2-3 mm long, straight or nearly so, scarcely (or not at all) exserted beyond the tips of the glumes; lemmas smooth, shiny; leaf blades flat or folded at the midvein (V-shaped in cross-section); ligule 3-10 (-17) mm long ............................................................. D. cespitosa ssp. glauca

Deschampsia cespitosa (Linnaeus) Palisot de Beauvois ssp. glauca (Hartman) Hartman, Tufted Hairgrass. Mt (NC, VA, WV), Ip (KY): thin soil of rock outcrops or barrens over calcareous mafic, and ultramafic rocks (such as serpentinitized olivine, amphibolite, limestone, and dolostone), seepages; rare. June-July. D. cespitosa is a complex species, with a complicated polymorphic and aneuploid series, variously subdivided (or not) by various taxonomists. As a whole, D. cespitosa is circumboreal, ranging south in North America to NJ, sw. NC, WV, c. KY, IL, MN, and AZ. Ssp. glauca is the most widespread American subspecies, and extends the farthest south. Other subspecies occur farther north and in Eurasia. In our area, D. cespitosa is at its southern limit and is a rare species limited to barrens and outcrops over mafic or ultramafic rocks. Barkworth in FNA (2007a) states that there is no legitimate name available for this taxon. [= K; = D. cespitosa var. glauca (Hartman) Lindman f. – RAB, F, WV; < D. cespitosa ssp. cespitosa – FNA; < D. cespitosa var. cespitosa – C, Z; < D. cespitosa var. cespitosa – G; < D. cespitosa var. cespitosa – HC; = D. cespitosa ssp. cespitosa – FNA; < D. cespitosa var. cespitosa – FNA; D. cespitosa var. cespitosa – FNA; < D. cespitosa var. cespitosa – W] * Deschampsia elongata (Hooker) Munro, Slender Hairgrass. Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of w. North America. [= FNA, HC, K] {not keyed}

Desmazeria Dumortier 1822


* Desmazeria rigida (Linnaeus) Tutin, Fern Grass. Cp (FL, SC): waste areas around wool-combing mills, other disturbed areas; rare, perhaps only a waif, native of Mediterranean Europe. [= FNA, K; = Catapodium rigidum (Linnaeus) Domy – Z; = Scheropoa rigida (Linnaeus) Grisebach]

Diarrhena Palisot de Beauvois 1812 (Beakgrain, Twingrass)
Depending on circumscription, a genus of either 2 species of perennial grasses of e. North America, or of ca. 6 species of e. North America and e. Asia. References: Brandenburg in FNA (2007a); Brandenburg, Estes, & Collins (1991)=Z. Key from Z.

1 Callous pubescent on all mature lemmas except the first; lemmas widest below the middle and gradually tapering into a cusp at the apex, those of the first floret 7.1-10.8 mm long; mature fruit 1.3-1.8 mm broad, gradually tapering into a broad, blunt beak .............. D. americana

1 Callous glabrous on all mature lemmas; lemmas widest near or above the middle and more-or-less abruptly contracted into a cusp at the apex, those of the first floret 4.6-7.5 mm long; mature fruit 1.8-2.5 mm broad, abruptly contracted into a bottle-like shaped beak.............. D. obovata

\textbf{Diarrhena americana} Palisot de Beauvois, Eastern Beakgrain. Ip (KY, TN), Mt (GA, NC, TN, VA, WV): rich moist forests, usually over calcareous rocks; rare (in NC and VA, rare in TN Mountains). July-August; August-October. W. VA and WV west to IN, south to TN, sw. NC, and nw. GA. (Jones & Coile 1988); disjunct in MO. This species forms large clonal patches. [= K, Z; = Diarrhena americana var. americana – C, G, WV; < Diarrhena americana – F, HC, W; < Diarina festucoides Rafinesque – S]

\textbf{Diarrhena obovata} (Gleason) Brandenburg, Western Beakgrain. Mt (WV), Pd (VA), Ip (KY, TN): alluvial forests, other moist forests; rare. July-August; August-October. Sw. PA and IN west to SD, KA, south to w. VA, e. TN, and ne. TX. First reported for VA by Fleming & Ludvig (1996). The floodplain of the Potomac River (in Fairfax County, VA) has a number of disjuncts of species with more midwestern affinities, including Diarrhena obovata, Erigeria bulbosa, Valeriana pauciflora, and Erythronium albidum (Fleming & Ludvig 1996). [= K, Z; = Diarrhena americana var. obovata Gleason – C, G, WV; < Diarrhena americana – F, HC, W; < Diarina festucoides Rafinesque – S]

(by Richard J. LeBlond)

A genus of 70-100 species, perennials, of temperate and tropical America. References: Gould and Clark (1978)=Z; Freckmann (1911)=Y; Lelong (1984)=X; LeBlond (2001)=Q; Davidsie and Polh (1992); Hansen & Wunderlin (1988); Hitchcock & Chase (1910); Freckmann & Lelong (2002). The treatment of \textit{Dichanthelium} sect. \textit{Lanuginosa} (=D. \textit{acuminatum} group) is based closely on Y. The contributor must take responsibility for the treatment of sect. \textit{Angustifolia} (including \textit{D. hirsuta}), sections \textit{Dichotoma} and \textit{Ensifolia} (the \textit{D. dichotomum} group), and for sect. \textit{Lancearia}. Other treatments are based largely on Z.

"We admit that our failure to distinguish the several named taxa ... was born of despair!" – Godfrey & Wooten (1979).

"The recognition of only four species and six varieties in this complex [\textit{sabulorum}] to which almost 50 species names have been applied admittedly is somewhat arbitrary and certainly not entirely satisfactory." – Gould & Clark (1978).

\textbf{Identification notes:} \textit{Dichanthelium} has often been treated as subgenus \textit{Dichanthelium} of \textit{Panicum}. It is most readily (though not consistently) separated from \textit{Panicum} by the following combination of features: plants producing over-wintering rosettes of leaves often shorter and broader than the culm leaves; plants producing simple culms with terminal panicles in spring, the culms branching and producing panicles only on branches in the summer and autumn.

Perhaps the most complex and confusing genus in our region, \textit{Dichanthelium} requires careful collection and close observation of several characters to determine to which taxon a specimen belongs, or at least to which taxa it seems most closely aligned. A taxon that is distinct in one part of its range may be indistinguishable from another taxon elsewhere. This is particularly true of Coastal Plain species adapted to natural (and now human) disturbances. Although hybridization is frequently suspected in \textit{Dichanthelium}, documentation of natural hybrids is rare.

When collecting specimens in the field, mature spikelets are essential. This is determined by examining the usually whitish fertile lemma, which is firm and plump at maturity. Immature spikelets often are longer than mature ones (they shorten as they fatten); only mature spikelet length is used in the various manuals and keys. It is also important to note whether a plant is in its “vernal” or “autumnal” flowering phase before collecting. “Vernal” plants produce panicles only at the summits of the culms (typically April-June). “Autumnal” plants produce panicles from leafy axillary branches below the summit (typically July-September). The autumnal panicles in most species are much smaller than the vernal panicles (and often hidden by fascicled leaves), but the spikelets are the same. When collecting autumnal plants, it is important to select specimens still possessing their vernal leaf blades and panicles, even though these will likely be senescent. It is also important to collect the whole plant, with the basal rosette intact (whether senescent or of current year’s growth). When several plants are growing together, compare the culm, leaf, and spikelet features for differences; \textit{Dichanthelium} taxa are gregarious.

When analyzing the character of the culm internodes and nodes, look at the first elongate internode above the base (the lowest internode is often very short and uncharacteristic). Determining whether a node is bearded is often difficult. A bearded node usually is characterized by pubescence that is longer and of a different orientation or structure than that of the internodes and sheaths. Nodes with short pubescence generally are not regarded as bearded. Lower nodes are more likely to be bearded than upper nodes. Some internodes are described as “crisp-puberulent.” This condition is characterized by a dense covering of minute hairs mostly less than 0.1 mm long, and usually crimped or curved. Glanular hairs or protuberences are often intermixed. When analyzing sheaths, look at those on the lower half of the culm. Senescent vernal sheaths often lose their pubescence (though in some species hair papillae are evident). All references in the key to sheath glabrousness or pubescence is without regard to the presence or absence of marginal hairs (cilia). A sheath that is glabrous except for marginal cilia is called glabrous. All culm leaves should be analyzed for blade characters; in general, the key relies on the size and character of the vernal blades. A “cordate” blade is one where the basal lobes of the blade extend outward and partially surround the culm when the culm is enclosed by the sheath. As with sheaths, references in the key to blade glabrousness or pubescence is without regard to marginal cilia. The ligule is an important diagnostic character for many \textit{Dichanthelium} taxa; at least three ligules per specimen should be examined before making conclusions about its structure and length. Ligules form a distinct ring from a cartilaginous base at the inner summit of the sheath; in some species the ligule is membranous, but in most it is pubescent. Care must be taken to distinguish the pubescence of the ligule from any pubescence emanating from the inner surface of the blade base, and from marginal cilia. Ligules of senescent vernal leaves frequently lose their integrity. Spikelet shape as well.
as length should be determined only from mature spikelets. Measure the length from the base of the first glume (usually at an articulation) to the apex of the second glume or sterile lemma (whichever is longer). A micrometer is essential for determining the length of spikelets, first glumes, ligules, and various pilosity features. Sometimes one-tenth of a millimeter is all that separates two Dichanthelium taxa.

Certain characters, particularly node bearding, cordate/non-cordate blade bases, and ligule length, can be quite variable, and an effort has been made to account for this variability in the key. Nonetheless, some specimens just won't "fit," and the road not taken may have to be reconsidered.

1 Plants densely tufted, often cushion-forming; leaves basally disposed, the blades ascending or spreading-ascending, not forming a distinct rosette of basal leaves shorter than the culm leaves; autumnal culms branching basally or from the lower nodes .......................................................... Key A

2 Spikelets 3.3-5.2 mm long.  .......................................................... Key B
3 Spikelets 0.8-3.2 mm long.
4 Lower culm internodes hairy .......................................................... Key F
5 Lower culm internodes glabrous .......................................................... Key G
3 Spikelets 2.1-3.2 mm long.
5 Larger culm blades 13-25 mm wide .......................................................... Key C
6 Culm nodes (at least the lower) bearded .......................................................... Key D
6 Culm nodes not bearded, the lowermost sometimes puberulent or sparsely hairy .......................................................... Key E

Key A - Plants densely tufted, often cushion-forming; leaves basally disposed, the blades ascending or spreading-ascending, not forming a distinct rosette of basal leaves shorter than the culm leaves; autumnal culms branching basally or from the lower nodes

1 Spikelets 2.4-4.5 mm long.
2 Nodes, internodes, and sheaths glabrous; blades 4-13 cm, 5-8 mm, the surfaces smooth, glabrous; spikelets 2.4-2.9 mm long, glabrous; not known to produce axillary (autumnal) inflorescences .......................................................... [D. nudicaule]
2 Nodes bearded or otherwise pubescent; internodes and sheaths variously pubescent to glabrate; blades 6-35 cm, 2-5 mm, one or both surfaces scabrous and often pubescent; spikelets 1.7-4.5 mm long, glabrous or pubescent; plants produce axillary (autumnal) inflorescences.
3 Spikelets 2.8-3.8 (-4.5) mm long, the second glume and sterile lemma pointed or beaked and extended beyond the summit of the fertile lemma; first glume 1.2-2 mm long .......................................................... D. depauperatum
3 Spikelets 1.7-2.8 mm long, the second glume and sterile lemma blunt or broadly pointed, not extending beyond the summit of the fertile lemma; first glume 0.7-1.2 mm long .......................................................... D. linearifolium
1 Spikelets 0.9-2.3 mm long.
4 Longer blades > 6 cm; if only 6 cm, then sheaths retrorsely long-pilose (D. laxiflorum).
5 Spikelets 1.2-1.5 mm long, glabrous .......................................................... [D. dichotomum var. glabrefolium]
5 Spikelets 1.7-2.3 (-2.8) mm long, pubescent.
6 Longer blades 10-35 cm long, 2-4 mm wide; sheaths glabrous to variously pilose, but not conspicuously retrorsely long-pilose; nodes variously pubescent to glabrate; spikelets 1.7-2.3 (-2.8) mm long .......................................................... D. linearifolium
6 Longer blades 6-18 cm long, 7-12 mm wide; sheaths conspicuously retrorsely long-pilose; nodes bearded with retrorse or spreading hairs; spikelets 1.9-2.3 mm long .......................................................... D. laxiflorum
4 Longer blades 1.5-6 cm; sheaths glabrous or pubescent, but not retrorsely long-pilose.
7 Blades 1-3 mm wide, glabrous, ciliate or basally ciliate; spikelets 0.9-1.4 mm long.
8 Spikelets pubescent, 1.2-1.4 mm long; blades involute, often falcate, 2.5-6 cm long .......................................................... [D. chamaelonche ssp. breve]
8 Spikelets glabrous, 0.9-1.2 mm long; blades flat, not falcate, 1.5-4 (-5) cm long .......................................................... D. chamaelonche ssp. chamaelonche
7 Blades 1-3 mm wide; spikelets 1.1-2.1 mm long (if < 1.5 mm, then blades either pubescent on one or both surfaces or ciliate to the apex).
9 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous .......................................................... D. strigosum var. leucoblepharis
9 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
10 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-1.8 mm long .......................................................... D. strigosum var. glabrescens
10 Blades pilose, at least abaxially; spikelets 1.1-1.6 mm long .......................................................... D. strigosum var. strigosum

Key B - Spikelets 3.3-5.2 mm long

1 Nodes (at least lower) densely bearded with retrorse hairs; spikelets 3.7-5.2 mm long.
2 Ligule 2.5-4 mm long; internodes pubescent with long ascending or spreading hairs; blades 8-15 cm long, 10-25 mm wide; first glume 1.8-2.5 mm long .......................................................... D. ravenelli
2 Ligule 0.4-0.9 (-1.3) mm long; internodes glabrous to puberulent; blades 7-12 cm long 12-40 mm wide; first glume 1.5-2.2 mm long; .......................................................... D. boscii
1 Nodes glabrous, pubescent, or sparsely pilose; spikelets (2.4+ 3.3-4.2 mm long.
3 Ligule 1.6-3 mm long; blades 4-9 mm wide, > 10× as long as wide .......................................................... D. oligosanthes var. oligosanthes
3 Ligule 0.3-1.5 mm long; if larger blades < 9 mm wide and mostly 15× or more as long, then ligule 0.5-1 mm long (D. fusiforme).
4 Larger blades 2-6 (-8) mm wide, mostly 15× or more as long as wide; spikelets fusiform to elliptic, acute, basally constricted .......................................................... D. fusiforme
4 Larger blades 6-35 mm wide, mostly 10× or less as long as wide; spikelets broadly elliptic to obovate, rounded to sub-acule, not basally constricted.
5 Spikelets strongly papillose-hispid with spreading hairs 0.5-1 mm long; blades papillose-hispid .......................................................... [D. leibergii]
5 Spikelets glabrous to pubescent with hairs < 0.5 mm long; blades glabrous, scabrous, or pubescent.
6 Ligules 1-1.5 mm long; blades 5-10 cm long by 6-15 mm wide, glabrous or pubescent, basally rounded; spikelets glabrous to pubescent .......................................................... D. oligosanthes var. scribnerianum
<table>
<thead>
<tr>
<th>Key C - Spikelets 2.1-3.2 mm long, larger leaves 13-25 mm wide</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Culm nodes, at least the lower, bearded (often retrorsely).</td>
</tr>
<tr>
<td>2  Ligule a stramineous to light brown membrane (with or without ciliate or lacerate extensions); peduncle and often internodes scabrous. ................................................................. D. scabriusculum</td>
</tr>
<tr>
<td>3  Ligule entirely of white hairs; peduncle and internodes either smooth or densely hairy (velvety).</td>
</tr>
<tr>
<td>4  Second glume and sterile lemma acute to short-acuminate, conspicuously longer than the fertile lemma; spikelets glabrous (occasionally sparsely pubescent in D. scabriusculum).</td>
</tr>
<tr>
<td>5  Panicle rachis pellucid-punctate; ligule a stramineous to light brown membrane, with or without terminal ciliations; peduncle and often internodes scabrous; first glume 0.3-0.6 (-0.8) mm long, reniform to suborbicular ................................................................. D. scabriusculum</td>
</tr>
<tr>
<td>6  Panicle rachis not pellucid-punctate; ligule entirely of white hairs; peduncle and internodes smooth; first glume 0.7-1.2 mm long, ovate to lanceolate. ................................................................. D. yadkinense</td>
</tr>
<tr>
<td>7  Second glume and sterile lemma blunt to subacute, shorter than, equaling, or barely exceeding the fertile lemma; spikelets pubescent (sometimes sparsely so in D. clandestinum).</td>
</tr>
<tr>
<td>8  Sheaths, at least the lower, papillose-hispid with spreading hairs; blades 10-28 cm long ................................................................. D. clandestinum</td>
</tr>
<tr>
<td>9  Sheaths glabrous, puberulent, finely pubescent, or sparsely pilose; blades 5-18 cm long.</td>
</tr>
<tr>
<td>10 Ligule 0.0-0.3 mm long; spikelets 2.2-3.7 mm long, 1.1-1.5 mm wide; first glume 0.6-2.6 mm long ................................................................. D. commutatum var. commutatum</td>
</tr>
<tr>
<td>11 Ligule 0.4-0.7 mm long; spikelets 2.9-3.9 mm long, 1.6-2.0 mm wide; first glume 1.5-2.2 mm long ................................................................. D. latifolium</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Key D - Spikelets 2.1-3.2 mm long, larger culm blades &lt; 13 mm wide, at least the lower culm nodes bearded with a usually spreading-ascending collar of dense and/or longish hairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Ligule with a dense ring of short hairs 0.5-1 mm long in front of a usually less dense ring of longer hairs (pseudoligule) 1-5 mm long.</td>
</tr>
<tr>
<td>2  Nodes retrorsely bearded; internode and sheath hairs spreading to restrorse; blade surfaces velvety-pubescent or long-pilose.</td>
</tr>
<tr>
<td>3  Spikelets 2.5-3.2 mm long; longer hairs of pseudoligule 1-3 mm long; blade surfaces velvety-pubescent; panicle rachis densely pubescent; [of cedar glades and dry limestone soils] ................................................................. [D. malacophyllum]</td>
</tr>
<tr>
<td>4  Spikelets 1.8-2.5 mm long; longer hairs of pseudoligule 3-5 mm long; blade surfaces long-pilose; panicle rachis sparsely pilose; [of dry sandy soil of pine and oak woodlands] ................................................................. D. villoissimum var. villoissimum</td>
</tr>
<tr>
<td>5  Node beard hairs spreading to ascending; internode and sheath hairs ascending to appressed; blade surfaces glabrate to appressed-pubescent.</td>
</tr>
<tr>
<td>6  Spikelets 2.5-3.1 mm long; larger leaves usually glabrous adaxially except for long hairs at or near the margin (appearing ciliate), appressed-pubescent abaxially ................................................................. D. ovale var. ovale</td>
</tr>
<tr>
<td>7  Spikelets 2.1-2.6 mm long; lower culm blades usually sparsely appressed-pubescent on both surfaces, ciliate or ciliate at the base only; ................................................................. D. ovale var. addisonii</td>
</tr>
<tr>
<td>8  Ligule a single structure, without a pseudoligule.</td>
</tr>
<tr>
<td>9  Ligule &lt; 2 mm long, ciliate or membranous.</td>
</tr>
<tr>
<td>10 Ligule with a dense ring of short hairs 0.5-1 mm long in front of a usually less dense ring of longer hairs (pseudoligule) 1-5 mm long.</td>
</tr>
<tr>
<td>11 Ligule with a stramineous to light brown membrane, with or without terminal ciliations; peduncle and often internodes scabrous; larger leaves 10-25 cm long, 8-15 mm wide; ligule 0.5-1.3 mm long; lowest elongate culm internode &gt; 2 mm in diameter; lowest nodes usually scabrous or pubescent; [of cedar glades and dry limestone soils] ................................................................. [D. malacophyllum]</td>
</tr>
<tr>
<td>12 Panicle rachis smooth, pellucid-punctate; first glume 0.3-0.6 (-0.8) mm long, as broad as or broader than long, truncate to obtuse; larger leaves 10-25 cm long, 8-15 mm wide; ligule 0.5-1.3 mm long; lowest elongate culm internode &gt; 2 mm in diameter; lowest nodes usually scabrous or pubescent; ................................................................. D. scabriusculum</td>
</tr>
<tr>
<td>13 Panicle rachis smooth, not pellucid-punctate; first glume 0.5-1.1 mm long, longer than wide, rounded to acute; larger leaves 3.5-12 cm long, 3-9 mm wide; ligule 0.1-0.6 mm long; lowest elongate culm internode &lt; 2 mm in diameter; lowest nodes retrorsely bearded or glabrous.</td>
</tr>
<tr>
<td>14 Lowest nodes usually retrorsely bearded; ligules (0.1-) 0.3-0.6 mm long; largest vernal blades 7-12 cm long, (4.5-) 6-9 mm wide; peduncle ciliate or scabrous; spikelets ovate-lanceolate, acute, 2.0-2.4 mm long; first glume lanceolate, blunt to acute; fertile lemma smooth ................................................................. D. species 9 (= euryanthum)</td>
</tr>
<tr>
<td>15 Lowest nodes usually glabrous; ligules 0.1-0.2 (-0.3) mm long; largest vernal blades 3.5-7 cm long, 3-6 mm wide; peduncle ciliate or scabrous; spikelets elliptic, blunt to acute, 1.6-2.2 mm long; first glume ovate to rotund, rounded to acute; fertile lemma papillate ................................................................. D. lucidum</td>
</tr>
<tr>
<td>16 Ligule entirely of white hairs; peduncle variously hairy or glabrous, but not antrorsely scabrous.</td>
</tr>
<tr>
<td>17 Culms to 1.5 m tall, with a broad, glabrous, viscid band below the nodes; blades of the lower leaves typically villous or velvety-pubescent. ................................................................. D. scoparius</td>
</tr>
</tbody>
</table>
Culms rarely exceeding 1 m, without a viscid band below the nodes; blades various.

Sheaths retrorsely pilose with hairs 2-3 mm long; basal leaves usually numerous, ascending, similar in size and shape to the culm leaves; culms branching only at the base; spikelets usually not more than twice the culm leaves at nodes in age. 

Culms internodes glabrous to sparsely pilose; culm nodes bearded with long retrorse hairs; blade surfaces glabrous to velvety-pubescent. 

Culms internodes, at least the lower, strigose, pilose, or villous; culm nodes bearded with ascending or spreading hairs; blade surfaces glabrous or variously hairy. 

Lower and often mid-culm nodes bearded with spreading, stiffish, and short-to-long hairs; mid-culm blades usually 15-20 x or less as long as wide. 

Blades stiff, often longitudinally ribbed, at least the lower villous or strongly pilose on the abaxial surface, and usually strongly pilose at least basally on the adaxial surface. 

Spikelets 2.5-3.1 mm long; lower culm blades usually glabrous adaxially except for long hairs at or near the margin (appearing ciliate), appressed-pubescent abaxially. 

Spikelets 2.1-2.6 mm long; lower culm blades usually sparsely appressed-pubescent on both surfaces, ciliate or ciliate at the base only. 

Lower nodes bearded with erect-ascending, soft, and long hairs; mid-culm blades usually 20 x or more as long as wide. 

Spikelets 2.9-4.0 mm long, fusiform to elliptic, acute, basally constricted; first glume 1.4-2.6 mm long. 

Spikelets 1.5-3.1 mm long, obovate to elliptic-obovate, obtuse to sub-acute, not basally constricted; first glume 0.6-1.5 mm long. 

Spikelets 1.5-2.2 mm long; first glume 0.6-0.8 mm long; longer caudine blades 4-8 cm, 2.5-5 mm wide, <20 x as long as wide; lower caudine leaves glabrous to sparsely pilose abaxially; autumnal leaves involute. 

Spikelets 1.5-2.1 mm long; first glume 0.7-1.5 mm long; longer caudine blades 7-12 (-15) cm, 3-6 mm wide, <20 x as long as wide; lower caudine leaves often abaxially (especially in *D. species 1=arenicoloides*); autumnal leaves involute or flat. 

Spikelets 4-8 mm wide, averaging 15-20 x as long as wide; autumnal blades flat; spikelets 2.3-3.1 mm long; first glume 0.8-1.5 mm long. 

Spikelets 3-4 (-5) mm long, averaging >20 x as long as wide; autumnal blades usually involute; spikelets 2.1-2.5 (2.8) mm long. 

Spikelets (3.0-3.2) 3.8 mm long, fusiform, pointed at summit, attenuate at base, with both glumes attached 0.3-0.5 mm below sterile lemma; the autumnal spikelets 3.5-3.8 mm wide, the lower and mid-culm blades of similar width; autumnal blades involute. 

Spikelets 1.8-3.1 mm long, obovate, blunt, and the base not attenuate except in *D. species 1=arenicoloides* with autumnal spikelets 2.3-3.1 mm long; longer vernal blades 2-8 mm wide, the lower usually wider and often shorter than mid-culm blades; autumnal blades involute or flat. 

Longest vernal blades to 16 cm, widest vernal blades 4-8 mm, usually longitudinally wrinkled; vernal and autumnal spikelets 2.3-3.1 mm long; autumnal blades flat, the larger to 9 cm × 2-4 mm. 

Longest vernal blades to 6 (D. aciculae) or 12 (D. species 1=arenicoloides) cm long, 2-5 mm wide, not noticeably wrinkled; vernal spikelets 1.5-2.8 mm long, autumnal spikelets either 1.5-2.3 (D. aciculae) or 2.3-3.1 (D. species 1=arenicoloides); autumnal blades involute, the larger to 6 cm × 1.5 mm. 

Longest vernal blades to 6 (-8) cm, widest vernal blades 2-5 mm; vernal and autumnal spikelets 1.7-2.3 mm long, blunt, not attenuate, the glumes attached <0.2 mm below sterile lemma; first glumes 0.6-0.9 mm long; larger autumnal blades to 3 cm by 1 mm. 

Longest vernal blades to 12, widest vernal blades 3-4 (-5) mm; vernal spikelets 2.1-2.8 mm long; autumnal spikelets 2.3-3.1 mm long, pointed, attenuate, the glumes attached 0.3-0.5 mm below sterile lemma; first glumes 0.7-1.5 mm long; larger autumnal blades to 6 cm by 1.5 mm. 

Key E - Spikelets 2.1-3.2 mm long, longer culm blades < 13 mm wide, culm nodes not bearded, the lowermost sometimes puberulent or sparsely pilose

1 Ligule 1.6-4 mm long. 

2 Ligule < 1.5 mm long. 

Blades, at least the lower, cordate or subcordate at the base, mostly 6-12 mm wide. 

3 Spikelets obpyriform when viewed dorsally, strongly plano-convex when viewed laterally, usually markedly reddish-purple basally; sterile lemma papillose. 

4 Internodes crisp-puberulent; ligules 0.3-0.4 mm long, ciliate; larger culm blades 4-8 (-11) cm long, 5-10 (-12) mm wide, broadest near the base; spikelets 2.1-2.7 mm long; first glumes 0.7-0.9 mm long. 

5 Ligule 0.3 mm long, ciliate; larger culm blades 5-25 mm wide; spikelets 2.2-3.7 mm long; first glumes 0.6-2.6 mm long. 

6 Ligule about 0.5 mm, ciliate; larger culm blades 6-13 mm wide; spikelets 2.3-3 mm long; first glumes 0.5-1 mm long. 

Blades tapering to the base, 2-12 mm wide. 

6 Ligule a stramineous to light brown membrane, with or without terminal ciliations; peduncle antorsely scabrous but not hairy.
7 Panicle rachis smooth, pellucid-punctate; first glume 0.3-0.6 (-0.8) mm long, as broad as or broader than long, truncate to obtuse; larger leaves 10-25 cm long, 8-15 mm wide; ligule 0.5-1.3 mm long; lowest elongate culm internode > 2 mm in diameter; lowest nodes usually glabrous or pubescent .................................................. D. scabriusculum
7 Panicle rachis scabrous or smooth, not pellucid-punctate; first glume 0.5-1.1 mm long, longer than wide, rounded to acute; larger leaves 3.5-12 cm long, 3-9 mm wide; ligule 0.1-0.6 mm long; lowest elongate culm internode < 2 mm in diameter; lowest nodes retrorsely bearded or glabrous.
8 Lowest nodes usually retrorsely bearded; ligules (0.1-) 0.3-0.6 mm long; largest vernal blades 7-12 cm long, (4.5-) 6-9 mm wide; panicle peduncle scabrous; spikelets ovate-lanceolate, acute, 2-0.2 mm long; first glume lanceolate, blunt to acute; fertile lemma smooth ................................................................. D. species 9 (=cryptanthum)
8 Lowest nodes usually glabrous; ligules 0.1-0.2 (-0.3) mm long; largest vernal blades 3.5-7 cm long, 3-6 mm wide; panicle peduncle smooth; spikelets elliptic, blunt to acute, 1.6-2.2 mm long; first glume ovate to rotund, rounded to acute; fertile lemma papillose.................................................. D. lucidum
9 Leaves basaly disposed, usually matted or cushion-forming, larger than the mid and upper culm leaves; blade margins uniformly papillose-ciliate; culms branching only at the base, 0.5-3.5 dm tall; internodes glabrous or sparsely pubescent .......................................................... D. strigosum var. leucocepharts
10 Blades of mid-culm leaves typically long and stiff, acuminate, linear or narrowly lanceolate, usually > 10× as long as wide, only 2-5 mm wide when < 8 cm long.
11 Vegetative parts glabrous (spikelets pubescent, lowest internodes and sheaths sometimes sparsely pubescent, blades and sheaths sometimes ciliate); mature panicles less than ¼ as wide as long, the branches erect-ascending, the spikelets often subsecond; autumnal blades 4-10 cm long, involute, <2 mm wide; spikelets 1.8-2.2 mm long........ D. aciculare ssp. neanthurum
11 Vegetative parts pubescent, at least in the lower portion of plant; mature panicles usually more than half as wide as long, the branches spreading-ascending, the spikelets not noticeably subsecond; autumnal blades 1-6 cm long, involute and <2 mm wide in D. aciculare ssp. aciculare and D. species 1=arenicoloides; or to 9 cm long, flat and 2-4 mm wide in D. angustifolium; spikelets 1.5-3.1 mm long.
12 Spikelets (3.0-) 3.2-3.8 mm long, fusiform, pointed at summit, attenuate at base, with both glumes attached 0.3-0.5 mm below sterile lemma, the autumnal spikelets 3.5-3.8 mm long; larger vernal blades 3-6 mm wide, the lower and mid-culm blades of similar width; autumnal blades involute................................................................. D. species 8 (=fusiforme)
12 Spikelets 1.8-3.1 mm long, obovate, blunt, and the base not attenuate (except in D. species 1=arenicoloides with autumnal spikelets 2.3-3.1 mm long); larger vernal blades 2-8 mm wide, the lower usually wider and often shorter than mid-culm blades; autumnal blades involute or flat.
13 Longest vernal blades to 16 cm, widest vernal blades 4-8 mm, usually longitudinally wrinkled; vernal and autumnal spikelets 2.3-3.1 mm long; autumnal blades flat, the larger to 9 cm by 2.4 mm.............................................. D. angustifolium
13 Longest vernal blades to 6 (D. aciculare ssp. aciculare) or 12 (D. species 1=arenicoloides) cm long, 2-5 mm wide, not noticeably wrinkled; vernal spikelets 1.5-2.8 mm long, autumnal spikelets either 1.5-2.3 (D. aciculare ssp. aciculare) or 2-3.1 (D. species 1=arenicoloides); autumnal blades involute, the larger to 6 cm by 1.5 mm.
14 Longest vernal blades to 12 cm, widest vernal blades 3-4 (-5) mm; vernal spikelets 2.1-2.8 mm long; autumnal spikelets 2.3-3.1 mm long, pointed, attenuate, the glumes attached 0.3-0.5 mm below sterile lemma; first glumes 0.7-1.5 mm long; larger autumnal blades to 6 cm by 1.5 mm.................................................. D. species 3=leucoblepharis
14 Longest vernal blades to 6 (-8) cm, widest vernal blades 2-5 mm; vernal and autumnal spikelets 1.7-2.3 mm long, blunt, not attenuate, the glumes attached <0.2 mm below sterile lemma; first glumes 0.6-0.9 mm long; larger autumnal blades to 3 cm by 1 mm................................................................. D. aciculare ssp. aciculare
10 Blades of mid-culm leaves lanceolate, thin or firm but not stiff, usually < 10× as long as wide, usually 7 mm or more wide when as much as 8 cm long.
15 Spikelets 2.9-3.8 mm long, broadly elliptic, rounded at the summit, with broad and thick nerves................................................................. D. oligosanthes var. scribnerianum
15 Spikelets 2.1-2.9 mm long, elliptic or obovate, rounded or pointed at the summit, the nerves often raised, but not broad and thick.
16 Culm internodes and sheaths glabrous or sparsely pilose.
17 Spikelets strongly plano-convex when viewed laterally, obpyriform when viewed dorsally, 2.2-2.6 mm long; fertile lemma and palea papillose; first glume and base of second glume usually strongly reddish-purple.......................... D. species 2 (=webberianum)
17 Spikelets biconvex to elliptic when viewed laterally, variously shaped but not obpyriform when viewed dorsally; fertile lemma and palea smooth or reticulate (or papillose in D. lucidum with weak and sprawling culms and spikelets 1.7-2.3 mm long); first and second glume various.
18 Culms tending to be stiffly erect; blades erect or erect-spreading, broad, usually but not always tapering from just below the middle to both ends, often yellowish green; plants not or only sparingly branched in age, not developing leafy fascicles of reduced leaves and inflorescences................................................................. D. boreale
18 Culms not stiffly erect; leaves usually spreading, broad or narrow, dark to bright green; plants often freely branched in age, becoming top-heavy with a mass of fascicled, reduced leaves and inflorescences.............................................. D. dichotomum group
16 Culm internodes crisp-puberulent (sparsely so in D. species 2 (=webberianum); sheaths puberulent or glabrous.
19 Spikelets elliptic, sub-acute to pointed, greenish or faintly purple-tinged basally.......................... D. commutatum var. ashei
19 Spikelets strongly plano-convex when viewed laterally, obpyriform when viewed dorsally, broadly rounded, usually markedly reddish-purple basally.
20 Fertile lemma and palea papillose; spikelets 2.2-2.6 mm long; lower culm blades 6-12 mm wide, glabrous.................. D. species 2 (=webberianum)
20 Fertile lemma and palea smooth (minutely reticulate but not papillose); spikelets (1.8) 1.9-2.2 (-2.3) mm long; lower culm blades 4-8 mm wide, glabrous, glabrate, or puberulent (especially abaxially)........ D. species 3 (=lancearium)

Key F - Spikelets 0.8-2.0 mm long, lower culm internodes variously hairy
1 Longer hairs of ligule 2-5 mm long.
   Ligule without a distinct ring of short hairs in front of the long hairs.
2 Blades of mid-culm leaves linear or narrowly lanceolate, stiff, acuminate, often involute, 4-10 cm long, 2-5 mm wide; spikelets 1.3-1.7 mm long.................................................. D. aciculare ssp. aciculare
3 Blades of mid-culm leaves lanceolate, thin or firm but not stiff, length and width various, less than 15× as long as wide.............................. D. aciculatum group

2 Ligule with a distinct ring of short hairs in front of the long hairs.
4 Peduncle, panicle axis, and sheaths puberulent with hairs 0.1 mm long; larger blades 3-6 cm long, 3-5 mm wide; spikelets 1.3-1.7 mm long................................................................. D. meridionale
4 Peduncle panicle axis hairs > 0.1 mm long; sheaths and internodes densely clothed with straight retrorse (occasionally spreading to spreading-ascending) hairs often > 4 mm long................................................................. D. villosissimum var. villosissimum

1 Longer hairs of ligule < 2 mm long.
5 Culm leaves basally crowded, ascending, usually matted or cushion-forming, larger than the mid and upper culm blades.
6 Sheaths variously pubescent or glabrous, but not conspicuously retrorsely long-pilose; longer blades 2-6 cm long and 1-8 mm wide; spikelets 0.9-2.1 mm long.
7 Blades 1-4 mm wide, glabrous, the margins eciliate or basally ciliate; spikelets 0.9-1.5 mm long, glabrous; autumnal form branched from lower and mid nodes as well as from basal nodes.
8 Blades 1.5-4 (-5) cm long; spikelets 0.9-1.2 mm long .................................................. D. chamaeleonche
8 Blades 4-12 (-20) cm long, some at least 7 cm long; spikelets 1.2-1.5 mm long........ D. dichotomum var. glabroflorum
7 Blades 2-10 mm wide, pubescent or glabrous, the margins coarsely papilllose-ciliate throughout; spikelets 1.1-2.1 mm long, glabrous or pubescent; autumnal form branched from basal nodes only.
9 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous ............................................. D. strigosum var. leucolepharis
9 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
10 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-2.1 mm long........... D. strigosum var. glabrecens
10 Blades pilose, at least abaxially; spikelets 1.1-1.6 mm long; blade surfaces pubescent .................................................. D. strigosum var. strigosum

3 Basal leaves rosette-forming, usually much smaller than the culm leaves, not matted or cushion-forming; culms branching at the mid and upper nodes in age.
4 Blades of mid-culm leaves typically long and acuminate, linear or narrowly lanceolate, usually 10-20× as long as wide, only 2-5 mm wide when < 8 cm long.
5 Spikelets (glandular-) papilllose-pubescent; blades 1-3 (-5) mm wide; first glume 0.8-1.0 mm long; culms to 4 dm tall ................................................................. D. aciculare ssp. neantherum
6 Spikelets glabrous; blades 3-8 mm wide; first glume 0.3-1.1 mm long; culms to 10 dm tall.
7 Blades 3-8 mm wide; panicle (8-) 20-40 mm wide; first glume 0.6-1.1 mm long, blunt to acute...................... D. dichotomum group
8 Leaves 3-5.5 mm wide; panicle 2-5 mm wide; first glume 0.3-0.4 mm long, truncate to obtuse....................... D. hirstii

Key G - Spikelets 0.8-2.0 mm long, lower culm internodes glabrous

1 Ligule 1-5 mm long.
2 Ligule 1-2 mm long; sheaths sparsely to moderately spreading short-pilose; internodes glabrous; nodes retrorsely bearded; leaves 1-4 cm long, 2-5 mm wide; spikelets 1.2-1.4 mm long................................................................. D. species 10 (=curtifolium)
2 Ligule (1.5-) 2-5 mm long; sheaths glabrous to variously pubescent; internodes glabrous or pubescent; nodes glabrous, or bearded with ascending, spreading, or tangled hairs; leaves 3-10 cm long, 3-10 mm wide; spikelets 0.8-1.9 mm long................................. D. aciculatum group
1 Ligule < 1 mm long.
3 Basal leaves rosette-forming, usually much smaller than the culm leaves, not matted or cushion-forming; culms branching at the mid and upper nodes in age.
4 Blades of mid-culm leaves typically long and acuminate, linear or narrowly lanceolate, usually 10-20× as long as wide, only 2-5 mm wide when < 8 cm long.
5 Spikelets (glandular-) papilllose-pubescent; blades 1-3 (-5) mm wide; first glume 0.8-1.0 mm long; culms to 4 dm tall ................................................................. D. aciculare ssp. neantherum
6 Spikelets glabrous; blades 3-8 mm wide; first glume 0.3-1.1 mm long; culms to 10 dm tall.
7 Leaves 3-8 mm wide; panicle (8-) 20-40 mm wide; first glume 0.6-1.1 mm long, blunt to acute...................... D. dichotomum group
8 Leaves 3-5.5 mm wide; panicle 2-5 mm wide; first glume 0.3-0.4 mm long, truncate to obtuse....................... D. hirstii
4 Blades of mid-culm leaves lanceolate, mostly 10+ or less as long as wide, usually 7 mm or more wide when as much as 8 cm long.
7 Spikelets elliptic, oblong, or obovate; lower culm blades 3-12 (-15) mm wide, thin, tapered to the base; plants often freely branching in age, becoming top-heavy with a mass of fascicled, reduced leafy branches and inflorescences. **D. dichotomum group**
7 Spikelets broadly elliptic to suborbicular; lower culm blades 6-30 mm wide, thickish, broad, and cordate to subcordate at the base; plants sparingly branched in top-heavy with fascicled, reduced leafy branches and inflorescences.
8 Spikelets 0.9-1.2 mm long; longer blades 6-8 cm long, erect to erect-ascending. **D. erectifolium**
8 Spikelets 1.2-1.9 mm long; longer blades 8-20 cm long, ascending or the uppermost erect. **D. sphaerocarpon**
9 Mid-culm blades 6-11 (-14) mm wide, the uppermost 3-9 cm long. **D. sphaerocarpon var. sphaerocarpon**
9 Mid-culm blades, at least some, 15-30 mm wide, the uppermost 10-15 cm or more long. **D. polyanthus**
3 Basal leaves similar to or larger than the mid and upper culm leaves, often matted or cushion-forming; culms branching at the base (also at mid and upper nodes in **D. chamaeleonche** vars. and **D. dichotomum var. glabrifolium**).
10 Longer blades > 6 cm; if only 6 cm, then sheaths retrorsely long-pilose (**D. laxiflorum**).
11 Spikelets 1.2-1.5 mm long, glabrous. **D. dichotomum var. glabrifolium**
11 Spikelets 1.7-2.3 (-2.8) mm long, pubescent.
12 Longer blades 6-18 cm long by 7-12 mm wide; sheaths conspicuously retrorsely long-pilose; nodes bearded with retrorse or spreading hairs; spikelets 1.9-2.3 mm long. **D. laxiflorum**
12 Longer blades 10-35 cm long by 2-4 mm wide; sheaths glabrous to variously pilose, but not conspicuously retrorsely long-pilose; nodes variously pubescent to glabrate; spikelets 1.7-2.3 (-2.8) mm long. **D. linearifolium**
10 Longer blades 1.5-6 cm; sheaths glabrous or pubescent, but not retrorsely long-pilose.
13 Blades 1-3 mm wide; sheaths retrorsely long-ciliate, glabrous.
14 Spikelets pubescent, 1.2-1.4 mm long; blades involute, often falcate, 2.5-6 cm long. **D. chamaeleonche ssp. breve**
14 Spikelets glabrous, 0.9-1.2 mm long; blades flat, not falcate, 1.5-4 (-5) cm long. **D. chamaeleonche ssp. chamaeleonche**
13 Blades 3-8 mm wide; spikelets 1.1-2.1 mm long (if < 1.5 mm, then blades either pubescent on one or both surfaces or ciliate at the apex).
15 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous. **D. strigosum var. leucoblepharis**
15 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
16 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-2.1 mm long. **D. strigosum var. glabrescens**
16 Blades pilose, at least abaxially; spikelets 1.1-1.6 mm long. **D. strigosum var. strigosum**

Key to the Dichanthelium acuminatum group

1 Internodes glabrous.
2 Ligule 1.2 mm long; sheaths glabrous; leaves 1-3 cm long, 2-5 mm wide; spikelets 1.2-1.4 mm long. **D. species 10 (=urtifolium)**
2 Ligule (1.5-2.5) mm long; sheaths glabrous to variously pubescent, but not spreading short-pilose; nodes glabrous or pubescent, but not bearded; leaves 4-11 cm long, 4-8 mm wide.
3 Panicles 8-12 cm long, ½-½½ as wide, bearing 250 or more spikelets; spikelets 1.4-1.6 mm long; ligule (1.5-2.3) mm long. **D. spretum**
3 Panicles 3-8 cm long, > ½ as wide, bearing < 200 spikelets; spikelets 1.1-1.6 mm long; ligule 2-5 mm long; larger blades 4-10 cm long.
4 Internodes glabrous to pubescent (especially lower); larger vernal blades usually longer than 6 cm, the basal margin prominently long-ciliate (1.5-2.1) mm long; spikelets 1.1-1.7 mm long; longer hairs of ligule usually more than 3 mm; plants often yellowish-green. **D. acuminatum var. lindheimeri**
4 Internodes glabrous (the lowest rarely slightly pubescent); larger vernal blades usually shorter than 7 cm, the basal margin cilia inconspicuous or absent; spikelets 1.1-1.5 mm long; longer hairs of ligule often less than 3 mm long; plants often purplish-green. **D. longiligulatum**

5 Peduncle, panicle axis, and/or sheaths of vernal culms puberulent with hairs 0.1 mm long, sometimes also pubescent with longer hairs, but never grayish-villous; larger blades 2-7 cm long, 2-7 mm wide.
6 Spikelets 0.8-1.1 mm long; blades 2-4.5 cm long, 2-5.5 mm wide; sheaths sparsely puberulent, lacking papillose-based longer hairs. **D. wrightianum**
6 Spikelets 1.1-1.7 mm long; mid-culm blades generally 3-7 cm long and 3-7 mm wide; sheaths with some papillose-based hairs 2 mm or more long.
7 Larger mid-culm blades 4-7 cm long, 4-7 mm wide, glabrous to sparsely pubescent adaxially; ligule 1-5 mm long; spikelets 1.1-1.5 mm long. **D. leucothrix**
7 Larger mid-culm blades 3-6 cm long, 3-5 mm wide; ligule with a ring of hairs < 1 mm and scattered longer hairs to 4 mm; spikelets 1.3-1.7 mm long. **D. meridionale**
5 Peduncle, panicle axis, and sheaths of vernal culms glabrous, or pilose, or grayish-villous with some shorter hairs 0.2-0.5 mm long, but never puberulent with hairs 0.1 mm long; larger blades 4-12 cm long, 4-12 mm wide.
8 Sheaths and internodes of vernal culms gray-villous with a dense, tangled, or matted mixture of slender hairs 2-4 mm long, variously ascending, spreading, and retrorse, papillose or non-papillose, often with shorter hairs beneath; blades velvety-pubescent on abaxial surface, the margins ciliate for half or more their length. **D. acuminatum var. acuminatum**
8 Sheaths and internodes of vernal culms puberulent, pubescent or papillose to hispid with ascending straight hairs, but never grayish-villous; blades glabrous to variously pilose abaxially, but not velvety-pubescent, the margins ciliate or ciliate only below the middle.
9 Spikelets 0.8-1.1 mm long; blades 2-4.5 cm long, 2-5.5 mm wide. **D. wrightianum**
9 Spikelets 1.1-2.0 mm long; blades 3-12 mm long, 3-12 mm wide.
10 Peduncle, panicle axis, and/or sheaths glabrous; sheaths lacking hairs or papillae, at least near mid-length. **D. acuminatum var. lindheimeri**
10 Peduncle, panicle axis, and internodes puberulent, pubescent, or pilose; sheaths puberulent, pubescent, or pilose.
11 Blades 5-12 cm long, 6-12 mm wide; spikelets 1.5-2.0 mm long; peduncle, panicle axis, and sheaths variously pilose, but lacking puberulent hairs 0.1 mm long. **D. acuminatum var. fasciculatum**
11 Blades 3-7 cm long, 3-7 mm wide; spikelets 1.1-1.7 mm long; puberulent hairs 0.1 mm long often present on peduncle, panicle axis, or sheaths.
1. Lower cauline nodes bearded, the hairs usually retrorse.

2. Spikelets glabrous.

3. Ligule an eciliate membrane; leaves 3.5-7 cm long by 3-6 mm wide.................................................. \**D. species 11***

4. Ligule ciliate; leaves either 1.5-4 (-5) cm long by 1-5 mm wide, or 5-12 cm long by 1-15 mm wide.

5. Spikelets 1.2-1.4 mm long; sheaths spreading-pilose; vernal cauleal blades 2-5 mm wide; ligule 1-2 mm long; node beard hairs usually spreading or reflexed; internodes glabrous.................. \**D. species 10 (=curtifolium)**

6. Spikelets 0.9-1.2 mm long; sheaths glabrous; vernal cauleal blades 1-2 (-3) mm long; ligule < 1 mm long; node beard hairs and often only partially encircling the node; internodes glabrous or puberulent.......................... \**D. chamaeleonche**

7. Spikelets 1.4-2.3 mm long; vernal cauleal blades 5-12 cm long and 3-15 mm wide; internodes and sheaths glabrous.

8. Usually all culm nodes bearded; internodes glabrous, or middle and upper internodes and peduncle sparsely to moderately spreading short-hairy, sometimes also glandular; upper as well as lower vernal sheaths and both surfaces of cauleal blades pubescent, often densely so; spikelets (1.5-) 1.8-2.2 mm long; [of dry rocky or sandy basic soil and barrens]........................................ \**D. annulum***

9. Often only lower culm nodes bearded; internodes glabrous; at least middle and upper cauleal blades glabrous; spikelets 1.4-2.8 mm long; [mostly of wet acid soils and mesic to dry woodlands].

10. Spikelets (2.0-) 2.2-2.8 mm long; first glume 0.5-1.3 mm long; fertile lemma 1.8-2.3 mm long; lowest vernal cauleal blades pubescent at least abaxially.................................................. \**D. mattramuskeetense***

11. Spikelets 1.7-2.2 mm long; first glume 0.6-0.9 mm long; fertile lemma 0.7-1.0 mm wide.................................. \**D. dichotomum var. nitidum***

12. Spikelets 1.4-1.9 mm long; first glume 0.3-0.6 (-0.8) mm long; fertile lemma 0.6-0.8 mm wide............................. \**D. dichotomum var. ramulosum***

13. Spikelets pubescent.

14. Spikelets 1.2-1.4 mm long; sheaths spreading-pilose; vernal cauleal blades 1-4 cm long and 2-5 mm wide; ligule 1-2 mm long............. \**D. dichotomum var. curtifolium***

15. Spikelets 1.4-2.2 mm long; first glume 0.3-0.9 mm long; fertile lemma 1.4-1.7 mm long; lowest vernal cauleal blades glabrous.

16. Blades neither involute (except apically) nor falcate, 1-7 cm long, 1.5-7 mm wide, about 10× as long as wide; lower internodes glabrous or sparsely pilose, but not strigose; spikelets 1.1-1.7 mm long; culms 15-60 cm long.

17. Blades 1-3 (-5) cm long, 1.5-3 (-4) mm wide, the cartilaginous margins typically gray-green to white-beige and about 0.1 mm wide; spikelets 1.2-1.5 mm long; culms to 40 cm long.................. \**D. ensifolium***

18. Blades 2-7 cm long, 3-6 mm wide, the cartilaginous margins typically white-beige and about 0.2 mm wide; spikelets (1.2-) 1.4-1.7 mm long; culms to 60 cm long.................................................. \**D. tenue***

19. Spikelets glabrous.

20. Blades mostly basally disposed, strongly ascending, much larger than the 2-3 remote middle and upper cauleal leaves of fertile culms; spikelets 2.4-2.9 mm long; culms branch from basal and lower nodes, but are not known to produce autumnal inflorescences ...... \*D. nudicaula*

21. Cauline leaves mostly basally disposed, strongly ascending, much larger than the 2-3 remote middle and upper cauleal leaves of fertile culms; spikelets 2.4-2.9 mm long; culms branch from basal and lower nodes, but are not known to produce autumnal inflorescences ...... \*D. nudicaula*

22. Spikelets 0.9-1.5 mm long; vernal blades 1-4 mm wide.

23. Blades 1-3 (-5) cm long, 1.5-3 (-4) mm wide, about 10× as long as wide; autumnal plants cushion-forming.................. \**D. chamaeleonche var. chamaeleonche***

24. Spikelets 1.2-1.5 mm long; blades 1-12 (-20) cm long; autumnal plants not cushion-forming.

25. Blades 4-12 (-20) cm long (the longer at least 7 cm), 2-4 mm wide, 20-30 (-50) times as long as wide........................................ \*D. ensetifolium*

26. Spikelets 1.4-2.6 mm long; vernal blades 3-15 mm wide (if spikelets < 1.6 mm long and vernal blades < 5 mm wide, then larger blades > 5 cm long in \*D. caudalumescens").

27. Widest vernal cauleal blades 7-15 mm wide; upper sheaths often gluttonous-warty; spikelets 2.1-2.6 mm long, some or most acute to beaked, second glume and sterile lemma extending 0.3-0.5 mm beyond fertile lemma in at least some spikelets..............
21 Widest vernal cauline blades 3-10 mm wide; upper sheaths not glutinous-warty; spikelets 1.4–2.3 mm long, blunt to subacute, second glume and sterile lemma often equal to or shorter than fertile lemma, or extending < 0.3 mm beyond it.

22 Ligule an eliicate membrane; largest vernal blades 3-6 cm long, usually 10-15 × as long as wide .................. D. species 11

22 Ligule crisped, largest vernal blades 5-12 cm long, usually 15-20 × as long as wide.

23 Spikelets 1.4-1.8 mm long; first glume 0.3–0.8 mm long; fertile lemma 1.3-1.5 mm long; mature vernal panicles usually short-exserted with ascending branches; fresh foliage bluish-glaucous ........................................ D. caerulescens

23 Spikelets 1.7-2.3 mm long; first glume 0.6-1.1 mm long; fertile lemma 1.6-1.9 mm long; mature vernal panicles exserted with spreading branches; fresh foliage not bluish-glaucous.

24 Vernal cauline blades spreading to deflexed, flexuous; [of wet-mesic to dry woods and thickets] .........................

................................................................. D. dichotomum var. dichotomum

24 Vernal cauline blades stiffly erect; [of wet pine savannas and open swamps] .................... D. dichotomum var. roanokeense

**Dichanthelium aciculare** (Desvaux ex Poiret) Gould & Clark. Needle Witch Grass. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA): sandy woods and fields; common (uncommon in GA, NC, and SC Piedmont, rare in VA Piedmont, rare in DE Coastal Plain). May-October. NJ south to n. FL, west to TX and OK, also in West Indies and n. South America. Blades typically are strongly involute. Can be confused with autumnal forms of *D. ovale* var. *addisonii*, which has vernal blades 5-10 mm wide. Plants referable to *Panicum chrysopsidifolium* by HC have ligules <1 mm long; blades 5-10 cm long and 3-5 mm wide; densely villous nodes, internodes, sheaths, and blades; and villous, obovate spikelets 1.9-2.2 mm long. This entity needs further study. [= Panicum aciculare Desvaux ex Poiret – RAB, F; < P. aciculare – C; = P. aciculare ssp. aciculare – FNA; > P. aciculare – G, HC, S; > P. chrysopsidifolium Nash – G, HC, S; > P. benettense M.V. Brown – HC, S; < D. aciculare – K, Z]

**Dichanthelium aciculare** (Desvaux ex Poiret) Gould & Clark *ssp. neantherum* (Grisebach) Freckmann & Lelong, Nerved Witch Grass. Maritime wet grasslands, Piedmont prairie-like barrens. May-November. Disjunct in se. and central NC, se. SC, GA, FL, MS, e. TX, AR, Bahamas, Cuba, and Belize. Can occur with the similar-appearing *D. caeruleans*, from which it differs by having spikelets that are longer (1.8-2.2 mm vs. 1.4-1.8), rounded summits vs. obtuse to sub-acute, and pubescent vs. glabrous; longer first glumes (0.8-1.0 mm vs. 0.3-0.8); leaves 15× or more as long as wide vs. 10-15×; and a nearly strict panicle. FNA gives a spikelet length of 2-2.8 mm, well beyond the length of spikelets on specimens we have seen. Although FNA provides no synonymy, it appears that its concept of *ssp. aciculare* has been reduced to *Dichanthelium caeruleans* ssp. *iteratedum*. We have observed plants of this entity from the Piedmont of NC match descriptions of *Panicum ovimum*, known from dry to moist open ground and prairies in e. TX, MS, and AR when last recognized (HC). Both of these taxa are treated here as synonyms of *ssp. neantherum*. [= FNA; > Panicum neantherum Grisebach – RAB, HC, S; > P. ovimum Scribn & J.G. Smith – HC, S; > P. pinetorum Swallen – HC, S; < D. aciculare – K, Z]


**Dichanthelium acuminatum** (Swartz) Gould & Clark *ssp. fasciculatum* (Torrey) Focke, Slender-stemmed Witch Grass. Mt (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): open or cut-over woods, thickets, fields, meadows, and shores, frequently on disturbed soils; common (uncommon in GA, NC, SC, and VA Coastal Plain). May-August. NL (Newfoundland) south to FL, west to CA, north to s. BC. Typically much less pilose than var. *acuminatum*, the hairs usually papillate. Plants referable to *Panicum glutinosum* var. *fasciculatum* Fernald may be a hybrid of var. *fasciculatum* with *D. scoparium*. Known only from se. VA, they are described as having culms 7-9 dm high; elongate internodes with cinereous puberulence and black, warty, viscous glands; villous nodes; glutinous-warty and scabrous sheaths and blades; ligule 4-5 mm long; minutely puberulent panicle axis; spikelets ellipsoid, subacute, 1.7-1.8 mm long, pubescent; first glume subacute, 0.6-0.7 mm long. [= Y; < Panicum lanuginosum Elliott – RAB; > P. lanuginosum var. fasciculatum (Torrey) Fernald – C, F, G; > P. lanuginosum var. tennesseensis (Ashe) Gleason – C, G; > P. lanuginosum var. implicatum (Scribner) Fernald – C, F, G; = D. acuminatum ssp. fasciculatum (Torrey) Freckmann & Leong – FNA; > P. implicatum Scribn – HC, WV; > P. hauchoecae Ashe var. hauchoecae – HC, S; > P. hauchoecae var. fasciculatum (Torrey) Hubb. – HC; > P. tennesseensis Ashe – HC, S; > P. hauchoecae var. silvicola Hitchcock & Chase – S; < D. acuminatum var. acuminatum – K, Z; < D. acuminatum var. implicatum (Scribner) Gould & Clark – K, Z; > P. hauchoecae Ashe – WV; > P. acuminatum Swartz var. fasciculatum (Torrey) Leong – X; > P. acuminatum var. uncipilum (Trinius) Leong – X]
POACEAE


Dichanthelium angustifolium (Elliott) Gould, Narrow-leaved Witch Grass. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA), sandy pinelands and fields; common (rare in Mountains, rare in DE and VA). May-October. NJ south to FL, west to AR and e. TX. Vernal blades typically are flat (often involute distally). Can be confused with D. consanguineum, which has spreading-pilose nodes and blades 10-15× as long as wide; D. angustifolium blades typically are 20× or more as long as wide. Plants with involute blades to 8 cm long, spikelets 2.1-2.5 mm long, and first glumes 0.7-1.1 mm long are referable to Panicum species 1=arencioideae. They are transitional to D. aciculare. [= Panicum angustifolium Elliott – RAB, F, G; < P. aciculare Desvaux ex Poiré – C; = D. aciculare ssp. angustifolium (Elliott) Freckmann & Lelong – FNA; > P. angustifolium – HC, S; > P. arencioideae Ashe – HC, S; < D. aciculare – K, Z]

Dichanthelium annulum (Ashe) LeBlond, Ringed Witch Grass. Pd (DC, MD, NC, SC, VA), Cp (DC, NC, Mt (VA): dry sandy or rocky soil of open woods, dry grasslands, and barrens, and glades over serpentine, limestone, calcareous shales, and other high pH dry soils; rare. May-October. NJ, IN, and MO south to AL and MS, primarily in the Appalachian Province with very few occurrences in the Coastal Plain. One of the more distinctive taxa within the D. dichotomum group by morphology, habitat, and range. Plants from se. MA with all leaves pubescent, glabrous internodes, and spikelets 2.2-2.5 mm long were described as Panicum annulum var. glabrescens, but belong to D. mattamuskeetense. [= Q; < P. dichotomum Linnaeus – RAB, C, GW; = Panicum annulum Ashe – F, HC, S; = P. annulum var. annulum – G; > D. dichotomum ssp. mattamuskeetense (Ashe) Freckmann & Lelong – FNA; < D. dichotomum (Linnaeus) Gould – K, Z; > P. dichotomum var. mattamuskeetense (Ashe) Lelong – X]

Dichanthelium boreale (Nash) Freckmann, Northern Witch Grass. Pd (GA, NC, VA), Mt (GA, NC, VA): open woods and grassy slopes, usually in moist soil; rare. April-September. NL (Newfoundland) and ON south to NC, GA, and AR. Our plants are =Panico bicknellii, regarded as a "putative hybrid" (along with =P. calliphyllum) by FNA, which cites WV as the southern limit of D. boreale. [= K, Z; > Panicum bicknellii Nash – RAB, F, HC, S; > P. boreale Nash – C, F, G, HC; > P. calliphyllum Ashe – F, HC; > D. boreale – FNA; > P. bicknellii var. bicknellii – G; > P. bicknellii var. calliphyllum (Ashe) Gleason – G]


Dichanthelium caerulescens (Hackel ex Hitchcock) Correll, Blue Witch Grass. Cp (NC, VA): marshes, swamps, wet pinelands, maritime grasslands, damp sandy soil; rare. June-October. NJ to NC, and from FL to LA, also in the Bahamas and West Indies. Not treated by FNA, where it presumably would have been placed in synonymy with D. dichotomum ssp. roanokense. [= Q; < Panicum dichotomum Linnaeus – RAB, GW; > D. caerulescens Hackel ex Hitchcock – F, HC, S; > D. dichotomum ssp. roanokense – FNA; < P. roanokense Ashe – G; > D. dichotomum var. dichotomum – K, Z; > Panicum dichotomum var. roanokense (Ashe) Lelong – X]

Dichanthelium chamaeleonche (Triinus) Freckmann & Lelong ssp. chamaeleonche, Carpet Witch Grass. Cp (GA, NC, SC, VA): moist pine savannas and flatwoods, pineland pondshores; uncommon (rare in VA). April-September. SE. VA south to FL, west to LA, also in Cuba and Belize. Internodes can be glabrous or pubescent, and nodes glabrous, pubescent, or bearded, but the glabrous spikelets 0.9-1.2 mm long are diagnostic. The concept of this taxon in FNA (as ssp. chamaeleonche) appears to include D. dichotomum var. glabriofolium (see descriptions of Floridian D. chamaeleonche ssp. breve and D. dichotomum var. glabriofolium). [= Panico chamaeleonche Triinus – RAB, G, GW, HC, S; > P. extensifolium Baldwin – C; > D. chamaeleonche ssp. chamaeleonche – FNA; > D. dichotomum (Linnaeus) Gould var. extensifolium (Baldwin) Gould & Clark – K, Z; = P. chamaeleonche var. chamaeleonche – X]

Dichanthelium clandestinum (Linnaeus) Gould, Deer-tongue Witch Grass. Mt (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA), Mt (NC, VA): shaded to filtered woodlands, ditches and low areas, and often in moist sandy soil; common (uncommon in GA, NC, and SC Coastal Plain). May-October. NS and QC south to n. FL, west to IA, KA, and TX. [= FNA, K, Z; = Panicum clandestinum Linnaeus – RAB, C, F, G, HC, S, WV, X]


Dichanthelium commutatum (Schultes) Gould var. commutatum, Variable Witch Grass. Cp (FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): low, shaded, moist woodlands and woodland edges, and dry, thin, often rocky woods and thickets; common. May-October. ME south to FL, west to MI, MO, OK, and TX, also in Mexico. Plants with spikelets 3.0-3.7 mm long, first glumes half or more as long, and with broadly linear leaves about 10× as long as wide have been recognized as ssp. equilaterale by FNA, and Panicum equilaterale by HC and S, but intermediates occur throughout the NC to FL portion of the range of specimens bearing the equilaterale name. [= Panicum commutatum Schultes – RAB, C; > P. commutatum var. commutatum – F, G; > P. commutatum – HC, S, WV; > P. mutabile Scribner & Smith ex Nash – F, G, HC, S; > D. commutatum ssp. commutatum Freckmann & Lelong – FNA; > D. commutatum ssp. equilaterale (Scribner) Freckmann & Lelong – FNA; > D. commutatum ssp. joori (Vasey) Freckmann & Lelong – FNA; < D. commutatum – K; > P. joori Vasey – HC, S; < D. equilaterale – HC, S]
**POACEAE**

*Dichanthelium consanguineum* (Kunth) Gould & Clark, Kunth's Witch Grass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): moist or dry sandy soils of pinelands; common in the Coastal Plain, uncommon in the Piedmont (rare in VA). April-September. Occasional from VA south to FL, west to TX and IN. Often not easily separated from *D. angustifolium* and *D. ovale*. It is distinguished from *D. angustifolium* by spreading-hirsute nodes and leaves 10-15× as long as wide (*D. angustifolium* has beardless nodes, or nodes bearded with erect-ascending soft hairs, and longer leaves 20× or more as long as wide). *D. consanguineum* is distinguished from *D. ovale* by having strongly pilose upper blade surfaces (*D. ovale* upper blade surfaces are glabrous or with a few blade hairs basally). The hairs of *D. consanguineum* frequently are strongly papillate. [= FNA, K, Z; = Panicum consanguineum Kunth – RAB, C, F, G, HC, S]


*Dichanthelium dichotomum* (Linnaeus) Gould var. dichotomum. Forked Witch Grass. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): wet-mesic to dry woods, thickets, and woodland openings; common (rare in VA Coastal Plain). May-October. S. Canada and MI south to FL and TX. Plants with bearded nodes and larger leaves are referable to *Panicum dichotomum* var. barbulatum (here included) but intermediates abound. [= Q; < Panicum dichotomum Linnaeus – RAB, C, GW; > P. dichotomum var. dichotomum – F, WV; > P. dichotomum var. barbulatum (Michaux) Wood – F, WV; > D. dichotomum ssp. dichotomum – FNA; > P. dichotomum – G; > P. dichotomum – HC, S; > P. barbulatum Michaux – HC, S; > D. dichotomum var. dichotomum – K, Z; > P. dichotomum var. dichotomum – X]

*Dichanthelium dichotomum* (Linnaeus) Gould var. nitidum (Lamarck) LeBlond, Shining Witch Grass. Cp (GA, NC, SC, VA), Pd (NC), Mt (SC, VA): moist sandy or peaty soil of wet pine savannas and pocosin ecotones, wet meadows near the coast, swamps, and marshes; uncommon (rare in Mountaint and Piedmont, rare in VA). PA and NJ south to FL, west to MO and TX; also the Bahamas (Sorrie & LeBlond 1997) and West Indies, and Mexico to Venezuela. [= Q; < Panicum dichotomum Linnaeus – RAB, C, GW; > P. nitidum Lamarck – F, HC, S; > D. dichotomum ssp. nitidum (Lamarck) Freckmann & LeLorgne – FNA; > P. nitidum var. nitidum – G; > D. dichotomum var. dichotomum – K, Z; > P. dichotomum var. nitidum (Lamarck) Wood – X]


*Dichanthelium fusiforme* (Hitchcock) Harvill, Spindle-fruited Witch Grass. Cp (GA, NC, SC, VA): dry to moist sand of open pine and pine/oak woods and clearings; rare. May-September. SC. VA south to FL, west to MS, also in West Indies, Mexico, Central America, and Venezuela; most much abundant in FL. Autumnal blades often flat. The autumnal form of *D. fusiforme* is distinguished from the vernal blades of the former are missing. They are best separated by ligule length (0.5-1.1 mm in fusiforme, 1.5-3.5 mm in oligosanthes) and the more attenuated ends of the fusiforme spikelet. [= Panicum fusiforme Hitchcock – RAB, F, G, HC, S; > P. aciculare Desvaux ex Poiré – C; = D. aciculare sp. fusiforme (Hitchcock) Freckmann & LeLorgne – FNA; > D. aciculare – K, Z]

*Dichanthelium hirsutii* (Swallen) Kartesz, Hirsut's Witch Grass. Cp (DE, GA, NC): pond-cypress savannas and limesink depressions; rare. June-September. This distinctive species is known from only seven sites: two in NC, one in DE, two in NJ (one not seen since 1992), and two historical populations in GA. Described in 1961 (Swallen 1961), it is treated by some taxonomists as the *D. aciculare* group and by others as part of the *D. dichotomum* group; its affinities appear to lie with the former. See Schuyler (1996) for a discussion of the taxonomic distinctiveness of this species. The occurrence of this species in NC is documented in LeBlond & Sorrie (2001). [= K; < Panicum aciculare Desvaux ex Poiré – C; > D. dichotomum ssp. roanokense (Ashe) Freckmann & LeLorgne – FNA]


*Dichanthelium laxiflorum* (Lamarck) Gould, Open-flower Witch Grass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): open or shaded woodlands, often in moist soil; common. April-September. MD south to FL, west to TX, north to IN, also in Mexico, Central America, and West Indies. [= FNA, K, Z; = Panicum laxiflorum Lamarck – RAB, C, F, G; > P.
Dichanthelium leucothrix (Nash) Freckmann, Rough Witch Grass. Cp (GA, NC, SC), Pd (GA, NC, SC, VA): wet sandy, peaty, or mucky soil of pinelands; uncommon (rare in Piedmont). May-October. S. NJ south to FL, west to TX, also in TN, West Indies and n. South America. A micrometer is needed to measure the very short puberulence (0.1 mm) that distinguish this taxon, *D. meridionale*, and *D. wrightianum* from other members of the *D. acuminatum* group. [= K, Y; = Panicum leucothrix Nash – RAB, F, G, HC, S; = P. leucothrix – C; = D. acuminatum ssp. leucothrix (Nash) Freckmann & Lelong – FNA; = P. spretum ssp. leucothrix – GW; = P. acuminatum var. leucothrix (Nash) Lelong – X; = D. acuminatum (Swartz) Gould & Clark var. implicatum (Scribner) Gould & Clark – Z]


Dichanthelium lucidum (Ashe) LeBlond, Bog Witch Grass. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): wet meadows, sphagnum swamps, bogs, wet woods, sphagnum seepage meadows, baygalls; common (uncommon in Mountains). May-October. MA and MI south to FL and TX. Vernal culms soon recline, producing a tangled mass. The papillate fertile lemma is diagnostic. Rarely, entire populations of *D. lucidum* can have eiliate ligules composed of a membrane 0.1-0.3 mm long. Even rarer are plants within these populations with retrorsely bearded nodes. Both conditions may reflect introgression with another taxon, possibly within the *dichotomum* complex, or with *cryptanthum* in section *Clandestina*. [= Q; = Panicum dichotomum Linnaeus – RAB, C, GW; = P. lucidum Ashe – G, S; = P. lucidum var. lucidum – F, HC; = P. lucidum var. opacum Fernald – F, HC; = D. dichotomum lucidum (Freckmann & Lelong) Gould & Clark – FNA; = D. dichotomum var. dichotomum – K, Z; = P. dichotomum var. lucidum (Ashe) Lelong – X]


Dichanthelium meridionale (Ashe) Freckmann, Matting Witch Grass. Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): dry to damp sand of shores and woods; common (uncommon in GA, NC, SC, and VA). May-October. Sw. NS and MA to MN, south to e. NC, n. GA, and n. AL. A micrometer is needed to measure the very short puberulence (0.1 mm) that distinguishes this taxon, *D. leucothrix*, and *D. wrightianum* from other members of the *D. acuminatum* group. [= K, Y; = Panicum lanuginosum Elliott – RAB, F; = P. leucothrix Nash – C; = P. meridionale var. albemarlense (Ashe) Fernald – F; = D. acuminatum (Swartz) Gould & Clark spp. implicatum (Scribner ex Nash) Freckmann & Lelong – FNA; = P. meridionale Ashe – G; = P. meridionale – HC, S, WV; = P. albemarlense Ashe – HC, S, WV; = P. acuminatum Swartz var. unciphyllum (Trinianus) Lelong – X; = D. acuminatum var. implicatum (Scribner) Gould & Clark – Z]


Dichanthelium ovale (Elliott) Gould & Clark var. ovale, Oval-flowered Witch Grass. Cp (GA, NC, SC, VA): dry to damp sandy, peaty soil of swamps; common (rare in GA, NC, SC, VA). May-October. NY to WI, south to FL and e. TX. Infrequent over most of its range except FL. In our region, the *D. ovale* double ligule character is more evident in var. *ovale*, with var. *addisonii* often having only a single ligule about 1 mm long. Plants referable to *Panicum malacaon* have spikelets 3-3.2 mm long with a first glume attached conspicuously below the second glume and sterile lemma, and half or more as long as the spikelet; leaves 3-5 mm wide, puberulent beneath, and puberulent to glabrous above. It needs further study. Also see note under *D. consanguineum* regarding *D. ovale*. [= K, Z; = Panicum ovale Elliott – RAB, X; = D. ovale ssp. ovale – FNA; = P. ovale – HC, S; = P. malacaon Nash – HC, S; = P. ovale ovale – X]
POACEAE

Dichanthelium polyanthus (Schultes) Mohlenbrock, Small-fruited Witch Grass. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): damp to dry soil of open woods and ditches; common (absent from the outer Coastal Plain south of the Neuse River, NC). June-October. VA to s. IL, south to GA and e. TX. [= FNA; = Panicum polyanthus Schultes – RAB, C, F, G, GW, HC, S, WV; = D. sphaeroacapron (Elliott) Gould var. isophyllym (Scribner) Gould & Clark – K, Z]


Dichanthelium scoparium (Lamarck) Gould, Velvet Witch Grass. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): moist sandy soil of woodland openings and ditches; common (uncommon in Mountains). May-October. MA and MI south to FL and TX, also in Mexico and West Indies. The dense, velvety pubescence of the internodes, sheaths, and blades of this taxon, combined with the viscid band below the nodes, are diagnostic. See note under D. acuminate var. fasciculatum regarding Panicum glutinosacum. [= FNA, K, Z; = Panicum scoparium Lamarck – RAB, C, F, G, GW, HC, S]

Dichanthelium species 1 (=arenicolioides), Sandy Woods Witch Grass. Cp (GA, SC, NC), Pd (NC): in open sandy soil of pinelands and dunes, primarily near the coast; possibly uncommon, but long overlooked. May-September. NC south to FL and west to TX and AR; also in West Indies, Central America, and n. South America. Should be sought in VA. Autumnal form strongly resembling D. aciculare but with larger spikelets and longer first glumes. Vernal cauleine leaves are longer than those of D. aciculare but of similar width. Panicile branches often ascending. [= Panicum arenicolioides Ashe – HC, S; < D. aciculare (Desvaux ex Poiret) Gould & C.A. Clark ssp. angustifolium (Elliott) Freckmann & Lelong – FNA; < D. aciculare – K, Z]


Dichanthelium species 3 (=lancearium), Nash's Witch Grass. Cp, Pd (GA, NC, SC, VA): moist pine savannas and flatwoods, moist to dry openings in maritime forests, dry pine and oak sandhills; common (uncommon in Piedmont, rare in VA Piedmont and Coastal Plain). May-September. Se. VA to FL, west to e. TX, also in West Indies and Central America. This and D. portoricense appear to intergrade in our region, and =lancearium is treated as part of D. portoricense ssp. patulum in FNA, whose concept of ssp. patulum includes Panicum webberianum (D. species 2 here) and P. patentifolium, both of which appear to merit recognition (= "Panicum lancearium" as a species and =p. patentifolium as at least a variety). [= Panicum lancearium Trinius – RAB, C, G; > P. lancearium var. lancearium – F; > P. lancearium var. patulum (Scribner & Merrill) Fernald – F; < D. portoricense (Desvaux ex Hamilton) B.F. Hansen & Wunderlin ssp. patulum (Scribner & Merrill) Freckmann & Lelong – FNA; > P. lancearium – HC, S; > P. patulum (Scribner & Merrill) Hitchcock – HC, S; < D. sabulorum (Lamarck) Gould & Clark var. patulum (Scribner & Merrill) Gould & Clark – K, Z; < P. portoricense Desvaux ex Hamilton var. nashianum (Scribner) Lelong – X]

Dichanthelium species 9 (=cryptanthum), Hidden-flowered Witch Grass. Cp (NC, SC): wet meadows and ditches, streamside openings; rare. May-September. NC (or NJ?) to MS (or TX?) (previous concepts of this taxon and its range are unclear). In the field, this taxon can be mistaken for D. yadkinense; it is readily distinguished by its scabrous peduncle and membranous ligules. [= Panicum cryptanthum Ashe – F, HC, S; < P. scabriusculum Elliott – RAB, C, GW; < D. scabriusculum (Elliott) Gould & Clark – FNA, K, Z; = P. scabriusculum var. cryptanthum (Ashe) Gleason – G]


Dichanthelium splagunlica (Nash) LeBlond, Peaty Witchgrass. Cp (FL, GA): edges of cypress swamps, in sphenoglossum bogs, moist shady places; rare (but poorly known). May-October. GA (Chatham, Camden, Lanier counties) (Carter, Baker, & Morris 2009) to FL; should be sought in se. SC. Treated in synonymy with Panicum dichotomum by RAB, but no specimen is known from the Carolinias. This species is similar to D. lucidum in appearance, and differs most readily by its larger pubescent spikelets with smooth fertile lemma and palea. [= Q; < Panicum dichotomum Linnaeus – RAB; < D. dichotomum (Linnaeus) Gould ssp. lucidum (Ashe) Freckmann & Lelong – FNA; = P. splagunlica Nash – HC, S; < D. dichotomum var. dichotomum – K, Z; < P. dichotomum var. lucidum (Ashe) Lelong – X]

Dichanthelium spretum (Shultes) Freckmann, Eaton's Witch Grass. Pd (GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): wet sands and peats of bogs, savannas, meadows, and shores; rare (rare in NC and VA, common in DE Coastal Plain). May-September. ME south to n. FL, LA and e. TX. Intermediate forms between this taxon and D.
POACEAE

longiligulatum occur. [= K, Y; = Panicum spretum Schultes – RAB, C, F, G, HC, S; = D. acuminatum (Swartz) Gould & Clark ssp. spretum (Schultes) Freckmann & Lelong – FNA; < P. spretum – GW; = P. acuminatum Swartz var. densiflorum (Rand & Redfield) Lelong – X; = D. acuminatum var. densiflorum (Rand & Redfield) Gould & Clark – Z]

**Dichanthelium strigosum** (Muhlenberg) Freckmann var. **glabrescens** (Grisebach) Freckmann, Hairless Witch Grass. Cp (GA, NC): low, open sandy pinelands and hammocks; rare. May-October. CA and FL west to LA; disjunct in se. NC; also in West Indies, Belize. Included in synonymy with *Panicum strigosum* by RAB, but no specimen from the Carolinas had been found prior to discovery of a population in Onslow County in 2009. [= K; = D. strigosum ssp. glabrescens (Grisebach) Freckmann & Lelong – FNA; < Panicum strigosum Muhlenberg – GW; RAB; = P. polycaulon Nash – HC, S; = D. leucolepharis (Trinius) Gould & Clark var. glabrescens (Grisebach) Gould & Clark – Z]

**Dichanthelium strigosum** (Muhlenberg) Freckmann var. **leucoblepharis** (Trinius) Freckmann, Dwarf Witch Grass. Cp (GA, NC, SC), Mt (GA, NC, SC): sandy, acidic soils of pinelands; uncommon (rare in Mountains). May-October. NC south to FL, west to TX, also in Mexico. [= K; = Panicum ciliatum Elliot – RAB, HC, S; = D. strigosum ssp. leucoblepharis (Trinius) Freckmann & Lelong – FNA; = P. strigosum Muhlenberg var. leucoblepharis (Trinius) Lelong – X; = D. leucolepharis (Trinius) Gould & Clark var. leucoblepharis – Z]


**Dichanthelium tenue** (Muhlenberg) Freckmann & Lelong, White-edged Witch Grass. Ct (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, NC, SC): weedy to sandy soil pineland savannas, flatwoods, bogs, and meadows; common (uncommon in Piedmont, rare in Mountains). May-October. NJ south to FL, west to TX; also in Mesoamerica and Cuba. This treatment of *D. tenue* includes plants from northern Alabama formerly recognized as *Panicum concinnius*, with spikelets 1.2-1.4 mm long but otherwise possessing the characters of *D. tenue*. [= FNA; = Panicum tenue Muhlenberg – RAB, C; > P. tenue – F, HC, S; > P. albomarginatum Nash – F, HC, S; > P. trilobum Nash – F, G, HC, S; < P. ensifolium Baldwin – G; > P. concinnus Hitchcock & Chase – HC, S; < D. dichotomum (Linnaeus) Gould var. tenue (Muhlenberg) Gould & Clark – K, Z]

**Dichanthelium villosissimum** Freckmann var. **villosissimum**, White-haired Witch Grass. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): dry sandy soil of open woods and prairies; common (uncommon in VA). April-September. MA south to FL, west to TX, also in Mexico and Mesoamerica. Appearing to be related to *D. ovalis* based on such characters as the double ligule. [= K, Y; = Panicum villosissimum Nash – RAB, C, HC, S, WV; = P. villosissimum var. villosissimum – F, G; = D. ovalis (Elliot) Gould & Clark var. villosissimum (Nash) Freckmann & Lelong – FNA; = P. ovalis Elliot var. villosissimum (A. Gray) Lelong – X; < D. acuminatum (Swartz) Gould & Clark var. villosum (A. Gray) Gould & Clark – Z]

**Dichanthelium wrightianum** (Scrubine) Freckmann, Wright's Witch Grass. Cp (DE, GA, NC, SC, VA): limesink ponds and meadows, cypress savannas, pine savannas, bogs; uncommon (rare in DE and VA). May-September. MA south to FL, west to TX, also in Cuba and Mesoamerica. A micrometer is needed to measure the very short puberulence (0.1 mm) that distinguishes this taxon, *D. meridionale*, and *D. leucothrix* from other members of the *D. acuminatum* group. [= FNA, K, Y; = Panicum wrightianum Scrubine – RAB, C, F, G, HC, S; < P. spretum Schultes – GW; = D. acuminatum (Swartz) Gould & Clark var. wrightianum (Scrubine) Gould & Clark – Z]

**Dichanthelium yadkinense** (Ashe) Mohlenbrock, Spotted-sheath Witch Grass. Pd (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): floodplain forests, thickets, bottomlands, and swamps, often on alluvial deposits; common (uncommon in Coastal Plain, uncommon in Mountains, uncommon in VA, rare in DE). May-October. NJ and MI south to GA and TX, also in Mexico. Sheaths often with wart-like glands. This taxon resembles *D. species 9* (= *cryptanthum*), from which it differs most readily by its hairy ligule (vs. membranous) and smooth peduncle (vs. antrorsely scabrous). [= Q; < Panicum dichotomum Linnaeus – RAB, GW; = P. yadkinense Ashe – C, F, G, HC, S, WV; = D. dichotomum ssp. yadkinense (Ashe) Freckmann & Lelong – FNA; < D. dichotomum var. dichotomum – K, Z; = P. dichotomum var. yadkinense (Ashe) Lelong – X]

**Dichanthelium chamaeleonchae** (Trinius) Freckmann & Lelong ssp. breviflorum (Hitchcock & Chase) Freckmann & Lelong, Short Witch Grass, endemic to c. and s. FL, primarily near the east coast. [= FNA; = Panicum breviflorum Hitchcock & Chase – HC, S; = D. dichotomum (Linnaeus) Gould var. breviflorum (Hitchcock & Chase) Gould & Clark – K, Z; = P. chamaeleonchae Trinius var. breviflorum (Hitchcock & Chase) Lelong – X]

**Dichanthelium dichotomum** (Linnaeus) Gould var. glabrescens (Nash) Gould & Clark, Smooth-leaved Witch Grass, endemic to peninsular FL, mostly near the west coast. Like *D. chamaeleonchae* ssp. breviflorum, this taxon appears to be more closely related to *D. chamaeleonchae* than to *D. dichotomum* or *D. ensifolium*. [= K; = P. dichotomum Nash – HC, S; < P. chamaeleonchae Trinius var. chamaeleonchae – X]

**Dichanthelium leibergii** (Vasey) Freckmann, Leiberg's Witch Grass. NY and PA west to AB, ND, and KS. [= FNA, K, Z = Panicum leibergii (Vasey) Scrubine – C, F, G, HC, S]

**Dichanthelium malacophyllum** (Nash) Gould, Soft-leaf Witch Grass. KY and TN west to KS and TX. Primarily a plant of cedar glades and dry calcareous soils. Reported from SC by FNA, but source of record has not been identified. [= FNA, K, Z = Panicum malacophyllum – F, G, HC, S]

**Dichanthelium nudaclavae** (Vasey) B.F. Hansen & Wunderlin. Cp (AL, FL, MS): bogs, wet pine savannas; rare. W. FL Panhandle and s. AL west to MS. [= Q; = Panicum nudaclavae Vasey] {add synonymy}

**Dichanthelium villosissimum** (Vasey) Freckmann is shown as occurring in SC and MS on the range map in FNA, but the source of these records is not known for this plant primarily of dry prairies in the Upper Midwest. It is not treated here.

**Dichanthelium xanthophysum** (A. Gray) Freckmann, Slender Witch Grass. Mt (WV): {habitats}; rare. NS and ME west to SK, south to PA, ne. WV, and SD. [= FNA, K, Z = Panicum xanthophysum A. Gray – C, F, G, HC, WV]

**Digitaria** Haller 1768 (Crab Grass)
A genus of about 200 species, primarily in the tropics and subtropics. Most of our species occur primarily in disturbed situations; their original distributions and habitats are now obscure. References: Wipff in FNA (2003a); Webster (1987) = Z; Wipff & Hatch (1994) = Y; Wipff (1996b) = X; Webster (1980).

1 Inflorescence an open panicle; spikelets long-pedicellate, borne singly at the ends of long panicle branches; [section Pennatae] .......................................................... D. cognata var. cognata

1 Inflorescence of 2- several spike-like racemes borne digitately or in close proximity near the summit of the culm; spikelets sessile or short-pedicellate, borne more-or-less closely spaced along the racemes.

2 Rachis of each raceme narrow, trigonous, only slightly (if at all) winged.

3 Spikelets 4.2-5.9 mm long .......................................................... D. insularis

3 Spikelets 1.3-3.6 mm long.

4 Spikelets in 2s on the middle portions of the primary branches, the pedicels not adnate; upper lemmas gray, yellow, and/or purplent when immature, purple at maturity .......................................................... D. texana

4 Spikelets in groups of 2-5 on the middle portions of the primary branches, the longer pedicels often adnate to the primary branch for a portion of their lengths; upper lemmas brown when immature, dark brown at maturity.

5 Spikelets 1.7-2.2 mm long; plants 3-10 dm tall; racemes to 10 cm long; upper sheaths glabrous, lower sheaths glabrous to sparsely pilose .......................................................... D. filiformis var. filiformis

5 Spikelets 2.0-2.8 mm long; plants 8-15 dm tall; racemes to 25 cm long; upper sheaths glabrous or pilose, lower sheaths densely pilose .......................................................... D. villosa

2 Rachis of each raceme broad (0.5-1 mm wide), winged, the wings as wide as or wider than the rachis proper.

6 Lower sheaths glabrous; second glume 0.75-1× as long as the first glume (which may be ; fertile lemma dark brown or black at maturity (or pale brown or gray in D. longiflora)

7 Hairs of the spikelet minutely capitate; second glume ca. 1× as long as the first glume; spikelets 1.7-2.3 mm long ............... D. ischaemum

7 Hairs of the spikelet not minutely capitate; second glume 0.75× as long as the first glume; spikelets 1.2-1.7 mm long................. .............................................................................. D. violascens

6 Lower sheaths pilose; second glume 0.3-0.6× as long (to 0.8× as long in D. ciliaris) as the first glume; fertile lemma white, tan, or grayish-brown at maturity.

8 Spikelets 1.5-1.8 mm long, villous with crinkled hairs; pedicels glabrous, terete in cross-section ................................. D. serotina

8 Spikelets (1.7-) 2.4-4.1 mm long, glabrous, scabrous, or pubescent with straight hairs; pedicels scabrous, 3-angled in cross-section; [section Digitaria].

9 Spikelets (1.7-) 2.5-3.4 mm long, leaf blades pilose on the upper surface ........... D. sanguinalis

9 Spikelets 2.6-4.1 mm long, averaging 3.1 mm long or longer; leaf blades glabrous except for a few hairs on the upper surface at the base.

10 Lower lemma of the sessile spikelet with 5 equidistant nerves; lowermost inflorescence node glabrous or pubescent with hairs < 0.4 mm long; apex of the first glume rounded to truncate .......................................................... D. bicornis

10 Lower lemma of sessile spikelet with the lateral nerves crowded to the margins; lowermost inflorescence node pubescent with hairs > 0.4 mm long; apex of the first glume acute. ........................................................................ D. ciliaris

Digitaria ciliaris (Retzius) Köler, Southern Crab Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): sandy fields, roadsides, disturbed areas; common. Webster (1980) believed that this species is likely to occur in VA and MD, as well. Whether or not it is introduced is unclear; it is now widely distributed in the tropics and subtropics worldwide. [= FNA, K, Z]

Digitaria ciliaris (Retzius) Köler, Southern Crab Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): sandy fields, lawns, roadsides, disturbed places; common. Webster (1980) believed that this species is likely to occur in VA and MD, as well. Whether or not it is introduced is unclear; it is now widely distributed in the tropics and subtropics worldwide. [= FNA, K, Z]

Digitaria ciliaris (Retzius) Köler, Southern Crab Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): sandy fields, lawns, roadsides, disturbed places; common. Webster (1980) believed that this species is likely to occur in VA and MD, as well. Whether or not it is introduced is unclear; it is now widely distributed in the tropics and subtropics worldwide. [= FNA, K, Z]

Digitaria ciliaris (Retzius) Köler, Southern Crab Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): sandy fields, lawns, roadsides, disturbed places; common. Webster (1980) believed that this species is likely to occur in VA and MD, as well. Whether or not it is introduced is unclear; it is now widely distributed in the tropics and subtropics worldwide. [= FNA, K, Z]
**Digitaria texana** A.S. Hitchcock, Texas Crabgrass. Cp (VA): disturbed areas; rare, native of coastal Texas. Established in City of Virginia Beach, VA (VBA 2007). Also reported for St. Johns County, FL, adjacent to our area. [= FNA, HC, K] [add to synonymy]


**Digitaria eriantha** Steudel ssp. *pentzii* (Stent) Kok, Pangola Grass. Cp (FL): pastures; rare, native of Africa. Introduced in n. FL (Wunderlin & Hansen 2003, 2006). [= FNA; < *D. eriantha* – K; = *D. pentzii* Stent] [not yet keyed; add to synonymy]

**Digitaria horizontalis** Wildenow, Jamaican Crabgrass. Reported for SC on the basis of a specimen at NCU (Kartesz 1999). [check specimen] [= FNA, K] [not yet keyed; add to synonymy]

**Digitaria longiflora** (Retzius) Persoon, Indian Crabgrass. Cp (FL): lawns, roadsides, pastures; uncommon, native of Asia and Africa. Alachua, Dixie Duval, and Holmes counties southward to s. FL. [= FNA, K] [not yet keyed]

**Digitaria nuda** Schumacher. Cp (FL): disturbed areas; rare, native of Africa. In our area, known only from Columbia County, FL. [= FNA, K; *Syntherisma nuda* (Schumacher) A.S. Hitchcock] [not yet keyed; add to synonymy]

**Dinebra** Jacquin 1809 (Viper Grass)


**Dinebra retroflexa** (Vahl) Panzer, Viper Grass, native of Africa and s. Asia, has been collected as a waif in Mecklenburg County, NC (Mellichamp, Matthews, & Smithka 1987). [= FNA, K] [not keyed]

**Distichlis** Rafinesque 1819 (Saltgrass)


**Identification notes:** When sterile, *Distichlis spicata* is easily confused with *Sporobolus virginicus*, with which it sometimes occurs. *Distichlis spicata* is generally a coarser plant, and lacks long hairs around the collar of the sheath; *Sporobolus virginicus* is more delicate, and typically has long hairs on either side of the collar.

1 Leaf blades < 1.5 cm long, subulate; plant colonial by surficial stolons (rarely rhizomatous); pistillate and staminate inflorescence with 1 spikelet; [FL and other subtropical shores]

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**Distichlis littoralis** (Engelmann) H.L. Bell & Columbus, Shoregrass, Key Grass. Cp (FL): brackish shores; rare. From n. peninsular FL (Taylor and Dixie cos. on the west coast and Volusia County on the east coast) southward. Also known from coastal sw. LA (Cameron Parish) and TX southward. [= *Monanthochloa littoralis* Engelmann – FNA, K, S, WH]

**Distichlis spicata** (Linnaeus) Greene, Saltgrass, Spike Grass. Cp (DE, FL, GA, NC, SC, VA): coastal marshes and shores, especially common in hypersaline flats (where infrequent tidal inundation is followed by evaporation); common. June-October. Two varieties (or subspecies or species) have often been recognized: var. *spicata* ranging along the Atlantic coast from NS and PE south to tropical America, and var. *stricta* (Torrey) Scribner widespread in saline situations in western North America. These do not appear to warrant taxonomic recognition (Barkworth in FNA 2003a). [= RAB, FNA, GW, K, S; > *D. spicata* var. *spicata* – C; > *D. spicata* – F, G, HC; > *D. spicata* ssp. *spicata*]

**Echinochloa** Palisot de Beauvois 1812 (Barnyard-grass, Jungle-rice)

A genus of 4-5- species of the tropics and warm temperate regions. References: Michael in FNA (2003a). Key based in part on C.

1 Panicle elongate, the branches few, distant, unbranched, and short, to 2 (-3) cm long; spikelets awnless; leaves 3-6 (-9) mm wide

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**E. colomum**

2 Lower sheaths glabrous; fertile lemma 1.5-2.5× as long as wide.

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**E. crus-pavonis** var. *crus-pavonis*

3 Inflorescence nodding; awns 4-29 mm long

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**E. crus-pavonis** var. *crus-pavonis*

4 Second glume and sterile lemma hairy or scabrous to nearly glabrous, the hairs usually not papillose-based; fertile lemma obtuse or broadly acute, with a thin, membranous (later withering) tip set off from the body by a line of minute hairs.
5 Panicle fairly open, the branches erect, appressed, or spreading; spikelets green or purple-tinged, awnless or with a well-developed awn (to 25 mm long); leaves 5-15 mm wide; plants mostly 3-7 dm tall. E. crusgalli var. crusgalli
5 Panicle very crowded, the branches appressed to slightly spreading, the tips often incurved; spikelets purplish-brown, awnless (or with awn to 2 mm long); leaves mostly 15-30 mm wide; plants mostly 7-15 dm tall. E. frumentacea

Second glume and sterile lemma usually with stout, papillose-based hairs on the veins; fertile lemma acuminate, abruptly narrowed to a firm, persistent tip.

6 Spikelets < 3.5 mm long, not including the awn (if present); sterile lemma awnless or with an awn to 6 (10) mm long. E. pungens
6 Spikelets > 3.5 mm long, not including the awn (if present); sterile lemma usuallyawned (rarely awnless), the awn 6-25 mm long. E. pungens


* Echinochloa crusgalli* (Linnaeus) Palisot de Beauvois var. *crusgalli*, Barnyard-grass. Cp (DE, FL, VA), Pd (DE, VA), Mt (VA, WV), {GA, NC, SC}: disturbed areas; common. July-October. [= C, G; < *E. crusgalli* – RAB, GW, WV (also see E. muricata); = *E. crus-galli* – K, orthographic variant; < *E. crusgalli* – F, FNA; < *E. crus-galli* ssp. crus-galli = S (also see E. muricata)]

Echinochloa cruspavonis (Kunth) J.A. Schultes var. *cruspavonis*. Cp (FL, VA), {AL, MS} July-October. [= *E. crus-pavonis* – HC; = *E. crus-pavonis* var. crus-pavonis – FNA, K, orthographic variant]


Echinochloa muricata (Palisot de Beauvois) Fernald var. *microstachya* Wiegang, Barnyard-grass. Mt (VA, WV), {GA, NC, SC, VA}: habitat; uncommon in WV {rarity}. July-October. [= C, FNA, K; < *E. crusgalli* – RAB, GW, WV; = *E. pungens* (Poir) Rydberg var. microstachya (Wiegang) Fernald & Griscom – F; = *E. microstachya* (Wiegang) Rydberg – G; < *E. crusgalli* ssp. crus-galli = S]

Echinochloa muricata (Palisot de Beauvois) Fernald var. *muricata*, Barnyard-grass. Cp (DE, FL, NC, VA), Pd (DE, VA), Mt (VA, WV): interdune wetlands, {other habitats}; common. July-October. [= C, FNA, K, WV; < *E. crusgalli* – RAB, GW, WV; = *E. pungens* (Poir) Rydberg var. pungens – F; = *E. pungens* var. ludoviciana (Wiegang) Fernald & Griscom – F; = *E. muricata* – G; < *E. crusgalli* ssp. crus-galli = S]

Echinochloa walteri (Pushr) Heller. Cp (DE, FL, GA, NC, SC, VA), Pd (GA), Mt (WV): marshes; common (rare in WV), July-October. MA south to FL, west to TX on the outer Coastal Plain; also inland from OH west to WI, south to w. WV, MO, and AR. [= RAB, C, F, FNA, GW, HC, K, S, W]

Eleusine Gaertner 1788 (Yard Grass)

A genus of about 9 species, native to Africa and South America. References: Hilu in FNA (2003a). Key based on FNA.

1 Panicles with 1-3 branches, attached in a single digitate cluster....................................................... E. tristachya
1 Panicles with 4-20 branches, 1-2 of these attached below the terminal digitate cluster.
2 Lower glumes 2-3-veined; panicle branches 3-5.5 mm wide; ligule 0.2-1 mm long, ciliate with hairs 1-2 mm long. E. coracana ssp. africana
2 Lower glumes 1-veined; panicle branches 5-7 mm wide; ligule 1-2 mm long, ciliate with hairs 1-2 mm long. E. frumentacea


* Eleusine tristachya* (Lamarck) Lamarck. Cp (SC): in waste areas of wool-combing wills; rare, native of South America, perhaps only a waif in our area. Reported as introduced in additional, scattered states in e. United States, including VA (Kartesz 1999, but apparently in error), NJ (Hilu 1980) and AL (Small 1933). [= FNA, K, S]

Elionurus Humboldt & Bonpland ex Willdenow 1805 (Balsamscale)

A genus of about 150 species, semicosmopolitan in temperate regions. The genus, as now circumscribed, includes all allopolyploid taxa with at least one chromosome complement contributed from *Pseudoroegneria*. North American *Elymus* are allopolyploids of *Pseudoroegneria* and *Hordeum* (Helfgott & Mason-Gamer 2004). Reference: Barkworth, Campbell, & Salomon in FNA (2007a); Campbell (2000); Church (1967); Tucker (1996)=Z; Barkworth (1997)=X. This treatment largely follows Barkworth, Campbell, & Salomon in FNA (2007a).

**Identification notes:** Measurements of the spike include the awns, but measurements of spikelets and its components do not. Rachis internodes should be measured near the middle of the spike. Glume widths are measured at the widest point, or if the widest point is not apparent, at about 5 mm above the glume base.

1 Spikelets solitary at each node (occasionally paired at the lowest nodes); glumes and lemmas awned or unawned; plants cespitose to strongly rhizomatous.

2 Plants strongly rhizomatous; [common and weedy introduced species]; [section Elytrigia] .................................................................................................................. *E. repens* GA

3 Spikelets 20-30 mm long; anthers 3-6 mm long; rachis internodes hirtellous below the spikelets; [very rare introduction, reported for c. GA] .................................................................................................................. *E. semiostatus*

4 Lemma awns 15-40 mm long, longer than the body of the lemma .................................................. *E. trachycaulus* ssp. subsecundus

5 Spikelets 8-25 mm long; anthers 0.8-3 mm long; rachis internodes glabrous below the spikelets; [rare natives of glades and barrens].

6 Lemma awns 1-13 mm long, shorter than the body of the lemma.................................................. *E. trachycaulus* ssp. trachycaulus

7 Spikelets 2-3 (-5) at each node; glumes and lemmas usually unawned; plants usually cespitose, occasionally short-rhizomatous.

8 Both glumes (including their awn) either 0.3-3 mm long and subulate or 1-2 mm long and differing in length by > 7-5 mm, 0.1-0.6 mm wide, tapering from the base, with 0-1 distinct veins, persistent; rachis internodes 4-12 mm long, ca. 0.5 mm thick at the narrowest section.

9 Spikelets appressed; lemma awns straight or curving; glumes sometimes absent, but usually 1-20 mm long, 0.1-0.6 mm wide, with a distinct vein; spikes erect or nodding .......................................................... *E. svensonii*

10 Spikelets widely spreading to horizontal; lemma awns straight (rarely slightly curving); glumes 0-3 mm long, with no distinct veins (rarely 1 glume to 20 mm long, 0.2 mm wide); spikes usually erect.

11 Glumes basale flat, thin, and evidently veined, or indurate for < 1 mm, the bodies not exceeding the adjacent (usually 8-15 mm long) lemmas; lemma awns usually curving outward; spikes usually nodding to pendent; internodes (2-) 4-12 mm long.

12 Glumes 0.5-1.6 mm wide; lemma awns 15-40 (-50) mm long; paleas acute; rachis internodes 2-5 (-7) mm long; blades (3-) 4-15 (-20) mm wide, pale green, usually glabrous or scabridulous above .............................................................. *E. canadensis* var. canadensis

13 Glumes 0.3-0.8 mm wide; lemma awns 15-25 (-35) mm long; paleas narrowly truncate; rachis internodes 5-8 (-12) mm long; blades 8-24 mm wide, dark green, usually thinly pilose above .............................................................. *E. wiegiadui*

14 Glumes bases flat, indurate, and lacking evident veins for 0.5-4 mm, the bodies (unless indistinct from the awns) exceeding the adjacent (usually 6-12 mm long) lemmas; lemma awns straight; spikes erect or nodding; internodes 2-5 mm long (to 7 mm in *E. sp. 1*).

15 Glumes persistent, 0.2-1 mm wide, with 2-4 veins, the basal 0.5-2 mm essentially straight; lemmas rarely glabrous; spikelets with 1-3 (-4) florets; spikes nodding, exerted.

16 Blades glabrous to scabrous; spikelets usually 1-2 cm long; lemmas 6-10 mm long .................................................. *E. riparius*

17 Blades glabrous to scabrous, pale dull green; spikes 7-25 cm long; internodes usually 3-5 mm long; spikelets with 2-3 (-4) florets; lemmas usually scabrous, 7-14 mm long, 1.5-5 mm longer than the acute paleas; flowering usually late June to late July.................

18 Blades viviparous, dark glossy green; spikes 4-12 cm long; internodes usually 2-3 mm long; spikelets with 1-2 (-3) florets; lemmas usually villous, 5.5-9 mm long, 0.1-1.5 mm longer than the obtuse paleas; flowering usually very early June to early July .................

19 Glumes least 0.7-2.3 mm wide, with (2-) 3-5 (-8) veins, the basal 1-4 mm clearly bowed-out; lemmas often glabrous; spikelets with (2-) 3-5 (-6) florets; *Elymus virginicus* complex.

20 Spikes with 9-18 nodes; internodes 4-7 mm long; blades usually lax, dark glossy green under the glaucous bloom; auricles 2-3 mm long, blackish at maturity; flowering usually in mid-May to mid-June .............................................................. *E. macgregoriı*

21 Spikes with 15-30 nodes; internodes 3-5 mm long; blades lax, or often ascending and involute, pale dull green; auricles 0-2 mm long, brownish at maturity; flowering usually in mid-June to late July.

22 Spikelets (and usually also the foliage) pubescent; spikes usually 6-12 cm long; lemmas 6-10 mm long .................................................. *E. glabriiflorus* var. australis

23 Spikelets (and usually also the foliage) glabrous to scabrous; spikes usually 9-16 cm long; lemmas 7-13 mm long.................................................. *E. glabriiflorus* var. glabriiflorus

24 Spikelets 0.7-2 cm wide (including the awns), exerted or sheathed; lemma awns 1-15(20) mm long; spikelets appressed to slightly spreading; blades usually glabrous to scabridulous.

25 Lemma awns 1-3(5) mm long; blades often ascending, somewhat involute, those higher on the stiffly erect culms broader and more persistent; flowering usually in early July to mid-August................................. *E. curvus*

26 Lemma awns 5-15(20) mm long; blades usually spreading or lax, not markedly broader or more persistent towards the culm summit; flowering usually in mid-June to late July.

27 Spikelets glaucous, hispidulous to villous-hirsute, often intermediate in exsertion; glumes indurate in the lowest 1-2 mm; ligules and auricles usually absent; flowering usually early July to mid-August................................. *E. virginicus* var. intermedius

28 Spikelets green to glaucous, usually glabrous to scabrous, partly included in the sheath to fully exerted; ligules and auricles often present; flowering usually mid-June to mid-July.

29 Spikes partly sheathed; glumes 1-2.3 mm wide, strongly indurate and bowed-out in the lowest 2-4 mm; plants usually green to yellowish-brown; nodes mostly covered.................................................. *E. virginicus* var. virginicus
POACEAE

17 Spikes usually exerted; glumes (0.5-) 0.7-1.5 (-1.8) mm wide, moderately indurate and bowed out in the lowest 1-2 mm; plants usually glaucous, sometimes reddish-brown at maturity; nodes often exposed.
18 Culms usually 3-8 dm tall, with 4-6 nodes; blades 2-9 mm wide, becoming involute; spikes 3.5-11 cm long, strongly glaucous; glumes usually indurate in the lowest 1-2 mm.......................... E. virginicus var. halophilus
18 Culms usually 7-10 dm tall, with 6-8 nodes; blades 3-15 mm wide, flat; spikes 4-20 cm long, pale green or glaucous; glumes indurate only in the lowest 1 mm.......................... E. virginicus var. jeunus


Elymus curvatus Piper, Awnless Wild-rye. Ip (KY, TN); moist bottomlands and slopes; rare. NY and QC west to BC and WA, south to s. OH, KY, c. TN, OK, and n. TX. [= FNA; < E. virginicus Linnaeus – C; = E. submucifolius (Hooker) Smyth & Smyth – K; = E. virginicus Linnaeus var. submucifolius Hooker – F; < G; < E. virginicus var. virginicus – S]
* Elymus elymoides (Rafinesque) Swezy ss. brevilolius (J.G. Smith) Barkworth. Mt (KY): [habitat]; rare. [= FNA] [synonymy incomplete]


Elymus hystrix Linnaeus var. bigelowiana (Fernald) Bowden, Northern Bottlebrush Grass. Mt (NC): high elevation forests, rare. [< Hystrix patula Moench – RAB, G, WV; < Elymus hystrix – C, FNA; = Hystrix patula var. bigelowiana (Fernald) Deam – F; = E. hystrix var. bigelowiana – K, orthographic variant; < Hystrix hystrix (Linnaeus) Millsap – S]


* Elymus repens (Linnaeus) Gould, Quackgrass, Dog-grass, Witchgrass. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, NC, VA): roadsides, disturbed areas, pastures; uncommon, probably introduced from Europe (sometimes considered to be partially native along the coast). June-August. [= FNA, K, X; = Elytrigia repens (Linnaeus) Neveski – C; Z; = Agropyron repens (Linnaeus) Melis de Beavoulois – RAB, G, HC, S, W, WV; > Agropyron repens var. repens – F; > Agropyron repens var. subalatum (Schröber) Römer & J.A. Schultes – F]


* Elymus semistatus (Nees ex Steudel) Meldr. Reported for c. GA by Jones & Cole (1988), as Agropyron semistatum Nees ex Steudel, but FNA states that known reports from North America are based on misidentifications. [= FNA, K; = Agropyrum semistatum Nees ex Steudel]


* Elymus trachycaulus (Link) Gould ex Shinners ssp. subsecundus (Link) A. & D. Löve, Bearded Wheatgrass. Mt (WV): glades, barrens, open woodlands; rare. June-August. NL (Newfoundland) west to AK, south to MD, WV, KY, MO, NM, AZ, and CA. [= FNA, K; < Agropyron trachycaulus (Link) Malte ex H.F. Lewis var. glaucum (Pease & Moore) Malte – F; G; = Agropyron subsecundum (Link) A.S. Hitchcock var. subsecundum – HC; < Agropyron subsecundum (Link) A.S. Hitchcock – WV]

* Elymus trachycaulus (Link) Gould ex Shinners ssp. trachycaulus, Slender Wheatgrass. Mt (NC, VA, WV): glades and barrens, over serpentine, etc.; rare. August. Greenland, NL (Labrador), Keewatin, NU, YT, and AK, south to w. NC, OH, IN, IL, MO, TX, Mexico and CA. [= FNA, K; < Agropyron trachycaulus (Link) Malte ex H.F. Lewis – RAB, W, WV; < Elymus trachycaulus – C; > Agropyron trachycaulus var. novae-angliae (Scriber) Fernald – F; > Agropyron trachycaulus var. ciliatum (Scriber & J.G. Smith) Gleason – G; < Elymus trachycaulus var. trachycaulus – HC]

Elymus wiegandi Fernald, Northern Riverbank Wild-rye. South to sc. PA and NJ; reported for nc. KY (Kartesz 2010). [= C, F, FNA, K; < E. canadensis – G]

Elymus villosus Muhlenberg ex Willdenow, Downy Wild-rye. Mt (NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, NC, SC, VA), [GA]: moist forests; uncommon. QC, ON, MN, ND, and WY south to GA, AL, MS, and TX. [= RAB, C, F, FNA, G, GW, K, W, WV; < E. strigus Willdenow – S]


Enteropogon Nees 1836

* Enteropogon prieurii (Kunth) W.D. Clayton. Cp (NC): on ballast at Wilmington, New Hanover County, NC; rare, native of Africa, probably only a waif. Also reported from Mobile, Baldwin County, AL (Hitchcock & Chase 1950). [= K; = Chloris prieurii Kunth – S]

Eragrostis Wolf 1776 (Lovegrass)

A genus of about 350 species of temperate and tropical areas. References: Peterson in FNA (2003a); Koch (1978); Peterson & Harvey (in prep.)=Z. Key adapted from Peterson & Harvey (in prep.).

1 Plants cespitose or geniculate or mat-forming annuals, lacking innovations or buds in the lower sheaths.

2 Plants without short or thick rhizomes; florets articulating whole....................................................................................E. spectabilis

3 Caryopsis with a deep to shallow groove along the adaxial surface.

4 Caryopsis dorso-ventrally compressed, flattened parallel to the side of the embryo, translucent, light brownish...............E. curvula

5 Caryopsis laterally compressed, flattened on the side perpendicular to the embryo, or cylindric, opaque (rarely translucent), usually redbrown.

6 Lateral veins of the lemmas conspicuous, often greenish, the lemmas strongly keeled.................................E. trichodes

7 Lateral veins of the lemmas inconspicuous and hardly evident, the lemmas sometimes weakly keeled.

8 Stomens 3.

9 Spikelets 4-8.2 (-10) mm long .................................................................E. curvula

10 Leaf blades 25-60 cm long, 3-8 (-11) mm wide; lemmas 1.6-2.4 mm long; spikelets 1.0-1.7 mm wide ..............E. hirsuta

11 Panicle 15-45 cm wide, open, diffuse, broadly ovate to obovate in outline, the panicle branches capitillary; pedicels 0.5-35 (-50) mm long, longer than or shorter than the spikelets.

12 Spikelets with widely spreading pedicels, the lower pedicels all generally longer than the spikelets; disarticulation of the lemmas only, the paleas persistent .............................................................E. elliottii

13 Spikelets with appressed pedicels, lower pedicels of each branch shorter than the spikelets; disarticulation usually of the whole floret..............................................................................................................E. refracta

14 Spikelets 0.7-2.4 mm wide; glumes 0.3-2.2 mm long; lemma 1.5-2.5 mm long, the apex acute (sometimes acuminate)........................E. bahiensis

15 Spikelets 2.4-5 mm wide; glumes 1.4-4 mm long; lemma 2-6 mm long, the apex acuminate to attenuate..................E. secundiflora var. oxylepis

1 Plants cespitose, geniculate or mat-forming annuals, lacking innovations or buds in the lower sheaths.

16 Paleas prominently ciliate-pectinate on the keels, the hairs 0.1-0.8 mm long.

17 Paleas open, cylindrical to narrowly ovate, usually 1-8 cm wide.

18 Spikelets (1.0-) 1.5-3.5 mm long, 0.9-1.4 mm wide, 4-12-flowered; lemmas 0.7-1.1 mm long, membranous, the apex truncate to obtuse................E. amabilis

19 Caryopsis with a deep to shallow groove along the adaxial surface.

20 Spikelets 4-5 (-10) mm long, 5-11 (-15)-flowered; pedicels ascending, somewhat appressed along the branches.

21 Spikelets ovate to oblong in outline, >1.4 mm wide; lower glume 1.2-2.3 mm long......................E. mexicana ssp. mexicana

22 Spikelets linear to linear-lanceolate, <1.5 mm wide; lower glume 0.7-1.7 mm long .....................E. mexicana ssp. virens

23 Spikelets (1.4-) 1.8-2.5 mm long; 2-6 (-7)-flowered; pedicels erect, spreading along the branches.

24 Panicle 10-45 (-55) cm long, 2/3 or more the height of the plant; pedicels 4-5 (-25) mm long; glandular pits absent below the nodes, branches, and rachis............................................................E. capillaris

25 Panicle 4-20 cm long, < ½ the height of the plant; pedicels 1.5-5 mm long; glandular pits often present below the nodes, branches, and rachis ..........................................................E. frankii

26 Panicle 10-45 (-55) cm long, 2/3 or more the height of the plant; pedicels 4-5 (-25) mm long; glandular pits absent below the nodes, branches, and rachis ............................................................E. capillaris

27 Caryopsis not grooved on the adaxial surface.

28 Panicle 10-45 (-55) cm long, 2/3 or more the height of the plant; pedicels 4-5 (-25) mm long; glandular pits absent below the nodes, branches, and rachis ............................................................E. capillaris

29 Caryopsis not grooved on the adaxial surface.
23 Plants with glandular pits or bands on the culm below the nodes, on the veins of the sheath, on the margins and veins of the blade, on the rachis, on the inflorescence branches and pedicels, and/or on the midveins of the lemma and palea.

24 Spikelets (1.7-)2-4 mm long, 3-6-flowered .......................................................... \textit{E. frankii}

25 Spikelets 0.6-1.3 mm wide; pedicels 1-10 mm long, flexuous and delicate, appressed or spreading ........................................ \textit{E. pilosa}

26 Spikelets 1.1-4 mm wide; pedicels 0.2-4 mm long, straight and rigid, mostly spreading.

27 Inflorescence and glandular areas of spots or rings on the rachis below the panicle branch bases, the blades often shiny or yellowish; stamens 3; blade margins lacking crateriform glands .................................................. \textit{E. barrelieri}

28 Inflorescence sometimes with glandular areas of spots or crateriform pits on the rachis below the panicle branch bases, the glands usually dull and greenish-gray to straw-colored; stamens 2; blade margins sometimes with crateriform glands .......................................................... \textit{E. minor}

29 Spikelets 3-6-flowered. .................................................................................. \textit{E. pilosa}

30 First glume 0.3-0.6 (-0.8) mm long, <0.5× as long as the lowest lemma; spikelets 0.6-1.3 mm wide; panicle branches usually whorled at the lowest 2 nodes .......................................................... \textit{E. frankii}

31 Pedicels appressed or rarely diverging up to 20 degrees from the branches .......................... \textit{E. pectinacea var. miserrima}


\textit{Eragrostis barrelieri} Daveau, Mediterranean Lovegrass. Cp (FL, SC): waste areas near wool-combing mills, other disturbed areas; rare, native of Mediterranean Europe. Also reported for e. TN (Chester et al. 1993). [= FNA, HC, K, Z]


\textit{Eragrostis eliottii} S. Watson, Elliot's Lovegrass. Cp (FL, GA, NC, SC): ulitsox wet pine savannas, maritime wet grasslands, inland edges of brackish marshes, inland edges of freshwater tidal marshes, calcareously-influenced wet pine savannas; rare. September-October. NC south to FL, west to TX. [= RAB, FNA, GW, HC, K, S, Z]


?? \textit{Eragrostis japonica} (Thunberg) Trininius, Pond Lovegrass. Cp (FL, GA, SC): moist or wet sandy areas; rare. SC and TN south to Central America, South America, and West Indies; Old World tropics; Perhaps introduced from the Old World.
POACEAE

320


**Eragrostis** lugens Nees, Mourning Lovegrass. Cp (FL, NC, SC, VA), Pg (GA, NC, SC, VA): marshes, roadways, low fields; rare, introduced (NC Watch List). June-October. Perhaps only introduced from further south and west. [= RAB, FNA, HC, K, S, W, Z]


Eremochloa Büse 1852 (Centipede Grass)


**Identification notes:** In the autumn, the inflorescences make this grass readily recognizable at a distance: a short, tight lawn grass with a reddish aspect.

* Eremochloa ophiuroidea* (Munro) Hackel, Centipede Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): lawns, roadways, sometimes weedy in more natural sites; common (rare in VA), native of se. Asia. Now very commonly planted as a lawn and roadside grass in the Coastal Plain from se. NC southward. Stalter & Lamont (1996) report the VA occurrence of this species. [= RAB, FNA, HC, K]

Eriochloa Kunth 1816 (Cup Grass)

1. Lemma of fertile floret with an awn >0.2 mm long; second glume awned; panicle compact, the raceme-like lateral branches close together and ascending-appeased, of irregular lengths; spikelets 8-16 on a typical, primary branch.........................................................E. contracta

2. Spikelets 2.0-2.5 mm wide .................................................................E. villosa
3. Spikelets 1.1-1.8 mm wide.

1. Lemma of fertile floret lacking an awn; second glume not awned; panicle open, the raceme-like lateral branches remote and divergent, the lowermost longest, the upper gradually reduced in length to the apex (E. acuminata var. acuminata, E. michauxii var. michauxii) or the panicle compact (E. villosa); spikelets 12-40 on a typical, primary branch.

2. Spikelets 2.0-2.5 mm wide .................................................................E. acuminata var. acuminata
3. Perennial, 5-25 dm tall; spikelets 1.3-1.8 mm wide ...........................................E. michauxii var. michauxii

* Eriochloa acuminata (J. Presl) Kunth var. acuminata. Cp (GA, SC), Pd (GA): disturbed areas, waste areas near wool-combing mills; rare, presumably native of further south. Reported for scattered locations in GA (Jones & Coile 1988, as E. gracilis). Reported for NC (Kartesz 1999), but the specimen basis is of cultivated material. [= FNA, K, Y, Z; = E. gracilis (Fournier) A.S. Hitchcock var. gracilis – HC] * Eriochloa villosa (Thunberg) Kunth, Chinese Cupgrass. Mt (VA), Pd (DE): fields, meadows, other disturbed areas (open edge of railroad bed); rare, native of e. Asia. See Belden et al. (2004) for additional information about the first occurrence in Virginia. [= C, FNA, HC, K, Y]

Eriochloa punctata (Linnaeus) Desvaux ex Hamilton, Louisiana Cupgrass. Cp (GA): marshes, creek banks; rare. MS west to TX, and south into the New World Tropics; reported for e. GA (FNA). [= FNA, HC, K] {not yet keyed; synonymy incomplete}

* Eustachys Desvaux 1810 (Finger-grass)


1. Lateral nerves of the fertile lemma glabrous; culms stout, 7-15 dm tall; spikes 8-16 (-20), 7-12 cm long..............................................E. glauca
2. Lateral nerves of the fertile lemma pubescent; culms slender, 3-10 dm tall; spikes 1-20, 2.5-9 cm long.

2. Keel of the fertile lemma appressed brownish-ciliate; spikes 1-6; [native].
3. Spikes 5-10 cm long; spikelets >3 mm long ..................................................E. floridana
4. Spikes 2.5-6 cm long; spikelets <2.5 mm long ..................................................E. petraea
2. Keel of the fertile lemma glabrous; spikes 7-20; [aliens, in disturbed situations].
4. Spikelets >2.4 mm long; sterile floret oblanceolate, acute ..................................E. distichophylla
4. Spikelets <2.1 mm long; sterile floret widely cuneate, truncate ..........................E. retusa


Eustachys petraea (Swartz) Desvaux, Dune Finger-grass. Cp (FL, GA, NC, SC): dune slacks and sand flats, sometimes in disturbed areas; common (uncommon north of GA). (May-)June-October. NC (Dare County) south to FL and west to TX. [= FNA, K, Z; = Chloris petraea Swartz – RAB, GW, HC, S]


* Eustachys caribaea (Sprengel) Herter, Chickenfoot Grass. Cp (GA): disturbed areas; rare, native of South America. [= FNA, K; = Chloris caribaea – HC, misapplied] {add to synonymy; not yet keyed}

Festuca Linnaeus 1753 (Fescue)

1 Leaves 0.2-3 mm wide, often involute.
2 Plant loosely tufted, often rhizomatous; basal sheaths disintegrating into fibers; spikelets 6-13 mm long.................\textit{F. rubra} ssp. \textit{rubra}
2 Plant tufted, lacking rhizomes; basal sheaths persistent, remaining firm and entire; spikelets 3-9 mm long.
3 Lemmas 2.3-4.0 (-4.4) mm long, awnless, or with a minute projection to 0.4 mm long; anther 1.5-2.2 (-2.5) mm long; spikelets 3.0-6.0 (-6.5) mm long.........................\textit{F. filiformis}
3 Lemmas 3.8-5.5 mm long, with an awn 0.5-2.5 mm long; anther (2.3-) 2.5-3.0 mm long; spikelets 5.5-9.0 mm long....\textit{F. trachyphylla}

\textit{Leaves 3-12 mm wide, flat.}

4 Larger lemmas 5.5-10 mm long; leaf blades auriculate at the base; anthers 2-4 mm long. \[\text{see \textit{Schedonorus}}\]
4 Larger lemmas 3.3-5.2 mm long; leaf blades not auriculate at the base; anthers 0.8-1.5 mm long; [subgenus \textit{Subulatae}, section \textit{Obtusae}].
5 Ligules 2-9 mm long; [raw introduction] \[\text{not mapped}\] \textit{F. thurberi}
5 Ligules 0.1-1.5 (-2) mm long; [common natives].
6 Principal lowermost panicle branches with 2-7 spikelets scattered along the outer half; spikelets narrowly ovate, 2-4 mm wide...........\textit{F. paradoxa}


\textit{Festuca thurberi} Vasey. Cp (SC): waste areas near wool-combing mills; rare (possibly only a waif), native of sw. United States (NM, CO, WY, and UT). [= FNA, K]

\* \textit{Festuca trachyphylla} (Hackel) Krajina, Hard Fescue. Pd (DE, GA, NC, VA), Mt (NC, VA, WV), Cp (NC, SC, VA): meadows, pastures, disturbed areas; uncommon (rare in DE), native of Eurasia. May-June. The nomenclatural debate about the application of the name \textit{F. trachyphylla} is summarized in Darbyshire & Pavlick (1997). [= C, K, Y, Z; ? \textit{F. ovina} – RAB, S, W, WV, in a broad sense (misapplied as to our material); < \textit{F. ovina} \textit{var. ovina} – F, G, HC; < \textit{F. ovina} \textit{var. duriuscula} (Linnaeus) W.D.J. Kock – F, G, HC, misapplied as to our material]

Glycera R. Brown 1810 (Mannagrass)

A genus of about 40 species, nearly cosmopolitan. References: Barkworth & Anderton in FNA (2007a); Tucker (1996)=Z. [also see \textit{Torreyochloa}]

1 Spikelets 10-40 mm long, linear, subterete, 5-15\(^\times\) as long as wide, terete or nearly so in cross-section; [section \textit{Glyceria}].
2 Lemma (6-) 7-8.5 (-10) mm long, acute to acuminate; palea longer than the lemma, extending 1.5-3 mm beyond the lemma apex.................\textit{G. acutiflora}
2 Lemma 2.4-6.0 mm long, obtuse to notched; palea about as long as the lemma (ranging from shorter than the lemma and included, to projecting up to 1.5 mm beyond the lemma apex).
3 Lemma (3.5-) 4.0-6.0 mm long, the apex with 1-2 strongly developed lobes, and also often toothed between the lobes; leaf blades 2-12 cm long; primary panicle branches 1.5-9.5 cm long.................................\textit{G. declinata}
3 Lemma 2.4-4.8 mm long, the apex rounded or with a few poorly developed rounded teeth; leaf blades 18-32 cm long; primary panicle branches 3-17 cm long.

Glyceria arkansana Fernald, Arkansas Mannagrass. Swamps. IL south to LA and AR; disjunct in w. NY. The VA report is in error. The appropriate treatment of this taxon needs further investigation. [= F, HC, K, Z; < G. septentrionalis – C, G; = G. septentrionalis A.S. Hitchcock var. arkansana (Fernald) Steyermark & Kučera – FNA]


* Glyceria declinata de Brébisson. Cp, Pd (SC), Mt (NC): disturbed moist areas; rare. Native of Europe. Documented for Allegheny County, NC (D. Poindexter, pers. comm. 2009) [= FNA] [check for additional synonymy]

* Glyceria elata (Nash) M.E. Jones. Pd (GA): {habitat unknown}; rare, native of w. North America. Reported for GA by FNA; presumably a chance introduction. [= FNA] [add synonymy]


Glyceria laxa (Scribn) Scribn, Lax Mannagrass. Mt (NC, VA, WV), Cp (DE): bogs; rare. June-August. PE south to NC, mostly Appalachian. Though often described as a hybrid of G. canadensis and either G. striata var. striata and/or G. grandis var. grandis, G. laxa ranges south of the distribution of both G. canadensis and G. grandis var. grandis. It is best considered as a species, perhaps of hybrid origin. [= F, G, K, WV; = G. canadensis (Michaux) Trinius var. laxa (Scribn) A.S. Hitchcock – RAB, FNA, HC; = G. laxa – C; < G. canadensis – GW]


* Glyceria nutata Chevallier, Marked Mannagrass. Reported for TN (FNA). [= FNA] [add synonymy]

Glyceria nubigena W.A. Anderson, Smoky Mountain Mannagrass. Mt (NC, TN): moderate to high elevation seepages in the Great Smoky Mountains, sometimes in areas appearing dry (such as heath balds), nearly endemic to Great Smoky Mountains National Park; rare. June-July. Endemic to the Great Smoky Mountains of w. NC and e. TN. G. nubigena has nearly the same range as R. nudicaulis, but is more restricted to seepage. The distinctions and relationship between this taxon and G. grandis need further investigation. [= RAB, FNA, HC, K, W, Z]

Glyceria obtusa (Muhlenberg) Trinius, Coastal Mannagrass. Cp (DE, NC, SC, VA), Mt (VA): blackwater swamp forests, wet meadows, freshwater marshes; common (uncommon in NC, SC, VA). June-September. NS south to SC, on or near the Coastal Plain; disjunct to w. VA in Shenandoah Valley sinkhole ponds. [= RAB, C, F, FNA, G, GW, HC, K, W; Z = Panicularia obtusa (Muhlenberg) Kuntze – S]


Glyceria striata (Lamarck) A.S. Hitchcock var. striata, Fowl Mannagrass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): wet meadows, seepages, bogs, marshes, swamp forests; common. April-June. NL
A genus of about 15 species, in temperate and tropical areas of the Americas. References: Smith in FNA (2007b); Smith (1971)=Z.

Identification notes: When sterile, Gymnopogon is sometimes confused with Dichanthelium. Gymnopogon differs in having the sheaths conspicuously overlapping (vs. not overlapping in Dichanthelium) and leaves that are definitely cordate-clasping and of stiff texture (only a few Dichanthelium have this combination).

1 Awn of the lemma 4.5-12 mm long; inflorescence branches with spikelets distributed from the tip nearly to the base; leaves 5-15 mm wide; [Coastal Plain, Piedmont, and Mountains]. ……………………………………………………………………………………………………………………G. ambiguus

1 Awn of the lemma 0.8-1.6 (-3.5) mm long; inflorescence branches with spikelets distributed from the tip nearly to the base (G. chapmanianus) or to roughly the midpoint, the basal portion naked (or some branches rarely with a few spikelets) (G. brevifolius); leaves 2-8 mm wide; [Coastal Plain and lower Piedmont].

2 Spikelets 1-flowered; first glume 2.3-3.7 mm long……………………………………………………………………………………………………………G. brevifolius

2 Spikelets 2-4-flowered; first glume 3.8-5 mm long……………………………………………………………………………………………………………G. chapmanianus

Hainardia W. Greuter 1967 (Thintail)

A genus of 1 species, an annual, native of Europe. References: Smith in FNA (2007a); Tucker (1996)=Z.


Heteropogon Persoon 1806 (Tanglehead)

A genus of about 10 species, pantropical and extending into subtropical and warm temperate areas. References: Barkworth in FNA (2003a).

* Heteropogon melanocarpus (Elliott) Elliott ex Bentham, Sweet Tanglehead. Cp (FL, GA, NC, SC): sandy roadsides, disturbed areas; rare, probably naturalized from further south (or even from the Old World). September-October. The species is widespread in the Old World and New World tropics, north in North America to se. NC. [= RAB, FNA, HC, K, S]

Holcus Linnaeus 1753 (Velvet Grass, Soft Grass)


1 Plant not rhizomatous; upper culm internodes velvety-villous; lemma awn 1-2 mm long, recurved as a hook …………………………………………H. lanatus

1 Plant strongly rhizomatous; upper culm internodes glabrous; lemma awn 3-5 mm long, straight or geniculate………………H. mollis ssp. mollis
Hordeum Linnaeus 1753 (Barley)


1 Rachis remaining intact at maturity; leaves 5-12 mm wide, with well-developed auricles; [section Hordeum]..........................H. vulgare
   1 Rachis disarticulating at maturity; leaves 1-5 mm wide, not auriculate (except in *H. murinum ssp. leporinum*).
   2 Perennial; glumes 25-150 mm long; [inters ectional hybrid derivative of section Sibirica and section Critesion] .......H. jubatum ssp. jubatum
   2 Annual; glumes 7-22 (-28) mm long.
   3 Leaves auriculate; glumes of the central spikelet (in the triad) with ciliate margins; [section Hordeum]..............H. murinum ssp. leporinum
   3 Leaves not auriculate; glumes of the central spikelet (in the triad) with scabrous margins; [section Critesion]......................H. pusillum


* Hordeum vulgare* Linnaeus, Barley. Cp (FL, NC, SC, VA), Pd (NC, SC, VA), Mt (VA): cultivated fields, commonly cultivated, rare as a waif, native of Eurasia. May-June. A diploid taxon. The original wild form is often treated as *H. vulgare* ssp. spontaneum and the cultivated, non-shattering derivative as ssp. *vulgare* (Hancock 2004). The wild form was used as a food source since at least 19,000 years ago, and ssp. *vulgare* developed by 8,500 years ago. [= RAB, C, F, K, Z; > *H. aegiceras* Nees ex Royle – G; > *H. vulgare* var. *vulgare* – G, HC; > *H. vulgare* var. *trifurcatum* (Schlechtendahl) Alefeld – G, HC; > *H. vulgare* ssp. *vulgare* – FNA; > *H. vulgare* ssp. spontaneum (K. Koch) Thellung]

* Hordeum brachyantherum* Nevski ssp. brachyantherum is reported for sc. PA (Rhoads & Klein 1993) and also is apparently known from specimens from GA (Sorrie, pers. comm.). A tetraploid taxon. [= FNA, K; ? *Critesion brachyantherum* (Nevski) Barkworth & D.R. Dewey] {not yet keyed}


Imperata Cirillo 1792 (Cogongrass, Satintail)

A genus of about 8-9 species, of tropical, subtropical, and warm temperate areas of both hemispheres. References: Gabel in FNA (2003a); Ward (2004c)=Z; Hall (1998)=Y.

* Imperata cylindrica* (Linnaeus) Palisot de Beauvois, Cogongrass, Brazilian Satintail. Cp (FL, GA, SC): grassy roadside; common (rare north of FL), introduced from the tropics. See Nelson (1993) for first report from SC. An extremely aggressive and dangerous weed, now well-established and rapidly invading fire-maintained Coastal Plain areas (such as longleaf pine and slash pine flatwoods and longleaf pine clayhills) on the Gulf Coastal Plain of FL, AL, and MS. Hall (1998) argues that *I. cylindrica* and *I. brasilensis* are not distinct. The only character considered to separate them is that *I. brasilensis* has 1 anther and *I. cylindrica* has 2. Ward (2004c) treats the 2 taxa at varietal level. Both putative taxa are present in the Gulf Coast area of FL, GA, AL, and LA. [= Y; > *I. cylindrica* – FNA, HC, K; > *I. brasilensis* Trinius – FNA, HC, K, S; > *I. cylindrica* var. *cylindrica* – Z; > *I. cylindrica* var. *mexicana* (Ruprecht) D.B. Ward – Z]

Koeleria Persoon 1805 (Junegrass, Koeleria)

[also see Rostraria]

A genus of about 60 species, north and south temperate. References: Standley in FNA (2007a)

*Koeleria macrantha* (Ledebour) J.A. Schultes, Junegrass. Pd (DE): South to DE, MD, PA, KY, AL, LA, TX, and Mexico. [= FNA, K; < *K. pyramidata* (Lamarck) Palisot de Beavois – C]
Lachnagrostis Trinius 1820


* Lachnagrostis filiformis (G. Forst.) Trinius, Pacific Bentgrass. Cp (SC): waste areas around wool-combing mill; rare, perhaps only a waif, native of Australia. [= FNA; = Agrostis avenacea J.F. Gmelin – K]

Lagurus Linnaeus 1753 (Hare's-tail Grass)


* Lagurus ovatus Linnaeus, Hare's-tail Grass. Cp (FL, NC): on ballast, other disturbed areas; rare, native of Mediterranean Europe. April-June. [= RAB, FNA, HC, K, Z]

Leersia Swartz 1788 (Cutgrass)


1 Lower panicle branches alternate (rarely opposite); spikelets 2.2-5.0 mm long, 0.8-4.0 mm broad; stamens 2 or 6.  
2 Spikelets suborbicular-falcate, 3.0-4.0 mm broad, < 2× as long as broad; principal leaf-blades 10-15 mm wide; stamens 2 ...... L. lenticularis
2 Spikelets narrowly elliptic-falcate, 1.0-2.0 mm broad, > 2× as long as broad; principal leaf-blades usually < 7 mm wide; stamens 2 or 6.
3 Spikelets 3.8-4.7 mm long, 1.5-2.0 mm broad; panicle branches short, bearing spikelets nearly to their bases; stamens 6 ...... L. hexandra
3 Spikelets 2.2-3.5 mm long, 0.8-1.2 mm broad; panicle branches long, filiform, the longer ones bearing spikelets only in their upper half; stamens 2 ................................................................. L. virginica

Leersia hexandra Swartz, Southern Cutgrass. Cp (FL, GA, NC, SC, VA): clay-based Carolina bays, limesink ponds, lakes, pools, usually in places where periodically or seasonally inundated; uncommon (rare in VA). June-August. Panropical, ranging north in North America to MD, TN, and TX. This species is considered a serious weed in the Old World and New World tropics; in our area, however, it is uncommon and not weedy. [= RAB, C, F, FNA, G, GW, HC, K, Z; = Homalocenchrus hexandra (Swartz) Kuntze – S]

Leersia lenticularis Michaux, Catchfly Cutgrass. Cp (FL, GA, NC, SC, VA): floodplain forests and swamps; uncommon. September-October. Se. VA south to ne. FL and Panhandle FL, west to e. TX, north in the interior to IN and MN. [= RAB, C, F, FNA, G, GW, HC, K, Z; = Homalocenchrus lenticularis (Michaux) Kuntze – S]

Leersia oryzoides (Linnaeus) Swartz, Rice Cutgrass. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV); marshes, riverbanks, pond-shores; common. August-October. NS west to BC, south to Panhandle FL and CA; also in Europe and e. Asia. [= RAB, C, F, FNA, G, GW, HC, K, WV; = Homalocenchrus oryzoides (Linnaeus) Pollich – S]

Leersia virginica Willdenow, White Grass, White Cutgrass. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV); floodplain forests, swamps, streambanks; common. August-October. QC west to MN and SD, south to c. peninsular FL and TX. [= RAB, C, FNA, G, GW, HC, K, WV; = Homalocenchrus virginicus (Willdenow) Britton – S]

Leptochloa Palisot de Beauvois 1812 (Sprangletop, Feathergrass)

A genus of about 30 species, pantropical and extending into warm temperate areas. The circumscription of Leptochloa has been controversial; many earlier authors have preferred to separate Diplachne as a separate genus. References: Snow in FNA (2003a); Snow (1998); Cronquist (1991).

1 Spikelets 1-2.5 mm long, with 2-4 flowers; sheaths sparsely pilose with long, pustular-based hairs ..................... L. panicoides
1 Spikelets 3.5-10 mm long, with 5-12 flowers; sheaths glabrous (rarely slightly scabrous).
2 Lemmas 2-3 mm long, the apex obtuse to truncate, with the midrib often extended as a mucro .......................................... L. uninervia
2 Lemmas 3-5 mm long, the apex acuminate or awned.
3 Lemmas acuminate; leaf blades 3-10 mm wide ................................................................. L. paniceoides
3 Lemmas awned; leaf blades 1-3 mm wide.
4 Low sprawling grasses, < 5 dm tall; lemma awns (1-) 2.5-5 mm long; first glume 2.5-3.5 mm long; second glume 4-7 mm long......... ............................................................... [L. fascicularis var. maritima
4 Taller grasses, usually 5-10 dm tall; lemma awns 0.5-2.5 mm long; first glume 1.3-3.4 mm long; second glume 2.2-5 mm long.
5 First glume 2.3-3.4 mm long; second glume 3.4-5.0; lemmas 4-5 mm long, with an awn 0.5-2.5 mm long ......................... [L. fascicularris var. acuminata]
5 First glume 1.3-2 mm long; second glume 2.2-3.5; lemmas 3-4 mm long, with an awn 0.5-1 mm long ......................... [L. fascicularris var. fascicularris
Leptochloa fascicularis (Lamarck) A. Gray var. fascicularis, Bearded Sprangletop. Mt (WV), Pd* (NC*), Cp* (SC*): bed of artificial impoundment, brackish habitats, disturbed areas; rare, adventive from further west. September. Widespread in e. North America, primarily west of the Appalachians (adventive further east), and extending into South America. Reported (as L. fascicularis) for SC by Nelson & Kelly (1997). [= C, G; < L. fascicularis – RAB, GW, HC, S; < L. fusca (Linnaeus) Kunth ssp. fascicularis (Lamarck) N. Snow – FNA, K; = Diplachne fascicularis (Lamarck) Palisot de Beauvois – F]

Leptochloa fascicularis (Lamarck) A. Gray var. maritima (Bicknell) Gleason, Salt-meadow Grass. Cp (DE, NC, VA): fresh to brackish marshes, overflow flats, other disturbed brackish habitats; common (rare in NC and VA). August-October. Along the coast from s. NH south to se. NC. This taxon appears to warrant status as a species separate from L. fascicularis. [= C, G; < L. fascicularis – RAB, GW, HC, S; = Diplachne maritima E.P. Bicknell – F; < L. fusca (Linnaeus) Kunth ssp. fascicularis (Lamarck) N. Snow – FNA, K; = Leptochloa maritima (E.P. Bicknell) LeBlond & Sorrie ined.]


* Leptochloa panicoides (J. Presl) A. Hitchcock & Chase, Amazon Sprangletop. Pd (VA), Cp (GA): drawdown habitats on lake margins; rare, native of South America. Belden et al. (2004) discuss the VA occurrences along the banks of the Roanoke (Staunton) River at Kerr Reservoir. Also reported for e. GA in the Coastal Plain (Sorrie, pers. comm.). [= C, FNA, G, GW, HC, K; < Diplachne halei Nash – F; ? Diplachne floribunda Doell – S; = Diplachne panicoides (J. Presl) McNeill]


* Leptochloa decipiens (R. Brown) Stapf ex Maiden ssp. peacockii (Maiden & Betché) N. Snow. Cp (SC): waif at wool-combing mill; rare, introduced, probably not established. [= K] {not keyed}


* Leptochloa divaricatissima S.T. Blake. Cp (SC): waif at wool-combing mill; rare, introduced, probably not established. [= K] {not keyed}

* Leptochloa dubia (Kunth) Nees. Cp (SC): waif at wool-combing mill; rare, introduced, probably not established. Also reported for NC by Kartesz (1999), but the documentation indicates that it was cultivated at a Soil Conservation Service test nursery in Chapel Hill, Orange County. [= FNA, HC, K] {not keyed}

* Leptochloa fascicularis (Lamarck) A. Gray var. acuminata (Nash) Gleason. Reported as adventive in PA and along highways in WV from halophytic habitats of w. United States (Cusick 1994). [= C, G; < Diplachne acuminata Nash – F; < L. fascicularis – HC; < L. fusca (Linnaeus) Kunth ssp. fascicularis (Lamarck) N. Snow – FNA, K; = L. acuminata (Nash) Mohlenbrock} {not keyed}

* Leptochloa panicaceae (Retzius) Ohwi ssp. mucronata (Michaux) Nowack. Cp (LA, MS), Pd* (GA*): {habitats}; rare. [= K] {not yet keyed; add to synonymy}

* Leptochloa virgata (Linnaeus) Palisot de Beauvois, Tropical Sprangletop. Cp (SC): waif at wool-combing mill; rare, introduced, probably not established. [= FNA, HC, K] {not keyed}

Linnodea L.H. Dewey 1894


Linnodea arkansana (Nuttall) L.H. Dewey. Cp (AL, FL, LA, MS, SC*): hammocks, moist forests (Panhandle FL westward), waste at wool-combing mill, probably not established (SC); rare, introduced, native of sc. United States (w. FL, c. and s. AL, west through MS, LA, and AR to OK, TX, and adjacent Mexico). [= FNA, HC, K, S, Z; = Cinna arkansana (Nuttall) G. Tucker – Y]

Loliurn Linnaeus 1753 (Rye-grass, Darnel, Fescue)


1 Inflorescence paniculate (spikelets borne on branches off the central axis) ................................................................. [see Schedonorus]

1 Inflorescence spike-like (spikelets sessile on the central axis).

2 Glumes (12-) 15-25 mm long, subcorymbose, equaling or surpassing the uppermost lemma (therefore the length of the spikelet); florets 4-9 per spikelet; annual .......................................................... L. temulentum

2 Glumes 4-12 mm long, herbaceous, shorter than the lemmas (therefore shorter than the spikelet); florets (2-) 5-22 per spikelet; annual or perennial.

3 Lemmas (at least the upper) awned, the awns to 15 mm long; florets 11-22 per spikelet; annual or perennial. . . . L. perenne var. aristatum

3 Lemmas awnless; florets (2-) 5-10 per spikelet; perennial .......................................................... L. perenne var. perenne

* Loliurn perenne Linnaeus var. aristatum Willdenow, Italian Rye-grass, Annual Rye-grass. Cp (GA, NC, SC, VA), Pd (NC, SC), Mt (NC, SC, VA, WV), {FL}: fields, roadsides, pastures, disturbed areas; common (rare in VA), native of Eurasia. April-

**Lolium temulentum** Linnaeus ssp. temulentum, Darnel. Pd (GA, NC, VA), Cp (FL, NC, VA), {SC}: fields, roadsides, pastures, disturbed areas; common (rare in FL and VA), native of Eurasia. May-June. [= FNA; < L. temulentum – RAB, C, F, HC, S, Z; > L. temulentum var. leptochaetum A. Braun – G; > L. temulentum var. macrochaetum A. Braun – G; > L. temulentum ssp. temulentum – K]

**Luziola** Antoine Laurent de Jussieu 1789 (Southern Water Grass)


1 Culms prostrate; leaves conspicuously clustered towards the apex of the culms, floating, 1-5 (-8) cm long; pistillate inflorescence an inconspicuous axillary raceme, 1.1-3.5 cm long, with 2-5 florets ...............................................................L. bahiensis

1 Culms suberect to erect; leaves scattered along the culm, not floating, > 6 cm long; pistillate inflorescence an axillary panicle, 2-21.5 (-58) cm long, with 18-250 (-350) florets.

2 Pistillate florets 2-3.5 mm long; achenes striate .......................................................................................................................................

2 Pistillate florets 2.5-5 mm long; achenes smooth ....................................................................................................................................

**L. bahiensis** (Steudel) Hitchcock. Cp (AL, FL, MS): streams and riverbanks; rare. Apparently native (Anderson & Hall 1993), but considered native of South America by some authors. [= FNA, HC, K, X]

**L. fluitans** (Michaux) Terrell & H. Robinson var. fluitans, Southern Water Grass. Cp (GA, NC, SC), Pd? (GA?): aquatic in water of natural lakes, overflow of streams, and other stagnant waters; rare (NC Watch List). August-October. Var. fluitans ranges from ne. NC to c. FL and west to e. TX; var. oconnerii (Guzman M.) G. Tucker occurs in the highlands of w. Mexico (Tucker 1988). A very unusual grass, truly aquatic, with flexuous stems and unwettable, floating leaves. In addition to floating leaves (helpful in the field but not in the herbarium!), other useful characters include two secondary blade nerves on either side of the midvein and virtually as prominent as the midvein, and which extend onto the sheath where they occur with another 5 or so strong nerves; often with cilia 0.5-1 mm long at the summit of the ventral face of the sheath (an unusual place); and a hyaline ligule about 1 mm long on the same plane as the sheath (i.e., free from the base of diverging blades). [= FNA, Y, Z; < L. fluitans – K, X; < Hydrochloa carolinensis Palisot de Beauvois – RAB, GW, HC, S]


**Megathyrsus** (Pilger) B.K. Simon & S.W.L. Jacobs 2003 (Guinea Grass)


**Melica** Linnaeus 1753 (Melic)


1 First glume oblong, 6.5-10 mm long, 2-4× as long as wide, acute to obtuse at the apex, about the same length and width as the second glume; inflorescence with 0-1-5 branches from the lower nodes only; fertile lemmas 2; leaves 1-6 mm wide; [common, widespread in our area] ....

1 First glume broadly ovate, 5-8 mm long, 1.5-2× as long as wide, obtuse to rounded at the apex, shorter and broader than the second glume; inflorescence with 2-10 (or more) branches from most nodes; fertile lemmas 2-3; leaves 3-12 mm wide; [rare, Mountains of NC and VA, northwards and westwards] ...........................................................................................................................................

**M. mutica** Walter, Two-flower Melic. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): forests and woodlands, including coastal fringe and maritime forests; common (rare in WV). April-May. MD west to IN and IL, south to FL and TX. [= RAB, C, F, FNA, G, HC, K, S, W, WV, Z]

**M. nitens** (Scribner) Nuttall ex Piper, Three-flower Melic. Mt (GA, NC, VA, WV): rocky upland woodlands, barrens, and glades, over calcareous rocks (such as limestone, calcareous shale); rare. May-June. PA west to s. MN and NE, south to nw. GA and TX. [= RAB, C, F, FNA, G, HC, K, W, WV, Z]

**POACEAE**
**Melinis** Palisot de Beauvois 1812 (Natalgrass)


* Melinis repens* (Willdenow) Zizka ssp. repens, Rose Natalgrass. Cp (FL, GA, PD, GA), Mt (GA): disturbed areas, roadsides, railroad embankments, other disturbed areas; common (rare north of FL), native of Africa. Reported for several s. GA counties (Carter, Baker, & Morris 2009); the report for NC by Kartesz (1999) is an error. [= FNA; < M. repens – K; ? Rhynchelytrum roseum (Nees) Stapf & C.E. Hubbard ex Bews – HC; < Rhynchelytrum repens (Willdenow) C.E. Hubbard]

**Microstegium** Nees in Lindley 1836 (Sasa-grass, Japanese-grass)


* Microstegium vimineum* (Trinius) A. Camus, Japanese Stilt-grass, Flexible Sasa-grass, Japanese-grass. Pd (DE, GA, NC, SC, NC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, FL, GA, NC, SC, VA): disturbed areas, colonizing moist, rich soil, especially in floodplains; common (uncommon in DE Coastal Plain), native of tropical se. Asia. The following chronological synopsis of flora accounts of *Microstegium* is perhaps instructive: not treated by Small (1933), "local" (Fernald 1950), "rarely introduced and possibly not established" (Gleason & Cronquist 1952), "sporadically naturalized" (Godfrey & Wooten 1979), "a rapidly spreading pernicious invader on moist ground, too common" (Wofford 1989). RAB report it from fewer than 1/3 of the counties of the Carolinas (in 1968); it is now undoubtedly in every county, an abundant weed in most of them. This species has become a very serious pest, now ranking as one of the most destructive introduced plants in our area, forming extensive and dense patches, sprawling over and eliminating nearly all other herbaceous plants. Eradication is very difficult, and considering its obvious colonizing abilities, only temporary. Hunt & Zaremba (1992) document the continuing northern expansion of *Microstegium* into NY and CT. Redman (1995) discusses its habitat preferences in MD and DC. Koyama (1987) reports it as "common as undergrowth of forests" in Japan, part of its native distribution. [= RAB, C, FNA, GW, K, W; = Eulalia viminea (Trinius) Kunze – G; > Eulalia viminea var. viminea – F; > Eulalia viminea var. variabilis Kunze – F; > M. vimineum var. vimineum – HC; > M. vimineum var. imberbe (Nees) Honda – HC]

**Milium** Linnaeus 1753 (Wood-millet, Millet-grass)


* Milium effusum* Linnaeus var. *cisatlanticum* Fernald, American Wood-millet, Millet-grass. Mt (NC, VA, WV): forests at high (or rarely moderate) elevations; rare. June. A circumboreal species, ranging in North America south to w. NC (Swain County), e. TN (Sevier County), w. VA, WV, OH, IN, IL, and MN. The American plants are sometimes segregated as var. *cisatlanticum* Fernald (Fernald 1950b). Though considered "probably accidentally introduced and established" in NC by Radford, Ahles, & Bell (1968), the native origin of this northern species is more plausible; the only known occurrence in NC (not recently seen) is in the Great Smoky Mountains National Park. [= FNA, K, Y; < *M. effusum* – RAB, C, F, G, HC, W, WV, Z; = M. effusum ssp. *cisatlanticum* (Fernald (A. Haines – X)]

**Miscanthus** Andersson 1855 (Eulalia)

References: Barkworth in FNA (2003a).


**Muhlenbergia** Schreber 1789 (Muhly)

A genus of about 176 species, of North America south to Andean South America, and e. and se. Asia. *Muhlenbergia* is a large and diverse genus, recently reclassified by Peterson, Romaschenko, & Johnson (2010); the subgenera used here follow that classification. References: Peterson, Romaschenko, & Johnson (2010); Pohl (1969); Gustafson & Peterson (2007)=Y; Morden & Hatch (1989)=Z; Peterson in FNA (2003a).

1. Panicle open and diffuse, > 4 cm broad, the spikelets borne on slender or capillary pedicels longer than the lemmas.
2. Plant with rhizomes, the rhizomes prominent, creeping, and covered with imbricate scales; culms and sheaths strongly compressed at base, the leaves distichous; spikelets 1.5-2 mm long; [subgenus incertae sedis] ................................................................................................. *M. torreyana*
2. Plant without rhizomes, tufted with erect culms (a "bunchgrass"); culm and sheaths terete, the leaves not distichous; spikelets 1.5-5 mm long (excluding awns, if present).

3. Spikelets 1.5-2 mm long, awnless; [subgenus *Pseudosporobolus*]………………………………………..*M. uniflora*.

4. Spikelets 2.5-5 mm long (excluding awns), awned or aawnless; [subgenus *Trichochloa*]………………..*M. expansa*.

5. Lemma awn (2-) 3-3.5 mm long; glume bodies (0.3-) 0.7-1.7 (-2.4) mm long, > ½ as long as the lemma body, one or both glumes sometimes awned; spikelets usually purple (when fresh); basal sheaths usually very fibrous …………………………………………..*M. expansa*.

6. Lemma awn (2-) 3-3.5 mm long; glume bodies (0.3-) 0.7-1.7 (-2.4) mm long, > ½ as long as the lemma body, one or both glumes sometimes awned; spikelets usually purple (when fresh); basal sheaths rarely strongly fibrous.

7. Lemma awn (2-) 3-3.5 mm long; first glume awnless (or rarely with an awn to 3.2 mm long), second glume awnless (or rarely with an awn up to 5.0 mm long), pales aawnless; lemma lacking setaceous teeth flaming the awn; flowering late August-October; [widely spread in our area, particularly in rocky, clayey, or sandy glades, barrens, and woodlands with prairie affinities]…………………………………………………………*M. capillaris*.

8. Lemma awn (8-) 12-26 (-35) mm long, first glume awn (0.5-) 1.7-(-10) mm long, second glume awn (1-) 5-19 (-25) mm long, palea awn-tipped; lemma with two setaceous teeth flaming the awn, the teeth 0.5-2.5 (-4.7) mm long; flowering October-November; [sandy maritime situations on barrier islands of the outer Coastal Plain]………………………………………..*M. sericea*.

9. Lemma awn 1-11 mm long; spikelets 3-5 mm long; leaf blades (2) 6-10 (-13) mm wide (often > 8 mm wide) ………………………………………………………………………………………………..*M. capillaris*.

10. Lemma awn 1-11 mm long; spikelets 3-5 mm long; leaf blades (2) 6-10 (-13) mm wide (often > 8 mm wide) ………………………………………………………………………………………………..*M. sericea*.

11. Lemma awn 1-11 mm long; spikelets 3-5 mm long; leaf blades (2) 6-10 (-13) mm wide (often > 8 mm wide) ………………………………………………………………………………………………..*M. sericea*.

12. Lemma awn 1-11 mm long; spikelets 3-5 mm long; leaf blades (2) 6-10 (-13) mm wide (often > 8 mm wide) ………………………………………………………………………………………………..*M. sericea*.

13. Lemma awn 1-11 mm long; spikelets 3-5 mm long; leaf blades (2) 6-10 (-13) mm wide (often > 8 mm wide) ………………………………………………………………………………………………..*M. sericea*.
**Muhlenbergia expansa** (Poiret) Trinius, Savanna Hairgrass. Cp (FL, GA, NC, SC, VA): pine savannas, pine flatwoods, mesic areas in sandhill-pocosin ecotones; common (rare in VA). September-October. Sc. VA south to FL, west to e. TX (nearly exactly the range of *Pinus palustris*). An important part of the grassy component of many longleaf pine savannas, *M. expansa*’s flowering is stimulated by fire, and, lacking fire, it may be found in large populations in solely vegetative condition. It can be distinguished in sterile condition from other savanna bunchedgrasses (*Sporobolus teretifolius*, *S. pinetorum*, *S. florid anus*, *S. curtissii*, *Aristida stricta*, and *A. beyrichiana*) by the following characteristics: old leaf bases fibrous and curly (rather than hardened and cartilaginous) and ligules 1-3 mm long (rather than 0.2 to 0.5 mm long). The open panicle somewhat resembles that of several species of similar habitat which often co-occur with *M. expansa* – *Sporobolus teretifolius*, *S. pinetorum*, *S. curtissii*, *S. florid anus*, and *Calamovilfa brevipilis*, but the panicle of *M. expansa* is capillary, flexuous, and fragile, tending to break up over the winter (vs. fine-textured but not capillary, the branches rigid and ascending, more likely to persist over the winter in relatively intact condition). The vegetative characters listed above and under *Calamovilfa brevipilis* are also useful. See *M. capillaris* for a discussion of recent studies on the *M. capillaris* complex. [= RAB, F, FNA, GW, HC, S, Y; = *M. capillaris* var. trichopodes (Elliott) Vasey – C, K, Z]

**Muhlenbergia frondosa** (Poiret) Fernald, Smooth Wirestem Muhly. Mt (GA, KY, NC, VA, WV), Pd (DE, GA, NC, VA), Cp (KY, NC), Ip (KY): moist forests and disturbed areas; common (uncommon in GA, NC, VA, WV, rare in Piedmont, rare in NC Coastal Plain, rare in KY). September-October. This species is widespread in e. North America, south to ne. GA and west into the Plains. [= RAB, C, F, FNA, G, GW, HC, K, W, WV; = *M. mexicana* – S, misapplied]

**Muhlenbergia glabriflora** Scribnr, Clay-pan Muhly. Ip (KY, TN), Cp (KY, WV), Pd (NC, VA): open oak flatwoods, other open habitats, in clacey soils; rare. October-November. VA and NC west to IA, MO, AL, and TX, local and apparently rare in all of that range. In NC, only known from one collection, that from Durham County in 1936, with vague habitat data. F describes the habitat as "dry excreted or baked soils, prairies, gravelly or rocky slopes," Pohl (1969) as "mostly on low ground, in shade on heavy clay soils." [= C, F, G, HC, K; = *M. glabriflora* – FNA, orthographic variant]

**Muhlenbergia glomerata** (Willdenow) Trinius, Spiked Muhly. Mt (NC, VA): fens and seeps over mafic (amphibolite) or ultramafic (olivine) rocks; rare. August-October. This species is widespread in e. North America, nearly throughout the United States and s. Canada. [= RAB, C, F, G, HC, K, W, WV; > *M. mexicana* var. *filiformis* (Torrey) Scribnr – FNA; > *M. mexicana* var. *mexicana* – FNA; > *M. foliosa* (Roemer & J.A. Schultes) Trinius – S]

**Muhlenbergia schreberi** J.F. Gmelin, Nimblewill, Dropseed. Mt (GA, KY, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Ip (KY): bottomland and other moist forests, dry forests, disturbed areas; common (uncommon in FL). August-October. This species is widespread in e. United States. [= RAB, C, F, FNA, GW, HC, K, S, W, WV; > *M. schreberi* var. *schreberi* – G; > *M. schreberi* var. *palustris* (Scribnr) Scribnr – G; > *M. palustris* Scribnr – S]

**Muhlenbergia sericea** (Michaux) P.M. Peterson, Dune Hairgrass, Sweet Grass. Cp (FL, GA, NC, SC): maritime dry grasslands, maritime wet grasslands, interdune swales, low dunes, sometimes edges of freshwater or brackish marshes, apparently limited to the barrier islands (sometimes in close proximity with *M. capillaris*); uncommon, though sometimes locally abundant (SC Rare). October-November. This species is a very conspicuous part of the Outer Banks flora in the autumn, especially showy and abundant beside Rodanthe (Chicamacomico) and (Kinnakeet), Dare County, NC, and also abundant on Ocracoke Island, Hyde County, NC. The capillary pedicels and awns of its purple inflorescences are so light as to be moved by the slightest breeze. By December or January they fade to tan, but remain showy. This grass is a major component of baskets made in the Low Country of SC by the Gullah, who call it "sweet grass." I agree with Curtis (1843), Blomquist (1948), Pinson & Batson (1971), Gould (1975), and others who consider *M. sericea* (as *M. filipes*) a species distinct from *M. capillaris*. Its range is from NC (slightly north of Oregon Inlet, Dare County, south of Nags Head) south to FL and west to TX, primarily on barrier islands. In addition to a discussion of its relationship to *M. capillaris*, Pinson and Batson (1971) and Morden & Hatch (1989) provide descriptions, not elsewhere available. See *M. capillaris* for a discussion of recent studies on this complex. (= RAB, F, G, HC, K, W; < *M. capillaris* – RAB, GW; > *M. capillaris* var. *filipes* (M.A. Curtis) Chapman ex Beal – HC, K, S, Z; = *M. filipes* M.A. Curtis)


**Muhlenbergia tenuiflora** (Willdenow) Britton, Sterns, & Poggenburg, Slender Muhly. Mt (GA, KY, NC, CA, WV), Pd (DE, GA, NC, VA), Ip (KY), (SC): moist forests and disturbed areas, up to at least 1400 meters; uncommon (rare in DE, GA, NC, and SC Piedmont, rare in DE and VA Piedmont). August-October. NH, WI, and NE south to GA, AL, MS, and OK. Two varieties are sometimes recognized: var. *tenuiflora*, with lemma awn 4-11 mm long and the sheaths and stems retrorsely hirsute, especially around the nodes, and var. *varfullis* (endemic to the Southern Appalachians), with lemma awn 1-4 mm long or absent, and the sheaths and stems glabrous or nearly so. The validity of the varieties needs further assessment. [= RAB, F, FNA, G, HC, K, S, W, WV; > *M. tenuiflora* var. *tenuiflora* – C; > *M. tenuiflora* var. *varfullis* (Scribnr) Pohl – C]

**Muhlenbergia toreyiana** (J.A. Schultes) A.S. Hitchcock, Pinebarren Smokegrass. Cp (DE, GA, NC), Ip (TN), (KY?): in the Coastal Plain in moist soils of depression meadows and clay-based Carolina bays, often under or near *Taxodium ascendens*, in the Interior Low Plateau and Cumberland Plateau in moist grassy oak savannas; rare. August-November. NJ to GA in the Coastal Plain, and disjunct in KY (‘and TN; currently known to be extant only in NJ, NC, and TN. It was first discovered in NC in 1987. Although it rarely flowers except following fire, it can be recognized in sterile condition by its forming clonal patches
with evenly spaced, upright, blue-green tufts, each tuft a flattened stem with 5-10 ascending-erect, rather stiff, usually conduplicate leaves, the summit of each sheath with a pronounced cartilaginous thickening, easily felt by running the flattened stem from base to apex between thumb and forefinger. [C, F, FNA, G, HC, K; = Sporobolus torreyanus (J.A. Schultes) Nash – S]


**Nassella** (Trinius) Desvau 1846


1 Florets 1.5-2.5 mm long; leaves 0.2-0.6 mm wide, stiff and tightly convolute ................................................................. *N. trichotoma*

1 Florets 3.4-13 mm long; leaves 1.8 mm wide, flat or convolute.

2 Crown (surrounding the base of the awn) as wide or wider than long, the rim with hairs <0.5 mm long; floret widest just below the the crown...................................................................................................................................................[N. neesiana]

2 Crown longer than wide, the rim with hairs 1-2 mm long; floret widest near or only slightly above the middle.

3 Florets 6.5-13 mm long; crown usually flaring at the tip; awns 40-90 mm long..........................................................................*N. leucotricha*

3 Florets 6-8 mm long; crown parallel-sided; awns 30-50 mm long............................................................................................[N. n. manicata]

* **Nassella leucotricha** (Trinius & Ruprecht) Pohl, Texas Needlegrass. Cp (SC): waste areas near wool-combing mill; rare, native of sc. United States and Mexico. [= FNA; = Stipa leucotricha Trinius & Ruprecht – HC]

* **Nassella trichotoma** (Nees) Hackel ex Arechavaleta, Serrated Tussockgrass. Cp, Pd (NC, SC): fields; rare, native of South America, perhaps extirpated as a noxious weed. [= FNA; = Stipa trichotoma Nees]

* **Nassella manicata** (E. Desv.) Barkworth, Andean Tussockgrass. Reported from MS; perhaps only a waif. [= FNA; = Stipa manicata E. Desv.]

* **Nassella neesiana** (Trinius & Ruprecht) Barkworth, Uruguayan Tussockgrass. Known only from old collections on ballast from Mobile, AL. [= FNA; = Stipa neesiana Trinius & Ruprecht]

**Neeragrostis** Bush 1903

A monotypic genus of warm temperate North America and tropical Central America and n. South America. References: Peterson & Harvey (in prep.)=Z.

**Neeragrostis reptans** (Michaux) Nicora. Mt (WV): shores and wet flats; rare. Reported for scattered locations as far east as c. TN by Chester et al. (1993), as well as in WV, KY, and possibly GA (Kartesz 1999). [= K, Z; = Eragrostis reptans (Michaux) Nees – C, F, G, GW, HC]

**Opismenus** Palisot de Beauvois 1807 (Woods-grass, Basket-grass)


1 Leaf sheaths and culm axis glabrate to pilose (usually sparsely, but dense at sheath summit) with hairs <1.5 mm long; hairs on leaf surfaces similarly long; leaves 1.5-6 cm long; longest leaves with acute to acuminate tip (but not long-acuminate); lemma (7-) 9-11-veined ............... *O. hirtellus ssp. setarius*

1 Leaf sheaths and culm axis pilose with hairs 3-5 mm long; hairs on leaf surfaces similarly long; leaves 2.5-10 cm long; longest leaves with long-acuminate tip; lemma 7-veined.................................................................................*O. hirtellus ssp. undulatifolius*

* **Opismenus hirtellus** (Linnaeus) Palisot de Beauvois ssp. *setarius* (Lamarche) Mez ex Ekman, Woods-grass. Cp (FL, GA, NC, SC), Pd (GA, SC): hammocks, maritime forests, shell middens, moist forests; common (uncommon in GA, NC, and SC). August-October. *O. hirtellus* is widespread in tropical and subtropical areas of the New and Old World; ssp. *setarius* ranges from e. NC south to FL, west to AR and TX, and south through the Caribbean and Central America to central South America. Scholz (1981) recognizes many other subspecies. This species is undoubtedly native in our area, occurring in undisturbed habitats in natural communities entirely devoid of alien species; the basis of Gould's (1975) assertion that *Opismenus* is "introduced or adventive in the United States" is unknown. Superficially, *Opismenus* resembles *Arthraxon*, but has the leaves only slightly cordate at the base (vs. strongly cordate-clasping). Crins (1991) favors treating *O. setarius* as a taxonomically unrecognized component within a polymorphic *O. hirtellus*. [= FNA, K, Y; = O. setarius (Lamarche) Roemer & J.A. Schultes – RAB, HC, S; < O. hirtellus (Linnaeus) Palisot de Beauvois – Z]

* **Opismenus hirtellus** (Linnaeus) Palisot de Beauvois ssp. *undulatifolius* (Ard.) U. Scholz. Mt (VA): moist forests; rare, but locally abundant. Native to the Eastern Hemisphere (Asia and perhaps also native in s. Europe), has been reported as an
introduction in Baltimore Co., MD (Peterson et al. 1999). It can be expected to spread. [≡ FNA, K, Y; < O. hirtellus (Linnaeus) Palisot de Beauvois – Z]

* Opilisnenum burmannii (Retzius) Palisot de Beauvois. Collected in peninsular FL just south of our area and may eventually appear farther north (Davis, Judd, & Perkins 2006). [not keyed]

**Oryza** Linnaeus 1753 (Rice)


* Oryza sativa Linnaeus, Rice. Cp (GA, NC, SC, VA?): marshes, impoundments; rare, of only sporadic occurrence outside of cultivation, native of Asia. October. Perhaps the single most important food crop in the world, developed as a crop in Asia and cultivated at least since 10,000 years BP (Hancock 2004). Rice was an important crop before the Civil War in SC, GA, and extreme se. NC. Most rice planted today in our area is in waterfowl impoundments. [≡ RAB, C, FNA, G, GW, HC, K, S, X, Y, Z]

**Oryzopsis** Michaux 1803 (Ricegrass)


**Oryzopsis asperifolia** Michaux, Rough-leaved Ricegrass, Whiteseed Mountain-ricegrass. Mt (VA, WV): high elevation pine-oak/heath barrens and woodlands; rare. NL (Newfoundland) west to BC, south to w. VA (Rockingham County), WV, n. IN, SD, NM, and UT. This grass forms large cespitose clumps, the leaves evergreen and somewhat bicolored (green on the upper surface, bluish on the lower). [≡ C, F, FNA, G, HC, K, WV]

**Panicum** Linnaeus 1753 (Panic Grass)

(contributed by Richard J. LeBlond)

[INTRODUCTION: Describe differences between Panicum, Dichanthelium, Urochloa (=Brachiaria), and Paspalidium (now in Setaria), all of which are treated as Panicum in RAB. Describe collection methods and character analysis.] [also see Dichanthelium, Megathyrsus, Panopyrum, Setaria, Steinchisma, and Urochloa]

There has been considerable controversy over the generic limits of Panicum. In its broader recent conceptions, it has been considered to include (in our area) taxa sometimes and variously segregated as Brachiaria, Dichanthelium, Erichloa, Paspalidium, Panopyrum, Steinchisma, and Urochloa. All were originally recognized based on morphological characteristics, to which have recently been added anatomical, chemical, and other evidence. Crins (1991) recognizes Erichloa, Urochloa (including Brachiaria), Paspalidium, and Panicum as genera, with Panicum subdivided into subgenera Panicum, Agrostoides, Dichanthelium, Panopyrum, and Steinchisma. We prefer to recognize most of the segregates as genera, pending further analyses, since there is little evidence related to one another than they are to other genera recognized in the Paniceae. Panopyrum and Dichanthelium are the only segregate groups with C4 photosynthesis. Erichloa and Urochloa (including Brachiaria) have C4 photosynthesis, with PEP-cck decarboxylation. Panicum and Setaria (Paspalidium) have C3 photosynthesis, with NAD-me or NADP-me decarboxylation. Steinchisma, in addition to its unusual expansion of the palea, apparently has a peculiar photosynthetic pathway, described by Crins (1991) as "intermediate between" C3 and C4 photosynthesis; "the leaves have Kranz anatomy, but there are fewer organelles than usual in the outer sheath."

We agree with Hansen & Wunderlin (1988) that "Dichanthelium is as 'good' a grass genus as many others (e.g. Brachiaria, Sacciolepis, and many more in other tribes)." Despite arguments to the contrary, there is little doubt that Dichanthelium is a natural group. Zuloaga, Ellis, and Morrone (1993) argue against the recognition of Dichanthelium as a genus, preferring to treat it as a subgenus under Panicum. They state, however, "within Panicum, Dichanthelium can be distinguished at the subgeneric level by the following set of characters: lax inflorescences; ellipsoid to obovoid spikelets; upper glume and lower lemma usually 7-11 nerved; upper anthecium apiculate or shortly crested, and simple papillae on the lemma and palea. Anatomically, all species are readily distinguishable from each other, and the combined genus would be very large, indeed. References: Lelong (1986)=Z; Zuloaga & Morrone (1996)=Y; Freckmann & Lelong in FNA (2003a); Haines (2010)=X.

1 Spikelets tuberculate.
2 Lower lemmas tuberculate-hispid; spikelets 3.2-4.0 mm long; [of dry to mesic prairies and pinelands].................................**P. brachyanthum**
2 Lower lemmas warty; spikelets 1.7-2.2 mm long; [of wetlands]..................................................................................**P. verrucosum**
1 Spikelets smooth, not tuberculate.
2 Panicle < 2 cm wide at maturity.
3 Spikelets > 4.5 mm long; first glume > 2.4 mm long; ligule 4-6 mm long; [of coastal dunes]; [subgenus Panicum, section Repentia]........................................................................................................................................................................ P. amarum var. amarum
4 Spikelets < 4 mm long; first glume < 2.1 mm long; ligule < 2 mm long; [not of coastal dunes].
5 Blades involute, 1.5-4 mm wide; culms wiry................................................................. [see Coleataenia]
6 Blades flat, the larger 6-20 mm wide; culms stout.
7 Panicles constricted, 0.3-1.6 cm wide; spikelets subsessile to short-pedicelled; summit of fertile palea not enclosed by fertile lemma......................................................................................................................... P. hemitomon
8 Panicles > 1 cm wide; spikelets short to long-pedicelled; summit of fertile palea enclosed by fertile lemma ............................................................ [see Coleataenia]
9 Lower primary panicle branches in whorls of 4-7 at the nodes, stiffly spreading, naked on the proximal ½, the axis strongly pilose; lower culm internodes appressed papilllose-pubescent; first glume acuminate, ½ as long as spikelet; fertile lemma chestnut brown at maturity.............................. P. bergii
10 Plants without the above combination of characters.
11 Plants from a cluster of fibrous roots, without rhizomes or hard knotty crowns, annual.
12 First glume 1/5 to 1/4 length of spikelet, broadly rounded to truncate; sheaths usually glabrous; nodes glabrous; [subgenus Panicum, section Dichotomiflorum]
13 Spikelets oblong-lanceolate, (2.0-) 2.4-3.6 mm long, widest below middle, tapering to acuminate tips, second glume and sterile lemma firm, subcoriaceous; most pedicels < 3 mm long and shorter than spikelets.... P. dichotomiflorum var. dichotomiflorum
14 Spikelets ovoid to slenderly ellipsoid, 1.6-2.3 mm long, widest at middle with acute tips, second glume and sterile lemma thin, submembranous; some to many pedicels > 3 mm long and longer than spikelets ........ P. dichotomiflorum var. puritanorum
15 Plants with rhizomes or hard knotty crowns, perennial.
16 Plants with hard crowns, lacking rhizomes; fertile lemma 1.2-1.6 mm long........................................................................................................................................................................ [see Coleataenia]
17 Plants with rhizomes; fertile lemma 1.6-4 mm long.
18 Rhizomes about 1 cm thick with pubescent scale-like leaves; lower portion of culm hard, nearly woody......... P. antidotale
19 Rhizomes less than 1 cm thick with glabrous scale-like leaves; culms not woody.
20 First glume truncate apically.......................................................................................... P. repens
21 First glume acute to obtuse.
22 Culms slightly compressed below; ligules 0.5 mm long or less; spikelets subsessile and subsecund, usually some obliquely bent above the first glume; fertile lemma 1.8-2.2 mm long.................................................................................................................................................. [see Coleataenia]
23 Culms terete; ligules 1-6 mm long; spikelets pedicelled and not at all secund, essentially straight; fertile lemma 2.4-4 mm long; (subgenus Panicum, section Repentia)
24 Rhizomes elongate, or if short, then culms horizontally divergent at base, densely clumped...
25 Rhizomes elongate, or if short, then culms horizontally divergent at base, loosely clumped.......................... P. virgatum var. virgatum
Panicum amarum Elliott var. amarulum (A.S. Hitchcock & Chase) P.G. Palmer, Southern Seabeach Grass. Cp (DE, FL, GA, NC, SC, VA), Mt* (WV*): coastal dunes and shores, sandflats, and sandhills; common (uncommon in WV, rare in FL, GA, NC, SC, VA). July-November. NJ s. to FL and West Indies, w. to TX and Mexico; restricted to the Coastal Plain except for WV (where apparently introduced). Although well-marked variations of var. amarulum and var. amarum are quite distinctive, only the number and structure of first glume nerves appears to be a constant over the range of the two taxa (Palmer 1975). Primarily a coastal plant, var. amarulum has been found in the Sandhills of NC (Richmond Co.). Blomquist 1948 says this taxon "does not seem to grow naturally in North Carolina." [= K, Z; = Panicum amarulum A.S. Hitchcock & Chase – RAB, C, F, G, HC, S, WV; = Panicum ssp. amarulum (A.S. Hitchcock & Chase) Freckmann & Lelong – FNA; not Panicum]


* Panicum bergii Arechavalea, Berg's Panic Grass. Cp (GA): ditches and shallow, sporadically flooded depressions in grasslands; rare, native of South America. Reported for SC, GA (AL), Kartesz (1999), and sc. TX. [= FNA, GA, HC, K, S; > Panicum pilocomaense Hackel; Panicum s.s.]


Panicum capillare Linnaeus, Old-witch Grass, Tumbleweed, Tickle Grass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, VA): open sandy or stoney soil, fields, roadsidens, waste places, often weedy in cultivated soil; common (rare in SC). August-November. E. to Canada, s. to FL and TX; Bermuda. Plants formerly known as Panicum capillare var. occidentale Ryding, ranging from British Columbia south to NJ, WV, KY, TX, and CA, are distinguished by long-acuminate spikelets 2.5–4 mm long that are mostly subsessile or short-pedicelled. In our region, Panicum capillare has short-acuminate spikelets 1.8–2.8 mm long, mostly on long pedicels. [= RAB, K, S, WV, Z; < Panicum capillare – C, Y (also see P. gattingeri); > Panicum capillare var. capillare – F, HC, W; > Panicum capillare ssp. capillare – FNA; > Panicum capillare var. agrestis Gatterer – G; Panicum s.s.]

Panicum dichotomiflorum Michaux var. dichotomiflorum, Spreading Panic Grass, Fall Panic Grass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): marshy shores, exposed wet soils, alluvial deposits in floodplain forests, spoil banks, ditches; common. July-October. E. Canada west to BC, south to FL and TX; also in the Bahamas (Sorrie & LeBlond 1997). Plants with geniculate bases, enlarged lower nodes and sheaths, and panicles with included peduncles and divergent branches have been recognized as var. dichotomiflorum var. geniculatum (A.S. Hitchcock & Chase) Freckmann & Lelong – FNA; > Panicum dichotomiflorum var. dichotomiflorum – F, G, W; > Panicum dichotomiflorum var. dichotomiflorum ssp. dichotomiflorum – FNA; > Panicum dichotomiflorum var. dichotomiflorum – HC; Panicum s.s.]

Panicum dichotomiflorum Michaux var. puritanorum Svenson, Puritan Panic Grass. Cp (DE, VA): wet sands and peats of seasonally exposed pond and lake shores; rare. July-October. NS, NH, and NY south to DE (Sorrie & LeBlond 2008) and VA; IA and IL. Plants from DE northward typically have slender culms 0.3–6 dm long and leaves 1–8 mm wide. Plants with floral characters of var. puritanorum but with nominate-like stout culms 0.8–2 m long and leaves 7–25 mm wide occur in bottomlands in se. VA, and have been recognized as Panicum dichotomiflorum var. imperiorum Fernald. For the time being they are placed here based on floral characters (they will key here), but need further study. [= F, G, K; < Panicum dichotomiflorum – C; > Panicum dichotomiflorum var. imperiorum Fernald – F; > Panicum dichotomiflorum ssp. puritanorum (Svenson) Freckmann & Lelong – FNA; > Panicum dichotomiflorum var. puritanorum – HC; Panicum s.s.]


Panicum gattingeri Nash, Gattinger's Panic Grass. Mt (NC, VA, WV), Pd (NC, VA), C (GA): damp or dry, usually calcareous sandy soils of fields, roadsidens, shores, and cultivated ground; common in Mountains, uncommon in Piedmont (rare in VA). August-October. NY, sw. QC, and MN south to NC, TN, GA, AL, and AR. [= RAB, F, HC, K, S, WV; < Panicum capillare – C, Y; > Panicum capillare var. sylvaticum Torrey – W; > Panicum philippicum var. campestre Gattinger – G, W; > Panicum philippicum var. pilocomaense Hackel; Panicum s.s.]

Panicum hemitomon J.A. Schultes, Maidencane. Cp (DE, FL, GA, NC, SC, VA), Mt (VA): lake, pond, and river shores, swamp borders, marshes, ditches, often in shallow water; common (rare in VA). June-July. Coastal Plain from s. NJ south to FL, west to TX; also TN; South America. Often forming dense colonies in the low margin and shallow waters of limesink ponds. [= RAB, C, F, FNA, G, HC, K, S, WV, Z; not Panicum]

Panicum lithophilum Swallen, Flatrock Panic Grass. Pd (GA, NC, SC), Mt (NC): soil islands on granitic flatrocks and domes; rare. August-October. Restricted to granite outcrops in NC, SC, and ec. GA. There is some question about the distinctness of this taxon from Panicum philippicum. Zuloaga & Morrone (1996) did not consider it separable from Panicum philippicum. [= RAB, HC, K; > Panicum philippicum Bernhardi ex Trinius spp. lithophilum (Swallen) Freckmann & Lelong – FNA; < Panicum capillare Linnaeus var. sylvaticum Torrey – W; > Panicum philippicum – Y; Panicum s.s.]

* Panicum miliaceum Linnaeus ssp. miliaceum, Broomcorn Millet, Proso Millet, Hog Millet. Cp (DE, FL, VA), Mt (VA), Pd (DE, VA): planted in wildlife food plots, sometimes persistent or self-sowing; common (rare in FL, NC, and VA), introduced, native of Eurasia. July-October. [= C, F, FNA, G, HC, K, S, Y; Panicum s.s.]

* Panicum philippicum Bernhardi ex Trinius, Woodland Panic Grass. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, VA): glades, barrens, dissected pondshores, riversides, or other rocky or dry sandy soil of open woods and roadsidens; common (uncommon in WV, rare in DE and SC). NSW west to WI, south to GA and e. TX. Plants formerly known as Panicum tuckermanii Fernald, ranging from se. Canada south to s. VA and OH, are distinguished by included or short-exserted
peduncles less than one-third as long as the panicles. [= RAB, C, G, K, S, WV; > P. philadelphicum – F, HC; > P. tuckermanii Fernald – F, HC; = P. philadelphicum Bernhardi ex Trinius ssp. philadelphicum – FNA; < P. capitillare Linnaeus var. sylvaticum Torrey – W; < P. philadelphicum – Y (also see P. lithophilum); = P. philadelphicum var. philadelphicum – X; Panicum s.s.]

* Panicum repens Linnaeus, Torpedo Grass. Cp (FL, GA, NC, SC): ditches, roadbanks, disturbed coastal sands, in areas where ship's ballast was deposited; common (uncommon in GA, rare north of GA), native of Europe. First reported for NC by Leonard (1971b); reported for numerous counties in the GA Coastal Plain (Carter, Baker, & Morris 2009). [= FNA, GW, HC, K, S; Panicum s.s.]


Panicum virgatum Linnaeus var. cuneense Grisebach, Blunt Panic Grass. Cp (DE, FL, GA, NC, SC, VA): dry to wet sandy pinelands; uncommon. June-October. Coastal Plain from MA to FL, west to MS; also in MI; West Indies. [= F, HC, S; < P. virgatum – RAB, C, FNA, G, GW, W, Z; < P. virgatum var. virgatum – K]

Panicum virgatum Linnaeus var. spissum Linder, Tufted Switchgrass. Cp (DE): gravelly or sandy fresh to brackish shores and swamps; rare. E. Canada south to PA, MD, and DE (Kartesz 1999). [= F, HC, K; < P. virgatum – C, FNA, G; not Panicum]

Panicum virgatum Linnaeus var. virgatum, Switchgrass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, SC, VA, WV): dry or wet sandy soils of pinelands, fresh and brackish marshes, shores; common (uncommon in Mountains). June-October. Sw. QC and ND south to FL and TX, west to NV; Bermuda; Central and South America. [= F, HC, S; < P. virgatum – RAB, C, FNA, G, GW, W, W, Z; < P. virgatum var. virgatum – K; not Panicum]

* Panicum miliaceum Linnaeus ssp. ruderale (Kitagawa) Tzvelev, Panic Millet. [= FNA, K; = P. miliaceum ssp. spontaneum (Kit.) Tzvelev – C; < P. miliaceum – F, G, HC; Panicum s.s.] (not yet keyed)

Parapholis C.E. Hubbard 1946 (Sickle Grass)


* Parapholis incurva (Linnaeus) C.E. Hubbard, Sickle Grass, Hard Grass, Thin-tail. Cp (DE, NC, VA): sandy and muddy flats, brackish or salt marshes; rare, native of Europe. [= RAB, C, FNA, HC, K, Z; = Pholiurus incurvus (Linnaeus) Schinzius & Thellung – F, G; ? Lepturus filiformis (Roth) Trinius]

Pascopyrum A. Löve 1980 (Wheatgrass)


* Pascopyrum smithii (Rydberg) A. Löve, Western Wheatgrass. Mt (GA): disturbed areas; rare. Reported for ne. GA (Rabun County) by Jones & Coile (1988), as Agropyron smithii Rydberg. It is also reported for TN and KY (Kartesz 1999). [= FNA, K; = Elytrigia smithii (Rydberg) Nevski – C; = Agropyron smithii Rydberg – F, G, W]

Paspalum Linnaeus 1759 (Paspalum, Crown Grass, Beadgrass)

(by Alan S. Weakley & Richard J. LeBlond)


1 Spikes solitary, not associated with rudimentary spikelets or naked pedicels.
2 Panicles usually composed of a terminal pair of branches, sometimes with 1 (-5) additional branches below the terminal pair.
3 Upper glumes pubescent on the back or margins.
4 Spikelets 1.3-1.9 mm long; upper glumes pilose along the margins .............................................................. [P. conjugatum]
5 Spikelets 2.4-3.2 mm long; upper glumes sparsely pubescent on the back .......................................................... P. distichum
3 Upper glumes glabrous.
5 Spikelets elliptic,acute or acuminate at the tip ................................................................................................. P. vaginatum
5 Spikelets ovate to broadly elliptic, obtuse to broadly acute at the tip.
6 Spikelets 1.9-2.3 mm long; leaf blades flat ...................................................................................................... P. minus
6 Spikelets 2.5-4.0 mm long; leaf blades flast or longitudinally folded ................................................................. P. notatum
2 Panicles with 1-70 branches, if > 1, the branches arranged racemously.
7 Panicle branches 7-70, the axes extending beyond the outermost spikelets; panicle branches disarticulating at maturity .......... P. fluitans
7 Panicle branches 1-6, terminating in a spikelet; panicle branches persistent.
8 Upper florets olive to dark brown .................................................................................................................... P. scrobiculatum
8 Upper florets pale to tan.
9 Axes of panicle branches not broadly winged, 0.6-1.3 mm wide.
10 Spikelets orbicular, 2.8-3.2 mm wide ........................................................................................................... P. laeve var. circulare
10 Spikelets slightly longer than broad, 2.0-2.5 mm wide .................................................................................. P. laeve var. laeve
9 Axes of panicle branches broadly winged, 1.8-3.3 mm wide.
11 Spikelets 3.2-4.0 mm long; upper lemmas with a few short hairs at their tips .................................................. P. acuminatum
11 Spikelets 1.7-2.1 mm long; upper lemmas glabrous .......................................................... P. dissectum
1 Spikelets paired, or at least the second nonfunctional spikelet represented by a naked pedicel.
12 Spikelets 1.0-1.3 mm long .................................................................................................................. [P. paniculatum]
12 Spikelets 1.3-4.1 mm long
13 Margins of upper glumes and lower lemmas pilose.
14 Panicle branches 2-7; spikelets 2.3-4.0 mm long .................................................................................. P. dilatatum
14 Panicle branches (4-10) 30; spikelets 1.8-2.8 mm long ......................................................................... P. urvillei
13 Margins of upper glumes and lower lemmas neither ciliate-lacerate, winged, nor pilose (if pubescent, the hairs not pilose).
15 Upper florets olive to dark brown.
16 Panicle branches 10-28 (or more).
17 Plants annual; axes of panicle branches broadly winged, the wings about as wide as the central portion; [common native].
17 Plants perennial; axes of panicle branches narrowly winged, the wings narrower than the central portion; [rare exotics].
18 Axes of panicle branches 0.5-1.2 mm wide; spikelets 1.1-1.8 mm wide .................................................. P. conspersum
18 Axes of the panicle branches 1.0-1.7 mm wide; spikelets 1.8-2.4 mm wide .................................................. P. virgatum
19 Plants annual.
20 Spikelets 1.3-1.8 mm wide, broadly elliptic to orbicular, glabrous; panicles with 1-10 (-28) branches, the axes 0.7-2.3 mm wide .......................................................... P. boscianum
20 Spikelets 1.7-2.4 mm wide, broadly obovate, shortly pubescent; panicles with 1-5 branches, the axes 0.8-1.3 mm wide .......................................................... [P. convexus]
19 Plants perennial.
21 Plants cespitose, rhizomes poorly developed; culms 10-20 dm tall; panicle branches ascending, divaricate, or reflexed.
22 Leaves 7-18 mm wide ......................................................................................................................... P. conspersum
22 Leaves 2.5-4 mm wide ......................................................................................................................... P. plicatum
21 Plants not cespitose, rhizomatous; culms 1-1.5 dm tall; panicle branches ending in a tuft of leaf blades
23 Rhizomes long, evident ......................................................................................................................... P. nicorae
23 Rhizomes short, indistinct ..................................................................................................................... P. plicatum
20 Spikelets 1.3-1.8 mm wide, broadly elliptic to orbicular, glabrous; panicles with 1-10 (-28) branches, the axes 0.7-2.3 mm wide .......................................................... P. boscianum
20 Spikelets 1.7-2.4 mm wide, broadly obovate, shortly pubescent; panicles with 1-5 branches, the axes 0.8-1.3 mm wide .......................................................... [P. convexus]

23 Rhizomes long, evident ......................................................................................................................... P. nicorae
23 Rhizomes short, indistinct ..................................................................................................................... P. plicatum

24 Lower lemmas with well-developed cross-ribs over the veins; upper glumes absent .................................................. P. malacophyllum
24 Lower lemmas not ribbed over the veins; upper glumes present.
25 Panicles with 1-15(-100) branches.
26 Plants annual; upper glumes and lower lemmas rugose ............................................................................... [P. racemosum]
26 Plant perennial; upper glumes and lower lemmas glabrous.
27 Plant rhizomatous; panicle branch axes 0.9-1.2 mm wide; panicle branches often arcing .......................... P. intermedium
27 Plant cespitose; panicle branch axes 0.3-0.6 mm wide; panicle branches straight.
28 Panicle branches spreading to reflexed (rarely ascending); leaf blades 10-23 mm wide; axes of panicle branches 0.3-0.4 mm wide ................................................................................................................. P. corystaphiun
28 Panicle branches erect to ascending; leaf blades 4.9-6.1 mm wide; axes of panicle branches 0.5-0.6 mm wide ................................................................................................................................. [P. quadriflorum]
25 Panicles with 1-15 branches.
29 Spikelets 1.3-2.5 mm long.
30 Upper glumes (and usually also the lower lemmas) shortly pubescent.
31 Lower glumes present .......................................................................................................................... [P. langel]
31 Lower glumes absent.
32 Panicles both terminal and axillary, the axillary panicles partially or completely enclosed by the subtending leaf sheath .......................... [see Key A]
32 Panicles all terminal .......................................................................................................................... P. caespitosum
30 Upper glumes and lower lemmas glabrous.
33 Panicles both terminal and axillary, the axillary panicles partially or completely enclosed by the subtending leaf sheath .......................... [see Key A]
33 Panicles all terminal.
34 Upper panicle branches spreading to ascending .................................................................................. P. monostachyum
34 Upper panicle branches spreading to ascending.
35 Upper glumes and lower lemmas 5-veined ......................................................................................... P. caespitosum
35 Upper glumes and lower lemmas 3-veined.
36 Lower sheaths villous or hirsute ........................................................................................................... P. praecox var. curtisianum
36 Lower sheaths glabrous or sparsely papillose pubescent ....................................................................... P. praecox var. praecox
29 Spikelets 2.5-4.1 mm long.
37 Spikelet pairs barely if at all imbricate; lower glumes usually present .................................................. P. bifidum
37 Spikelet pairs imbricate; lower glumes absent or present.
38 Upper glumes pubescent; lower lemmas usually pubescent.
39 Lower glumes present .......................................................................................................................... [P. langel]
39 Lower glumes absent .......................................................................................................................... P. pubiflorum
38 Upper glumes glabrous; lower lemmas usually glabrous.
40 Upper florets golden brown .................................................................................................................. P. floridanum
40 Upper florets pale to tan.
41 Terminal panicle branches erect ........................................................................................................ P. monostachyum
41 Terminal panicle branches spreading to ascending.
42 Plants decumbent, rooting at the lower nodes; spikelets obovate to elliptic .................................................. P. pubiflorum
42 Plants rhizomatous; spikelets orbicular to elliptic.
43 Spikelets 2.9-4.1 mm long; 1.9-3.1 mm wide, suborbicular to elliptic; upper glumes 5-veined; leaf blades flat .......................................................................................................................... P. floridanum
1 Leaves glabrous to glabrate (if glabrate, also see var. stramineum in couplet 8).
2 Blades not especially crowded toward the base, erect, ascending or spreading, 2-20 mm wide; spikelets 1.6-2.6 mm long, pubescent or glabrous.
3 Blades 3-8 mm wide; spikelets 1.6-1.9 mm long, pubescent, subacute; [of GA and FL southward] .................. P. propinquum
4 Plants erect to spreading; blades 3-20 mm wide; spikelets 1.7-2.6 mm long; [of NJ to TX] .............. P. setaceum var. ciliatifolium
4 Plants stiffly erect; blades 2-6 mm wide; spikelets 2.0-2.6 mm long; [of GA and FL] .................. P. setaceum var. rigidifolium

Paspalum acuminatum Raddi, Brook Paspalum, Canoe Grass. Pd (GA): wet areas, often disturbed; rare, possibly only adventive in our area. C. GA and ne. TX south to s. FL and s. TX, south through the New World tropics to s. South America. [= FNA, HC, K]


Paspalum caespitosum Flügge. Cp (AL, FL): pinelands, hammocks; rare. S. AL and n. FL south to s. FL; West Indies, Mexico and Central America. [= FNA, GW, HC, K, S]

Paspalum conjugatum Bergius, Sour Paspalum. Cp (AL, FL, LA, MS): disturbed areas, forest edges; uncommon. Ne. FL, FL Panhandle, and s. AL west to e. TX, south in the New World tropics; Old World tropics. [= FNA, HC, K, S] [synonymy incomplete]

* Paspalum conspersum Schrad., Scattered Paspalum. Cp (GA): roadsides, other disturbed areas; rare, native of Mexico south to South America. [= FNA] [synonymy incomplete]

* Paspalum corysteum Trinius, Emperor Crown-grass. Cp (FL), Pd (NC): disturbed areas; rare, native of South America. [= FNA, K] [synonymy incomplete]


Paspalum distichum Linnaeus, Joint Paspalum, Knotgrass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC): brackish and freshwater marshes; uncommon (rare in VA). June-August. NJ, KS, and WA south to s. FL, s. TX, s. CA and through the New World and Old World tropics. [= RAB, C, F, FNA, G, HC, K, S, W, Y; < P. distichum – GW (also see P. vaginatum); = P. paspaloides (Michaux) Scribner]

POACEAE

**Paspalum setaceum** Michaux var. *stramineum* (Nash) D. Banks, Yellow Sand Paspalum. Cp (FL, GA, NC): dry sandy soils; rare. June-September. Ml west to MT, south to LA, and NM; scattered eastwards, especially near the coast, perhaps at least in part as introductions. [= C, FNA, Z; < *P. setaceum* – RAB, GW, K, W; = *P. ciliatifolium* Michaux var. *stramineum* (Nash) Fernald – F, G; = *P. setaceum* Nash – HC, Y]

**Paspalum setaceum** Michaux var. *supinum* (Bosc ex Poiret) Trinian. Cp (FL, GA, NC, SC, VA?): sandy soils, old fields; uncommon. June-September. E. NC (e. VA?) south to s. FL, west to s. MS. Also reported for the Coastal Plain of Virginia by Tatnall (1946); needing confirmation of the specimen identification. [= F, FNA, Z; < *P. setaceum* – RAB, GW, K, W; = *P. supinum* Bosc ex Poiret – HC, S]

**Paspalum setaceum** Michaux var. *villosissimum* (Nash) D. Banks. Cp (FL): sandy pine flatwoods and fields; uncommon. N. FL (very near GA) south to s. FL; Cuba. [= FNA, Z; < *P. setaceum* – GW, K; < *P. dhille* Michaux – HC; = *P. villosissimum* Nash – S]


* Paspalum vaginatum* Swartz, Sand Knotgrass, Seashore Crown Grass. Cp (FL, GA, NC, SC), Pd (NC): brackish marshes, rarely inland in disturbed places; rare. July. NC south to s. FL, west to s. TX, southward through the New World tropics; Old World tropics. [= RAB, FNA, HC, K, S, Y; < *P. distichum* – GW]

* Paspalum virgatum* Linnaeus, Talquezal. Cp (GA): disturbed areas; rare, native of Mexico, Central America, and South America. [= FNA, K] [synonymy incomplete]

* Paspalum convexus* Flügge, Mexican Paspalum. Disturbed areas. MS, LA, and e. TX, native of tropical America. [= FNA, K] [synonymy complete] *Paspalum denticulatum* Trinian. Cp (AL): wet disturbed areas; rare. FL, AL, LA, TX southward. [synonymy incomplete; not yet keyed] *Paspalum panicum* Linnaeus, Arrocillo. Disturbed areas, native of tropical America. Ec. MS and sw. FL. [= FNA, K] [synonymy incomplete]

* Paspalum quadrisarium* Lamarck, Tussock Paspalum. Disturbed areas. S. MS. Native of South America. [= FNA] [synonymy incomplete]

* Paspalum racemosum* Lamarck, Peruvian Paspalum. Disturbed areas. MS and other widely scattered localities in North America, native of n. South America. [= FNA, K] [synonymy incomplete]

**Pennisetum** L.C. Richard ex Persoon 1805

A genus of 80-130 species, perennials and annuals, mainly of the tropics and subtropics. References: Wipff in FNA (2003a). Key adapted from FNA.

1 Primary bristles (immediately subtending each spikelet) scabrous.
2 Panicles with 9-16 fascicles per cm of length; plants 0.3-1.2 m tall .................................................................................................................................*P. alopecuroides*

1 Primary bristles conspicuously long-ciliate.
3 Spikelets 9-12 mm long ..................................................................................................................................................................................*P. villosum*

3 Spikelets 2.5-7 mm long.
4 Fascicles not disarticulating from the racemes; fascicles 33-160 per cm of inflorescence; panicles 4-200 cm long; leaves 7-70 mm wide. ....................................................................................................................................................*P. glaucum*

4 Fascicles disarticulating from the racemes at maturity; fascicles 8-37 per cm of inflorescence; panicles 2-32 cm long; leaves 2-13 mm wide.
5 Spikelets 4.5-7 mm long; leaves 2-3.5 mm wide, folded or conduplicate and superficially appearing even narrower; rachis pubescent. .................................................................................................................................*P. setaceum*

5 Spikelets 2.5-5.6 mm long; leaves 2-13 mm wide, flat; rachis scabrous.
6 Inner bristles fused for < ¼ of their length; many outer bristles exceeding the spikelets; terminal bristles 10.5-23 mm long, noticeably longer than the other bristles in the fascicle ........................................................................................................*P. ciliare*

6 Inner bristles fused for ½-¾ of their length; outer bristles not exceeding the spikelets; terminal bristles 2.9-6.5 mm long, usually not noticeably exceeding the other bristles in the fascicle ...........................................................................*P. setigerum*

* **Pennisetum alopecuroides** (Linnaeus) Sprengel, Chinese Fountaingrass. Cp (DE), Pd (DE, VA), Mt (VA): disturbed areas; rare, native of e. Asia. [= FNA, HC, K]

* **Pennisetum ciliare** (Linnaeus) Link, Buffelgrass. Cp (FL): disturbed areas; rare, native of Africa. Known in our area from ne. FL, s. AL, e. TN, and ec. MS. [= FNA, HC; = *P. ciliare var. ciliare* – K; = Cenchrus ciliaris Linnaeus]

* **Pennisetum glaucum** (Linnaeus) R. Brown, Pearl Millet. Cp (FL), Mt (VA, WV), Pd (VA), {GA, NC, SC}: disturbed areas; common, native of the Old World. [= RAB, FNA, HC, K, WH; ? Chaetochloa lutescens (Weigel) Stuntz – S; = Setaria glauca (Linnaeus) Palisot de Beauvois – WV]


* **Pennisetum setigerum** (Vahl) Wipff. Cp (FL): disturbed areas; rare, native of Africa. Known in our area from ne. FL and ec. MS. [= FNA; = *P. ciliare* (Linnaeus) Link var. *setigerum* (Vahl) Leke – K; = Cenchrus setigerus Vahl]

Phalaris Linnaeus 1753 (Canary-grass)


1 Perennial, with scaly rhizomes; inflorescence either obviously paniculate, 7-25 cm long, with ascending to appressed branches, the main branches of the inflorescence apparent, the inflorescence outline thus appearing lobed, or densely spikelike, 1.5-15 cm long.
  2 Glumes broadly winged; fertile lemmas ovate-lanceolate, densely pubescent............................................................................................ P. aquatica
  2 Glumes not winged; fertile lemmas narrowly lanceolate, glabrous to sparingly pubescent ...
  1 Annual, without rhizomes; inflorescence densely spikelike or almost capitate, 1-9 cm long, the branches not apparent, the inflorescence outline a single ovoid, ellipsoid, or lanceolate form.

3 Spikelets borne in clusters, the lower 4-7 spikelets in each cluster with a staminate terminal floret........................................................................................................... P. paradoxa
  3 Spikelets borne singly; all spikelets with a bisexual terminal floret.
    4 Keels of the glumes broadly winged (the wing ca. 1 mm wide); sterile florets 2.0-4.5 mm long............................................. P. canariensis
    4 Keels of the glume narrowly winged (the wing < 0.5 mm wide); sterile florets 0.5-2.5 mm long.
      5 Sterile floret 1............................................................................................................................................................................. P. minor
      5 Sterile florets 2.
        6 Nerves of the glumes scabrous; panicle cylindric in outline, 6-18 cm long; glumes 3.5-4.0 mm long; sterile florets 0.5-1.5 mm long.......................................................................................................................... P. angusta
        6 Nerves of the glumes not scabrous; panicle narrowly ovate in outline, usually 2-6 cm long; glumes 5-6 mm long; sterile florets 1.5-2.5 mm long.......................................................................................................................... P. caroliniana

* Phalaris angusta * Nees ex Trinian. Cp (FL, GA, SC): waterfowl impoundments, marshes; uncommon, native of tropical America, perhaps native in LA and TX. [= GW, FNA, HC, K, Z]


**? Phalaris arundinacea ** Linnaeus, Reed Canary-grass, Ribbon Grass. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA): moist forests, moist disturbed areas, bogs; common (rare in VA Coastal Plain). June. NL (Newfoundland) west to AK, south to NC, TN, AR, NM, CA; Mexico; Eurasia. A variegated form, P. arundinacea forma variegata (Parn.) Druce, is cultivated for ornament, as Ribbon Grass. [= RAB, C, F, FNA, GW, K, S, W, WV, Z; > P. arundinacea var. arundinacea – G, HC; > P. arundinacea var. picta Linnaeus – G, HC]

* Phalaris canariensis * Linnaeus, Birdseed Grass, Canary-grass. Cp (FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (VA, WV): disturbed areas; rare, native of Mediterranean Europe. Also reported for other scattered states in e. North America, including peninsular FL (Kartesz 1999). [= FNA, HC, K] [synonymy incomplete]

* Phalaris minor * Retzius, Lesser Canary Grass. Cp (SC): waste areas near wool-combing mills; rare, native of Mediterranean Europe. Also reported for other scattered states in e. North America, including peninsular FL (Kartesz 1999). [= FNA, HC, K] [synonymy incomplete]

* Phalaris paradoxa * Linnaeus, Mediterranean Canary Grass. [NC]: [habit]; rare. Reported for NC, MD, NJ, and PA (Barkworth in FNA 2007a; Kartesz 1999). [= FNA, K; > P. paradoxa var. paradoxa – HC; > P. paradoxa var. praemorsa (Lamarck) Coss. & Durieu – HC] [synonymy incomplete]

Phanopyrum (Rafinesque) Nash 1903 (Phanopyrum)


Phleum Linnaeus 1753 (Timothy)


1 Spikelets 2.0-3.6 (-3.8) mm long, including the 0.2-1.0 (-1.2) mm long awns; panicle 3-6 (-6.7) mm wide; leaves 2-6 mm wide; ligule usually acute............................................................................................................................................................................. P. pratense ssp. bertolonii
1 Spikelets 3.5-4.5 mm long, including the (0.8-) 1.0-2.0 mm long awns; panicle 5-10 mm wide; leaves 3-9 mm wide; ligule usually obtuse ........................................................................................................ P. pratense ssp. pratense

Phragmites Adanson 1763 (Common Reed)


1 Panicle diffuse and partially drooping, with lower lateral branches naked for 1-4 cm; leaf blades of lower stem leaves abscising from the sheaths by mid-season; leaves lightly scabrous on lower surface; culms stout, to 20 mm in diameter, smooth and glossy; [native on the Gulf Coast, from FL and GA westward, and southward into the tropics].................................................................P. karka

1 Panicle erect and relatively compact, with lower lateral branches spikelet-bearing to base
2 Ligules 0.4-0.9 mm long; lower glumes 2.5-5.0 mm long; upper glumes 4.5-7.5 mm long; leaf blades of lower stem leaves abscising from the sheaths caducous with age; culms exposed in the winter, smooth and shiny; [native south to WV and VA].........................................................P. americanus
2 Ligules 1.0-1.7 mm long; lower glumes 3.0-6.5 mm long; upper glumes 5.5-11.0 mm long; leaf sheaths caducous with age; culms exposed in the winter, smooth and shiny; [native on the Gulf Coast, from FL and GA westward, and southward into the tropics].................................................................P. pratense

Phragmites americanus (Saltonstall, P.M. Peterson, & Soreng) A. Haines, American Reed. Freshwater marshes. New England westward. [= V; < P. australis ssp. americanus] Saltonstall, P.M. Peterson, & Soreng – FNA, X, Y, Z; < P. australis – C, K; < P. communis Trinius – RAB, G, HC; < P. communis var. berlandieri (Fournier) Fernald – F]

* Phragmites (Cavanilles) Trinius ex Steudel, Common Reed. Brackish and freshwater Marshes, dredge-spoil deposit islands, ditches. August-October. Nearly worldwide in distribution. Fox, Godfrey, & Blumquist (1948) report its first collection in NC (in 1948). In most of our area, reed is of relatively recent introduction, reported from only nine counties in RAB, but now becoming a serious weed in coastal areas, where it aggressively colonizes freshwater and brackish marshes, excluding the native species. [= V; < P. australis ssp. americanus – X, Y; = Phragmites australis (Cavanilles) Trinius ex Steudel var. australis – FNA; Z; < P. australis – C, GW, K; < P. communis Trinius – RAB, G, HC; < P. communis var. communis – F; < P. phragmites (Linnaeus) Karsten – S]


Phyllostachys Siebold & Zuccarini 1843 (Bamboo)

A genus of about 50 (or more) species, native of mainly temperate e. Asia. References: Stapleton & Barkworth in FNA (2007a); Duncan & Duncan [in prep.]=Z; Judziewicz et al. (2000)=Y. Key adapted from Z.

1 Internodes at the base of principal culms dissimilar in length, the lowermost internode 1-12 cm long, the next 3 internodes distinctly longer, with nodal junctions mostly straight across.................................................................P. aurea
1 Internodes at the base of principal culms all similar in length, mostly 4-8 cm, with nodal junctions oblique
2 Groove on internode (above the branch) yellowish-green, the rest of the culm dull greenish.........................................................P. aureosulcata
2 Groove on internode (above the branch) the same color as the rest of the culm.
3 Internodes of principal culms densely velvety; outer surface of culm sheaths with abundant erect brown hairs; lowest internode of principal culms ca. 5 cm long; culms pale green astrift, becoming gray with accumulated waxy powder in age..................P. heterocyla
3 Internodes of principal culms glabrous or slightly hairy; outer surface of culm sheaths lacking erect brown hairs; lowest internode of principal culms ca. 8.5-12 cm long; culms various (see below, but not as described in first lead).
**POACEAE** 343

4 Largest culms to 15 cm in diameter and 25 m tall; upper culm sheaths with auricles; outer surface of culm sheaths usually with a green streak down the middle, flanked by streaks of purple and buff; culms medium to dark glossy green at first (some cultivars golden yellow or yellow streaked), remaining so in age. .................................................................*P. bambusoides*

4 Largest culms to 3.2 (-4) cm in diameter and 10 m tall (rarely taller); upper culm sheaths with or without auricles; outer surface of culm sheaths variously streaked, spotted, or mottled with brown or red (but not as above); culms pale green to green at first, usually becoming purple spotted, gray, or yellow in age.

5 Lowest internode of principal culms ca. 8.5 cm long; culm sheaths with auricles, usually sparsely pubescent with erect, pale hairs, usually pinkish-brown at maturity, marked with numerous brown spots near the tip; culms green at first, usually becoming speckled and then more-or-less completely darkened with purplish spots (remaining green in some cultivars). ...........................................*P. nigra*

5 Lowest internode of principal culms ca. 12 cm long; culm sheaths lacking auricles, glabrous, usually green to buff at maturity, striped and marginally bordered with red; culms pale green at first, becoming gray to yellowish in age. ............*P. rubromarginata*

*Phyllostachys aurea* Carrière ex A. & C. Rivière, Golden Bamboo, Fishpole Bamboo. Cp (DE, FL?, NC, SC, VA), Pd (DE, NC, SC, VA), Mt (VA): suburban woodlands; uncommon (rare in VA Mountains), native of China and Japan. Not known to flower in our area. This is the usual large bamboo cultivated and naturalizing in our area, forming dense stands, up to 15 m tall. [= RAB, FNA, HC, K, Y, Z]

*Phyllostachys aureosulcata* McClure, Yellowgroove Bamboo. Cp (SC), Pd (VA), Mt (WV), {GA}: cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= K, WV, Y, Z]

*Phyllostachys bambusoides* Siebold & Zuccarini, Giant Timber Bamboo. Cp (NC, SC), Pd (NC, SC), Mt (NC, SC): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= FNA, HC, K, Y, Z]


*Phyllostachys nigra* (Loddiges) Munro, Black Bamboo. Pd (SC), Pd (VA), Mt (WV): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China and Japan. [= K, WV, Y, Z; > *P. nigra* var. *henonis* (Mif.) Stapf – WV]

*Phyllostachys rubromarginata* McClure. Pd (SC): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= K, Y, Z]

*Phyllostachys meyeri* McClure is reported as introduced in FL, NC, and SC (Kartesz 1999). {investigate} [= K] {not yet keyed}

A number of other species are sometimes cultivated in our area, and may be encountered. Bamboos are seriously under-represented in herbaria, since they rarely flower and are impractical to press. All of the species above should be anticipated in other physiographic provinces and states than those listed.

**Piptatherum** Palisot de Beauvois 1812


1 Glumes 2.5-3.5 mm long; lemmas glabrous; [alien] .............................................................................................................................*[P. miliaceum]*

1 Glumes 3-8 mm long; lemmas evenly pubescent; [native].

2 Leaves primarily cauline, the basal leaves < 2 cm long or merely represented by sheaths; leaves 8-16 mm wide; florets 4.5-7.5 mm long. .................................................................*P. racemosum*

2 Leaves primarily basal, the basal leaves 4-45 cm long; leaves 0.5-1.8 mm wide; florets 2.2-4.5 mm long. .......................................................................................................................... ...........................................................................

3 Awns absent or < 2 mm long, caducous ..........................................................................................................................................

3 Awns 5-15 mm long, persistent, 1-2× geniculate ...........................................................................................................*P. racemosum*

3 Awns absent or < 2 mm long, caducous ..........................................................................................................................*P. pungens*

**Piptatherum canadense** (Poiret) Dorn, Mountain Ricegrass. Mt (WV): sandy barrens on quartzite; rare. NL (Newfoundland) west to BC, south to n. NY, MI, and WI; disjunct at Panther Knob, Pendleton County, WV. [= K; = Oryzopsis canadensis (Poiret) Torrey – C, F, G, HC, WV]

**Piptatherum pungens** (Torrey ex Sprengel) Dorn. Mt (WV): {habitat}; {abundance}. NL (Labrador), NU, and YT south to NJ, WV, IN, IL, IA, SD, and CO. [= K; = Oryzopsis pungens (Torrey ex Sprengel) A.S. Hitchcock – C, F, G, HC]

**Piptatherum racemosum** Ricker ex A.S. Hitchcock, Blackseed Ricegrass. Mt (VA, WV), Pd (DE): calcareous woodlands and forests; common (rare in DE and WV). QC and ON west to ND, south to w. VA, e. TN (FNA), sc. KY, sc. MO, and e. NE. [= K; = Oryzopsis racemosa (Smith) Ricker ex A.S. Hitchcock – C, F, G, HC, W, WV]


**Piptochaetium** J. Presl 1830 (Needlegrass)

A genus of about 27 species, of temperate North and South America, and montane tropical South America (Cialdella & Giussani 2002). References: Barkworth in FNA (; Cialdella & Giussani (2002).

1 Florets 7-13 mm long; awns 40-75 mm long; [widespread in our area] .............................................................................................................................*P. avenaceum*

1 Florets 13.5-22 mm long; awns 62-120 mm long; [endemic to FL] .............................................................................................................................*P. avenacioides


Pleioblastus Nakai 1925

A genus of about 20 species, shrubs, native of China and Japan.

* Pleioblastus simonii (Carrière) Nakai. Reported for GA (Kartesz 1999). [investigate] [= Arundinaria simonii (Carrière) A. & C. Rivière – K]

Poa Linnaeus 1753 (Bluegrass)


1 Plants with well-developed rhizomes; perennial.
2 Upper stems strongly flattened; [section Tichopoa]..........................P. compressa
3 Upper stems terete or nearly so.
4 Lower nodes of the panicle with 1-3 branches; [section Madropoa]..........................P. cuspidata
5 Lower nodes of the panicle with 4 or more branches; [section Poo]..........................P. pratensis

1 Plants lacking rhizomes; perennial or annual.
2 Upper stems strongly flattened; [section Tichopoa]..........................P. compressa
4 Lower nodes of the panicle with 1-3 branches; [section Madropoa]..........................P. cuspidata
5 Lower nodes of the panicle with 4 or more branches; [section Poo]..........................P. pratensis

1 Plants dioecious, the florets perfect; lemmas and glumes scarios and silvery; [rare introduction in our area]; [section Dioecopoa]..............P. arachnifera
2 Plants not dioecious, the florets perfect; lemmas and glumes not notably scarios and silvery; [collectively common and widespread in our area].

3 Lower nodes of the panicle with 4 or more branches; [section Arenariae].........P. bulbosa
4 Upper stems terete or nearly so.
5 Lower nodes of the panicle with 4 or more branches; [section Arenariae].........P. bulbosa
6 Lower nodes of the panicle with 1-3 branches; [section Madropoa]..........................P. cuspidata
7 Lower nodes of the panicle with 4 or more branches; [section Poo]..........................P. pratensis

1 Plants with well-developed rhizomes; perennial.
2 Upper stems strongly flattened; [section Tichopoa]..........................P. compressa
3 Upper stems terete or nearly so.
4 Lower nodes of the panicle with 1-3 branches; [section Madropoa]..........................P. cuspidata
5 Lower nodes of the panicle with 4 or more branches; [section Poo]..........................P. pratensis

8 Annual.
9 Marginal veins of the lemma glabrous.
10 Nodes of the panicle mostly with 4-8 branches; lemmas pubescent or scarios on the keel.
11 Sheaths glabrous; ligule 0.7-2.2 (-3.0) mm long; [section Sylvestres]..........................P. alsodes
12 Sheaths scarios; ligule (2.5-) 3-7 mm long; [section Pandemos]..........................P. trivialis

8 Annual.
9 Marginal veins of the lemma glabrous.
10 Nodes of the panicle mostly with 4-8 branches; lemmas pubescent or scarios on the keel.
11 Sheaths glabrous; ligule 0.7-2.2 (-3.0) mm long; [section Sylvestres]..........................P. alsodes
12 Sheaths scarios; ligule (2.5-) 3-7 mm long; [section Pandemos]..........................P. trivialis

9 Marginal veins of the lemma glabrous, at least basally.
13 Lower nodes of the panicles mostly with (1-) 2-3 branches.
14 Ligule truncate, 0-1 mm long; first glume 1.7-2.2 mm long, second glume 2.0-2.8 mm long; anthers 0.5-0.7 mm long; [section Oreatos]..........................P. paludigena
15 Ligule rounded-ovate, 1-2 mm long; first glume 2.5-3.5 mm long, second glume 3.0-3.8 mm long; anthers 1.1-1.4 mm long; [section Sylvestres]..........................P. saltuensis

8 Annual.
9 Marginal veins of the lemma glabrous, at least basally.
10 Nodes of the panicle mostly with (1-) 2-3 branches.
11 Ligule truncate, 0-1 mm long; first glume 1.7-2.2 mm long, second glume 2.0-2.8 mm long; anthers 0.5-0.7 mm long; [section Oreatos]..........................P. paludigena
12 Ligule rounded-ovate, 1-2 mm long; first glume 2.5-3.5 mm long, second glume 3.0-3.8 mm long; anthers 1.1-1.4 mm long; [section Sylvestres]..........................P. saltuensis

Poa alsodes A. Gray, Woodland Bluegrass. Pd (DE, NC, VA), Mt (NC, VA, WV): rich forests; common (uncommon in NC, VA, and WV Mountains, rare in NC and VA Piedmont). May-June. NS west to SD, south to NC and IL; also in w. United States. [= RAB, C, F, FNA, G, HC, K, S, W, WV, Z]

A genus of about 18 species, annuals and perennials, of tropical and warm temperate regions. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

1 Inflorescence verticillate, the rachis visible between the verticils; glumes 1.6-2.3 mm long, without awns; spikelets disarticulating near base of pedicel; stoloniferous perennial..........................................................P. viridis

1 Inflorescence dense, cylindrical, and spike-like; glumes 2-3 mm long, with prominent awns 3.5-7 mm long; spikelets disarticulating near apex of pedicel; annual.

2 Glumes deeply lobed, the awn borne between the lobes; glume ciliate-fringed; lemma 0.4-0.7 mm long, awnless.................................

2 Glumes slightly notched at the tip, the awn borne from near the tip; glume not ciliate-margined; lemma 0.7-1.1 mm long, awned.................................

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Poa infirma Kunth. Cp (SC): disturbed areas; rare, native of South America. [investigate] [= FNA, K] [not yet keyed; synonymy incomplete]

* Polypogon Desfontaines 1798


Poa languida Hitchcock, Drooping Bluegrass. Mt (VA): ultramafic outcrop woodlands, barrens, and glades; rare. April-May. VT and MA west to MN, south to PA, w. VA, KY, and IA. See comments under P. saltuensis. [C, F, G, HC, W; = P. saltuensis Fernald & Wiegand ssp. languida (Hitchcock) A. Haines – FNA; Y; < P. saltuensis – K]

Poa nemoralis Linnaeus, Wood Bluegrass. Pd (DE, VA), Mt (NC, VA): disturbed areas, sandy creek bottoms; uncommon (rare in VA), native of Europe. [= C, F, FNA, G, HC; < P. nemoralis ssp. nemoralis – K]

Poa paludigena Fernald & Wiegand, Bog Bluegrass. Mt (NC, VA, WV), Pd (DE): bogs, especially in deep shade under shrubs; rare. April-May. NY west to MN, south to PA, w. NC, and IL. This species withers and disintegrates shortly after flowering; its ephemeral habit may be responsible for its being overlooked in our area for many years. [= C, F, FNA, G, HC, K]


Poa saltuensis Fernald & Wiegand, Bob Bluegrass. Mt (NC, VA, WV): northern hardwood forests, ultramafic outcrop woodlands, barrens, and glades; rare. April-May. NL (Newfoundland) west to MN, south to PA, w. VA, and w. NC. The NC occurrences (on serpentinized olivine barrens) reported as introduced to GA (Small 1933). [= FNA, G, HC, K, S; var. maritimus

Poa saltuensis ssp. saltuensis. Variants: 1 Inflorescence verticillate, the rachis visible between the verticils; glumes 1.6-2.3 mm long, without awns; spikelets disarticulating near base of pedicel; stoloniferous perennial..........................................................P. viridis

1 Inflorescence dense, cylindrical, and spike-like; glumes 2-3 mm long, with prominent awns 3.5-7 mm long; spikelets disarticulating near apex of pedicel; annual.

2 Glumes deeply lobed, the awn borne between the lobes; glume ciliate-fringed; lemma 0.4-0.7 mm long, awnless.................................

2 Glumes slightly notched at the tip, the awn borne from near the tip; glume not ciliate-margined; lemma 0.7-1.1 mm long, awned.................................

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..........................................................P. maritimus var. saltuensis – F; = P. saltuensis ssp. saltuensis – FNA, Y; < P. saltuensis – K (also see P. languida)


Poa trivialis Linnaeus ssp. trivialis, Rough Bluegrass. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA), Mt (NC, SC, VA): moist forests, disturbed areas, bottomlands; common (rare in VA Coastal Plain), native of Europe. April-June. [= FNA; < P. trivialis – RAB, C, F, G, GW, HC, K, S, W, WV, Z]

Poa wolfii Scribner. Mt (NC): moist rich forests; rare. OH west to MN, south to c. TN, n. AR, and NE; disjunct easterly w. NC. The NC occurrence is based on material from Great Smoky Mountains National Park (Haywood County) (K. Langdon, pers. comm.. 2006). The alleged VA occurrences are in error. [= C, F, G, HC, K, S, W, WV, Z]

* Polypogon Desfontaines 1798

A genus of about 18 species, annuals and perennials, of tropical and warm temperate regions. References: Barkworth in FNA (2007a); Tucker (1996)=Z.
* **Polypogon viridis** (Gouan) Breistr., Water Bent-grass. Cp (SC): introduced on ballast around old ports, probably not persistent; rare, native of the Old World. Distinguished from *Agrostis* in having the spikelet falling as a whole, disarticulating below the glumes. [= FNA, K, Z; = *Agrostis viridis* Gouan – C; > *Agrostis verticillata* Villars – F; > *Agrostis semiverticillata* (Forskål) C. Christensen – G, HC]

**Pseudosasa** Makino ex Nakai 1925 (Arrow Bamboo)

A genus of about 36 species, native of China, Japan, and Korea. References: Stapleton in FNA (2007a); Duncan & Duncan [in prep.]=Z; Judziewicz et al. (2000)=Y. Key adapted from Z.

* **Pseudosasa japonica** (Siebold & Zuccarini ex Steudel) Makino ex Nakai, Arrow Bamboo. Cp (FL, VA): cultivated as an ornamental, persistent or spreading from plantings; uncommon, native of Japan. [= FNA, HC, K, Y, Z; > *Sasa japonica* (Siebold & Zuccarini ex Steudel) Makino]

**Puccinellia** Parlatore 1848 (Alkali Grass, Goosegrass)


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<td>* Puccinellia fasciculata (Torrey) Bicknell, Eastern Alkali Grass, Saltmarsh Goosegrass. Cp (DE, VA): salt or brackish marshes; rare. NS south to VA, Europe; and in sw. United States. The native or introduced status of this species in ne. North America is controversial. [= C, F, FNA, G, HC, K]</td>
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* **Puccinellia maritima** (Hudson) Parlatore, Seaside Alkali Grass, Seaside Speargrass. Salt marshes and ballast near ports. Introduced south to se. PA (Philadelphia), NJ (Camden), and DE, especially on ballast. [= C, F, FNA, G, HC; > *P. americana* Sorensen – K] {synonymy incomplete}

**Reimarochloa** A.S. Hitchcock 1909

A genus of about 4 species, of the New World tropics. References: Barkworth in FNA (2003a).

**Reimarochloa oligostachya** (Munro ex Bentham) A.S. Hitchcock. Cp (FL): moist hammocks, wet grasslands; rare. Ne. FL (Duval County) and s. AL south to s. FL; Cuba. [= FNA, HC, K]

**Ripidium** Trinius 1820 (Ravenna-grass)

References: Hodkinson et al. (2002).

* **Ripidium ravennae** (Linnaeus) Trinius, Ravenna-grass, Plume-grass. Cultivated as an ornamental and rarely escaping or persisting; native of s. Europe. In sw. GA, TN, and MD (Kartesz 1999), DC (Steuery 2004a), FL (Wunderlin & Hansen 2006). [= *Saccharum ravennae* (Linnaeus) Linnaeus – FNA, K; > *Erianthus ravennae* (Linnaeus) Palisot de Beauvois – F; > *Erianthus ravennae* var. ravennae – HC; > *Erianthus ravennae* var. purpurascens (Anderss.) Hackel – HC]

**Rostraria** Trinius 1820

**Rostraria cristata** (Linnaeus) Tzvelev. Cp (FL, SC): waste areas near wool-combing mills, other disturbed areas; rare, introduced, native of Europe. It also occurs at scattered other sites in eastern United States, such as on ballast in se. PA (Rhoads & Klein 1993), and reported for MD, AL, and FL (Kartesz 1999). Not keyed. [= K; > *R. cristata* var. *cristata* – FNA; > *R. cristata* var. *glabriflora* (Trautvetter) Dogan – FNA; = *Lophochloa cristata* (Linnaeus) Hylander; = Koeleria phleoides (Villars) Persoon – HC; ? Koeleria Gerardii (Villars) Shinners]

**Rothoebia** Linnaeus f. 1782 (Itch-grass)

A genus of about 5 species, native to tropical Asia and Africa. References: Wipff in FNA (2003a); Wipff & Rector (1993)=Z.

**Rothoebia cochinchnensis** (Loureiro) W.D. Clayton, Itch-grass. Cp (FL, GA, NC, VA): disturbed ground; uncommon (rare north of FL), native of tropical se. Asia. August-October. This grass, considered a noxious weed, was found in at least 13 GA counties by 1985 (Duncan 1985; Carter, Baker, & Morris 2009), on a farm in Robeson County, NC in 1984, and in cornfields in Westmoreland County, VA in 2007. [= FNA, K, Z; = *Rothoebia exaltata* Linnaeus f. – HC; = *Manisuris exaltata* (Linnaeus f.) Kuntze – S]

**Saccharum** Linnaeus 1753 (Plume Grass)

A genus of uncertain circumscription at this time. Clayton & Renvoize (1986) pointed out that the "traditional division [of *Saccharum*] into awned (*Erianthus*) and awwless species seems wholly artificial," Hodgkin et al. (2002) developed molecular evidence which suggests that our species are not congeneric with *Saccharum*, however. Further study is needed, but likely our native southeastern species will be merged into *Miscanthidium* Stapf, while the introduced *S. ravennae* will be placed in the genus *Rigidium* Triñius (Hodkinson et al. 2002). Sugarcane (*Saccharum officinarum* Linnaeus, *S. sinense* Roxburgh, *S. barbieri* Jeswiet, *S. spontaneum* Linnaeus, and cultivars and hybrids derived from those four species) is cultivated further south, notably in FL and LA. References: Webster in FNA (2003a); Webster & Shaw (1995)=Z; Gandhi & Dutton (1993); Hodgkin et al. (2002). [also see *Rigidium*]

1 Lowermost inflorescence node densely hairy; callus hairs (ring of hairs beneath the spikelet) (7-) 9-25 mm long, equal to or longer than the spikelet; stem appressed-pubescent below the inflorescence, on the internodes as well as the nodes.  
2 Lemma awn flattened and spirally twisted at base; callus hairs 9-14 mm long, silvery or tinged with purple; leaves usually glabrous on the upper surface at maturity; [of moist to dry sites, rarely in wetlands] ................................................................. **S. alopecuroides**  
3 Lemma awn nearly terete, straight or slightly flexuous; callus hairs (7-) 15-20 (-25) mm long, tawny or brown; leaves usually pilose on the upper surface at maturity; [of moist to wet sites, rarely in uplands] ................................................................. **S. giganteum**  
4 Awn of the lemma of the upper floret flattened at the base, either spiraled or not; spikelets straw-colored or purplish; spikelet pair homomorphic; the upper lemma 0.9-1.0× as long as the lower lemma; lemma of the lower floret typically 3-nerved.  
5 Awn of the lemma of the upper floret basally spiraled, 15-22 mm long; lemma of the upper floret bifid, the tooth on either side of the lemma 2.0-2.5 mm long. ................................................................. **S. brevibarbe var. brevibarbe**


**Saccharum brevibarbe** (Michaux) Persoon var. *brevibarbe*, Short-bearded Plume Grass. Cp (NC): marshes, ditches; rare. September-October. MS, AL, and TN west to TX, AR, and OK; disjunct in e. NC. [= FNA, K, Z; < *Erianthus brevibarbis* Michaux – RAB, C, G, GW, S (also see *S. coarctatum*); > *E. brevibarbe* – F; > *Erianthus coarctatus var. elliotii* Fernald – HC; > *Miscanthidium species 3*]

**Saccharum brevibarbe** (Michaux) Persoon var. *contortus* (Elliott) R. Webster, Bent-awn Plume Grass. Cp (DE, FL, GA, NC, SC, VA); Pt (GA, NC, SC, VA), Mt (GA, NC, SC, VA): open woodlands and forests, woodland borders; common (rare in Mountains, rare in DE, FL, and VA). Late July-October. DE and MD south to Panhandle FL, west to TX and AR, with scattered occurrences north to TN. [= FNA, K, Z; = *Erianthus contortus* Elliott – RAB, C, F, G, GW, HC, S, W; = *Saccharum contortum* (Elliott) Nuttall; = *Erianthus brevibarbis* Michaux var. *contortus* (Elliott) D.B. Ward; = *Miscanthidium species 4*]
POACEAE


Saccharum giganteum (Walter) Persoon, Sugarcane Plume Grass, Giant Plume Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA); Mt (GA, NC, SC, VA): marshes, ditches; common (rare in Mountains). September-October. NY south to FL, west to se. TX and AR; inland in TN and KY. [= FNA, K, Z; = Erianthus giganteus (Walter) Palisot de Beauvois – RAB, C, G, GW, HC, W; > Erianthus giganteus var. giganteus – F; > Erianthus giganteus var. compactus (Nash) Fernald – F; = Erianthus saccharoides Michaux – S; = Miscanthidium species 6]

Sacciolepis Nash 1901 (Cupscale)


1. Annual, cespitose; spikelets 2.5-3.5 mm long; [rare alien] ................................................................. S. indica
1. Perennial, from creeping stolons; spikelets (3-) 4-5 mm long; [common native] ........................................... S. striata

* Sacciolepis indica (Linnaeus) Chase, Indian Cupscale. Cp (FL, GA, NC, SC): low fields, ditches; uncommon (rare north of FL); native of India. October. [= RAB, FNA, GW, HC, K]

* Sacciolepis striata (Linnaeus) Nash, American Cupscale. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): marshes, interdune swales, ditches, swamps; common (rare in Piedmont and Mountains, rare in DE). July-October. S. NJ south to FL, west to e. TX and OK, nearly limited to the Coastal Plain, but occasionally inland as in w. NC and TN; also native in the West Indies and n. South America. [= RAB, C, F, FNA, G, GW, HC, K, W]

Sasa Makino & Shibata 1901


Schedonorus Palisot de Beauvois 1812 (Meadow Fescue, Tall Fescue)

A genus of perennials, native of Eurasia. The correct generic placement of the introduced species Schedonorus arundinaces (= Festuca elatior; = Festuca arundinacea; = Lolium arundinaceum) and S. pratense has been disputed. The traditional placement in Festuca has been defended by Aiken et al. (1997); Darbyshire (1993) transferred them to Lolium; and Soreng & Terrell (1998) place them in the genus Schedonorus. References: Darbyshire in FNA (2007a); Darbyshire (1993)=X; Aiken & Darbyshire (1990)=Y; Tucker (1996)=Z; Soreng & Terrell (1998)=V. Key based in part on C and Y.

1. Auricles ciliate (sometimes only very sparsely so – check several at 10-20× magnification); spikelets with 3-6 (-9) florets; old sheaths pale straw-colored, often remaining intact; internodes of the rachilla antrorsely scabrous .............................................................. S. arundinaces
1. Auricles glabrous; spikelets with (2-) 4-10 (-12) florets; old sheaths brown, decaying to fibers; internodes of the rachilla glabrous (smooth) or nearly so............................................................... S. pratensis

* Schedonorus arundinaces (Schreber) Dumortier, Tall Fescue, Alta Fescue. Cp (FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, roadsides, pastures, disturbed areas; common (uncommon in FL), native of Eurasia. May-July. [= FNA, V; < Festuca elatior Linnaeus – RAB, F, S, W, WV, misapplied; < Festuca arundinacea Schreber – HC, Y; = Festuca elatior Linnaeus – C; = Festuca elatior var. arundinacea (Schreber) Wimmer – G; < Festuca pratensis Hudson – GW; = Lolium arundinaceum (Schreber) Darbyshire – K, X, Z; ? Schedonorus phoenis (Scopoli) Holub]

* Schedonorus pratensis (Hudson) Palisot de Beauvois, Meadow Fescue. Mt (VA, WV), Pd (DE), Cp (DE): fields, roadsides, pastures, disturbed areas; common (rare in DE), native of Eurasia. May-July. [= FNA, V; < Festuca elatior Linnaeus – F, S, W, WV, misapplied; = Festuca pratensis Hudson – C, Y; = Festuca elatior var. pratensis (Hudson) A. Gray – G; < Festuca pratensis Hudson – GW; = Festuca elatior – HC, misapplied; = Lolium pratense (Hudson) Darbyshire – K, X, Z]

Schizachne Hackel 1909 (False Melic)


Schizachyne purpurascens (Torrey) Swallen, Purple Outgrass, False Melic. Mt (VA, WV): moist, rocky northern hardwood and spruce forests; rare. NL (Newfoundland) west to AK, south to MD, w. VA, WV, KY, IL, NM, and Mexico; also in ne. Asia. May-July. [= F, FNA, G, HC, K, WV; > S. purpurascens var. purpurascens – C]

Schizachryum Nees 1829 (Little Bluestem)

Schizachyrium littorale (Nash) Bicknell. Seaside Little Bluestem. Coastal dunes and maritime dry grasslands, often with Uniola paniculata, Panicum amarum, and other dune plants. August-October. E. MA south to NC (or SC?), and inland on the shores of the Great Lakes. In NC, S. littorale is present and abundant on dunes of barrier islands from Shackleford Banks, Carteret County south to Brunswick County, near the SC border, and entirely absent from the Outer Banks (from Cape Lookout, Carteret County, north through Hyde County to Dare County). Reported for FL for ne. FL (Duval County) and Panhandle FL (Franklin County). [= FNA, GW, K; < Andropogon scoparium Michaux – RAB; = S. scoparium var. littorale (Nash) Gould – C, Z; = Andropogon scoparius Michaux var. littorales (Nash) A.S. Hitchcock – F, G; = Andropogon littoralis Nash – HC, S; < S. scoparium (Michaux) Nash ssp. littorale (Nash) Gandhi & Smeins – Y]

Schizachyrium maritimum (Chapman) Nash. Coastal dunes and grasslands. AL, FL west to e. LA. [= FNA, GW, K; = Andropogon maritimus Chapman – HC, S] [add to synonymy]

Schizachyrium niveum (Swallen) Gould, Pinescrub Bluestem, is reported for Lowndes Co. in sc. GA (Kral 1973), but the report has been discounted by later authors (Wipff in FNA 2003a). [= FNA, K; = Andropogon niveus Swallen – HC, S] [not keyed or mapped]

Schizachyrium sanguineum (Retzius) Alston var. hirtiflorum (Nees) Hatch, Hairy Crimson Bluestem. Pine flatwoods, sandhills, disturbed sandy sites. Sw. GA and FL west to AZ and south through Central America to South America; West Indies. [= FNA, K; = Andropogon hirtiflorus (Nees) Kunth – HC, S; < S. sanguineum var. brevipedicellatum (Beal) Hatch]

Schizachyrium scoparium (Michaux) Nash var. hirtiflorum (Hackel) Gould, Pinehill Bluestem. Various open habitats. KY, AR, and TX, south to Panhandle FL, AL, MS, and LA. [= FNA, K; = Andropogon scoparius Michaux var. divergens Hackel; = Andropogon divergens – HC; < Andropogon scoparius – S]

Schizachyrium scoparium (Michaux) Nash var. scoparium, Common Little Bluestem. In a wide range of moist to dry habitats. (June-) August-October. NB west to AB, south to FL and Mexico. One of the most ubiquitous plants in the modern landscape of our area, occurring throughout in the majority of habitats. This species is extremely variable, some of the variability correlated with habitat and geography; the recognition of infraspecific taxa is warranted. [= C, FNA, Z; < Andropogon scoparius Michaux – RAB (also see S. littorale); = S. scoparium – GW; > Andropogon scoparius var. scoparius – F, G, HC; > Andropogon praematurus Fernald – F, G; > Andropogon scoparius var. polycladus Scribner & Ball – F; > Andropogon scoparius var. frequens F.T. Hubbard – F; = S. scoparium var. scoparius – K, Y; < Andropogon scoparius – S, W, WV]

Schizachyrium scoparium (Michaux) Nash var. stoloniferum (Nash) J. Wipff, Creeping Little Bluestem. Fall-line sandhills in the inner Coastal Plain, perhaps in other dry habitats, the habitat and range in our area requiring further study. August-October. SC and GA south to FL and west to MS. See Wipff (1996a) for additional discussion. [= FNA, K, Z; = S. stoloniferum Nash – GW; = Andropogon stolonifer (Nash) A.S. Hitchcock – HC, S; < S. scoparium ssp. littorale (Nash) Gandhi & Smeins – Y]
**Sclerochloa** Palisot de Beauvois 1812 (Hard Grass)


* Sclerochloa dura* (Linnaeus) Palisot de Beauvois, Hard Grass, Fairground Grass. Mt (VA, WV), {GA}: athletic fields, lawns; rare, native of Mediterranean Europe. In VA, known from a single site and doubtfully persisting (VBA 2007). Also reported from GA, MD, MS, and TN (Kartesz 1999). [= C, HC, K, Z]

**Secale** Linnaeus 1753 (Rye)


* Secale cereale* Linnaeus, Rye. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields; commonly cultivated, uncommonly persistent or volunteering after cultivation, native of Eurasia. May-June. An important crop, cultivated for at least 8000 years. The lemmas have awns 2-6 cm long. [= RAB, C, F, FNA, G, HC, K, Z; reported from GA, MD, MS, and TN (Kartesz 1999).]

**Setaria** Palisot de Beauvois 1807 (Foxtail Grass)


1 None of the spikelets subtended by a stiff bristle.
2 Spikelets 2.2-2.4 mm long; glumes and sterile lemma not papery ................................................................. *S. geminata* var. *geminata*
3 Spikelets 2.8-3.0 mm long; glumes and sterile lemma papery ................................................................. *S. geminata* var. *palmifolia*
4 Annual; leaves 10-25 mm wide ............................................................................................................. *S. paludivaga*
5 Perennial; leaves 2-8-30 mm wide ........................................................................................................... *S. verticillata*
6 Perennial, noticeably rhizomatous.
7 Panicle 3-8 (10) cm long; plant from knotty rhizomes; [native, common (sometimes weedy)] ................ *S. parviflora*
8 Panicle 5-25 cm long; plant from thick rhizomes; [alien, rare]................................................................. *S. sphaecelata*
9 Bristles 1-3 (rarely 6) below each spikelet.
10 Bristles antrorsely scabrous.
11 Upper lemmas smooth and shiny (occasionally with obscure rugosity)
12 Culms to 1 m tall; spikelets ca. 3 mm long; [alien, of ruderal sites] ......................................................... *S. italica*
13 Upper lemmas distinctly transversely rugose, dull.
14 Upper lemmas coarsely rugose; leaves 4-7 mm wide; [native, occasionally with obscure rugosity] ................................................................. *S. corrugata*
15 Upper lemmas finely rugose; leaves 4-25 mm wide; [alba, generally of ruderal sites].
16 Panicles densely spiciform; rachises not visible, villous. ................................................................. *S. viridis* var. *major*
17 Panicles arching and drooping from the base; spikelets 2.5-3.0 mm long................................. *S. faberi*
18 Panicles 10-20 cm long; culms 10-25 dm tall; leaves 10-25 mm wide ............................................. *S. viridis* var. *viridis*
19 Panicles 3-8 cm long; culms 2-10 dm tall; leaves 4-12 mm wide ......................................................... *S. viridis* var. *viridis*
Setaria viridis (Forskål) Veldkamp var. paludivaga (A.S. Hitchcock & Chase) R.D. Webster, Alligator Grass, Paspalidium. Cp (FL, GA, SC): in shallow water; rare. December. S. SC south to FL, west to TX; also in Central and South America. This taxon is sometimes considered an introduction from the Old World, but its occurrence in undisturbed wetlands remote from extensive human activity suggests that it is native. \(=\) Panicum paludivagum A.S. Hitchcock & Chase – RAB, HC, S; \!<\! Paspalidium geminatum – FNA, GW, X; \!<\! Paspalidium geminatum (Forskål) Stapf var. paludivaga (A.S. Hitchcock & Chase) Gould – K; \!<\! Paspalidium paludivagum (A.S. Hitchcock & Chase) Parodi]*


Setaria macrosperma (Lamson-Scribner & Merrill) K. Schumann, Coral Bristlegrass. Cp (FL, GA, SC): h hammocks and maritime forests, also disturbed areas; rare. SC south to FL; Bahamas, Mexico. \(=\) RAB, FNA, HC, K, Z; \!<\! Chaetochloa macrosperma Lamson-Scribner – S*

Setaria magna Grisebach, Saltmarsh Foxtail-grass, Giant Foxtail-grass. Cp (DE, FL, GA, NC, SC, VA), Pd* (GA*): interdune swales, near-coastal marshes; common (uncommon south of DE). NJ south to s. FL, west to e. TX; disjunct inland in GA, AR, LA, TX, and NM; West Indies, Bermuda, Costa Rica. \(=\) RAB, C, F, FNA, G, HC, K, Z; \!<\! Chaetochloa magna (Grisebach) Lamson-Scribner – S*

* Setaria palmitofila (J. König) Stapf, Palmgrass. Cp (FL, LA): disturbed areas; rare, native of Asia. \(=\) FNA, HC, K*

* Setaria parviflora (Poiret) Kerguelen, Knotted Bristlegrass, Perennial Foxtail-grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): marshes, ditches, moist disturbed areas; common (uncommon in DE and WV). MA to IA south to s. FL and s. TX, south through Mexico to Central America; CA and NV; West Indies. Gandhi & Barkworth (2003) provide a detailed discussion of the reasons for the nomenclatural change. \(=\) FNA, K, Z; \!<\! Setaria parviflora (Poiret) Kerguelen \(=\) Chaetochloa parviflora (Palisot de Beauvois) Millsbaugh & Paushe \(-\) S*

* Setaria pumila (Poiret) Roemer & Schultes ssp. pumila, Yellow Foxtail. Mt (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): disturbed areas, lawns, fields; common (rare in FL), native of Europe. \(=\) FNA; \!<\! Setaria pumila (Poiret) Roemer & Schultes ssp. pumila in Chaetochloa pumila (Poiret) Roemer & Schultes in Chaetochloa pumila (Poiret) Roemer & Schultes \(-\) S*

* Setaria phacelata (Schumacher) Stapf & C.E. Hubbard, African Bristlegrass. Cp (AL, FL, MS): disturbed areas; rare, native of Africa. \(=\) FNA, K*

* Setaria verticillata (Linnaeus) Palisot de Beauvois, Hooked Bristlegrass. Mt (VA, WV), Pd (DE), Cp (DE): disturbed areas; common (uncommon in VA, rare in WV), native of Europe. \(=\) FNA, G, K, WV; \!<\! Setaria verticillata var. verticillata – C, F, HC; \!<\! Chaetochloa verticillata (Linnaeus) Lamson-Scribner – S; \!<\! Setaria verticillata \(-\) Z*


Setaria adhaerans (Forskål) Chiovenda. Cp (AL): disturbed areas; rare. Distributed widely throughout the tropics and subtropics, in North America from s. AL west to CA (perhaps only adventive in portions of that distribution). \(=\) FNA, K, Z [synonymy incomplete]*

* Setaria verticilliformis Dumortier. Reported for NJ, PA, MD, and AL (FNA 2003a, Kartesz 1999). \(=\) FNA, K; \!<\! Setaria verticillata (Linnaeus) Palisot de Beauvois var. ambiguus (Guss.) Parlatore – C, F, HC; \!<\! Setaria viridis (Linnaeus) Palisot de Beauvois var. ambiguus (Guss.) Coss. & Durieu – G; \!<\! Chaetochloa ambiguus Guss. – S; \!<\! Setaria verticillata \(-\) Z*

* Setaria viridis (Linnaeus) Palisot de Beauvois var. major (Gaudin) Pospichal, Giant Green Foxtail. Reported as introduced in TN, MD, and PA (Kartesz 1999). \(=\) C, FNA, G, K, Z; \!<\! Setaria viridis \(-\) RAB, HC*

**Sorghastrum Nash 1901 (Indiangrass)**

A genus of about 18-20 species, of tropical and subtropical America and Africa, rarely extending into temperate areas. References: Hall (1982)= Z; Dávila Aranda & Hatch in FNA (2003a). Key adapted from Z.

1 Awns 10-22 (30) mm long, once-geniulate; plants rhizomatous; surfaces of the glumes tan to slightly brown basally; ligule 2-10 mm long, prominently auricled. \(=\) S. nutans

1 Awns 16-46 mm long, twice-geniulate; plants cespitose; surfaces of the glumes brown; ligule 1-5 mm long, truncate.

2 Axis of the panicle straight, erect, the bractlets appressed to ascending, the spikelets drooping-secund; spikelets 0.8-1.2 mm wide ............ \(=\) S. secundum

2 Axis of the panicle arching, usually strongly so, the bractlets ascending to spreading, the spikelets not drooping-secund; spikelets 1.1-1.8 mm wide.

3 Axis of the panicle straight, with the branches distributed no more than 180 degrees around the axis (as viewed from above) ............ \(=\) S. apalachicolense

3 Axis of the panicle arching, with the branches distributed through 360 degrees around the axis (as viewed from above) \(=\) S. elliottii

**Sorghastrum apalachicolense** D.W. Hall, Apalachicola Indian Grass, Open Indian Grass. Flatwoods and sandhills. July-August. Panhandle FL west to s. MS (Sorrie & Leonard 1999). It may well occur as well in GA. \(=\) K, Z; \!<\! S. elliottii – FNA**

**Sorghastrum elliottii** (C. Mohr) Nash, Slender Indian Grass. Woodlands and forests, river-scar areas, including oak-hickory forests and woodlands over mafic rocks. September-October. MD south to FL and west to TX, inland to TN, AR, and OK, mainly on the Coastal Plain, but extending inland to other physiographic provinces. \(=\) RAB, C, F, G, HC, K, W, Z; \!<\! S. elliottii – FNA (also see S. apalachicolense)**
**Sorghastrum nutans** (Linnaeus) Nash, Yellow Indiangrass. Xeric and mesic woodlands and forests of a, WV wide variety, powerline rights-of-way, roadbanks. September-October. ME and QC west to s. MB, south to c. peninsular FL, TX, UT, AZ, and Mexico. Along with *Andropogon gerardii*, *Schizachyrium scoparium*, and *Panicum virgatum*, *Sorghastrum nutans* is one of the dominant grasses of the tall-grass prairie. It is also common in a variety of open habitats (natural and altered) in the forested landscape of eastern North America. [= RAB, C, F, FNA, G, HC, K, S, W, WV, Z, = *S. avenaceum* (Michaux) Nash]

**Sorghastrum secundum** (Elliott) Nash, Lopsided Indiangrass. Sandhills. September-October. S. SC south to s. FL and west to s. AL (Sorrie & Leonard 1999). [= RAB, FNA, HC, K, S, Z]

*Sorghum* Moench 1794 (Sorghum, Milo, Johnson Grass)

A genus of about 25 species, of tropical and subtropical Old World (1 species in Mexico). References: Barkworth in FNA (2003a); de Wet (1978)=Z.

1 Rhizomatous perennial; leaves 1-2 cm wide................................................................. *S. halepense*
1 Fibrous-rooted annual; leaves (2-) 3-5 cm wide.
2 Inflorescence dense, compact; plants 0.5-1.3 m tall......................................................... *S. bicolor var. bicolor*
2 Inflorescence open, with spreading branches; plants 1.0-3.0 m tall.................................. *S. bicolor var. drummondii*

* *Sorghum bicolor* (Linnaeus) Moench var. *bicolor*, Sorghum, Milo, Broomcorn, Sorgo. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): cultivated, rarely persistent; common in cultivation, rare as an escape. October. [= C; *< Sorgum vulgare* Persoon – RAB; *< Sorgum vulgare* – F, orthographic variant; *< S. vulgare* var. *vulgare* – HC; = *S. bicolor* ssp. *bicolor* – FNA, K; < *Holcus sorghum* Linnaeus – S]

* *Sorghum bicolor* (Linnaeus) Moench var. *drummondii* (Nees ex Steudel) Mohlenbrock, Shattercane. Cp (FL, GA, NC, SC, VA): cultivated, rarely persistent; common in cultivation, rare as an escape. October. This is the taller variety with open inflorescences, usually sporadically present in sorghum fields. [= C; *< Sorgum vulgare* Persoon – RAB; *< Sorgum vulgare* – F, orthographic variant; *< Sorgum bicolor* ssp. *drummondii* (Nees ex Steudel) de Wet – FNA; = *Sorgum vulgare* Persoon var. *drummondii* (Nees ex Steudel) Hackel ex Chiovenda – HC; = *Sorghum bicolor* ssp. *drummondii* (Nees ex Steudel) de Wet & Harlan – K; < *Holcus sorghum* Linnaeus – S]


*Spartina* Schreber 1789 (Cordgrass)


1 Leaves with smooth or slightly scabrous margins; spikelets glabrous or nearly so; [of salt to brackish coastal marshes]........................... *S. alterniflora*
1 Leaves with strongly scabrous margins; spikelets scabrous, at least on the keel; [of brackish to fresh marshes, or inland or upland].
2 Plants strongly cespitose, forming large clumps with numerous basal leaves and culms; leaves involute; culms 0.5-2 m tall; [of s. SC southward].
3 Spikes 3-16 per inflorescence, appressed to ascending; leaves 3-7 mm wide, involute or somewhat flat toward the bases.......................... *S. bakeri*
3 Spikes (6-) 15-75 per inflorescence, tightly appressed; leaves 1.5-4.5 mm wide, strongly involute ..................................................... *S. spartinae*
2 Plants with elongate rhizomes, forming large clonal patches, the culms arising singly; leaves involute or flat; culms either 0.5-3.5 m tall; [collectively widespread in our area].
4 Spikes 1-9 per inflorescence; culms 0.5-1 m tall; leaves 0.5-4 (-7) mm wide, usually involute when fresh................................. *S. patens*
4 Spikes 5-70 per inflorescence; culms 1-3.5 m tall; leaves 5-20 mm wide, usually flat when fresh.
5 Second glume acute, not awned; first glume averaging ca. 1/2 as long as the lemma; spikes (6-) 20-50 (-more) per inflorescence; [of fresh to brackish coastal marshes]................................................................. *S. cynosuroides*
5 Second glume with an awn 3-10 mm long; first glume averaging ca. 7/8 as long as the lemma; spikes (5-) 7-27 per inflorescence; [of fresh marshes, either inland or coastal]................................................................. *S. pectinata*

*Spartina alterniflora* Loiseleur, Saltmarsh Cordgrass, Smooth Cordgrass. Salt marshes. August-October. NL (Newfoundland) south to FL, west to TX; e. South America; introduced in n. Europe. *S. alterniflora* is the dominant plant (often essentially a monoculture) of intratidal salt marshes in our area. [= RAB, C, FNA, GW, K, WH; *< S. alterniflora* var. *alterniflora* – F, G, HC, S; = *S. alterniflora* var. *glabra* (Muhlenberg ex Bigelow) Fernald – F, G, HC, S; = *S. alterniflora* var. *pilosa* (Merrill) Fernald – F, G, HC]

*Spartina bakeri* Merrill, Sand Cordgrass. Brackish marshes, marsh edges, wet coastal hammocks, under *Sabal palmetto*, *Quercus virginiana*, and *Juniperus virginiana* var. *silicicola*. June. Se. SC south to s. FL, west to Panhandle FL. Along with *S. spartinae*, distinctive among our species in its densely clumped growth form. [= FNA, GW, HC, K, S, WH]
**Spartina cynosuroides** (Linnaeus) Roth, Giant Cordgrass. Brackish and freshwater tidal marshes, especially along margins of tidal creeks. June-September. MA south to FL, west to e. TX. [= RAB, C, FNA, G, GW, HC, K, S, WH; > *S. cynosuroides var. cynosuroides* – F]

**Spartina patens** (Aiton) Muhlenberg, Small Saltmeadow Cordgrass, Salt Hay, Marsh-hay Cordgrass. Dunes, sand flats, upper edges of marshes, maritime wet grasslands, overwash flats. June-September. NL (Newfoundland) south to FL, west to TX. *Var. monogyna* has spikelets 7-10 mm long (vs. 9-13 mm); second glume acute to obtuse (rarely acuminate) (vs. acuminate); spikes (2-) 4-9 per inflorescence (vs. 1-4); second highest leaf blade on the stem (1-) avg. 2 (-5) dm long (vs. 0.5-2 dm); plants to 15 dm tall (vs. to 8 dm); culms to 6 mm in diameter at base (vs. to 3 mm). Whether var. *monogyna* is worthy of recognition is a matter of debate; there appear to be morphological differences correlated with geography and, according to some authors, habitat, but positive identification to variety is sometimes difficult. [= RAB, C, FNA, GW, K, S, WH; > *S. patens var. patens* – F, G, HC; > *S. patens var. monogyna* (M.A. Curtis) Fernald – F, G, HC]

**Spartina pectinata** Link, Prairie Cordgrass, Slough Grass. Banks of rivers and lakes, spray cliffs below waterfalls, rocky or sandy flood-scorched riverside grasslands, tidal freshwater (oligohaline) marshes, calcareous oak flatwoods and prairies. July-September. NL (Newfoundland) west to WA, south to ne. NC, sw. NC, AR, TX, and NM. [= RAB, C, F, FNA, G, GW, HC, K, W, WV; > *S. pectinata var. pectinata* – F; > *S. pectinata var. suntieei* (Farwell) Fernald – F; > *S. michauxiana* A.S. Hitchcock – S]

**Spartina spartinae** (Trinius) Merr. ex A.S. Hitchcock, Gulf Cordgrass. Brackish marshes and inland saline situations. AL and FL west to TX. [= FNA, GW, HC, K, S, WH]

![Spartina spartinae](image)

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**Sphenopholis** Scribner 1906 (Wedgegrass)


1. Spikelets 5-9.5 mm long; second lemma with an awn 3.5-7 mm long................................................................. *S. pensylvanica*
2. Spikelets 1.5-5 mm long; second lemma awnless, or with an awn up to 3.5 mm long.
3. Lower leaf blades mostly < 10 cm long, flat, 2-8 mm wide................................................................. *S. filiformis*
4. Lower leaf blades mostly < 10 cm long, flat, 2-8 mm wide.
5. First glume ½-⅓ as wide as the second glume; second lemma strongly scabrous................................. *S. nitida*
6. First glume less than ¼ as wide as the second glume; second lemma smooth to slightly scabrous.
7. First lemma unawned.
8. Panicle open; second glume 3-6× as long as wide, acute at the tip; lowermost rachilla internode 0.8-1.0 mm long ....... *S. intermedia*
9. Panicle densely cylindrical; second glume 2-3× as long as wide, rounded or truncate at the tip; lowermost rachilla internode 0.7-0.9 mm long................................. *S. obtusata*

**Sphenopholis filiformis** (Chapman) Scribner. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC); pine savannas, sandy woodlands; common (uncommon north of FL, rare in VA). April-May. Se. VA south to n. peninsular FL, west to e. TX. [= RAB, C, F, FNA, K, S, WH, Z]

**Sphenopholis intermedia** (Rydberg) Rydberg, Slender Wedgegrass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA); moist nutrient-rich forests; uncommon (rare in DE, GA, NC, SC, and VA). May-June. NL (Newfoundland) west to c. AK, south to Panhandle FL, c. TX, and AZ. Perhaps better treated at the varietal level. [= RAB, F, FNA, K, S, WV; = *S. obtusata* (Michaux) Scribner var. *major* (Torrey) K.S. Erdman – C, Z; < *S. intermedia* – G (also see *S. pallens*); < *S. obtusata* – GW, W, WH]

**Sphenopholis nitida** (Biehler) Scribner. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV); moist forests, bottomlands; common (uncommon in FL and WV). April-May. MA west to IL, south to n. peninsular FL and TX. [= RAB, C, F, FNA, K, W, SH, WH, Z; > *S. nitida var. glabra* (Nash) Scribner – G; > *S. nitida var. nitida* – G]

**Sphenopholis obtusata** (Michaux) Scribner, Prairie Wedgegrass. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV); forests, roadsides, disturbed areas; common (uncommon in Mountains). April-May. ME west to MN and BC, south to s. FL, TX, c. Mexico, and s. CA. [= RAB, FNA, G, K, S, WV; = *S. obtusata var. obtusata* – C, Z; > *S. obtusata var. obtusata* – F; > *S. obtusata var. pubescens* (Lamson-Scribner & Merrill) Lamson-Scribner – F; < *S. obtusata* – GW, W, WH (also see *S. intermedia*)]

**Sphenopholis pallens** (Biehler) Scribner (pro sp.) [S. obtusata × *pensylvanica*]. Cp (NC, SC, VA); ditches, wet forests; rare. Seemingly not always with its parents. May. [= C, K; = *S. pallens* – RAB, F, S; < *S. intermedia* (Rydberg) Rydberg – G]

**Sphenopholis pensylvanica** (Linnaeus) A.S. Hitchcock, Swamp-oats. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, NC, SC, VA); bogs, ditches, wet forests; uncommon (rare in DE). April-June. MA west to OH and se. MO, south to n. peninsular FL and LA. [= C, FNA, K, WH, Z; = *Trisetum pensylvanicum* (Linnaeus) Palisot de Beauvois ex Roemer & J.A. Schultes – RAB, F, G, S, WV; = *S. pensylvanica* – GW, orthographic variant]

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**Sporobolus** R. Brown 1810 (Dropseed)

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**POACEAE**

1 Inflorescence an open panicle, > 2 cm broad, the branches ascending to spreading.

2 Branches of the panicle verticillate, whorled; spikelets 2.5-4 mm long......................................................\textit{S. junceus}

3 Spikelets 1.5-2.5 (2.7) mm long.

4 Panicle branches bare of spikelets in the lower \(\frac{1}{4}\)-\(\frac{1}{3}\) of their length ......................................................\textit{S. cryptandrus}

4 Panicle branches bearing spikelets to the base .............................................................................................................\textit{S. domingensis}

3 Spikelets 4-6.5 mm long.

5 First glume scaberulous, acuminate or awn-like; spikelets dark gray; base of plant relatively fibrous; grain spherical; [of rocky barrens of the Mountains of NC and VA].................................................................................................................................\textit{S. heterolepis}

5 First glume glabrous, acute to acuminate; spikelets purplish fading tan; base of plant smooth and hard, made up of the indurated leaf bases; grain oblong (when present, usually abortive); [of pine savannas and seeps of the Coastal Plain of NC, SC, and southward].

6 Leaves terete or subterete (wiry), oval in cross-section, sometimes irregularly channelled for portions of their lengths (never with any portion above the sheath flat), < 1 mm wide, tending to senesce and turning tan in autumn, the margins generally smooth; culms (including the inflorescence) (2-) 4-7 (-10) dm tall; culms (from base to first inflorescence branch) 1.5-5 dm tall; first glume averaging about 0.7\* as long as the second glume (though variable, ranging from 0.5-0.75\*)(......................................................\textit{S. teretifolius}

6 Leaves flat (folded when dry), plane or V-shaped in cross-section, with free margins their entire length, 1.2-2 (2.7) mm wide, tending to remain green into the winter (at least until December), the margins scabrous (except in \textit{S. curtissii}); culms (including the inflorescence) 3-22 dm tall; culms (from base to first inflorescence branch) (4-) 6-10 dm tall; first glume averaging 0.75-1\* as long as the second glume (though variable, collectively ranging from about 0.6-1.2\*).

7 First glume averaging 0.95-1.1\* as long as the second glume (though variable, ranging from 0.8-1.3\*); pedicels mostly 1-3 mm long (a few sometimes as long as 10 mm long), appressed; culms (including the inflorescence) 3-7 dm tall; inflorescence branches stiffly ascending; leaves 0.5-1.5 mm wide (or to 2.0 mm wide when unburned), mostly 1.5-4 dm long (rarely to 5 dm long), smooth on the margins; [of e. SC southward].................................................................................................................................\textit{S. curtissii}

7 First glume averaging 0.6-0.9\* as long as the second glume (though variable, collectively ranging from about 0.6-0.95\*); pedicels mostly 4-15 mm long, spreading; culms (including the inflorescence) (3-) 7-16 (-22) dm tall; inflorescence branches initially ascending, later loosely ascending to spreading; leaves 1.2-10.0 mm wide, mostly (3-) 4-8 dm long, upwardly scabrous on the margins; [of e. NC southward].

8 Leaves (2.0-) 3-10 mm wide, pale bluish-green (often with some yellowish leaves as well); first glume averaging 0.75-0.9\* as long as the second glume (though variable, ranging from 0.6-0.95\*); culms (including the inflorescence) usually 12-22 dm tall; inflorescence usually 3.5-5 dm long; [of e. SC southward].................................................................................................................................\textit{S. floridanus}

8 Leaves (2.0-) 3-10 mm wide, pale bluish-green (often with some yellowish leaves as well); first glume averaging 0.6-0.8\* as long as the second glume (though variable, collectively ranging from 0.6-0.8\*); culms (including the inflorescence) usually 6-12 (-18) dm tall; inflorescence usually 2-3.5 dm long; [of e. NC south to e. GA] .................................................................................................................................\textit{S. pinetorum}

9 Plant a rhizomatous or tufted perennial; most inflorescences exerted to partly enclosed; inflorescence 5-15 cm long.

9 Plant creeping extensively by slender rhizomes; leaf blades cauline, distichous, to 12 cm long ......................................\textit{S. virginicus}

10 Spikelets (1.3-) 1.6-2.8 mm long; grain falling free of the lemma and palea; lemma glabrous ........................................\textit{S. neglectus}

10 Spikelets 2.3-5.5 mm long; grain falling enclosed in the lemma and palea; lemma strigose (use 10\* or more) or glabrous.

11 Lemma and palea shorter than the glumes; palea usually shorter than the lemma; lemma glabrous or strigose with hairs < 0.2 mm long; spikelets 2.3-3.3 (-3.8) mm long; floret (lemma, palea and enclosed grain) 1.6-3.3 (-3.8) as long as wide ........\textit{S. ozarkanus}

11 Lemma and palea longer than the glumes; palea usually longer than the lemma; lemma strigose with hairs > 0.2 mm long; spikelets 2.8-5 mm long; floret (lemma, palea and enclosed grain) 2.2-5.7 (-7.5) as long as wide ........\textit{S. vaginiflorus}

12 Plant a rhizomatous or tufted perennial; most inflorescences exerted to partly enclosed; inflorescence 5-15 cm long.

12 Plant creeping extensively by slender rhizomes; leaf blades cauline, distichous, to 12 cm long ......................................\textit{S. virginicus}

13 Spikelets 1.5-2.2 mm long; first glume 0.5-0.8 mm long; leaves primarily basal.

14 Panicle branches appressed, 0.5-2 cm long in the middle of the inflorescence; second glume acute, > \(\frac{1}{3}\) as long as the spikelet ...... \textit{S. indicus}

14 Panicle branches ascending, 2-8 cm long in the middle of the inflorescence; second glume truncate or broadly obtuse, < \(\frac{1}{3}\) as long as the spikelet. .................................................................................................................................\textit{S. pyramidalis}

15 Lemma pubescent, usually conspicuously shorter than the palea; pericarp loose when moist..............................\textit{S. clandestinus}

15 Lemma glabrous, about as long as the palea; pericarp gelatinous when moist.

16 Culms (1.4-) 2.0-5.0 mm thick; terminal sheath (1.3-) 1.5-6.0 mm wide; panicles with 12-35 primary branches, crowded, dense ......................................................\textit{S. compositus var. compositus}

16 Culms 1.0-2.0 (-2.5) mm thick; terminal sheath 0.8-0.2 (-0.5) mm wide; panicles with 8-18 primary branches, lax, loosely flowered .................................................................................................................................\textit{S. compositus var. drummondii}

\* \textit{Sporobolus airoides} (Torrey) Torrey, Alkali Sacaton. Waste areas near wool-combing mills; introduced from w. North America, not known to be established or persistent. [= FNA, HC, K] [not keyed]

\textit{Sporobolus clandestinus} (Biehler) A.S. Hitchcock, Rough Dropseed. Glades, barrens, and thin soil of woodlands, also in dry sands. September-October. This species is widespread in e. United States. Wipf & Jones (1995) recommend reducing this taxon to a variety under \textit{S. compositus}, because of its morphologic similarity. While \textit{S. clandestinus} and \textit{S. compositus} are undoubtedly closely related, I prefer to retain the two as species. [= RAB, C, FNA, F, G, HC, K, S, W, Z; = \textit{S. compositus} (Poiret) Merrill var. clandestinus (Biehler) J. Wipf & S.D. Jones]

\textit{Sporobolus compositus} (Poiret) Merrill var. compositus, Tall Dropseed. Diabase glades and barrens, limestone glades and barrens, disturbed areas over diabase or calcareous rocks. September-November. This species and variety are reported for NC in...
a recent revision of the \textit{S. asper} group (Riggins 1977); little is known about the occurrence of this species in NC. The general range is centered in the Plains, but extending east into ne. United States. The name \textit{S. compositus} has nomenclatural priority over the more familiar \textit{S. asper} (Kartesz & Gandhi 1995). [= FNA, K; \textit{S. asper} (Michaux) Kunth var. \textit{asper} – C, G, HC, Z; \textit{S. asper} – F, S, WV]

\textbf{Sporobolus compositus} (Poiret) Merrill var. \textit{drummondii} (Trinius) Kartesz & Gandhi. Glades, barrens, roadsides, disturbed areas. East to the Ridge and Valley province of e. TN (Chester et al. 1993), occurring over limestone, and allegedly to GA (Kartesz 1999). It could very likely occur in sw. VA, as it is in Hawkins County, TN, immediately adjacent to VA (Chester et al. 1993). [= FNA, K; \textit{S. asper} (Michaux) Kunth var. \textit{drummondii} (Trinius) Vasey – C; Z; \textit{S. drummondii} (Trinius) Vasey – F; S; \textit{S. asper} var. \textit{hookeri} (Trinius) Vasey – G, HC, misapplied]

\textbf{Sporobolus cryptandrus} (Torrey) A. Gray, Sand Dropseed. Floodplains, shores, disturbed areas; native west of the Appalachians, introduced eastward. C. and w. North America. This species is reported for NC by HC, F, and S. [= C, FNA, G, K, HC, S, WV; \textit{S. cryptandrus var. cryptandrus} – F]

\textbf{Sporobolus curtissii} (Vasey ex Beal) Small ex Scribner, Curtiss's Dropseed. Moist, gummy-clay flatwoods. September-November. E. SC south to c. FL. First positively documented for our area in 1993. Earlier attributions of \textit{S. curtissii} to NC and SC were apparently based on misapplication or confusion with \textit{S. teretifolius} and/or \textit{Sporobolus pinetorum}. \textit{S. curtissii} differs from other "bunchgrass" \textit{Sporobolus} of our area in having the spikelets short-pedicelled and appressed against the panicle branches (as opposed to long-pedicelled and spreading in \textit{S. teretifolius} and \textit{Sporobolus pinetorum}). [= FNA, HC, K, S, Y]

\textbf{? Sporobolus domingensis} (Trinius) Kunth, Coral Dropseed. Cp (GA): coastal sands?; rare, uncertain whether native or introduced. Se. GA south to s. FL; West Indies, Mexico. The e. GA record (Glynn County) is at Univ. of Georgia (Sorrie, pers. comm.). [= FNA, HC, K, S]

\textbf{Sporobolus chapmanii} (Chapman, Florida Dropseed. Cp (FL, GA, SC): wet savannas; uncommon (rare in SC). June-September. Se. SC south to ne. FL, west to Panhandle FL. First positively documented for SC in 1995. Earlier attributions of \textit{S. floridana} to NC and SC were apparently based on misapplication or confusion with \textit{Sporobolus pinetorum}. [= FNA, K, Y; \textit{S. floridana} – GW, HC, S (also see \textit{S. pinetorum}); the inclusion of \textit{S. floridana} in RAB was based on a misidentification of \textit{S. pinetorum}]

\textbf{Sporobolus heterolepis} (A. Gray) A. Gray, Prairie Dropseed. Mt (GA, NC, VA), Ip (KY): barrens, glades, and prairies under mafic, ultramafic, and calcareous rocks (olivine, serpentinite, limestone); rare. August-September. The primary distribution of \textit{S. heterolepis} is in the Plains, with outliers east to nw. GA (Jones & Coile 1988), c. TN (Estes & Beck 2005), w. NC, w. VA, se. PA, ne. United States, and adjacent Canada. [= RAB, C, F, FNA, G, HC, K, W, Y]


\textbf{Sporobolus neglectus} Nash, Barrens Dropseed. Ip (KY), Mt (VA, WV): dry rocky barrens and outcrops, over calcareous rocks (such as limestone or dolomite); uncommon (rare in VA and WV). August-September. ME west to ND, south to NJ, w. VA, TN, LA, and TX; apparently disjunct in WA and AZ. \textit{S. ozarkanus}, \textit{S. neglectus}, and \textit{S. vaginiflorus} form a still very poorly understood complex. [= C, F, FNA, G, HC, K, S, W]

\textbf{Sporobolus ozarkanus} Fernald, Ozark Dropseed. Ip (KY), Pd (NC), Mt (VA): limestone glades, diabase glades; rare. September-October. KY west to KS, south to e. TN, AR, and TX; disjunct in c. NC. In Granville County, NC, it is associated (on glades of diabase, a mafic rock) with other taxa with affinities to midwestern glades and prairies: \textit{Solidago rigidag}, \textit{Solidago ptarmicoides}, \textit{Baptisia australis} var. \textit{aberrans}, \textit{Symphyotrichum depauperatum}, \textit{Silphium terebinthinaceum}, \textit{Parthenium auriculatum}, \textit{Ruella humilis}, and others. \textit{S. ozarkanus}, \textit{S. neglectus}, and \textit{S. vaginiflorus} form a still very poorly understood complex. [= C, F, G, HC, K; = \textit{S. vaginiflorus} (Torrey ex A. Gray) Wood var. \textit{ozarkanus} (Fernald) Shinners – FNA, K]

\textbf{Sporobolus pinetorum} Weakley & P.M. Peterson, Carolina Dropseed, Savanna Dropseed. Cp (GA, NC, SC): wet savannas, savanna-pocosin ecotones, sandhill-pocosin ecotones, and extending upslope into mesic flatwoods or loamy or clayey shelves in the fall-line sandhills; uncommon (rare in GA and SC). June-September (and into December in response to growing-season fire). The identity of this taxon has been obscure; it is now clear that it is a previously unrecognized species, endemic to NC, SC, and adjacent e. GA. RAB included it in their concept of \textit{S. teretifolius}, though it does not key well (keying imperfectly to either \textit{S. floridana} or \textit{S. heterolepis}); in S and HC, it will key to \textit{S. floridana}, but the leaves are much narrower. Additionally, \textit{S. floridana} is a taller and coarser plant, the culms often averaging about 1.5 meters in height and 2-3 mm in diameter (vs. 1 meter high and 1 mm in diameter for \textit{Sporobolus pinetorum}). In wet savannas of Columbus County, NC, \textit{S. species 1} occurs with true \textit{S. teretifolius} (the two codominant over many hectares!), and the two taxa are manifestly distinct. The leaves of \textit{S. pinetorum} are not terete; after lengthy drought in the field (or dry on an herbarium sheet), the leaves become tightly folded to involute and can appear wiry. Like many Southeastern pineland grasses, \textit{S. pinetorum} flowers only following...
fire. In vegetative condition it may be distinguished from *Aristida stricta* and *A. beyrichiana*, with which it often grows, by the leaf pubescence (*S. pinetorum* with scaberulous margins, best felt by running a finger along the margin near the base, from apex toward base, *A. stricta* and *A. beyrichiana* not scaberulous, and with a sparse line of pilose hairs running more or less the length of the leaf in *A. stricta* and sometimes in *A. beyrichiana*) and base (much more indurated and polished in *Sporobolus* than in *Aristida*).  [= FNA, K, Y; > *S. teretifolius* – RAB, misapplied; > *S. floridanus* – RAB, misapplied; < *S. floridanus* Chapman – HC, S]

*Sporobolus pyramidalis* Palisot de Beauvois, West Indian Dropseed.  Cp (FL): pine flatwoods, beaches; rare.  FL Panhandle ( Wakulla County), FL peninsula; West Indies.  The original distribution disputed, possible introduced.  [<*S. jacquemontii* Kunth – FNA; = *S. indicus* var. *pyramidalis* (Palisot de Beauvois) Veldkamp – K; ? *S. berteroanus* (Trinius) A.S. Hitchcock & Chase – S]

*Sporobolus teretifolius* R.M. Harper, Wireleaf Dropseed.  Cp (AL, GA, NC, SC): wet savannas, pitcherplant bogs; rare.  July-September (and later in response to growing-season fire).  Very similar vegetatively to *Aristida stricta*. *S. teretifolius* can be distinguished by its tuft of hairs at the base of the otherwise glabrous blade (as opposed to line of pilose hairs the length of the blade in *A. stricta*).  This very rare species is known only from se. NC, ne. SC, s. GA, and se. AL (Houston County).  Many of the counties reported for this species in RAB actually are based on misidentified specimens of *S. pinetorum*.  In a few very wet savannas of Columbus and Brunswick counties, NC, *S. teretifolius* is dominant or codominant over many hectares.  Like many savanna grasses, *S. teretifolius* generally flowers only following fire.  [= FNA, HC, K, S, Y; < *S. teretifolius* – RAB (also see *S. pinetorum*)]


*Sporobolus virginicus* (Linnaeus) Kunth, Seashore Dropseed, Coastal Dropseed.  Cp (FL, GA, NC, SC): salt marshes, tidal mud flats, and low dunes in the outer Coastal Plain; common (rare north of FL).  September-October.  Se. NC along the coast to TX, in the West Indies and into n. South America (its alleged occurrence in se. VA is apparently incorrect). *Sporobolus virginicus* is similar in aspect and growth form to *Distichlis spicata*, with which it occurs in tidal flats. *Sporobolus virginicus* is more delicate, and typically has long hairs on either side of the collar of the sheath; *Distichlis spicata* is generally a coarser plant, and lacks long hairs around the collar of the sheath.  [= RAB, C, F, FNA, G, WH, HC, K, S]

*Sporobolus compositus* (Poiret) Merritt var. *macer* (Trinius) Kartesz & Gandhi.  [= FNA]  [not yet keyed]

* Sporobolus diandrus* (Retzius) Palisot de Beauvois.  [= FNA]  [not yet keyed]

* Sporobolus fimbriatus* (Trinius) Nees.  Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, introduced from Africa.  [= FNA, HC, K]  [not keyed]

* Sporobolus flexuosus* (Thurb. ex Vasey) Rydberg.  Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, introduced from sw. United States and n. Mexico.  [= FNA, HC, K]  [not keyed]

* Sporobolus tenuissimus* (Martius ex Schrank) Kunze.  Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, native of the tropical Old World and New World.  [= FNA, K]  [not keyed]

* Sporobolus weightii* Munro ex Scribner, Giant Sacaton.  Cp (SC): waste areas near wool-combing mills; rare, perhaps only a waif, introduced from sw. United States.  [= FNA, HC, K]  [not keyed]

**Steinchisma** Rafinesque 1830 (Gaping Panic Grass)


**Steinchisma hians** (Elliott) Nash, Gaping Panic Grass.  Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, WV*): stream, pond, and lake shores, low woods, cypress-gum ponds, floodplains, marshes, ditches, seepage slopes; common (uncommon in Coastal Plain, rare in Mountains).  May-October.  Se. VA south to FL, west to TX and OK, and south through Mexico and Central America to Colombia; also in s. South America.  The species occurs nearly throughout e. United States.  It has been interpreted as native or introduced in our area; its original range is probably now impossible to determine.  Sauer (1972) maps it as widespread along the coasts of s. North America, Central America, South America, the West Indies, Africa, Australia, and sw. Pacific Islands.  In our area it is certainly now more frequently encountered as a lawn or roadside grass than in anything that could be construed as a natural habitat.  The other 6 species in the genus are Asian, or on islands of the sw. Pacific or Indian Oceans.  [= RAB, FNA, HC, K, S, WH, Z]

**Stenotaphrum** Trinius 1820 (St. Augustine Grass)

A genus of about 7 species, tropical and subtropical.  References:  Allred in FNA (2003a); Sauer (1972)=Z.

**Stenotaphrum secundatum** (Walter) Kunze, St. Augustine Grass, Carpet Grass.  Cp (FL, GA, NC, SC, VA*): brackish marshes, roadides, lawns; common.  July-October.  A pioneer species of beaches and shores, *S. secundatum* was known from the Carolinas prior to 1800.  It has been interpreted as native or introduced in our area; its original range is probably now impossible to determine.  Sauer (1972) maps it as widespread along the coasts of s. North America, Central America, South America, the West Indies, Africa, Australia, and sw. Pacific Islands.  In our area it is certainly now more frequently encountered as a lawn or roadside grass than in anything that could be construed as a natural habitat.  The other 6 species in the genus are Asian, or on islands of the sw. Pacific or Indian Oceans.  [= RAB, FNA, HC, K, S, WH, Z]
**Thinopyrum** (Prat) Å. Löve 1980


1 Plants rhizomatous; lemmas 7.5-10 mm long; lateral veins slightly shorter than and less prominent than the midvein............ *Th. intermedium*
2 Plants cespitose; lemmas 9-12 mm long; lateral veins of the glumes about as long as and as prominent as the midvein............ *Th. ponticum*

**Thinopyrum intermedium** (Host) Barkworth & D.R. Dewey. Pd (GA): waif in railroad yards; rare, native of Europe and w. Asia. Tucker (1996) states that the record is as a waif in railroad yards. [= K, Z; > *Thinopyrum* spp. *intermedium* = FNA; = *Elytrigia intermedia* (Host) Nevski; = *Agropyron intermedium* (Host) Palisot de Beauvois – HC] {add to synonymy}

**Thinopyrum ponticum** (Podpéra) Barkworth & D.R. Dewey, Tall Wheatgrass. Cp (SC): waste areas near wool-combing mills; rare, native of Europe and w. Asia, not known to be established or persistent. [= FNA, K; ? *Agropyron elongatum* (Host) Palisot de Beauvois] {add to synonymy}

**Torreyochloa** G.L. Church 1949 (Pale Mannagrass)

A genus of 4 species, with a classic Tertiary moist temperate disjunct pattern; *Torreyochloa* is distributed in e. North America and e. Asia. References: Davis in FNA (2007a); Davis (1991)=Y; Tucker (1996)=Z.

1 Leaf blades 1-3 mm wide; anthers 0.2-0.5 mm long ................................................................................................................. *T. pallida var. fernaldii*
2 Leaf blades 4-8 mm wide; anthers ca. 1 mm long ................................................................................................................. *T. pallida var. pallida*


**Torreyochloa pallida** (Torrey) Church var. *pallida*, Pale Mannagrass. Mt (GA, NC, VA, WV), Cp (DE, NC, VA), Pd (SC, VA): bogs, mucky wetlands such as old beaver-ponds, pools in cypress swamps, drawdown shores of natural ponds; common (rare in GA, NC, SC, VA, and WV). June-July. The species as a whole is widespread in e. North America. Var. *pallida* ranges from NS west to MN, south to e. VA, se. NC (Columbus County), nw. NC (Avery County), and nw. GA (Jones & Coile 1988). Var. *paniciflora* (J. Presl) J.J. Davis is distributed in w. North America. Intermediates occur between the varieties. [= FNA, K, Y, Z; < *Glyceria pallida* (Torrey) Trinius – RAB, GW, HC, W; < *Puccinellia pallida* (Torrey) Clausen – C; = *G. pallida* – F, WV; = *G. pallida var. pallida* – G; = *Panicaria pallida* (Torrey) Kuntze – S]

**Tragus** Haller 1768 (Burggrass)


* Tragus *racemosus* (Linnaeus) Allioni, Stalked Burggrass, Texas Burggrass. Mt (VA), Cp (NC): roadsides, disturbed areas, on ballast near old seaports; rare, native of Mediterranean Europe and w. Asia. [= HC, C, F, FNA, G, K; = *Nazia racemosa* (Linnaeus) Kuntze – S] {not keyed}

* Tragus *australianus* S.T. Blake, Australian Burggrass. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of Australia. [= FNA, K] {not keyed}

* Tragus *benteronianus* J.A. Schultes, Spiked Burggrass. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of Africa and Asia. Also reported from chrome ore piles at Newport News, VA. [= FNA, K] {not keyed}

* Tragus *heptaneuron* W.D. Clayton. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of tropical Africa. [= FNA, K] {not keyed}

**Tridens** Roemer & J.A. Schultes 1817 (Triodia, Redtop, Tridens, Fluffgrass)


1 Panicle dense and spike-like, > 4× as long as wide, the branches ascending to appressed.
2 Plants from elongate rhizomes; lemma 4-5 mm long; spikelet 7-9 mm long.................................................................................... *T. carolinianus*
3 Plants cespitose; lemma 2.5-3 mm long; spikelet 4-6 mm long ........................................................................................................ *T. strictus*
1 Panicle open and spreading, < 4× as long as wide, the branches well-developed and spreading-ascending to reflexed.
3 Spikelets 4-5 mm long; 2.5-3.5 mm wide .................................................................................................................. *T. ambiguus*
4 Spikelets 6-8 mm long; 1.5-2.2 mm wide.
4 Primary pulvini densely pubescent, the hairs encircling the base of the panicule branch; secondary pulvini pubescent; spikelets mostly on pedicels 3-20 mm long; main branches of the inflorescence stiffly spreading ........................................................................ *T. chapmanii*
3 Primary pulvini glabrous to sparsely pubescent, tufted only in the axil (the upper surface of the panicule branch); secondary pulvini glabrous; spikelets on pedicels mostly < 3 mm long; main branches of the inflorescence spreading, ascending or drooping............ *T. flavus*
**Triplasis** Palisot de Beauvois 1812 (Sandgrass)


**Identification notes:** The foliage of both of our species has a sour taste.

1. Lemma awn 4.5-8 mm long; culm internodes appressed pilose or puberulent; perennial..........................*T. americana*
2. Lemma awn 0.5-1.5 mm long; culm internodes glabrous to minutely scaberulous; annual (or rarely perennial)......*T. purpurea* var. purpurea

**Triplasis americana** Palisot de Beauvois, Southern Sandgrass. Cp (FL, GA, NC, SC): open sandy areas; common. August-October. A Southeastern Coastal Plain endemic: NC south to s. FL, west to e. LA. [RAB, FNA, HC, K, S]

**Triplasis purpurea** (Walter) Chapman var. *purpurea*, Purple Sandgrass. Cp (DE, FL, GA, NC, SC, VA): dunes, maritime dry grasslands, open sandy areas; common. September-October. NH south to s. FL, and west to TX, along the coast; also around the Great Lakes, and in central United States. Var. *caribensis* R.W. Pohl is in the New World tropics. [FNA; < *T. purpurea* var. purpurea – RAB, C, F, G, HC, K; > *T. intermedia* Nash – S; > *T. purpurea* – S]

**Trisetum** Linnaeus 1759 (Gama Grass)

A genus of about 12 species, tropical and subtropical American. References: Barkworth in FNA (2003a); DeWet, Harlan, & Brink (1982)=Z.

**Trisetum dactyloides** (Linnaeus) Linnaeus var. *dactyloides*, Gama Grass. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA< WV), Cp (DE, FL, GA, NC, SC, VA): road sides, moist areas, disturbed areas, moist riverbanks; common (un common in VA, rare in WV). Late May-November. *T. dactyloides* is widespread in e. North America north to MA, MI, IA, and NE, ranging south into tropical Central and South America; var. *dactyloides* is North American. This important species of moist and wetland areas in the Great Plains is generally seen in disturbed habitats in our area; its original habitats in our area (if indeed it was native in the flora area) are poorly understood. [FNA, Z; < *T. dactyloides* var. occidentale* – RAB, C, G, HC, K; > *T. intermedia* Nash – S; > *T. purpurea* – S]

**Trisetum** Persoon 1805 (Oat-grass)

A genus of about 75–85 species, north and south temperate. References: Rumely in FNA (2007a); Randall & Hili (1986)=Z; Tucker (1996)=Y. [also see *Sphenopholis*]

**Trisetum spicatum** (Linnaeus) K. Richter, Alpine Oat-grass, Spike Trisetum. Mt (NC, VA): mountain cliffs at high elevations on metabasalt; rare. June-August. A circumboreal species, widespread and common in arctic and alpine areas, south in e. North America to New England, NY, and, rarely, PA, and disjunct to Hawksbill Mountain, Page County, VA (where extant) and Roan Mountain, Mitchell County, NC (where not seen since the nineteenth century). The species is also known from the West Indies, Mexico, and s. South America. *T. spicatum*, as broadly treated here, following Randall & Hili (1986), is polymorphic and consists of several ploidies. [C, FNA, HC, K, S, Y, Z; > *T. spicatum* var. *mollis* (Michaux) Beal – RAB, F, G; > *T. triflorum* (Bigelow) Löve & Löve ssp. *molle* (Michaux) Löve & Löve – W; > *T. spicatum* var. *maidenii* (Gandoger) Fernald – F]

**Triticum** Linnaeus 1753 (Wheat)

* * Triticum aestivum * Linnaeus, Bread Wheat. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields; frequently cultivated, rarely persistent or volunteering following cultivation, native of Eurasia. May-June. One of the most important crops in the world. The lemmas can either be awnless or with long awns (to 8 cm long). [FAB, C, F, FNA, G, HC, K, WH, Z]

**Uniola** Linnaeus 1753 (Sea Oats)

A genus of 2 species. The only other species of the genus ranges from Baja California south along the Pacific Ocean to Ecuador; other species previously treated in *Uniola* have been shown to be only distantly related and are now treated as *Chasmanthium*. References: Yates in FNA (2003a); Yates (1966a, 1966b)=Z. [also see *Chasmanthium*]

* * Uniola paniculata * Linnaeus, Sea Oats. Cp (DE*, FL, GA, NC, SC, VA): abundant on unforested primary and secondary dunes on barrier islands, and on dry to mesic sand flats and interdune swales; common (rare in DE and VA). June-November. Se. VA south to FL and west to TX and Mexico; West Indies. This is the most important sand-binding grass on ocean dunes from NC south, playing a critical role in primary succession on dunes. It is against the law in NC to pick or destroy *Uniola paniculata*. [FAB, C, F, FNA, G, HC, K, S, WH, Z]

**Urochloa** Palisot de Beauvois 1812 (Para-grass, Signal-grass)


1 Spikelets suffused with purple, borne in pairs (or threes) in each row .......................................................... *U. mutica*
2 Spikelets green, borne singly in each row.
   1 Upper half of second glume and first lemma with evident transverse veins connecting the longitudinal veins; spikelets 3.5-4.7 mm long........*U. platyphylla*
   2 Upper half of second glume and first lemma without evident transverse veins, or with very obscure cross-veins; spikelets either 2-4 mm or 5-6 mm long.
   3 Spikelets 2-4 mm long ............................................................................................................ *U. ramosa*  
   3 Spikelets 5-6 mm long ............................................................................................................ *U. texana*

* * Urochloa mutica * (Forskål) Nguyen, Para-grass. Cp (SC): margin of pond; rare, native of Africa. August. [FNA, K, Z; * Panicum purpurascens * Raddi – RAB, HC; * B. purpurascens * (Raddi) Henard – GW; = Brachiaria mutica (Forskål) Stapf]
* * Urochloa platyphylla * (Munro ex Wright) R. Webster, Broadleaf Signal-grass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, NC, VA), Mt (VA): disturbed wet or seasonally moist areas; rare, apparently native of South America. E. NC south to FL, west to TX, north in the interior to AR, OK, and se. MO; also in MD (Terrell & Reveal 1996). [FNA, K, Y, Z; = Brachiaria platyphylla (Munro ex Wright) Nash – RAB, GW, HC; B. extensa (Chase) S]
* * Urochloa ramosa * (Linnaeus) Nguyen, Broadnoot Millet, Dixie Signalgrass. Pd (GA, SC, NC, VA), Cp (FL, GA, NC, SC, VA): disturbed areas; rare, native of tropical Africa and Asia. This species has apparently been widely planted for wildlife food and erosion control in southeastern states. [FNA, K, Y, Z; = Panicum ramosum Linnaeus – HC; = Brachiaria ramosa (Linnaeus) Stapf]
* * Urochloa texana * (Buckley) R. Webster, Texas Millet, Texas Signalgrass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, NC, VA), Mt (GA, NC, SC, VA): disturbed areas, fields, gardens; uncommon (rare in VA), native of TX. First reported for South Carolina by Hill & Horn (1997). [K, Y, Z; = Panicum texanum Buckley – RAB, C, HC, S; = Brachiaria texana (Buckley) S.T. Blake]

* * Urochloa aderspa * (Trinius) R. Webster. Cp (FL): moist, sunny, disturbed areas; rare, apparently native of s. FL, the West Indies, and Argentina. Reported from AL, FL peninsula and Panhandle (FNA), and chrome ore piles in Newport News, VA (Reed 1964). [FNA, K] [not keyed; add to synonymy]

* * Urochloa fusca * (Swartz) B.F. Hansen & Wunderlin var. * reticulata * (Torrey) B.F. Hansen & Wunderlin, east to GA (Kartesz 1999). [FNA, K, Y, Z; = Urochloa fasciculata (Sw.) R. Webster – K; = Panicum fasciculatum Swartz – HC] [not yet keyed; synonymy incomplete]

* * Urochloa piligera * (Muell. ex Bentham) R.D. Webster. Cp (FL): roadsides; rare, native of Australia. Reported for Escambia County in the FL Panhandle (Kunzer et al. 2009). [WH] [not yet keyed; synonymy incomplete]
* * Urochloa plantaginea * (Link) R. Webster. Cp (FL, GA): Reported for s. GA (Jones & Coile 1988), as Brachiaria plantaginea, and for Escambia County in the FL Panhandle (Kunzer et al. 2009). [FNA, K, Y, Z; = Brachiaria plantaginea (Link) A.S. Hitchcock] [not yet keyed; synonymy incomplete]

* * Urochloa repta * (Linnaeus) Stapf. Cp (GA): [FNA, K] [not yet keyed; synonymy incomplete]

* * Urochloa villosa * (Lamarck) Nguyen, Hairy Signalgrass. Reported from chrome ore piles in Newport News, VA (Reed 1964); native of tropical Asia and Africa. [FNA, K] [not keyed; add to synonymy]

**Vulpia** C.C. Gmelin 1805 (Annual Fescue)
POACEAE

A genus of about 30 species, north and south temperate. References: Lonard in FNA (2007a); Tucker (1996)=Z. Key based in part on C.

1 First glume < ½ as long as the second glume ...................................................... V. myuros
1 First glume > ½ as long as the second glume.
2 Lemma pubescent; lowest lemma 2.5-3.5 mm long; grains 1.5-2 mm long ......................................................... V. sciurea
2 Lemma glabrous or scabrous; lowest lemma 2.7-7 mm long; grains 1.7-3.3 mm long.
3 First glume 1.7-4.5 mm long; lemma awns 3-12 mm long; spikelets with 4-7 loosely imbricate florets; rachilla internodes mostly 0.9-1.1 mm long. ......................................................... V. bromoides
3 First glume 3.5-5 mm long; lemma awns 0.3-6 (-9) mm long; spikelets with 5-11 (-more) closely imbricate florets; rachilla internodes mostly 0.5-0.7 mm long.
4 Spikelets 4-5.5 (-6.5) mm long; awn of the lowest lemma 0.3-3 mm long ........................................ V. octoflora var. glauca
4 Spikelets 5.5-10 (-13) mm long; awn of the lowest lemma 3-9 mm long ........................................ V. octoflora var. octoflora


Vulpia octoflora (Walter) Rydberg var. glauca (Nuttall) Fernald, Northern Six-weeks Fescue. Mt (WV), Cp (DE), Pd (DE), {Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA)}: fields, roadsides, disturbed areas; common (in FL and WV), native of Eurasia. May-June. [= C, FNA, K, Z; = Festuca octoflora Linnaeus – RAB, G, HC, S, W, WV]

Vulpia octoflora (Walter) Rydberg var. aristulata (Torrey ex L.H. Dewey – G; = Festuca octoflora var. aristulata – Z)

Vulpia octoflora, Southern Six-weeks Fescue. Mt (WV), Cp (DE), {Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA)}: fields, roadsides, disturbed areas; common (in FL, WV), rare in WV. April-June. S. ME west to NC, south to GA, AR, TX, and CA. [= C, FNA, K; < Festuca octoflora Walter – RAB, GW, S, W, WV; = Vulpia octoflora var. tenella (Willdenow) Fernald – F; = Festuca octoflora Walter var. tenella (Willdenow) Fernald – G, HC; < Vulpia octoflora – Z]


Zea Linnaeus 1753 (Corn, Maize)


1 Pistillate spikelets (kernels) borne on a spongy rachis (cob) in rows ...................................................... Z. mays ssp. mays
1 Pistillate spikelets embedded in a hardened rachis.
2 Annual............................................................ [Z. mays ssp. mexicana]
2 Perennial from creeping rhizomes ........................................................................................................ Z. perennis

* Zea mays Linnaeus ssp. mays, Corn, Maize. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): very commonly cultivated, rarely volunteering in old fields or around trashpiles; common in cultivation, rare as a short-lived escape. June-October. Zea is one of the most important cultivated plants in the world, originating in Mexico, probably from Zea mays ssp. parviglumis Iltis & Doebly. It was initially cultivated in sw. Mexico (before 8000 BP), spreading to the sw. United States before 5000 BP, and to the e. United States by 2000 years BP. At the time of European contact, Zea mays ssp. mays was an important staple crop from s. Canada south to s. South America (Hancock 2004). [= FNA, K; < Z. mays – RAB, F, HC, S]

* Zea perennis (A.S. Hitchcock) Reeves & Manglesdorf, Mexican Teosinte. Cp (SC): disturbed areas; rare, apparently established at least formerly. Z. perennis was considered by HC to be "established on James Island, S.C." [= K; = Euchlaena perennis A.S. Hitchcock – HC]

* Zea mays (Schrader) Kuntze ssp. mexicana (Schrader) H.H. Iltis, Chalco Teosinte, Nobogame Teosinte. Reported for AL (Kartesz 1999) and FL (Hansen & Wunderlin 2006). HC state that this taxon is "occasionally cultivated in the Southern States for green forage" and is similar to Z. perennis, except in being, like Z. mays ssp. mays, a coarse annual. It is considered to be an ancestor of Zea mays. [= FNA; = Z. mexicana (Schrader) Kuntze – K; = Euchlaena mexicana Schrader – HC, S]

Zizania Linnaeus 1753 (Wild-rice)


1 Lemmas of the pistillate spikelets flexible and chartaceous, dull, bearing short scattered hairs, these not or only slightly more dense toward the tip ...................................................... Z. aquatica var. aquatica
1 Lemmas of the pistillate spikelets stiff and coriaceous, lustrous, glabrous with lines of short hairs, the tips usually more hairy ................. Z. palustris var. palustris
**Zizania aquatica** Linnaeus var. *aquatica*, Southern Wild-rice. Cp (DE, FL, GA, NC, SC, VA), Pd (DE): freshwater marshes, usually tidal; common (uncommon in NC, rare in Piedmont). May-October. Var. *aquatica* ranges from ME west to WI, south to FL and LA; var. *brevis* Fassett is restricted to the St. Lawrence River in QC. *Zizania* was formerly an important food for Amerindians; it is now gathered as a specialty grain, commanding high prices. [= C, F, FNA, G, HC, K, X, Y, Z; < Z. *aquatica* – RAB, GW, S]


**Zizaniopsis** Döll & Ascherson 1871 (Giant Cutgrass)


**Identification notes**: Superficially similar to *Zizania* in its habitat and large size, *Zizaniopsis* may be distinguished by its very different inflorescence and by its stout horizontal rhizomes (*Zizania* is annual or perennial, but not rhizomatous).

**Zizaniopsis miliacea** (Michaux) Döll & Ascherson, Giant Cutgrass, Southern Wild-rice, Water-millet. Cp: brackish and freshwater marshes; common. May-July. MD south to FL, west to TX, north in the interior to MO, and disjunct in w. Mexico. The other species of the genus are South American. [= RAB, C, F, FNA, G, GW, HC, K, S, Y, Z; = Zizania *miliacea* Michaux]

**Zoysia** Willdenow 1801 (Zoysia, Temple-grass)

A genus of about 11 species, perennials, of tropical, subtropical, and temperate Asia. References: Anderson in FNA (2003a). Key closely following FNA.

1 Leaves < 0.5 mm wide; racemes with 3-12 spikelets; peduncles included to extending < 1 cm beyond the sheaths of the flag leaves .........................

.................................................................................................................................................................................................................................................................................................................................................

1 Leaves 0.5-5 mm wide; racemes with 10-50 spikelets; peduncles extending (0.3-) 1-6.5 cm beyond the sheaths of the flag leaves.

2 Pedicels 1.6-3.5 mm long; spikelets ovate, 1.1-1.4 mm wide; culm internodes 2-10 mm long; blades ascending..............................

Z. *japonica*

2 Pedicels 0.6-1.6 mm long; spikelets lanceolate, 0.6-1.0 mm wide; culm internodes 5-40 mm long, all plants with at least some internodes > 14 mm long; blades spreading at nearly 90 degree angles .................................................................................................................................

Z. *matrella*

* Zoysia *japonica* Steudel, Japanese Lawngrass, Korean Lawngrass, Zoysia. Cp (AL, LA), Mt (WV): used as a lawngrass, persisting or spreading; rare, native of Japan. Reported for VA (Kartesz 1999). [= C, FNA, HC, K]

* Zoysia *matrella* (Linnaeus) Merrill, Zoysia, Manila Temple-grass. Cp (AL, FL), Pd (GA): used as a lawngrass, persisting or spreading; rare, native of the Philippines. [= FNA, HC, K; = Z. *matrella* var. *matrella* – K]

* Zoysia *pacific* (Goudswaard) M. Hotta & Kuroki, Mascarene-grass, Korean Velvetgrass. Cp (LA), Mt (WV): used as a lawngrass, persisting or spreading; rare, native of e. Asia. [= FNA; ? Z. *tenuifolia* Willdenow – HC; > Z. *tenuifolia* Willdenow – K; > Z. *matrella* var. *pacific* Goudswaard – K]
SECTION 6: EUDICOTYLEDONAE (EUDICOTS)

107. CERATOPHYLLACEAE S.F. Gray 1821 (Hornwort Family) [in CERATOPHYLLALES]


*Ceratophyllum* Linnaeus 1753 (Hornwort, Coontail)


**Identification notes:** *Ceratophyllum* is sometimes mistaken for other, superficially somewhat similar aquatics, such as *Cabomba* (Cabombaceae), *Utricularia* (Lentibulariaceae), and *Myriophyllum* (Haloragaceae). *Cabomba* has the leaves opposite (rather than whorled), dichotomously divided (like *Ceratophyllum*), but the divisions lacking the marginal denticles of *Ceratophyllum*, and on a 1-3 cm long petiole (vs. sessile or on a petiole 0-2 mm long). *Utricularia* has the leaves sometimes dichotomously divided, but the divisions are usually irregular, the leaves are alternate (in most species), and bladder traps are present. *Myriophyllum* has the leaves pinnately rather than dichotomously divided.

1. Largest leaves forking 1-2× (count branching-nodes from the base of the leaf to the tip of the most-forked division); leaves coarse-textured, stiff, the marginal denticles usually strongly raised on a broad base of green tissue; achene margin wingless, with 2 basal spines or tubercles (these rarely absent), otherwise entire (lacking marginal spines) .........................................................*

2. Largest leaves forking 3-4× (count branching nodes from the base of the leaf to the tip of the most-forked division); leaves fine-textured, flaccid, the marginal denticles not raised on a broad base of green tissue, sometimes obscure or obsolete; achene margin winged, with 2-20 lateral spines 0.1-6.5 mm long (occasionally spineless), with 2 basal spines (these rarely absent).

2. Achene body (excluding the spines) 3-4.5 mm long; first leaves of the plumule simple; [Coastal Plain, NC southward] ..........*

2. Achene body (excluding the spines) 4.5-6 mm long; first leaves of the plumule forked; [widespread] ........................................

*Ceratophyllum australe* Griseb. Ponds, pools, slow-moving streams. May-September. Se. NC south to s. FL and Panhandle FL, and in the West Indies; also in s. Mexico, Central America, n. South America, with apparent disjunctions in c. South America and the Galapagos Islands. Les treats this taxon as a subspecies of the Old World *C. muricatum*. Because of their allopatic distribution on separate continents and relative morphological distinctiveness (as shown by Les), I prefer to recognize them at the species level. [= *Ceratophyllum muricatum* Chamisso ssp. *australe* (Grisebach) Les – FNA, K, Z; *C. muricatum* Chamisso – GW (also see *C. echinatum*)]

*Ceratophyllum demersum* Linnaeus, Coontail. Ponds, pools, slow-moving streams. May-September. NL (Newfoundland) west to AK, south to s. FL, TX, CA, and south through the West Indies and Central America to South America. [= RAB, C, F, FNA, G, GW, K, W, S, Z]

*Ceratophyllum echinatum* A. Gray in Torrey & A. Gray. Ponds, pools, slow-moving streams. May-September. NL (Newfoundland) west to ON and n. MN, south to c. peninsular FL and e. TX; also in BC, WA, and OR. [= RAB, C, F, FNA, G, K, S, Z; *C. muricatum* Chamisso – GW (also see *C. australe*); *C. submersum* Linnaeus var. *echinatum* (A. Gray) Wilmot-Dear]

109a. FUMARIACEAE A.P. de Candolle 1821 (Fumitory Family) [in RANUNCULALES]

This family includes 15-20 genera and 500-600 species, herbs, mostly north temperate. The Fumariaceae are often now subsumed into the Papaveraceae (Lidén 1981, 1986; Lidén et al. 1997; Judd, Sanders, & Donoghue 1994), but the option remains to recognize the two monophyletic clades as families: Papaveraceae s.s. and Fumaricaceae (including Pteridophyllum and Hypecoum). References: Wang et al. (2009); Stern in FNA (1997); Hill (1992); Lidén (1986, 1981); Lidén et al. (1997); Lidén in Kubitzki, Rohwer, & Bittrich (1993).

1. Corolla with the 2 outer petals spurred or saccate at their bases; [tribe Corydaleae].

2. Ultimate leaf segments 1-4 mm wide; plants with basal leaves only .................................................................*

2. Ultimate leaf segments 5-70 mm wide; plants of reproductive age with cauline leaves.

3. Ultimate leaf segments 5-10 mm wide; herbaceous vine with cauline leaves (acauluscent in its first year, and appearing to be an herb); [native] .................................................................*

3. Ultimate leaf segments 20-70 mm wide; herb with basal and cauline leaves; [alien, cultivated and rarely persistent or naturalized] ......

1. Corolla with only 1 outer petal spurred or saccate at its base.

4. Ovary and fruit subglobose, with 1 seed; [tribe Fumariaceae] .................................................................*

4. Ovary and fruit elongate, with several to many seeds; [tribe Corydaleae].

5. Flowers pink, the petals tipped with yellow; biennial; stem erect, 3-8 (-10) dm tall; capsules erect, 25-35 mm long ..........*

5. Flowers yellow; annual; stem erect, decumbent, or prostrate, 1-3 (-4) dm tall; capsules erect, ascending, divergent, or pendent, 10-20 (-25) mm long .................................................................*

*Adlumia* Rafinesque ex A.P. de Candolle 1821 (Climbing Fumitory)

*Corydalis* P. Miller 1805 (Corydalis)

A genus of about 400 species, herbs, of temperate regions of the Northern Hemisphere (especially China and the Himalayas). References: Stern in FNA (1997); Ownbey (1947) = Z; Lidén in Kubitzki, Rohwer, & Bittrich (1993). [also see *Capnoides*]

1 Fruits pendent or divergent; spurred petal 7-9 mm long; pedicels 6-15 mm long; seeds 2-2.5 mm wide, with a narrow, acute ring-margin ........................................... *Corydalis aurea* (Aiton) Greene ex Britton, Sterns, & Poggenburg, Alleghaney-vine, Cliff-Harlequin, Climbing Fumitory. Cliffs, talus, rocky slopes, rich stream-bottom forests, cool rocky forests. June-September. QC west to WI and MN, south to n. DE, w. NC, TN, and IN. [= RAB, C, F, FNA, G, K, S, W] 

2 Capsules mostly 15-20 mm long, ca. 1.0 mm in diameter, strongly constricted between the seeds at maturity; inflorescence long, usually far exceeding the poorly-developed upper leaves; ultimate leaf segments 0.5-1.5 (-3.0) mm wide; seeds < 1.5 mm wide; plant slightly to strongly glaucous; [of sandy soils of the outer Coastal Plain] ......................................................... *Corydalis micrantha* (Linnaeus) Persoon – RAB, C, F, FNA, G, K, W, WV, Z

2 Capsules mostly 10-15 mm long, 1.5-2.0 mm in diameter, slightly or not at all constricted between the seeds at maturity; inflorescence relatively short, barely (if at all) overtopping the upper leaves; ultimate leaf segments 1.0-2.0 (-4.0) mm wide; seeds > 1.5 mm wide; plant green to slightly glaucous; [of circumneutral rock outcrops of the upper Piedmont and Mountains] ............................................. *Corydalis halei* (Rafinesque) A. P. de Candolle – S

*Corydalis aurea* Willdenow. Reported as occurring as far south and east as MD, WV (?), and PA (Kartesz 1999, Kartesz 2010). No definitive documentation is known for this species in our area. [= G, K; = *Corydalis aurea* var. aurea – C; F; = *Corydalis aurea* ssp. aurea – FNA; = *Capnoides aureum* (Willdenow) Kuntze – S] [not keyed; not mapped; rejected as a component of our flora] 

*Corydalis cristallina* Engelmann. A species of the sc. United States, *C. crystallina* was collected in 1930 from an oat field at the Georgia Experiment Station in Laurens County. Presumably it was a one-time contaminant in seed and is a waif. Not considered a component of the flora of our area. [= FNA, F, G, K] [not keyed; not mapped; rejected as a component of our flora]

*Corydalis flava* (Rafinesque) A. P. de Candolle, Short-spurred Corydalis. Rich moist forests, especially alluvial forests, glades and outcrops over mafic rocks (such as greenstone). March-April; May-June. S. CT, NY, and s. ON west to SD, south to NC, AL, LA, and OK. [= RAB, C, F, FNA, G, K, W, WV, Z; = *Capnoides flavulum* (Rafinesque) Kuntze – S]

*Corydalis micrantha* (Small) Fernald & Schubert, Short-spurred Corydalis. Sandy roadsides and disturbed areas. March-April; May-June. N.C. south to FL, west to TX, and inland north to MO and OK. F and S recognized it as a species distinct from *C. micrantha*; Ownbey reduced it to a subspecies, citing inadequate morphological differences and some alleged intermediates in OK and MO. The two taxa appear readily separable on morphological, ecological, and geographical grounds; species status seems warranted. [= F; = *Corydalis micrantha* (Engelmann ex A. Gray) A. Gray var. *australis* (Chapman) G. B. Ownbey – RAB, FNA, K, Z; = *Corydalis micrantha* (Engelmann ex A. Gray) A. Gray var. *australis* (Chapman) Shinners – C; < *Corydalis micrantha* – G; = *Capnoides halei* Small – S]

*Corydalis micrantha* (Engelmann ex A. Gray) A. Gray, Slender Corydalis. Circumneutral rock outcrops and adjacent glades and woodlands. April, June. *C. micrantha* (in the narrow sense) is primarily midwestern, ranging from IL, WI, MN, and SD south to AR, TX, and OK, with disjunct outliers in e. TN and w. NC. Ownbey (1947) had no records of Southern Appalachian populations of *C. micrantha*, and considered “ssp. micrantha” to range no further east than IL and MO; RAB included montane populations in ssp. *australis*, stating "this is the only [subspecies] in our range.” Morphologically, however, these populations closely resemble *C. micrantha*; their association in the Brushy Mountains with other species disjunct from western or prairie ranges (*Anemone berlandieri*, *Arabis pycnocarpa*, *Pellaea wrightiana*) provides phytogeographic corroboration. [= F; = *Corydalis micrantha* ssp. micrantha – FNA, K, Z; = *Corydalis micrantha* var. micrantha – C; < *Corydalis micrantha* – G; = *Capnoides micranthum* (Engelmann ex A. Gray) Britton – S]

*Capnoides* P. Miller 1754 (Rock Harlequin)


*Capnoides semprevirens* (Linnaeus) Borkhausen, Rock Harlequin, Tall Corydalis, Pink Corydalis, Pale Corydalis. Rock outcrops, especially granitic exfoliation domes, but also quartzite, greenstone, and sandstone. April-August; May-July. NL (Newfoundland) west to AK, south to NJ, PA, in and near the mountains to ne. GA, n. OH, n. IN, MN, MT, and BC. [= S; = *Corydalis semprevirens* (Linnaeus) Persoon – RAB, C, F, FNA, G, K, W, WV, Z]
Dicentra Bernhardi 1833


1 Flowers pink, in panicles; rootstock lacking bulblets; ultimate leaf segments generally 3-parted, each part 2-5 mm wide at base, gradually tapering to the tip.
2 Reflexed portions of the outer sepals 4-8 mm long; [native and cultivated] .......................................................................................... D. eximia
3 Flowers white or yellowish (very rarely pinkish), in racemes; rootstock with bulblets; ultimate leaf segments not generally 3-parted, about 1 (-3) mm wide, with parallel sides for most of their length, then tapering suddenly to the tip.


Fumaria Linnaeus 1753 (Fumitory)


1 Corolla (9-) 10-14 mm long, creamy white (to reddish); fruiting pedicels deflected downwards; fruit smooth when dry .................. F. capreolata
2 Corolla 4-8 (-9) mm long, white to pink or purple; fruiting pedicels ascending; fruit rugose or verrucose when dry.
3 Corolla (6-) 7-8 (-9) mm long, dark pink to purple; raceme borne on a peduncle ..........................................................................


Lamprocapnos Endlicher 1850 (Asian Bleeding Heart)

A monotypic genus, a perennial herb of e. Asia. References: Lidén et al. (1997); Stern (1961)=Z.

Identification notes: Lamprocapnos differs from other "bleeding hearts" (the native Dicentra eximia and the western American Dicentra formosa ssp. formosa) in its leafy stem, the inflorescence borne terminally or opposite a leaf, the leaves much less finely divided, and the flowers about as broad as long (vs. much longer than broad in Dicentra eximia and Dicentra formosa).

* Lamprocapnos spectabilis (Linnaeus) Fukuhara, Bleeding Heart, native to e. Siberia, Korea, and n. China, is frequently cultivated and may persist or weakly naturalize. It is reported for KY (Kartesz 1999, Kartesz 2010) and various ne. United States. [= K; = Dicentra spectabilis (Linnaeus) Lemaire – Z]
A family of 23 genera and about 230 species, mainly herbs (some shrubs and small trees), largely north temperate in distribution. References: Kiger in FNA (1997); Wang et al. (2009); Kadereit in Kubitzki, Rohwer, & Bittrich (1993).

1. **Argemone** Linnaeus 1753 (Prickly-poppy)


1. Flowers white to pink; latex white or nearly clear .......................... 5. *Sanguinaria*
2. Flowers yellow to cream; latex yellow .......................................................... 4. *Macleaya*

**Argemone albiflora** Hornemann var. *albiflora*, Carolina-poppy, White Prickly-poppy. Sandy roadsides and disturbed areas. April-May (sporadically later). This species is apparently native to the southeastern United States, presumably including portions of our area, south to s. FL, but the native range is unclear. *Var. texana* (G.B. Ownbey) Shinners occurs in TX, AR, and LA. The species’ weediness suggests, however, that it may be merely adventive in our area. [= *A. albiflora ssp. albiflora* – FNA, K; < *A. albiflora* – RAB, C, WH; < *A. alba* Lestib. f. – G, S, misapplied]*


2. **Papaver** Linnaeus 1753 (Poppy)


**Identification notes:** Other species are cultivated and may be found in our area persistent, escaped, as waifs, or as naturalized populations.

1. Upper cauline leaves not clasping the stem; [section *Papaver]* ................................................................................................. *P. somniferum*
2. Upper cauline leaves clasping the stem.  
3. Capsules oblong to clavate, sparsely setose-pubescent; [section *Argemoneidium*].  
4. Capsules obovoid-ellipsoid to subglobose, densely setose with strong hairs .............................................................................. *P. argemone*
5. Ovaries and capsules glabrous.  
6. Flowers > 10 cm across; perennial; [section *Macrantha*] ............................................................................................................. *P. orientale*
7. Flowers < 10 cm across; annual; [section *Rhoeodium*].  
8. Capsule 2-3× as long as broad, stigmatic lobes 5-9 .................................................................................................................. *P. dubium*
9. Capsule 1-1.5× as long as broad; stigmatic lobes 8-15 .................................................................................................................. *P. rhoesu*
* **Papaver argemone** Linnaeus, Prickly Poppy. Disturbed areas; native of Europe and sw. Asia. Reported from PA (Rhoads & Klein 1993, Kiger & Murray in FNA 1997), VA (probably only from cultivation), and MD (Kiger & Murray in FNA 1997). [= FNA]
* **Papaver hybridum** Linnaeus, Rough Poppy. Disturbed areas; native of Eurasia. May-June. [= RAB, FNA, K, Z]

**3. Glaucium P. Miller 1754 (Horned-poppy)**

A genus of about 23 species, annual and perennial herbs, of temperate Europe and w. Asia. References: Kiger in FNA (1997); Kadereit in Kubitzki, Rohwer, & Bittrich (1993). Key based on FNA.

1 Basal leaves few, glabrate to moderately pubescent; blades of distal leaves not distinctly clasping stem; petals orange to reddish orange, usually with blackish basal spot; capsules straight to slightly curved, pubescent or glabrate ......................................................


**4. Macleaya R. Brown 1826 (Plume-poppy)**


**5. Sanguinaria Linnaeus 1753 (Bloodroot)**


*Sanguinaria canadensis* Linnaeus, Bloodroot, Red Puccoon. Moist nutrient-rich forests. March-April; April-May. NS west to MN and MB, south to Panhandle FL and OK. Fernald recognizes two varieties – var. *rotundifolia*, more southern and the primary form in our area, is considered to have leaves less lobed than the more northern var. *canadensis*; leaf shape variability within populations makes it impractical to recognize infraspecific taxa. [= RAB, C, FNA, G, K, S, W; > S. canadensis var. *canadensis* – F; > S. canadensis var. *rotundifolia* (Greene) Fedde – F]

**6. Chelidonium Linnaeus 1753 (Greater-celandine)**


7. *Stylophorum* Nuttall 1818 (Celandine-poppy)


*Stylophorum diphyllum* (Michaux) Nuttall, Celandine-poppy, Woods-poppy. Moist forests over calcareous rocks (such as limestone). March-April. S. QU, w. PA, s. MI, and WI, south to sw. VA, e. TN, nw. GA, sc. TN, and AR; introduced elsewhere from horticultural use. [= C, F, FNA, G, K, S, W, WV]

8. *Eschscholzia* Chamisso 1820 (California-poppy)


* Eschscholzia californica* Chamisso ssp. californica, California-poppy. Roadsides, disturbed areas; native of w. North America. May-August. [= FNA, K; < Eschscholtzia californica – RAB, F, orthographic variant]

111. *LARDIZABALACEAE* Decaisne 1839 (Lardizaba Family) [in RANUNCULACEAE]

A family of about 8 genera and 35 species, shrubs and vines, primarily Asian, but also in s. South America. References: Thieret & Kartesz in FNA (1997); Wang et al. (2009); Cheng-Yih & Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

*Akebia* Decaisne 1837 (Akebia)


* Akebia quinata* (Houttuyn) Decaisne, Five-leaf, Five-leaf Akebia, Chocolate-vine. Escaped from cultivation to roadbanks, suburban woodlands, and floodplains; native of Japan, China, and Korea, potentially invasive and difficult to eradicate. April-June; June-July. [= RAB, C, F, FNA, K]

112. *MENISPERMACEAE* A.L. de Jussieu 1789 (Moonseed Family) [in RANUNCULACEAE]

A family of about 72 genera and 450 species, vines, shrubs, trees, and herbs, ot tropical, subtropical, and warm temperate areas. References: Rhodes in FNA (1997); Wang et al. (2009); Hoot et al. (2009); Kessler in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves asymmetrically peltate (the stem attached 1-5 mm in from the leaf margin); stamens 12-24; petals 6-9; fruit bluish-black; [tribe Menispermeae] ...................................................................................................................................................................................

1 Leaves not peltate, usually cordate (the stem attached at the leaf margin); stamens 6 or 12; petals 6 or 0; fruit red or bluish-black.

2 Leaves 3-7-lobed, the sinuses usually deep, the lobes acute; stamens 12; petals 0; fruit bluish-black, 13-25 mm long; [tribe Tinosporeae] ...

2 Leaves entire or 3-lobed, the sinuses always shallow, the lobes (if present) broadly rounded; stamens 6; petals 6; fruit red, 5-8 mm long; [tribe Tiliacoreae] ...................................................................................................................................................................................

*Cocculus* A.P. de Candolle 1817 (Coralbeads, Snailseed)


*Cocculus lyonii* (Pursh) A. Gray, Cupseed, Lyonia-vine. Floodplain forests, wet hammocks. May-June. Se. SC, e. TN, se. KY, s. IN, s. IL, MO, and e. KS, south to se. GA, Panhandle FL, s. AL, s. MS, s. LA, and e. TX. [= C, F, FNA, G, K, S, WH]
MENISPERMACEAE


*Cocculus carolinus* (Linnaeus) A.P. de Candolle, Coralbeads, Carolina Moonseed, Snailseed, Red Moonseed. Moist to dry forests and thickets, especially where calcareous, also weedy in landscaping. June-August. VA south to FL, west to TX, north in the interior to s. IN and MO. Its occurrences in VA may be primarily adventive. [= RAB, C, F, G, K, W, WH; *Epibatrum carolinum* (Linnaeus) Britton – S]

Menispernum Linnaeus 1753 (Moonseed)


113. BERBERIDACEAE A.L. de Jussieu 1789 (Barberry Family) [in RANUNCULALES]

As broadly defined here, a family of about 15 genera and 650 species, herbs and shrubs, of the temperate Northern Hemisphere and Andean South America. There has been much debate and study of whether the Berberidaceae should be recognized as a broadly defined unit, or split into a variety of segregate families (such as Podophyllaceae, Epimediaceae, Nandinaceae, Leonticaceae). Based on molecular studies, Kim & Jansen (1996, 1998) conclude that division of the Berberidaceae into segregate families is not warranted. References: Whetstone, Atkinson, & Spaulding in FNA (1997); Wang et al. (2009); Stearn (2002); Kim & Jansen (1996, 1998); Ahrendt (1961); Locote & Estes (1989b); Meacham (1980); Locote in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves ternately compound; [subfamily Nandinoideae].
2 Plant a shrub, with multiple leaves; flowers white .............................................................................................................................. 1. Nandina
2 Plant an herb, with 2 leaves; flowers greenish or maroonish .............................................................................................................. 2. Caulophyllum

1 Leaves simple (though sometimes variously lobed or divided into segments).
3 Plant a shrub; leaves not peltate, simple or 1-pinnately compound; flowers yellow; [subfamily Berberidoideae] ......................... 3. Berberis
3 Plant an herb; leaves peltate, 2-parted or radially lobed; flowers white; [subfamily Podophylloideae].
4 Plant acaulescent; flower solitary and scapose; leaf segments 2; fruit a capsule ................................................................................. 4. Jeffersonia
5 Flowers cymose or umbellate; stamens 6; berry globose, 8-12 mm long, 2-4 seeded; larger leaves with only 2 clefts that extend > halfway to the peltate center of the leaf (thus the leaf divided into 2 halves, the other sinuses shallow) ..................................................... 5. Diphypleia
5 Flower solitary; stamens 12-18; berry ovoid, 25-70 mm long, many-seeded; larger leaves with 5 or more clefts that extend > halfway to the peltate center of the leaf (thus the leaf fairly evenly divided into multiple lobes) ..................................................... 6. Podophyllum

1. *Nandina* Thunberg 1781 (Nandina, Sacred-bamboo)

A monotypic genus, a shrub, native of Japan, China, and India. Here treated as a monotypic genus in the Berberidaceae, *Nandina* seems to have only a general kinship to the Berberidaceae (see Ehdai & Russell 1984, Locote & Estes 1989b, Meacham 1980) and should perhaps be placed in its own monotypic family. References: Whetstone, Atkinson, & Spaulding in FNA (1997); Ehdai & Russell (1984); Locote in Kubitzki, Rohwer, & Bittrich (1993).

* Nandina domestica Thunberg, Nandina, Sacred-bamboo. Forests and woodlands in suburban areas, commonly planted, increasingly escaping and naturalizing; native of China. May-June; October-November. *Nandina* has numerous cultivated forms, and is widely planted in the Piedmont and Coastal Plain of our area, especially southward. Leaflet shape varies in cultivated forms from broadly ovate to linear. [= RAB, FNA, K]

2. *Caulophyllum* Michaux 1803 (Blue Cohosh)

*

1 Carpels (in flower) 3.5-5 mm long, averaging 4 mm; style 0.8-1.5 mm long; sepals 6-9 mm long, usually purple; terminal leaflets (5-9) 7-9 (-10) cm long; (4-) 5-7.5 (-8) cm wide; main inflorescence with 4-18 flowers; first leaf 2-terinate or 3-terinate..............................*C. giganteum*
1 Carpels (in flower) 1.3-2.8 mm long, averaging 2 mm; style 0.3-1.0 mm long; sepals 3-6.5 mm long, yellow, yellow-purple, or green; terminal leaflets (3-) 5-7 (-8) cm long; (2-) 3.5-6.5 (-10) cm wide; main inflorescence with 5-70 flowers; first leaf 3-terinate or 4-terinate..............................*C. thalictroides*

**Caulophyllum giganteum** (Farwell) Loconte & Blackwell, Northern Blue Cohosh. Rich forests. April-May; July-August. *C. giganteum* is more northern in distribution than *C. thalictroides*, ranging south to VA, nw. NC, ne. and nc. TN (Chester, Wofford, & Kral 1997), and c. KY. This species blooms about 2 weeks earlier than *C. thalictroides* where they grow together. The combination of sympatry, morphologic distinctness, and phenologic separation of the two taxa argues for recognition at the species level. [= FNA, K, W, Y, Z; < *C. thalictroides* – RAB, F, G, S; = *C. thalictroides* var. giganteum Farwell – C]

**Caulophyllum thalictroides** (Linnæus) Michaux, Common Blue Cohosh, Green Vivian. Rich forests. April-May; July-August. NS, QC, ON, and MB, south to GA, AL, AR, and OK. [= FNA, K, W, Y, Z; < *C. thalictroides* – RAB, F, G, S (also see *C. giganteum*); = *C. thalictroides* var. thalictroides – C]

3. *Berberis* Linnæus 1753 (Barberry)

A genus of 400-600 species, shrubs, of North America, South America, Asia, Europe, and n. Africa. Many authors favor the inclusion of *Mahonia* in *Berberis*. It appears that *Mahonia* is a paraphyletic grade basal to *Berberis* (in the narrow sense) (Kim, Kim, & Landrum 2004). References: Whittmore in FNA (1997); Loconte in Kubitzki, Rohwer, & Bittrich (1993); Kim, Kim, & Landrum (2004).

**Identification notes:** Other species of *Berberis* are used horticulturally in our area. Though none appear to be established at this time, the possibility of encountering species other than the three treated above should be kept in mind. *B. julianae* Schneider is especially commonly planted in hedges and landscaping.

1 Leaves 1-pinnately compound, > 10 cm long, not fascicled on short spur shoots; stems not spiny; leaves evergreen.
2 Bud scales deciduous, 3-8 mm long; leaflet blades 1-3-veined from base.....................................................*B. repens*
2 Bud scales evergreen, 11-44 mm long; leaflet blades 4-6-veined from base.
3 Leaflet blades with 2-7 teeth per side, each tooth 3-8 mm long; leaflets very thick and stiff..............................................................*B. bealei*
3 Leaflet blades with 6-13 teeth per side, each tooth 1-2 (-3) mm long; leaflets thickish, but flexible when fresh........................................*B. nervosa*
1 Leaves simple, < 6 cm long, fascicled on short spur shoots; stems spiny; leaves deciduous or evergreen.
4 Leaves entire; flowers solitary or 2-4 in umbels; spines mostly simple; [section *Tschonoskyanae*]..................................................*B. thunbergii*
4 Leaves bristly-serrate; flowers 5-many in racemes (sometimes the racemes umbelliform); spines mostly trifurcate (some simple or bifurcate).
5 Leaves deciduous, herbaceous; leaf teeth tipped with weak bristles; fruits red, not pruinose
6 Leaves with 1-9 (20) bristles on each margin, the bristles 3-6 mm apart; berries ovoid (6-9 mm long, 6-7 mm broad), 5-10 (rarely more) in an often umbellate raceme; petals notched at apex; [section *Canadenses*]..................................................*B. canadensis*
6 Leaves with 18-36 bristles on each margin, ca. 2 mm apart; berries ellipsoid (8-10 mm long, 4-5 mm broad), 10-20 in a raceme; petals obtuse at apex; [section *Vulgares*]..................................................*B. vulgaris*

* Berberis bealei Fortune, Leatherleaf Mahonia, Chinese Mahonia, Holly-grape. In deciduous forests in suburban areas, spread from plantings; native of China. December-March; May-July. Naturalizing widely in the southeastern United States, including (at least) AL, DE, GA, FL, NC, and SC. [= FNA, WH; = Mahonia bealei (Fortune) Carrière – RAB, K]

* Berberis canadensis P. Miller, American Barberry, Allegheny Barberry. Rocky woods, forest openings, glades, usually over mafic rocks (such as diabase) or calcareous rocks (such as limestone), sometimes along fence-rows in sw. VA (presumably spread by birds). April-May; September-October. A broad Southern Appalachian-Ozarkian endemic, not occurring in Canada (the epithet a misnomer): scattered and local in VA, WV, KY, TN, NC, SC, AL, GA, MO, IL, IN, and sc. PA (where apparently now extirpated). Along with *B. vulgaris*, *B. canadensis* has been subjected to organized eradication programs because of its serving as an alternate host for wheat rust (*Puccinia graminis*). [= RAB, C, F, FNA, G, K, S, W]

* Berberis julianae Schneider, Evergreen Barberry. Seeding down and escaping locally near horticultural plantings; native of China. First reported for NC by Pittillo & Brown (1988). [= K; = *B. julianae*, orthographic variant]
**BERBERIDACEAE**


* Berberis repens Lindley, Creeping Oregon Grape. Suburban woodlands; native of nw. North America. [= FNA; = Mahonia repens (Lindley) G. Don – K] [add to synonymy]

* Berberis thunbergii A.P. de Candolle, Japanese Barberry. Rich forests, old fields; native of Japan. March-April; May-September. This species is immune to wheat rust; it is probably now the most commonly encountered barberry in our area. [= RAB, C, F, G, K, S, W]

* Berberis vulgaris Linnaeus, European Barberry, Common Barberry. Disturbed areas; native of Europe. April; September. This species, once widely cultivated and established in North America, serves as an alternate host to wheat rust and has been subjected to eradication programs for over half a century. It may no longer occur in our area. [= C, F, FNA, G, K]

4. Jeffersonia W. Barton 1793 (Twinleaf)

A genus of 2 species, the only other species of the genus is native to e. Asia (eastern Russia, Korea, Manchuria). The closest North American relatives of *Jeffersonia* are *Achlys* and *Vancouveria* of the Pacific Northwest. References: George in FNA (1997); Stearn (2002) = Y; Loconte & Estes (1989b); Loconte in Kubitzki, Rohwer, & Bittrich (1993).

* Jeffersonia diphylla* (Linnaeus) Persoon, Twinleaf. Moist and extremely nutrient-rich forests, generally over calcareous or mafic rocks (including limestone, dolostone, amphibolite, greenstone, etc.) or very rich alluvium. March-April; May. The species is widespread in ne. United States, south to MD, NC, and AL. It is somewhat suggestive of *Sanguinaria* in both foliage and flower. [= RAB, C, F, G, K, S, W, WV, Y]

5. Diphylleia  Michaux 1803 (Umbrella-leaf)


* Diphylleia cymosa* Michaux, Umbrella-leaf, Pixie-parasol. Seepages and brook-banks, sometimes away from brooks or seeps in northern hardwood or cove hardwood forests (but then usually in subterranean seepage), primarily at moderate to high elevations. May-June; July-August. A narrow Southern Appalachian endemic: high mountains of w. NC and e. TN, extending a short distance into ne. GA, nw. SC, and sw. VA. [= RAB, C, F, G, K, S, W, Y, Z]

6. Podophyllum Linnaeus 1753 (May-apple)

A genus of 2 species (or ca. 14 if *Dysosma* is included), herbs, one in e. North America, the other in e. Asia. The obvious morphological kinship of *Podophyllum*, *Diphylleia*, and *Hydrastis* is corroborated by alkaloid chemistry. References: George in FNA (1997); Shaw (2000, 2002) = Z; Loconte in Kubitzki, Rohwer, & Bittrich (1993).

* Podophyllum peltatum* Linnaeus, May-apple, American Mandrake. Rich forests, bottomlands, slopes, pastures. March-April; May-June. NS west to MN, south to Panhandle FL and TX. The ripe fruits are edible; the rest of the plant contains a variety of alkaloids, and is poisonous-medicinal. Compounds from *Podophyllum* are used in wart removal, and show anti-viral and anti-cancer promise. [= RAB, C, F, G, K, S, W, WV; > P. peltatum var. peltatum – Z; > P. peltatum var. annulare J.M.H. Shaw – Z]

114a. HYDRASTIDACEAE Martinov 1820 (Golden-seal Family) [in RANUNCULALES]

A family of 2 genera and 2 species, perennial herbs, of temperate e. North America and Japan. In chemistry, morphology, and anatomy, *Hydrastis* shows some relationship to *Podophyllum* and *Diphylleia* of the Podophyllaceae (often included in the Berberidaceae). Though usually placed in the Ranunculaceae, Tohe & Keating (1985) present evidence from morphology, anatomy, embryology, palynology, chemistry, and cytology that suggests that *Hydrastis* is best recognized as a monotypic family. They contend that "*Hydrastis* represents a reliclual primitive group which very early diverged from a common ancestral stock of the Ranunculaceae, Berberidaceae and probably of Circaeasteraceae, and that *Hydrastis* has evolved in its own evolutionary line parallel with other lines leading to the modern representatives of these families." In recent papers on
classification of the flowering plants, Thorne (1992) and Reveal (1993a) have also accepted Hydrastidaceae as a distinct family. Toke in Kubitzki & Bayer places Hydrastis with Glaucesis Siebold & Zuccarini in a bigeneric Hydrastidaceae. References: Tamura in Kubitzki, Rohwer, & Bittrich (1993); Wang et al. (2009); Toke in Kubitzki & Bayer (2002).

I. Hydrastis Linnaeus 1759 (Golden-seal)


Hydrastis canadensis Linnaeus, Golden-seal. Mesic, very nutrient-rich forests, with circumneutral soils, over calcareous or mafic rocks such as limestone, amphibolite, and dolostone, sometimes forming large colonies after canopy disturbance such as logging. April; May-June. VT and MN south to w. and c. NC, n. GA, TN, and AR. Exploited for the herbal trade (and still often used as a home remedy in more remote parts of the mountains), though too rare in our area to support economically significant wild collection. The root is bitter in taste and contains several alkaloids. Reported for SC (P. McMillan, pers.comm. 2002). [= RAB, C, F, FNA, G, K, S, W, WV]

114b. RANUNCULACEAE A.L. de Jussieu 1789 (Buttercup Family) [in RANUNCULACEAS]

A family of about 62 genera and 2450 species, herbs, shrubs, and vines, primarily of temperate and boreal regions. Classification of subfamilies and tribes follows Wang et al. (2009); Keener (1977); Tamura in Kubitzki, Rohwer, & Bittrich (1993); Whittemore & Parfitt in FNA (1997); Wang et al. (2009); Tobe in Kubitzki & Bayer (2002). [also see HYDRASTIDACEAE]

Key A

1 Shrub or vine; leaves compound (or sometimes some to most of them simple in Clematis).
2 Leaves opposite, distributed along the usually branched, clambering stem; sepals 4, white to blue or purplish, 10-50 mm long; wood not yellow; [subfamily Ranunculoideae, tribe Anemoneae] ................................................................. 16. Clematis
3 Leaves alternate, clustered together at the top of the usually unbranched, erect stem; sepals 5, maroon, 2-5 mm long; wood yellow; [subfamily Coptidoideae] ........................................................................................................................................ 1. Xanthorhiza

Key C

4 Plants in flower .......................................................................................................................................................................................
5 Plants in fruit .........................................................................................................................................................................................

Key D

4 Plants in  flower .......................................................................................................................................................................................
4 Plants in  flower .........................................................................................................................................................................................

Key A

1 Flowers bilaterally symmetrical, the upper sepal hooded or spurred; [tribe Delphinieae].
2 Upper sepal hooded or helmet-shaped; petals hidden by the sepal; perianth blue or creamy white; stems weak, clambering, reclining, vining, or ascending in a curve ................................................................. 7. Aconitum
3 Upper sepal spurred; petals at least partly exerted from the sepal; perianth blue, pink, white, or greenish; stems strong, erect, normally straight
4 Annual; pistil 1; petals 2, connate; leaf lobes < 1.5 mm wide................................................................................................................................. 8. Consolida
5 Perennial; pistil 3 (-5); petals 4, separate; leaf lobes > 2 mm wide................................................................................................................................. 9. Delphinium

Key B

1 Flowers radially symmetrical, no perianth parts spurred or hooded (except the 5 sepal spurred in Myosurus).
3 Petals present, white or yellow, larger and more conspicuous than the sepal; sepal present, green; [in other words, with a second, green, less conspicuous periand perianth whorl below the largest and colored perianth whorl; note that some Anemone have a calyx-like involucre of 3 bracts subtending each flower]; [tribe Ranunculeae].
4 Basal leaves linear to linear-spatulate, mostly 4-8 cm long, 1-3 mm wide; receptacle elongate, 1-6 cm long (superficially resembling a Plantago inflorescence)................................................................................................................................. 19. Myosurus
5 Basal leaves various, but not as above; receptacle globose to sub-cylindric, mostly < 1 cm long
6 Sepals 3 (-4); petals 7-12; achenes pubescent, beakless; leaves simple, coriaceous, unlobed; [introduced garden plants]....... 18. Ficaria
7 Sepals (3-) 5 (-6); petals typically 5-9 (10 in some "doubled" forms); achenes smooth or variously ornamented with spines, papillae, or tubercles, sometimes also pubescent; leaves various, usually not at once simple, coriaceous, and unlobed; [native or introduced]....... 20. Ranunculus
8 Sepals 3-5 mm long, caducous; stamens white and showy; [tribe Ranunculeae] ................................................................. 17. Trautvetteria
9 Sepals 6-40 mm long, not caducous; stamens not notably white and showy.
10 Leaves opposite, distributed along the stem; style plumose; [tribe Anemoneae] ........................................................................... 16. Clematis
7 Leaves all basal, or with a few alternate or whorled involucrate leaves on the stem; style not plumose.
8 Sepals white, bluish, or blue; basal leaves 3-5 (-7)-lobed; [tribe Anemonieae] .......................... 15. Anemone
8 Sepals yellow, green, or whitish (sometimes marked with purple); basal leaves unlobed, or palmately cleft into 5-11 (-many) segments.
9 Leaves cordate-reniform, unlobed; sepals bright yellow; petals absent; [native, of bogs and marshes]; [tribe Calthaeeae] .......................... 14. Caltha
9 Leaves palmately or pedately lobed or divided; sepals green, greenish, dull yellow, or whitish; petals modified into tubular nectaries; [introduced, rarely persistent or escaped from cultivation].
10 Sepals 5-8, much longer than wide, yellow; cauleine leaves absent, except for the involucre which immediately subdend the flower; [tribe Cimicifugeae] .......................... 12. Eranthis
10 Sepals 3-5, nearly as wide as long, green or maroon; cauleine leaves present; [tribe Helleboraeae] .......................... 11. Helleborus

Key B

1 Fruit a follicle, each carpel with 2 or more ovules.
2 Leaves cordate-reniform, toothed, not lobed or divided; [tribe Calthaeeae] .......................... 14. Caltha
2 Leaves variously palmately or pedately lobed or divided.
3 Carpels 1-3, plants 3-30 dm tall; [native, except Consolida]; [tribe Delphineae].
4 Stems weak, clambering, reclining, or vining .......................... 7. Aconitum
5 Annual; leaf lobes < 1.5 mm wide; [exotic] .......................... 8. Consolida
5 Perennial; leaf lobes > 2 mm wide; [native] .......................... 9. Delphinium
3 Carpels 3-6; plants 1-5 dm tall; [introduced, rarely persistent or escaping].
6 Cauleine leaves absent, except for the involucrre which immediately subdends the fruit; [tribe Cimicifugeae] .......................... 12. Eranthis
6 Cauleine leaves present; [tribe Helleboraeae] .......................... 11. Helleborus
1 Fruit an achene (or dehiscent utricle in Trautvetteria), each carpel with 1 ovule.
7 Leaves opposite, distributed along the stem; style plumose; [tribe Anemonieae] .......................... 16. Clematis
7 Leaves all basall, or with a few alternate or whorled involucrate leaves on the stem; style not plumose.
8 Basal leaves linear to linear-spulate, mostly 4-8 cm long, 1-3 mm wide; receptacle elongate, 1-6 cm long (superficially resembling a Plantago inflorescence); [tribe Ranunculeae] .......................... 19. Myosurus
8 Basal leaves various, but not as above; generally long-petiolate, with an expanded, cordate, 3-lobed, or palmately-lobed blade; receptacle globose to sub-cylindric, mostly < 1 cm long.
9 Fruit a dehiscent utricle; cauleine leaves alternate; [tribe Ranunculeae] .......................... 17. Trautvetteria
9 Fruit an achene; cauleine leaves opposite or whorled (or alternate in Ranunculus).
10 Cauleine leaves opposite or whorled, or reduced to 3 sepal-like involucral bracts immediately subdendting the flower; sepals absent (but in “Hepatica” mimicked by the bracts); [tribe Anemonieae] .......................... 15. Anemone
10 Cauleine leaves alternate; sepals present; [tribe Ranunculeae]
11 Achenes pubescent, beakless; leaves simple, cordate, unlobed; [introduced garden plants] .......................... 18. Ficaria
11 Achenes smooth or variously ornamented with spines, papillae, or tubercles, sometimes also pubescent; leaves various, usually not at once simple, cordate, and unlobed; [native or introduced] .......................... 20. Ranunculus

Key C

1 Leaflets linear, < 1.5 mm wide.
2 Flowers bilaterally symmetrical; [subfamily Ranunculoideae, tribe Delphineae] .......................... 8. Consolida
2 Flowers radially symmetrical.
3 Aquatic; [native]; [subfamily Ranunculoideae, tribe Ranunculeae] .......................... 20. Ranunculus
3 Terrestrial; [alien].
4 Flower lacking involucrre; pistils simple; [subfamily Ranunculoideae, tribe Adonideae] .......................... 6. Adonis
4 Flower closely subtended by a finely dissected involucrre; pistils compound; [subfamily Ranunculoideae, tribe Nigelleae] .......................... 10. Nigella
1 Leaflets broader, rounded, lobed, or toothed.
5 Leaves all cauline, opposite; stems somewhat woody at base; [subfamily Ranunculoideae, tribe Anemonieae] .......................... 16. Clematis
5 Leaves basal and cauleine, the cauleine alternate (or with opposite or whorled involucral bracts).
6 Petals present, conspicuous
7 Flowers danging; petals red, orange with yellow, or blue, spurred; [subfamily Thalictridoideae] .......................... 3. Aquilegia
7 Flowers not danging; petals yellow, not spurred; [subfamily Ranunculoideae, tribe Ranunculeae] .......................... 20. Ranunculus
6 Petals absent or inconspicuous (soon deciduous or altered into a nectary-bearing clavate structure); sepals sometimes petaloid and conspicuous.
8 Sepals petaloid, conspicuous, white (or tinged with pink or green).
9 Involucrre absent, all leaves on the stem alternate; petaloid sepals 5-10, white; [subfamily Thalictridoideae] .......................... 4. Enemion
9 Involucrre of opposite or whorled, leaflike bracts present; petaloid sepals 4-7, 5-20 (-30), white, cream, rose, or green.
10 Basal leaves with 3-5 leaflets, these toothed or incised; petaloid sepals white, cream, rose, or green; [subfamily Ranunculoideae, tribe Anemonieae] .......................... 15. Anemone
10 Basal leaves with > 3 leaflets; these with 0-3 rounded lobes at the tip; petaloid sepals white to pale pink; [subfamily Thalictridoideae] .......................... 5. Thalictrum thalictroides
8 Sepals absent, or inconspicuous in comparison to the stamens or pistils.
11 Leaflets 3; flower solitary; [subfamily Coptidoideae] .......................... 2. Coptis
11 Leaflets many; flowers many, in a panicle or raceme.
12 Inflorescence a raceme; [subfamily Ranunculoideae, tribe Cimicifugeae] .......................... 13. Actaea
12 Inflorescence a panicle; [subfamily Thalictridoideae] .......................... 5. Thalictrum
Key D

1 Fruit a follicle or capsular (or fleshy and berrylike in some Actaea).

2 Mature leaves > 3 dm wide; [subfamily Ranunculoideae, tribe Cimicifugae] ................................................................. 13. Actaea

3 Leaflets linear; [aliens].

4 Flowers in a raceme, not subtended by an involucre; fruit follicular, each with a 1-2 mm long beak; [subfamily Ranunculoideae, tribe Delphinieae] .................................................................................................................. 8. Consolida

5 Flower solitary, subtended by a finely divided involucre; fruit a spherical capsule-like structure composed of 5 or 10 partially connate follicles, each follicle terminated by a linear beak 13-20 mm long; [subfamily Ranunculoideae, tribe Nigelleae] ... 10. Nigella

6 Leaflets broad, rounded; [mostly natives].

7 Follicles borne on stipes, forming an umbel-like cluster; rhizomes yellow or orange; [subfamily Coptidoidae] ............... 2. Coptis

8 Follicles sessile; rhizomes brown or tan; [subfamily Thalictroideae].

9 Follicles 15-31 mm long, with beaks 7-18 mm long ................................................................. 3. Aquilegia

10 Follicles 3.5-6.5 mm long, with beaks 1.5-3 mm long ........................................................................ 4. Enemion

1 Fruit an achene.

7 Leaves divided into numerous linear segments, all of which are < 1 mm wide.

8 Plant aquatic (if leaves divided into numerous linear segments); [subfamily Ranunculoideae, tribe Ranunculeae] ........... 20. Ranunculus

9 Plant terrestrial; [subfamily Ranunculoideae, tribe Anemoneae] ................................................................. 6. Adonis

10 Leaf segments rounded or cleft, > 1 mm wide.

11 Leaves cauline, opposite; [subfamily Ranunculoideae, tribe Anemoneae] ................................................................. 16. Clematis

12 Leaves basal and/or cauline, cauline leaves (if present) alternate (leaflike involucral bracts sometimes present and opposite or whorled).

13 Leaflike involucral bracts present, opposite or whorled.

14 Achenes not ribbed or veined on lateral surfaces; leaf texture moderate to distinctly thick and leathery; [subfamily Ranunculoideae, tribe Anemoneae] ................................................................. 15. Anemone

15 Achenes conspicuously ribbed or veined on lateral surfaces; leaf texture thin, delicate; [subfamily Thalictroideae] ........... 5. Thalictrum thalictroides

16 Leaflike involucral bracts not present.

17 Leaflets 3-many, if many the leaflets typically with teeth, or sharp lobes; [subfamily Ranunculoideae, tribe Ranunculeae] .... 20. Ranunculus

18 Leaflets many, unlobed or typically with 3-9 rounded lobes; [subfamily Thalictroideae] .............................................. 5. Thalictrum

1. Xanthorhiza Marshall 1785 (Yellowroot)


Identification notes: An unmistakable plant, the woody stems usually about knee-high and unbranched, bearing a cluster of pinnate leaves near the tip, and the rhizomes with a bright yellow, staining, bitter-tasting alkaloid.

Xanthorhiza simplicissima Marshall, Yellowroot, Brook-feather. Streambanks and riverbanks. March-May; May-June. NY and se. PA (where only naturalized, according to Rhoads & Klein 1993), south to SC, sw. GA, w. FL, and AL. [= RAB, C, F, S; = Xanthorrhiza simplicissima – S, orthographic variant]

2. Coptis Salisbury 1807 (Goldthread)


Coptis trifolia (Linnaeus) Salisbury var. groenlandica (Oeder) Fassett, Goldthread, Goldenroot. Bogs. May-June. The species ranges from Greenland west to AK, south to NJ, nw. NC, n. IN, IA, and BC; and in e. Asia. Var. groenlandica is the variety in e. North America, northeast to Greenland, and in southern parts of nw. North America; var. trifolia is Alaskan and e. Asian. Whether the varieties are worth recognition is somewhat questionable. Coptis had been reported for NC by many floras (for instance, C, F, G, and S), but the documentation was unknown; its presence in NC has now been confirmed by P. McMillan. The species is distinctive, with neatly trifoliolate leaves, small white flowers on scapes, and yellow roots. [= C; = C. groenlandica (Oeder) Fernald – F, WV; = C. trifolia ssp. groenlandica (Oeder) Hultén – G; < C. trifolia – FNA, K, S]

3. Aquilegia Linnaeus 1753 (Columbine)


Identification notes: When in leaf, somewhat easily mistaken for Thalictrum or Enemion; look for old fruits.

1 Flowers red and yellow; [add other characters]; spurs straight; [native, common] ................................................................. 13. Actaea

1 Flowers blue, purple, mauve, pink, white, or red and yellow; spurs hooked; [alien, rare] ...................................................... 11. C. trifolia
Aquilegia canadensis Linnaeus, Canada Columbine, Eastern Columbine. Forests, woodlands, rock outcrops, especially (though by no means entirely) on calcareous or mafic substrates. March-May. NS, QC, ON, MB, and SK south to Panhandle FL, s. AL, w. TN, c. AR, and se. OK; disjunct in Edwards Plateau, TX. One of our most familiar wildflowers. Disjunct populations in the deep South, in limestone on sw. GA and FL Panhandle, have been described as A. australis or A. canadensis var. australis; they need additional study. [= RAB, C, FNA, G, K, S, W; > A. canadensis var. canadensis – F, Z; > A. canadensis var. coccinea (Small) Munz – F, Z; > A. canadensis – S; > A. australis Small – S; > A. coccinea Small – S; > A. canadensis var. australis (Small) Munz – Z]

* Aquilegia vulgaris* Linnaeus, European Columbine. Disturbed areas; native of Europe. Many varieties have been named; there seems little utility in trying to apply these names to the cultivated plants rarely persistent in our area. [= RAB, C, FNA, G, K; > A. vulgaris varieties – Z]

4. **Enemion** Rafinesque 1820 (Isopyrum)


**Identification notes:** *Enemion* is somewhat superficially similar to the much more common *Thalictrum thalictroides*, with which it sometimes grows, but can be distinguished by the following characters: fruit a follicle (vs. fruit an achene), petaloid sepals 5 (vs. 5-10, usually some at least of the flowers on a plant with 6 or more).

**Enemion biternatum** Rafinesque, Isopyrum, False Rue-anemone. Rich forests, either on natural levees with very nutrient rich sediments or on slopes with underlying mafic rocks. March-April; May. Mainly west of the Appalachians, W. NY, s. ON and MN south to TN and AR; disjunct in the Piedmont and Coastal Plain of VA, NC, and SC, and the FL Panhandle. [= FNA, K; = *Isopyrum biternatum* (Rafinesque) Torrey & Gray – RAB, C, F, G, S]

5. **Thalictrum** Linnaeus 1753 (Meadow-rue)


**Identification notes:** *Thalictrum thalictroides* is superficially similar to *Enemion biternatum*, but can be distinguished by the following characters: fruit an achene (vs. fruit a follicle), petaloid sepalas 5-10 (vs. 5).

1 Sepals petaloid, conspicuous, white (or tinged with pink or green); leaflike involucral bracts present, opposite or whorled; inflorescence an umbel; [section *Anemonella*]...........................................................................................................................................................................................................

1 Sepals absent, or inconspicuous in comparison to the stamens or pistils; leaflike involucral bracts not present; inflorescence a panicle, corymb or raceme.

2 Fruit (achene) scimitar-shaped, borne on a stipe 1.5-4 mm long; flowers perfect; [section *Physocarpum*].

2 Fruit (achene) not scimitar-shaped, not borne on a stipe; flowers unisexual (or sometimes a few or more bisexual).

3 Achene straight on the upper surface, 2.5-4 mm long, borne on a stipe 2.5-4 mm long; inflorescence branches flexuous and divergent at acute angles; [fairly widespread in our area, on a wide variety of moist substrates, especially in the Mountains] .......................

3 Achene straight on the upper surface, 2.5-4 mm long, borne on a stipe 2.5-4 mm long; inflorescence branches flexuous and divergent; [of sandstone rockhouses of Cumberland Plateau of AL, TN, and KY] .........................................................................................................................

4 Leaflets of the stem leaves linear to narrowly lanceolate, oblanceolate or elliptic, (3-) 5-10 (-25) mm long as wide; [section *Leucocoma*] ...........................................................................................................................................................................................................

4 Leaflets of the stem leaves ovate, obovate, or suborbicular, 0.7-3 (-5) mm long as wide.

5 Most of the leaflets with (3-) 4-6 (-9) lobes or teeth; [section *Heterogamia*].

6 Cauline leaf subtending the lowest flowering branch sessile; plant flowering May-July; achenes borne on a 0.7-2.5 mm long stipe.

6 Cauline leaf subtending the lowest flowering branch with a petiole 3-7 cm long; plant flowering March-April; achenes nearly sessile, the stipe non-existent or <0.3 mm long.

7 Largest leaflets < 15 mm wide; stems 10-40 cm tall, reclining ..................................................................................................................

7 Largest leaflets > 15 mm long; stems 30-80 cm tall, erect .....................................................................................................................

8 Leaflet undersurfaces, peduncles, and achenes with stipitate glands or papillae.

9 Anthers 1-3.6 (-4) mm long; stigmas 1.5-4.7 (-6) mm long ...........................................................................................................................................................................................................

9 Anthers 1-3.6 (-4) mm long; stigmas 1.5-4.7 (-6) mm long .................................

Thalictrum cooleyi Ahles, Cooley's Meadowrue, Savanna Meadowrue. Ecotones between calcareous savannas and adjacent swamp forests, shallowly underlain by coquina limestone ("marl"), generally within a few meters of Taxodium ascendens and Liriodendron tulipifera. Late June-early July; August-October. The species is endemic to two small areas, centered around Maple Hill (Pender and Onslow counties, NC) and Old Dock (Columbus and Brunswick counties, NC), with a small disjunct population in Panhandle FL (Walton County), and a small number of ambiguous populations in sw. GA (Dougherty and Worth counties); the GA populations are assigned here for now but may well represent a new taxon. It is associated with a number of other narrow endemic species. The leaflets of basal leaves (winter rosettes) are much broader, resembling the leaflets of other Thalictrum species in length/width ratio. Leaves produced from May on have the very narrow leaves typical of the species. Park (1992) found that Th. cooleyi has the highest chromosome number known in the genus, 2n = 210, a ploidy level of 30× compared to the base chromosome level of 7 in Thalictrum. [= RAB, FNA, GW, K, WH, Z]

Thalictrum coriaceum (Britton) Small, Appalachian Meadowrue, Maid of the Mist. Rich forests. May-July. A Southern and Central Appalachian endemic: MD, VA, and WV south through w. KY and e. TN to w. NC and ne. GA. The roots are bright yellow. A preliminary study concluded that Th. stelecanum B. Boivin is not distinct from Th. coriaceum (Park 1988); further study is needed. Th. stelecanum is alleged to differ in the following ways (and others): plant with long, cordlike rhizomes (vs. stout caudex), terminal leaflets mostly wider than long (vs. mostly longer than wide), achenes curved, 4-6 mm long (vs. less curved, 2.5-4.4 mm long). Park found these characters (and others) to be variable and to occur together within populations. It ranges from s. PA south through MD, e. WV, w. VA to nw. NC. [= RAB, FNA, K; > T. coriaceum – C, F, G, W, WV; > T. stelecanum B. Boivin – C, F, G, W, WV; > T. coriaceum – S; > T. caulephyloides Small – S]

Thalictrum dasycarpum Fischer & Avé-Lallemant, Purple Meadowrue. Forest, woodlands, and prairies. June-July. QC and YT south to PA, KY, TN, AL, MS, LA, TX, NM, AZ, and WA. It has been reported for scattered localities in VA (Harvill et al. 1992). Park (1992) and FNA do not document the occurrence of Th. dasycarpum in VA; substantiation is needed. [= FNA, K] {synonymy incomplete}

Thalictrum debile Buckley, Trailing Meadowrue. Moist to wet forests over limestone. Nw. GA west to e. MS. [= FNA, GW, K, S]


Thalictrum hepaticum Greene, Appalachian Tall Meadowrue. Seepage areas. May-July. PA south to n. GA and se. TN, strictly or primarily in the Appalachians. Plants tentatively placed here have been problematic. Keener (1981) reduced Th. hepaticum Greene to a variety of Th. pubescens, and discussed their distinction. Park (1992) contends that these plants are, indeed, glandular puberulent, and should therefore be reduced to synonymy under Th. revolutum, stating "these are not given varietal status [under Th. revolutum] since this morphological variation in anthers is not correlated with a continuous geographic range. As indicated above, I have located specimens from Georgia, North Carolina, Tennessee, and Pennsylvania which fit the description." As mapped by Keener (1981) Th. pubescens var. hepaticum (Greene) Keener appears as an endemic to the Southern Appalachians; if extended to Pennsylvania, the distribution is still very restricted (and in a phytogeographically plausible manner) compared to either Th. revolutum or Th. pubescens. This entity appears to be closer to Th. pubescens in leaflet shape, sepal length, anther length, and stigma length, and to Th. revolutum in leaflet and petiolule vestiture. More study is needed; the taxon is here provisionally accepted in order to draw attention to the problem. [= T. pubescens var. hepaticum (Greene) Keener – W; < T. polygamum Muhlenberg ex Sprengel – RAB, F, G, S, nomen nudum; < T. pubescens – C, GW, K, WV, < T. revolutum – FNA]

Thalictrum macrostylum Small & Heller, Small-leaved Meadowrue. Moist places, perhaps associated with circumneutral soils, moist to dry ultramafic outcrop barrens (over olivine), tidal freshwater marshes. May-August. Se. VA south and west

**Thalictrum mirabile** Small, Rockhouse Meadowrue. Wet sandstone cliffs, primarily in the Cumberland Plateau (and especially associated with sandstone rockhouses). KY south through TN to n. AL and nw. GA (and additionally cited in FNA as occurring in w. NC). A delicate relative of *T. clavatum*, the inflorescence appears sparser because of the shorter and narrower achenes borne on longer stipes. [= FNA, GW, K, S]

**Thalictrum pubescens** Pursh, Common Tall Meadowrue, Late Meadowrue, King-of-the-meadow. Bogs, marshes, wet forests. May-July. NL (Labrador), NL (Newfoundland), and ON south to GA, SC and MS. [= T. pubescens var. pubescens – W; < *Th. polygonum* Muhlenberg ex Sprengel – RAB, F, G, S, nomen nudum; < T. pubescens – C, GW, K, W, Z; < T. pubescens – FNA]

**Thalictrum revolutum** DC, Skunk Meadowrue. Mesic to dry forests, woodlands, and barrens, over hornblende, greenstone, dolostone, and serpentinitized olivine. May-July. QC and ON south to n. FL, LA, and TX, and scattered southwest to CO, NV, and AZ. The species is normally stipitate-glandular or papillose, but can be glabrous, as accounted for in the key. [= RAB, C, F, G, GW, K, S, W, WH, WV; < *T. revolutum* – FNA]


### 6. Adonis Linnaeus 1753 (Adonis)


### 7. Aconitum Linnaeus 1753 (Monkshood, Aconite)


1. Flowers white, creamy white, or yellowish; basal leaves numerous, large, usually 10-20 cm across, on long, stout petioles; roots fascicled; [section *Lycocotonum*] .............................................................................................................................................................................. *A. reclinatum*

2. Terminal lobe of petal > 2 mm wide; follicles glabrous .................................................................................................................................................................................. *A. acutidens*

3. Spur < 12 mm long; upper bracteoles overlapping the flower, attached 1-4 mm below the flower ........................................................................................................... *C. orientalis*

4. Consolida (A.P. de Candolle) S.F. Gray 1821 (Annual Larkspur)


1. Lower bracts of the inflorescence unlobed or the single lowermost bract with 3 lobes; pistil glabrous; follicle 8-17 mm long.

2. Terminal lobe of petal > 2 mm wide; follicles pubescent ............................................................................................................................. *C. pubescens*

3. Spur < 12 mm long. More than 2 of them with 3 or more lobes; pistil densely pubescent; follicle 12-25 mm long.

4. Lower bracts of the inflorescence unlobed or the single lowermost bract with 3 lobes; pistil pubescent; follicle 12-25 mm long.
RANUNCULACEAE

3  Spur > 12 mm long; upper bracteoles not overlapping the flower, attached 4-20 mm from the flower.
4  Inflorescence with 3 or fewer branches; stems glabrous to sparsely puberulent; follicles 12-25 mm long ............................. C. ajacis
4  Inflorescence with 3 or more branches; stems pubescent; follicles 10-15 mm long ......................................................... C. pubescens

* Consolida ajacis* (Linnaeus) Schur, Rocket Larkspur. Roadside, fields, waste places, disturbed ground; native of Europe. [= FNA, K; = Delphinium ajacis Linnaeus – RAB, F, G, S, WV; = Delphinium ambiguum Linnaeus – C; = Consolida ambigua (Linnaeus) P.W. Ball & Heywood in Heywood & P.W. Ball – W]

* Consolida orientalis* (Gay) Schrödinger, Oriental Larkspur. Disturbed areas, perhaps only a waif after cultivation; native of s. Europe, n. Africa, and w. Asia. [= FNA, K;? C. hispanica (Willk. ex Costa) Greuter & Burdet]


9. *Delphinium* Linnaeus 1753 (Larkspur)


1  Follicles divergent; raceme 0.5-2 (-3) dm long; flowering plants 2-9 (-13) dm tall; flowering March-May; [section Diedropetala; subsection Grumosa].
2  Stems (4.5-) 6-9 (-13) dm tall; flowers (sepals) deep blue; lower stem pubescent; [in sunny or semi-sunny situations, apparently endemic to n. AL] ................................................................................................. D. alabamicum
2  Stems 2-6 dm tall; flowers (sepals) deep bluish purple, pink, or white; lower stem glabrous or nearly so; [usually in deep shade, widespread in our area] ....................................................................................................... D. tricolor
1  Follicles erect; raceme > 3 dm long; flowering plants 5-20 dm tall; flowering May-September.
3  Seeds wing-margined, the surfaces smooth; stem below the inflorescence glabrous; flowering plants 8-20 dm tall; flowering July-September; [section Diedropetala; subsection Exaltata] .................................................................................. D. exaltatum
3  Seeds with prominent transverse ridges; stem below the inflorescence pubescent; flowering plants 2-10 (-15) dm tall; flowering May-July; [section Diedropetala; subsection Firescens].
4  Basal leaves usually present at anthesis; flowers (sepals) white; stems 2-4 (-7) dm tall; ultimate segments of midcauline leaves 5-12 in number; 2-4 mm wide ......... D. carolinianum ssp. calciphilum
4  Basal leaves absent at anthesis; flowers (sepals) blue to purple (rarely white); stems (3-) 6-10 (-15) dm tall; ultimate segments of midcauline leaves 12-25 in number, 0.5-1.5 mm wide ......................... D. carolinianum ssp. carolinianum

* Delphinium alabamicum* Kral, Alabama Larkspur. Limestone prairies and glades. Endemic to c. and n. AL and nw. GA. [= FNA, K]

* Delphinium carolinianum* Walter ssp. calchiphilum M.J. Warnock, Glade Larkspur. Limestone glades. KY south through e. and c. TN to ne. AL and nw. GA. [= FNA, K; < D. virescens Nuttall – C, G; < D. carolinianum var. carolinianum – F; < D. carolinianum – S; < D. virescens var. virescens var. virescens – Z; < D. carolinianum Walter ssp. virescens (Nuttall) R.E. Brooks]

* Delphinium carolinianum* Walter ssp. carolinianum, Prairie Larkspur, Carolina Larkspur, Blue Larkspur. Rocky woodlands, granite outcrops, Altamaha Grit outcrops, blackland prairies, moist sandy woodlands associated with longleaf pine. May-July. IL west to MO, south to LA and TX, with disjunct occurrences eastward in SC, GA, Panhandle FL (Gadsden County), TN, and MS. The flowers are a pale to medium blue. This species has been reported for NC (by C) and “north to Va.” (by F and S). I know of no documentation for its past or present occurrence in NC or VA, but its presence in those states is plausible. [= FNA, K; = D. carolinianum Walter – C, G, WH, Z; < D. carolinianum var. carolinianum – F; < D. carolinianum – S]

* Delphinium exaltatum* Aiton, Tall Larkspur. Dry to moist soils over calcareous (such as dolostone, especially Elbrook Formation) or mafic rocks (such as amphibolite, metagabbro, greenstone, and diabase), usually in the open (as grassy balds) or on forest edges in partial sun. July (low elevations) - September (high elevations). Sw. PA and OH southwest to MO and c. TN, and south to the Mountains of VA and the Mountains and Piedmont of NC. The flowers are a pale to medium blue. [= RAB, C, F, FNA, G, K, S, W, WV, Z]

* Delphinium tricolor* Michaux, Dwarf Larkspur. Rich, moist forests, especially over mafic or calcareous rocks, less commonly (as along the Roanoke River in ne. NC) on very fertile alluvial deposits. March-May. Sw. PA and MN south to NC, nw. GA, AL, and OK. The flowers are variable in color, usually a deep bluish violet, but ranging through pink to pure white. [= RAB, C, F, FNA, G, K, S, W, WV, Z]
10. Nigella Linnaeus 1753 (Fennel-flower)


* Nigella damascena Linnaeus, Love-in-a-mist, Fennel-flower. Cultivated in gardens, rarely persistent or escaping; native of s. Europe. [= C, F, FNA, G, K]

11. Helleborus Linnaeus 1753 (Hellebore, Christmas-rose)


Identification notes: Other species of Helleborus are increasingly being cultivated; all have the potential to naturalize.

1 Primary leaves of mature (fertile) plants all cauline; leaf segments <1.5 cm wide, flowers <3 cm across, >9 per inflorescence .............. H. foetidus
1 Primary leaves of mature (fertile) plants basal (the stem with reduced, bracteal leaves subtending the inflorescence); leaf segments >3 cm wide, flowers >4 cm across, (1-) 3 (-5) per inflorescence ................................................................. H. viridis

Helleborus foetidus Linnaeus, Stinking Hellebore. Cultivated in gardens, seeding down and spreading locally near plantings; native of Europe. December-March. [= K2]

* Helleborus viridis Linnaeus, Green Hellebore, Christmas-rose. Mt (VA, WV), Pd (NC): cultivated in gardens, seeding down, rarely escaped or persistent; rare, native of Europe. December-May. [= C, F, FNA, G, K1, K2, S, WV]

12. Eranthis Salisbury 1808 (Winter-aconite)


13. Actaea Linnaeus 1753 (Baneberry)


Identification notes: In rich coves, Actaea occurs with and is sometimes mistaken for (especially when in vegetative condition) various other superficially similar genera, including Astilbe (Saxifragaceae), Aruncus (Rosaceae), Caulophyllum (Berberidaceae), Angelica and Ligusticum (Apiaceae), Aralia (Araliaceae), and others. The curious evolutionary convergence of leaf morphology (to a 2-3-ternately compound form) of a large number of unrelated genera of Appalachian cove forests is interesting.

1 Plant with leaves only present.
2 Terminal leaflet deeply cordate, mostly >12 cm wide, with 7-9 major veins arising palmately from the base; principal leaves with 3-9 (-17) leaflets; [section Oligocarpae] ........................................................................................................................................ A. rubifolia
Actaea pachypoda

Eliott, White Banberry, Dolls'-eyes, White Cohosh. Rich cove forests and slopes. April-May; August-October. QC and MN south to c. GA, FL Panhandle, s. AL, s. MS, e. LA, and OK. = RAB, F, FNA, K, W, Z; = A. alba (Linnaeus)

Actaea racemosa


Actaea rubifolia

(Kearney) Kartesz, Appalachian Black-cohosh. Rich cove forests over calcareous rocks (limestone or dolostone). August-October. Sw. VA south to e. TN; disjunct in s. IL, w. KY, and nw. TN. This species is alleged by C (1991) to occur in NC, but this is probably an error, based on confusion with Cimicifuga cordifolia Pursh, now considered a form of Actaea racemosa. For this reason, the name Actaea cordifolia used by Compton, Culham, & Jury (1998) does not apply to this taxon. Actaea rubifolia is related to Actaea elata (Nuttall) Prantl of nw. North America. = K; = Cimicifuga rubifolia Kearney – C, FNA, S, W; > C. racemosa var. cordifolia (Pursh) A. Gray – F; misapplied in part; > C. racemosa var. racemosa – F; < C. racemosa – G (also see C. rubifolia); > Actaea racemosa Linnaeus var. racemosa – K, Z; > Actaea racemosa Linnaeus var. dissecta (A. Gray) J. Compton – K, Z

Actaea rubra


14. Calthta Linnaeus 1753 (Marsh Marigold, Cowslip)


Caltha palustris Linnaeus var. palustris, Marsh Marigold, Cowslip. Bogs, wet meadows, seepage swamps, brookbanks. April-June. Caltha palustris is circumboreal, widespread in n. Eurasia and n. North America, south in e. North America to e. VA, w. NC, ne. TN, WV, IN, IL, IA, and NE. Caltha palustris is polymorphic; one or more additional varieties (some of them sometimes recognized as separate species) are more northern. Eastern North American material is apparently uniformly 2n=32 (Keener 1977). = G, GW, K; < C. palustris – RAB, C, F, FNA, S, W; C. palustris var. flabellifolia (Pursh) Torrey & A. Gray

15. Anemone Linnaeus 1753 (Anemone)

A genus of about 140-200 species (depending on circumscription), perennial herbs (rarely shrubs), of Eurasia, North America, Central America, South America, and Africa. Hoot, Reznicek, & Palmer (1994) discuss the phylogeny of Anemone, and also
suggest that *Hepatica* be included within it. References: Dutton, Keener, & Ford in FNA (1997); Keener, Dix, & Dutton (1996); Tamura in Kubitzki, Rohwer, & Bittrich (1993); Steyermark & Steyermark (1960)=Z; Ziman et al. (2004)=Y.

1 Basal leaves lobed but not fully divided into 3 or more leaflets; [subgenus *Anemodium*].
2 Leaves lobed, and also toothed and variously cleft; leaves not variegated; [section *Anemodium*]................................. *A. canadensis*
3 Leaves 3-7 lobed, the lobes acute, the primary sinuses deep, over halfway to the petiole (the middle lobe 70-90% of the total length of the leaf blade); involucral bracts acute ................................................................. *A. acutiloba*
4 Leaves 3-lobed, the lobes broadly rounded, the primary sinuses less deep, about halfway to the petiole (the middle lobe 50-70% of the total length of the leaf blade); involucral bracts obtuse................................................................. *A. americana*

1 Basal leaves compound, fully divided into 3 or more leaflets.
4 Stem branched, 4-11 dm tall, bearing 2 or more flowers; involucral bracts petiolate; [subgenus *Anemone*; section *Anemone*; group *Multipeda*].
5 Base of involucral bracts usually truncate to subtruncate, sometimes reniform or cordate, terminal leaflets deep green, margins proximally concave- to straight-sided, distally incised, thinly pubescent; anthers typically < 0.8-1.2 (-1.5) mm long; heads of achenes more or less ovoid-cylindric, 8-10 (-11) mm in diameter ................................................................. [*A. virginiana var. alba*]
6 Base of involucral bracts cordate or reniform, rarely subreniform, terminal leaflets light green, margins proximally mostly straight- to convex-sided, variously lobed or serrate, variously pubescent; anthers typically > (0.9-) 1.1-1.5 (-1.7) mm long; heads of achenes ovoid to ovoid-cylindric, (9-) 10-12 (-14) mm in diameter ................................................................. *A. virginiana var. virginiana*

4 Stem unbranched, 0.5-4 dm tall, bearing 1 flower.
6 Sepals (5-) 8-20, cream-white, violet, blue, pink, or green; involucral leaves sessile; [subgenus *Anemone*; section *Anemone*; group *Coronaria*].
7 Stem densely pubescent above and below the involucr; involucre above the midpoint of the stem at anthesis; plant from a globose, vertically oriented bulb; involucral leaflets linear, (1.5-) 3-6 cm long, 1-4 (-6) mm wide; achene bodies > 2.7-3.5 mm long ....................

A. berlandieri
8 Sepals 5 (8), white; involucral leaves petiolate, the leaflets ovate, obovate, elliptic, lanceolate, or oblanceolate 2-8 cm long, 8-30 mm wide; [subgenus *Anemonantha*, section *Anemonantha*, series *Quinquefoliae*].
9 Ovaries and achenes with hairs 0.1-0.2 mm long; terminal leaflet broadest at or below the middle (lanceolate or ovate), serrate or serrate only above the middle; sepals 15 mm or more long ........................................................................................................... *A. lancifolia*
10 Ovaries and achenes with hairs 0.5-1.0 mm long; terminal leaflet broadest at or above the middle (elliptic, oblanceolate, or obovate), serrate only above the middle; sepals < 15 mm long.
11 Achene bodies 2.5-3.0 mm long; lateral leaflets of radical leaves toothed only (rarely lobed); terminal leaflet usually broadest at the middle; styles 0.5-1 mm long; sepals about 8 mm long .................................................................................................................... *A. minima*
12 Achene bodies 3.0-4.5 mm long; lateral leaflets of radical leaves lobed or cleft (sometimes only toothed); terminal leaflet usually broadest above the middle; styles 1-2 mm long; sepals 6-15 mm long........................................................................................................... *A. quinquefolia*


*Anemone americana* (A.P. de Candolle) H. Harv, Round-lobed Hepatica, Round-lobed Liverleaf. Moist forests. February-May. NS, s. QC, s. ON, and MB south to Panhandle FL, AL, MS, and AR. The two taxa of "Hepatica" seem entirely distinct in our area; they are described as hybridizing freely or merging indistinguishably in other parts of their ranges. They are also both closely related to the European *H. nobilis* P. Miller. Steyermark & Steyermark (1960) chose to treat the three entities as varieties of *H. nobilis*. I prefer to retain them at the specific level. [= FNA, WH, WH; = Hepatica americana (A.P. de Candolle) Ker-Gawler – RAB, C, F, G, W, WV, = Hepatica nobilis P. Miller var. obtusa (Pursh) Steyermark – K, Z, = Hepatica hepatica (Linnaeus) Karsten – S]

*Anemone berlandieri* Przetl, Eastern Prairie Anemone, Ten-petal Anemone. Thin, circumneutral soils around rock outcrops, calcareous hammerocks (in FL). March-April. *A. berlandieri* and *A. caroliniana* have been much confused in florals; see Joseph & Heimbarger (1966) for clarification. *A. berlandieri* is primarily a species of midwestern prairies, occurring from n. AR and s. KS south through OK to c. LA and s. TX; disjunct eastwards in AL, c. GA, n. FL, c. NC, c. SC, and sc. VA. It reaches its northeastern limit (and only VA occurrence) at calcareous mudstone cliffs on the Banister River in Pittsylvania County, VA; it is scattered in the Piedmont of NC on a variety of rock types, including mafic meta-argillite and plagioclase-rich granite. [= FNA, K, WH, < A. caroliniana Walter – RAB, C, F, G, S, W; ? A. heterophylla Nuttall ex Torrey & Gray; < A. decapetala Arduino, misapplied (a South American species)]

*Anemone blandia* Schott & Kotschy, Greek Anemone. Reported by Harvill et al. (1992) from Madison County, VA and for Faquier County, VA by Shetler & Orli . It is not known whether this species is established in our area. [make sure this is not a misidentified specimen of *A. berlandieri* – see FNA p. 140] [= FNA, K] [not yet keyed; not mapped; rejected]

*Anemone candelensis* Linnaeus, Canada Anemone. Moist forests. May-August. QC west to AB, south to MD, w. VA, s. WV, e. TN (Chester, Wofford, & Kral 1997), KY, MO, and NM. [= C, F, FNA, G, K, W]

*Anemone caroliniana* Walter, Prairie Anemone, Carolina Anemone. Clayey soils of post oak and blackjack oak woodlands (firedell soils), wet woodlands. Ranging primarily in the Midwest, north in the Southeast to disjunct locations in c. and sc. GA, c. SC, c. TN (Chester, Wofford, & Kral 1997), and sc. NC. [= FNA, K, < A. caroliniana Walter – RAB, C, F, G, S, W (also see A. berlandieri)]


Identification notes: Additional species of Clematis, of Asian or European origin, are cultivated as ornamentals and might be encountered.

1 Flowers numerous, in compound cymose-paniculate inflorescences; sepals white; filaments glabrous; [subgenus Clematis].

2 Flowers perfect, with 5-10 carpels; anthers 1.5-3 mm long; leaf margins entire (rarely cleft); leaflets (3-) 5 (-7); [alien, in disturbed areas].

3 Leaves 3-foliolate; pistillate flowers with 18-35 carpels ........................................................................................................ C. virginiana

4 Leaves (most or all of them) simple, sessile or subsessile; plant an erect herb to 7 dm tall; [subgenus Clematis].

5 Leaves glabrous and glaucous beneath, the uppermost completely pinnate and tendril-bearing ........................................ C. addisonii

6 Leaves of flowering material soft-pubescent beneath, the largest 3.5-11 cm wide, with stomates on the lower surface only; leaves of flowering material usually light green with the secondary and tertiary veins forming prominent reticulations on the upper surface. [of shale barrens and calcareous woodlands of W. VA] ........................................................................ C. ochroleuca

7 Stems and leaves usually densely sericeous-woolly; leaf blades 0.2-2.5 (-3.5) cm wide, not notably reticulate on the upper surface; [of wet pinelands of N. FL southwards] ................................................ C. baldwinii

8 Sepals tips obtuse to acute; achene bodies pilose throughout; [of shale barrens of W. VA and WV].

9 Leaf blades 0.2-2.5 (-3.5) cm wide, not notably reticulate on the upper surface; [of wet pinelands of n. FL southwards] ........................................................................................................ C. baldwinii

10 Leaf blades 3.5-11 cm wide, prominently reticulate on the upper surface; [of shale barrens of W. VA and WV].

11 Sepals thin in texture, 3-5 cm long, soft-villous, neither apically recurved nor with broad, strongly crisped margins; leaves 3-foliolate; [subgenus Atractogene] ........................................................................................................ C. occidentalis var. occidentalis

12 Sepals thick in texture, 1-3 cm long, short-sericeous, apically recurved; leaves 1-11-foliolate; [subgenus Viorna].
12 Lower surface of leaves glaucous and glabrous (rarely with a few scattered hairs).
13 Plant an erect or ascending herb; lower leaves simple, upper leaves simple to 2-6-foliolate; [of dry limestone glades, endemic to VA] ......................... C. addisonii
13 Plant a climbing vine; all leaves generally compound, often 6-10-foliolate; [of various habitats, ranging from NC south].
14 Leaf blade thin in texture; secondary and tertiary veins not prominently reticulate. [C. glaucoaphylla
14 Leaf blade leathery in texture; secondary and tertiary veins prominently reticulate; [in the Ridge and Valley of eastern TN and westward] ......................... C. versicolor

12 Lower surface of leaves not glaucous, pubescent (rarely nearly glabrous).
15 Plants erect, to 2-3 (-5) dm tall, forming clonal patches by underground rhizomes; leaflets linear-lanceolate, averaging ca. 10+ as long as wide .............................................................. C. sociatis
15 Plants viny, sprawling or climbing, the stems usually over 1 m long, not rhizomatous-clonal; leaflets generally broader.
16 Leaves coriaceous, the secondary and tertiary veins forming prominent reticulations on the upper surface.
17 Leaf blade coarsely reticulate-veined, the ultimate closed areoles mostly > 2 mm long in the longer dimension, the tertiary and quaternary veins not prominently raised; achene beak sparsely pubescent to silky, with ascending or appressed hairs.............. C. pitcheri var. pitcheri
17 Leaf blade finely reticulate-veined, the ultimate closed areoles mostly < 2 mm long in the longest dimension, the tertiary and quaternary veins often prominently raised; achene beak plumose, with spreading hairs .............................................. C. reticulata
16 Leaves membranous, the secondary and tertiary veins forming faint, indistinct reticulations on the upper surface.
18 Sepals 2.5-5 cm long, the tips widely spreading, the upper margins thin, crisped, to 6 mm wide; peduncles usually without bracts ......................................................... C. crispa
18 Sepals 1.5-3 cm long, the tips either abruptly and shortly recurved (C. viorna) or spreading to short-reflexed (C. morefieldii), the upper margins not thin or crisped, to 2.5 mm wide; peduncles usually with bracts.
19 Stems with cobwebby pubescence; bracts near the base of the peduncle; sepals densely silky-pubescent on the outer surface, pinkish-green; [limestone habitats of n. AL and se. TN] .......................................................... C. morefieldii
19 Stems glabrous to sparsely pilose; bracts well above the base of the peduncle; sepals sparsely pubescent on the outer surface, pale lavender to purple; [widespread in our area] .................................................................................. C. viorna


Clematis albica S. Watson. Calcareous flatwoods. E. MO, s. MO, nc. KS and sc. NE; disjunct in the Ridge and Valley of nw. GA (Floyd County) and se. TN; Hamilton County. See Anonymous (2003) and Horn & Shaw (2007) for additional information. [= FNA, K; = Coriflora albica (S. Watson) W.A. Weber]

Clematis baldwinii Torrey & A. Gray, Pine-hyacinth, Flatwood Clematis. Wet pine flatwoods. April-August. Ne. FL south to s. FL. [= FNA, GW, WH; = Clematis baldwinii var. baldwinii – K2; = Clematis baldwinii var. lattisscula R.W. Long – K2; = Viorna baldwinii (Torrey & A. Gray) Small – S; = Coriflora albica (Torrey & A. Gray) W.A. Weber] [not yet keyed]

Clematis catesbyana Pursh, Coastal Virgin's-bower, Satin-curts. Dunes and interdune swales with abundant shell hash, calcareous woodlands and thickets, calcareous hammocks. July-September. Se. VA south to c. peninsular FL and west to LA, and inland especially in calcareous parts of c. TN and n. AR and s. MO, as well as in the Ridge and Valley of VA and disjunct at Linville Caverns, McDowell County, NC, where on dolomite in a geologic window in the Blue Ridge. [= C, FNA, GW, K, WH; = Clematis ligusticifolia Nutall – RAB, misapplied; = Clematis catesbyana – S; = Clematis micrantha Small – S]

Clematis coactilis (Fernald) Keener, Virginia White-haired Leatherflower. Shale barrens, shaly woodlands, dry calcareous barrens and woodlands. May-June. Endemic to w. VA (Botetourt, Craig, Giles, Montgomery, Pulaski, Roanoke, and Wythe counties). [= C, FNA, K, Wh; = Clematis albica (Wherry) var. coactilis Fernald – F; = Coriflora species I]

Clematis crispa Linnaeus, Marsh Clematis, Southern Leatherflower, Blue Jasmine. Marshes, swamps, floodplain forests, disturbed wet or moist areas. April-August. Widespread in Southeastern United States, FL to TX, north to se. VA and s. IL. [= RAB, C, F, FNA, G, GW, K, Wh; = Viorna crispa (Linnaeus) Small – S; = Coriflora crispa (Linnaeus) W.A. Weber]

Clematis fremontii S. Watson. Calcareous flatwoods. E. MO, s. MO, nc. KS and se. NE; disjunct in the Ridge and Valley of nw. GA (Floyd County) and se. TN (Hamilton County). See Anonymous (2003) and Horn & Shaw (2007) for additional information. [= FNA, K; = Coriflora fremontii (S. Watson) W.A. Weber]

Clematis glaucoaphylla Small, White-leaved Leatherflower. Wet hammocks, habitat in our area poorly known, also probably in dry woodlands or openings over calcareous rocks, according to RAB in "rich woods". May-September. Widespread in Southeastern United States, from se. TN and OK, south to FL Panhandle and LA, but apparently rare and poorly known. Previous attributions of this species for NC, SC, KY, and (perhaps) VA appear to be based on misidentifications. [= RAB, C, F, FNA, G, GW, K, WH; = Viorna glaucoaphylla (Small) Small – S; = Coriflora glaucoaphylla (Small) W.A. Weber]

Clematis morefieldii Kral, Morefield's Leatherflower. Limestone habitats. Endemic to nc. AL and se. TN. See Estes & Fleming (2006) for additional information. [= FNA, K; = Coriflora morefieldii (Kral) W.A. Weber]
RANUNCULACEAE

**Clematis occidentalis** (Hornemann) A.P. de Candolle var. occidentalis, Purple Clematis, Mountain Clematis. Rocky slopes over mafic rocks (greenstone, amphibolite), known positively in NC only from amphibolite peaks in Ashe County. May-June. Var. occidentalis is widespread in NE. North America, from NB west to w. ON, south to NJ, DE, OH, nw. IL, and ne. IA, and in the mountains to w. VA and w. NC. Two other varieties occur in the Rocky Mountains. Fernald's var. cacuminis, published under *C. verticillaris*, described plants from the mountains of VA and NC; it is apparently merely a form based on material in early flower (Pringle 1971). [= FNA, K; < *Clematis verticillaris* A.P. de Candolle – RAB, G; < *Clematis occidentalis* – C, W; > *Clematis verticillaris* var. verticillaris – F; > *Clematis verticillaris* A.P. de Candolle var. cacuminis Fernald – F; < *Atragene americana* Sims – S]

**Clematis ochroleuca** Aiton, Curlyheads. Dry woodlands and woodland borders, generally over mafic or calcareous rocks, such as diabase, gabbro, or calcareous siltstone. April-June. Primarily Piedmont: C. MD south to ec. GA; disjunct on Long Island, NY. [= RAB, C, F, FNA, G, K, W; = *Viorna ochroleuca* (Aiton) Small – S; = *Coriflora ochroleuca* (Aiton) W.A. Weber] **Clematis pitcheri** Torrey & A. Gray var. pitcheri, Bellflower Leatherflower. Limestone glades and barrens. April-October. IN, IL, IA, and e. NE south to w. KY, c. TN, ne. MS, AR, TX, and NM. [= FNA, K; < *Viorna pitcheri* (Torrey & A. Gray) Britton – S]

**Clematis reticulata** Walter. Dry, sandy woodlands, such as longleaf pine sandhills and dry hammocks. May-August. Se. SC south to c. peninsular FL, west to TX, and north in the interior to TN and AR. [= RAB, FNA, K, WH; = *Viorna reticulata* (Walter) Small – S; = *Coriflora reticulata* (Walter) W.A. Weber]


**Clematis versicolor** Small ex Rydberg, Pale Leatherflower. Calcareous barrens. June-August. Sc. KY, c. TN, nc. AL; Ozarks and Ouachitas of s. MO, n. and c. AR, and e. OK south into c. TX. [= FNA, K; = *Viorna versicolor* (Small ex Rydberg) Small – S; = *Coriflora versicolor* (Small ex Rydberg) W.A. Weber]

**Clematis viorna** Linnaeus, Northern Leatherflower, Vase-vine. Mesic forests, woodlands, thickets, especially over mafic rocks. May-September. PA, IL, and MO south to GA, AL, MS, and AR. [= RAB, C, F, FNA, G, K, W; > *Viorna beadlei* (Linnaeus) Small – S; > *Viorna flaccida* (Small) Small – S; > *Viorna gattingeri* (Small) Small – S; > *Coriflora viorna* (Linnaeus) W.A. Weber; > *Coriflora beadlei* (Small) W.A. Weber]

* **Clematis virginiana** Linnaeus, Virgin's-bower. Moist forests, thickets, and openings. July-September. Noca Scotia, ON and MB, south to c. peninsular FL and TX. Vegetatively, this species can be distinguished from *C. viorna* and *C. crispa* (the other common and widespread species in our area) by its leaves with three relatively symmetrical leaflets (vs. leaves with 3-many irregular leaflets). [= RAB, C, FNA, GW, K, S, WH; ? *C. virginiana* var. virginiana – G]

* **Clematis vitalba** Linnaeus, Traveler's Joy. Disturbed areas, persistent after cultivation; native of e. Asia. Reported for Baltimore County, MD (Kartesz 2010). [= FNA, K2] [not yet keyed]

**Clematis viticaulis** Steele, Millboro Leatherflower. Shale barrens and shaly woodlands. May-June. Endemic to w. VA (Augusta, Bath, and Rockbridge counties). [= C, F, FNA, G, K, W; = *Coriflora viticaulis* (Steele) W.A. Weber]

* **Clematis viticella** Linnaeus, Italian Clematis. Disturbed areas, persistent after cultivation; native of Europe. Reported for TN (Pringle in FNA 1997). [= FNA, K; *Viticella viticella* (Linnaeus) Small] [not yet keyed]

1 Basal leaves deeply (over halfway to nearly all the way to the petiole) 5-9-lobed, the lobes oblanceolate, membranous (to fairly stiff when growing in an exposed setting), each lobe further divided into 2-4 lobules, the margin regularly crenate/dentate, venation highly reticulate; cauline leaves unlobed to shallowly 3-5-lobed, lobes deltoid; [endemic to Ridge and Valley of TN].................................................................................................................................................... T. caroliniensis

Trautvetteria caroliniensis (Walter) Vail, Tassel-rue, False Bugbane. Streambanks, seepages, grassy balds, moist forests, swamp forests, very rarely in calcareous longleaf pine savanna ecotones. Late May-July. Sw. PA and KY to GA, AL, and Panhandle FL, primarily in the Southern and Central Appalachians, disjunct on calcareous sites in AR (Sundell et al. 1999), e. TX (Floden 2011), IN, IL, and MO. The discovery of this species in the edge of a calcareous savanna (Camp Branch Savanna, Brunswick County, NC) in the outer Coastal Plain was surprising; the small population has since apparently been destroyed by intensive silvicultural practices. T. nervata Greene, named from the Coastal Plain of s. GA, needs additional evaluation (Floden 2011); the type specimen is striking in its deeply and multiply divided leaf segments. [= G, S, Z; < T. caroliniensis – RAB, F, FNA, GW, W, WV; = T. caroliniensis var. caroliniensis – C, K; > T. nervata Greene

Trautvetteria species 1. Dolomitic fens. Endemic (so far as known) to Claiborne County, ne. TN.

18. Ficaria Schaeffer 1760 (Lesser Celandine)


1 Leaves up to 8 cm long and 9 cm wide; petioles up to 28 cm long; petals 17-26 mm long, 4-15 (-18) mm wide; achenes 3-5 mm long, 2-3.5 mm wide.
2 Stem robust and erect; bulbils absent in leaf axils after flowering; petals 9-15 (-18) mm wide......................F. verna ssp. chrysocephala
2 Stem rather robust, but straggling; bulbils present in leaf axils after flowering; petals 4-12 mm wide......................F. verna ssp. ficariformis
1 Leaves up to 4 cm long and 4 cm wide; petioles up to 15 cm long; petals 6-20 mm long, 2-9 mm wide; achenes 2.5-3.5 mm long, 1.7-2.2 mm wide.
3 Leaves crowded at base with few on short stems; petiole to 10 cm long; petals 2.5-6 mm wide......................F. verna ssp. calthifolia
3 Leaves less crowded at base and more numerous on the elongating stem; petiole to 15 cm long (at least some on a plant > 10 cm long); petals 2-9 mm wide.
4 Bulbils not present in leaf axils after flowering; achenes well-developed; petals 4-9 mm wide......................F. verna ssp. fertilis
4 Bulbils present in leaf axils after flowering; achenes poorly developed (rarely fertile, and then only several per flower); petals 2-5 mm wide


**385**

- C, F, FNA, G; ‹ R. ficaria var. bulbifera Marsden-Jones – K; = Ranunculus ficaria Linnaeus ssp. ficariiformis (F.W. Schultz) Rouy & Foue. – Z]  

19. **Myosurus** Linnaeus 1753 (Mousetail)


**Myosurus minimus** Linnaeus, Mousetail. Usually in disturbed areas, such as fields in floodplains. March-May. The species is circumboreal and also found in various places in the Southern Hemisphere. Widely distributed in North America, Eurasia, and the Southern Hemisphere. A number of subspecies have been described; if these are recognized, our material is the typic ssp. minimus. The pre-Columbian occurrence of Myosurus in our area is uncertain; it may well be an alien, early introduced from sc. North America. [= RAB, C, F, FNA, G, GW, K, S; > M. minimus ssp. minimus – Z]

20. **Ranunculus** Linnaeus 1753 (Buttercup, Crowfoot, Spearwort)

A genus of about 600 species, perennial and annual herbs, nearly cosmopolitan (most diverse in temperate and boreal regions of the Northern Hemisphere). The subgenera are distinctive and have often been recognized at the generic level; two are represented in our area (after removal of Ficaria as a separate genus). Distributions given in many works (including Harvill et al. 1992) for the *R. hispidus* complex are apparently garbled by differences in taxonomic concepts. I am here following Duncan's (1980) taxonomic entities, though some of his varieties as species. References: Whittemore in FNA (1997); Duncan (1980)=Z; Keener (1976)=Y; Keener & Hoot (1987)=X; Paun et al. (2005); Tamura in Kubitzki, Rohwer, & Bittrich (1993).

**Identification notes**: Mature or relatively mature achenes are necessary for the identification of some species. Shape and pubescence of the receptacle is also a frequently used taxonomic character, best judged by stripping off the achenes.

1 Petals dull, white; achenes roughly transverse-ridged; plants aquatic, the leaves finely dissected to merely shallowly lobed; [native, occurring in circumboreal waters]; [subgenus *Batrachium*] ................................................................................................................. Key A
2 Petals shiny, yellow (sometimes fading or bleaching to white); achenes usually not transverse-ridged (though often variously ornamented); plants aquatic or terrestrial, the leaves various; [native or introduced, occurring in various habitats]; [subgenus *Ranunculus*].
3 Cauline leaves all simple, mostly lanceolate, either entire, denticulate, or serrate, but not lobed or deeply divided; [native, occurring in marshes or other wetlands]; [section *Flammula*] ............................................................................................................................... Key B
4 Cauline leaves (at least most them) lobed, divided, or compound; [native or introduced, occurring in various habitats].
5 Basal leaves mostly deeply parted or compound, the cauline leaves generally similar but smaller and often less divided; achenes various, 1-5 mm long, with or without pronounced marginal rims; petals 1.5-6.5 mm long; [native, occurring in mesic to dry forests and woodlands, and also (especially *R. abortivus*) weedy]; [section *Epirotes*] .................................................................................................................. Key C
6 Basal leaves not divided, mostly cordate, reniform, or ovate (and merely toothed), distinctly unlike the deeply divided cauline leaves; achenes turgid, ovoid, 1-2.5 mm long, without pronounced marginal rims; petals 1.5-6.5 mm long; [native or introduced, occurring in various habitats]; [section *Echinella*] ............................................ Key D
7 Achenes markedly spiny, papillose, or tuberculate (the protuberances few and small in *R. sardous*, keyed both here and below); [introduced, usually weedy and in disturbed habitats]; [section *Echitella*] .................................................................................. Key E
8 Achenes smooth (rarely pubescent or papillose); [native or introduced, occurring in various habitats].
9 Achenes turgid, 1-1.5 (-2) mm long, the marginal rims scarcely or not at all evident, the achenes corky-thickened at their bases for dispersal by floating; [of mucky marshes or ditches, or aquatic in pools]; [section *Hecatonia*] .................................................................................. Key F
10 Achenes moderately turgid or flattened, 1.5-3.8 mm long, with a pronounced (at 10× or more) marginal rim appearing as a differentiated border or flange, more-or-less flattened, and separated from the central bulge of the achene by a concavity or even a groove, the achenes not coryck-thickened at their bases; [of mostly terrestrial or in bottomland forests]; [section *Ranunculus*] ......... Key G

**Key A – subgenus *Batrachium* (White Water Crowfoots)**

1 Leaves floating, shallowly lobed; receptacles glabrous ............................................................ *R. hederaceus*
2 Leaves firm (not collapsing when removed from water); free petals much shorter than the dilated stipular base; leaves usually much shorter than the internode above; achene beaks 0.7-1.5 mm long .... *R. longirostris*

**Key B – subgenus *Ranunculus*, section *Flammula* (simple-leaved buttercups) (Spearworts)**

1 Petals 1-3 (-5), 1-2 mm long, about as long as the sepals; annual .................................................. *R. pusillus*
Key C – subgenus Ranunculus, section Epirotes

1 Petals 4-5.9, distinctly longer than the sepals; annual or perennial.
2 Cauline leaves 6-14 cm long; sepals 4-7 mm long; achene beak 1.0-1.3 mm long ...................................................... R. ambiguens
2 Cauline leaves 1-6.5 cm long; sepals 1.5-4 mm long; achene beak 0.1-0.6 mm long.
3 Cauline leaves linear, < 1 mm wide; achenes 1.2-1.6 mm long .......................................................... R. flammula var. reptans
3 Cauline leaves ovate to lanceolate, 4-24 mm wide; achenes 0.8-1.0 mm long ...................................................... R. lasticculus

Key D – subgenus Ranunculus, section Echinella

1 Flowers sessile, opposite the petioles; sepals 3; petals 3 ........................................................................................................ R. platensis
1 Flowers pedunculate, axillary; sepals usually 5; petals usually 5.
2 Petals 1-2 (-3) mm long; receptacles glabrous ................................................................................................. R. parviflorus
2 Petals (3-) 4-12 mm long; receptacles pubescent.
3 Achenes bodies 1.5-3 mm long, 30-60 per head; achene beak ca. 0.5 mm long; achene with conical protuberances or short spines, to 0.16 mm long; achene beak 0.1-0.5 mm long.
4 Achenes with a few conical protuberances; petals 5-12 mm long; plant sparsely to densely hirsute; achenes 30-40 per head .............. R. sardous
4 Achenes with numerous short spines; petals (3-) 4-5 mm long; plant with a few, widely scattered, long hairs; achenes 40-60 per head..
5 Achenes 3-5 mm long, 4-20 per head; achene beak 1.5-3.0 mm long; achene conspicuously spiny, the longer spines mostly 0.30-0.85 mm long.
5 Achenes 4-9 per head, in a single whorl; achene margins spiny, as also the faces; beak of the achene 2.5-3 mm long.............. R. arvensis
5 Achenes 10-20 per head, in several whorls; achene margins smooth, the spines restricted to the faces; beak of the achene 1.5-2.5 mm long............................................................. R. micranthus

Key E – subgenus Ranunculus, section Hecatonia

1 Petals 6-14 mm long; achene body 1.3-2.5 mm long, the beak 0.7-1.5 mm long; plants with submersed leaves dissected into numerous linear segments; [aquatic] ........................................................................................................... R. flabellaris
1 Petals 2-4 (-5) mm long; achene body 0.8-1.2 mm long, the beak 0-0.1 mm long; plants without distinctive, dissected submersed leaves; [terrestrial or semi-aquatic] .................................................................................. R. scleratus var. scleratus

Key F – subgenus Ranunculus, section Ranunculus

1 Petals 2-6 mm long, about as long as the sepals.
2 Basal leaves simple; achene beak strongly hooked ................................................................. R. recurvatus var. recurvatus
2 Basal leaves 3-foliate; achene beak straight or nearly so.
3 Petals 4-6 mm long, 3.5-5 mm wide; achene beak 1.0-1.2 mm long; [WV northwards] .................................................................. R. macounii
3 Petals 2-4 mm long, 1.25 mm wide; achene beak 0.6-0.8 mm long; [widespread] ......................................................................... R. pensylvanicus
1 Petals 5-15 mm long, (1.3-) 1.5× or more as long as the sepals; achene beak straight, flexuous, slightly curved, or hooked, 0.2-3.0 mm long.
4 Achene beaks recurved or hooked, the stigmatic surface elongate, along the upper (curved) side of the style (beak) (visible at 10×): [introduced, usually weedy in disturbed habitats].
5 Stems erect, not rooting at the nodes ................................................................. R. repens
5 Stems erect, not rooting at the nodes.
6 Petals 5-8 mm long; plant a soft-based annual; achene face usually with at least a few conical protuberances (if examined carefully at 10× or more) ................................................................. R. sardous [of section Echinella]
6 Petals 8-16 mm long; plant a cormose or hard-based perennial; achene face truly smooth.
7 Sepals spreading; stems not cormose-thickened at the base; larger leaves appearing (3-) 5-parted, all of the segments sessile; plant to 12 dm tall ................................................................. R. acri
7 Sepals tightly reflexed; stems cormose-thickened at the base; larger leaves pinnately 3-5-parted; terminal segment long-stalked; plant to 6 dm tall ........................................................ R. bulbosus
4 Achene beaks straight or slightly curved, flexuous, the stigmatic surface limited to the tip of the style (beak); [native, normally in more-or-less natural habitats].
8 Larger leaves mostly pinnately 3-7-foliate, the terminal leaflet larger than the lateral leaflets, the leaflets (especially the terminal) often further cleft or lobed, the blade usually longer than wide in outline, the segments often rather narrow; naked receptacle conical, tapering gradually to the apex (the region of stamina attachment as thick as the region of gynoecial attachment, which tapers through all or nearly all of its length, best seen by stripping off the achenes); rhizome regenerating totally each growing season, producing both fibrous and (at the end of the growing season) tuberous roots (1.3-4.9 mm in diameter); [rare in our area, in calcareous, mafic, or ultramafic sites with prairie affinities] ............................................................................... R. fascicularis
8 Larger leaves mostly palmately 3-foliolate, the terminal leaflet about the same size as the lateral leaflets, the leaflets sometimes further cleft or lobed, the blade usually as wide as long or wider; naked receptacle clavate or ellipsoid (the region of staminal attachment distinctly narrower than the region of gynoecial attachment, thus forming a waist, from which the gynoecial region expands and then tapers to the apex); rhizome regenerated partially each growing season, producing uniform, fibrous roots (up to 3.0 mm in diameter); leaves usually simple and ovate, or trifoliate with ovate leaflets; [collectively widespread in our area].

9 Achenes wide-margined (wider portions of the margin 1/4 to 2/3 as wide as the achene body); plants colonial, sending out stolons (by the time of fruiting) which root at the nodes, forming new plants; sepal reflexed at full anthesis ......................... R. carolinianus

9 Achenes narrow-margined (wider portions of the margin 1/8 or less as wide as the achene body); plants usually erect or repent by the time of fruiting (if repent sometimes forming adventitious roots at the nodes, but not generally developing new plants); sepal spreading at full anthesis (sometimes reflexed later).

10 Plants repent; aerial shoots 50-80 (-91) cm long at time of fruiting; [generally of swamps and marshes] ..................... R. caricosus

10 Plants erect; aerial shoots 14-45 (-60) cm long at time of fruiting; [generally of upland habitats] ......................... R. hispidus

Ranunculus abortivus Linnaeus, Kidneyleaf Buttercup. Low fields, disturbed areas, bottomlands, lawns, roadsides. (February-) March-June. NL (Labrador) to AK, south to FL, TX, and CO. A common weed in shady and sunny places. [= RAB, FNA, GW, K, S, W, WV, Y; > R. abortivus var. abortivus – C, F, G; > R. abortivus var. indivisus Fernald – F]


Ranunculus allegheniensis Brittton, Allegheny Buttercup, Mountain Crowfoot. Cove forests, rich forested slopes. April-June. MA west to OH, south to w. NC and ne. TN, an Appalachian endemic. [= RAB, C, F, FNA, GW, K, S, WV, Y]


Ranunculus bulbosus Linnaeus, Bulbous Buttercup. Fields, roadsides, disturbed areas; native of Europe. April-June. [= RAB, C, FNA, GW, K, S, W, WV, Y; > R. bulbosus var. bulbosus – F; > R. bulbosus var. dissectus Barbey – F; > R. bulbosus var. valdepabens (Jordan) Briquet – F]

Ranunculus caricosus Greene, Northern Swamp Buttercup, Marsh Buttercup. Swamplands and marshes. April-August. NB west to s. MB, south to n. NJ, n. OH, and s. MO; reports of this species further south are probably in error. This species is octoploid (n = 32); the remainder of the R. hispidus complex is tetraploid. [= R. hispidus Michaux var. caricosus (Greene) T. Duncan – C, FNA, K, Z; > R. septentrionalis Poiré – GW, W, Y; misapplied; > R. septentrionalis var. caricosus (Greene) Fernald – F; > R. septentrionalis var. pterocarpus Linnaeus Benson – G; > R. septentrionalis var. septentrionalis – F, G]

Ranunculus carolinianus A.P. de Candolle, Carolina Buttercup. Swamp forests, wet woodlands, open marshy wetlands. April-August. NY west to s. ON, WI, and MN, south to n. peninsular FL, LA, and e. TX. This species is tetraploid (n = 16). [= RAB, F, G, GW, W, WV, Y; = R. hispidus Michaux var. nitidus (Chapman) T. Duncan – C, FNA, K, Z; > R. palmatus Elliott – S; > R. septentrionalis – S]

Ranunculus fascicularis Muhlberg ex Bigelow, Thick-root Buttercup, Early Buttercup. Wet flats with prairie affinities (with Camassia scilloides), rocky barrens and glades over mafic rocks (such as gabbro or diabase), ultramafic outcrop barrens (over olivine), limestone barrens. March-June. MA and NY west to s. ON, MN, and se. MB, south to c. NC, ne. SC, sw. GA, and e. TX; occurrences which are both south of New England and east of the Appalachians are scattered and disjunct. This species is tetraploid (n = 16). [= C, FNA, GW, K, S, W, Y, Z; > R. fascicularis var. fascicularis – F, G]

Ranunculus flabellaris Rafinesque, Yellow Water Crow-foot. Pools in floodplains of small stream swamps, other stagnant or slowly moving waters. March-May. ME west to BC, south to ne. NC, KY, IN, IL, LA, OK, UT, and CA. [= RAB, C, F, FNA, G, GW, K, Y; = R. delphinifolius Torrey ex Eaton – S]

Ranunculus flammula Linnaeus var. reptans (Linnaeus) E. Meyer, Creeping Spearwort. Shallow water. Circumboreal, south in North America to NJ, WV, MI, MN, and WV. [= FNA; = R. flammula Linnaeus var. filiformis (Michaux) Hooker – C, G, K; = R. reptans Linnaeus var. reptans – F]

Ranunculus harveyi (A. Gray) Brittton. Forests and prairies. IN, IL, MO, and OK south to TN, AL, and LA. [= C, F, G; = R. harveyi var. harveyi – FVA, GW, K; < R. harveyi – C, F, G]
**Ranunculus hederaceus** Linnaeus, Ivy-leaved Water Crowfoot. Longstalked Crowfoot. Coastal brackish marshes, other circumneutral marshes. April-June. Se. PA south to SC on the Coastal Plain; disjunct in NL (Newfoundland); also in Europe. Perhaps questionable whether native in North America. [= RAB, C, F, FNA, G, GW, K, Y]

**Ranunculus hispidus** Michaux, Hairy Buttercup. Rich moist forests, creekbanks, mesic to dry woodlands and forests, bottomlands. March-June. MA and VT west to s. ON, n. IL, and se. KS, south to e. and c. NC, s. GA, s. AL, AR, and ne. OK. This species is tetraploid \((n = 16)\). [= RAB, GW, S, W, Y; \(= R. hispidus\) var. hispidus – C, FNA, K, Z; \(> R. hispidus\) var. falsus Fernald – F; \(> R. hispidus\) var. marilandicus (Poiret) L. Benson – G; \(> R. hispidus\) var. eurylobus L. Benson – F, G, WV]

**Ranunculus laxicaulis** (Torrey & A. Gray) Darby, Coastal Plain Spearwort. Marshes. April-June. DE south to sw. GA, west to TX, inland in the interior to w. TN, s. IN, s. IL, and KS, almost entirely on the southeastern Coastal Plain. \(R. subcordatus\) E.O. Beal, allegedly endemic to NC, is conspecific with \(R. laxicaulis\). [= RAB, F, FNA, G, K, W; \(? R. texensis\) Engelmann – C; \(> R. laxicaulis\) – GW, Y; \(? R. subcordatus\) E.O. Beal – GW, Y; \(? R. oblongifolius\) Elliott – S, misapplied]

**Ranunculus longirostris** Godron, White Water Crowfoot. Submerged in streams. Sw. QC west to SK, ID, and OR, south to DE, VA, KY, nc. TN, AL, AR, TX, NM, and AZ. [= C, F, GW, K, WV, Y; \(< R. aquatilis\) Linnaeus var. diffusus – FNA; \(? R. circinatus\) Sibthorp – G; \(< Batrachium trichophyllum\) – S, misapplied]

**Ranunculus macounii** Britton. Bogs, marshes. June. NL (Newfoundland) west to AK, south to MI, IA, TX, NM, AZ, CA; disjunct in WV. [= C, F, FNA, G, K, WV]

**Ranunculus micranthus** Nuttall, Small-flowered Buttercup, Rock Buttercup. Rich forests. April-June. MA west to SD, south to e. VA, e. NC, sc. TN, WV, OH, and OK. [= RAB, C, FNA, G, GW, K, S, W, WV, Y; \(> R. micranthus\) var. micranthus – F; \(> R. micranthus\) var. delitescens (Greene) Fernald – F]

**Ranunculus muricatus** Linnaeus. Ditches and marshes; native of Europe. April-June. [= RAB, FNA, GW, K, S, X, Y]

**Ranunculus pensylvanicus** Linnaeus f., Bristly Buttercup. Wet meadows, floodplans. NL (Newfoundland) west to AK, south to s. PA (Rhoads & Klein 1993), DE, DC, MD (Whittemore in FNA 1997), WV, OH, n. IN, n. IL, MN, and AZ; also in ne. Asia. [= C, FNA, G, K, WV]

**Ranunculus platensis** Sprengel. Lawns, ditches; native of South America. [= FNA, GW, K, X, Y]

**Ranunculus pusillus** Poiret, Low Spearwort. Marshes, ditches, other wet habitats. April-June. MA west to SD, south to e. VA, c. NC, sc. TN, WV, OH, and OK. [= RAB, C, FNA, G, GW, K, S, W, WV, Y; \(< R. aquatilis\) Linnaeus var. diffusus – FNA; \(? R. circinatus\) Sibthorp – G; \(< Batrachium trichophyllum\) – S, misapplied]

**Ranunculus recurvatus** Poiret var. recurvatus, Hooked Buttercup, Hooked Crowfoot. Bottomland forests, cove forests, swamps, mesic slope forests. April-June. ME and QC west to MN, south to sw. GA, MS, and OK. Var. tropicus (Grisebach) Fawcett & Rendle occurs in Puerto Rico {and elsewhere?}. [= FNA, K; \(< R. recurvatus\) – RAB, C, G, GW, S, W, Y; \(> R. recurvatus\) var. recurvatus – F, WV; \(> R. recurvatus\) var. adpressipilis Weatherby – F, WV]

**Ranunculus repens** Linnaeus, Creeping Buttercup, Meg-many-feet. Low meadows, disturbed areas; native of Europe. [= RAB, FNA, G, GW, K, S, W, Y; \(< R. repens\) var. repens – C, F, WV; \(> R. repens\) var. degeneratus Schur – C; \(> R. repens\) var. glabratius A.P. de Candolle – C, F; \(> R. repens\) var. pleniflorus Fernald – F, WV]

**Ranunculus sardous** Crantz, Sardinian Buttercup, Hairy Buttercup. Low fields, disturbed areas; native of Europe. April-July. [= RAB, C, F, FNA, G, GW, K, X, Y]

**Ranunculus sceleratus** Linnaeus var. sceleratus, Cursed Buttercup, Meg-many-feet. Marshes, ditches, and stream margins. June-September. The species is circumboreal, ranging south in North America (partly introduced, at least southward) to n. FL, LA, TX, and CA. Var. sceleratus is widespread and the only variety in e. North America; var. multifidus occurs in w. North America. The epithet is often misspelled "sceleratus." [= C, F, FNA, G, K; \(< R. sceleratus\) – RAB, GW, S, W, Y]
**RANUNCULACEAE**

*Ranunculus trichophyllus* Chaix var. *trichophyllus*, White Water Crowfoot. Submerged in water of acidic streams. *R. trichophyllus* is circumboreal, ranging south in North America to NJ, VA, nc. TN, PA, MN, SD, NM, AZ, and CA. Var. *trichophyllus* ranges south to the southern limit of the species. This taxon was reported as far south as NC by G and S; the documentation is unknown and the species was not treated by RAB. The more northern var. *calvescens* W. Drew, with the receptacle glabrous or with a few scattered hairs (vs. hirsute with tufted hairs), ranges south to PA and MI. [= C, F, K, < *R. aquatilis* Linnaeus var. *diffusus* Withering – FNA; < *R. trichophyllus* – WV, Y; ? *R. aquatilis* Linnaeus var. *capillaceus* (Thuill.) A.P. de Candolle – G; ? *Batrachium flaccidum* (Persoon) Ruprecht – S]

* Ranunculus trilobus Desfontaines. Fields, roadsides, ditches; native of sw. Europe. [= FNA, K, X, Y]

**116. NELUMBONACEAE** Dumortier 1829 (Lotus-lily Family) [in PROTEALES]


* Nelumbo Adanson 1763 (Lotus-lily, Lotus, Sacred-lotus, Sacred-bean)

Identification notes: *Nelumbo* can be immediately distinguished in vegetative condition from the other "pads" (*Nymphaea*, *Nuphar*, and *Nymphoides*) by its peltate leaves, and from the peltate *Brasenia* by the much larger size and roundness of the leaves.

1 Petals yellow; mature fruits (“nuts”) usually < 1.25× as long as wide ............................................................................................................ *N. lutea*
1 Petals pink or white; mature fruits (“nuts”) usually > 1.5× as long as wide .......................................................................................... *N. nucifera*

* Nelumbo lutea* Willdenow, Yonkapin, American Lotus-lily, Yellow Lotus, Yockernut, Water-chinquapin, Pond-nuts. Ponds, natural lakes. June-September. NY and s. ON west to MN and IA, south to s. FL and e. TX, and south into the West Indies and Mexico. [= RAB, C, F, FNA, G, GW, K, S, W, WV; *N. pentapetala* (Walter) Fernald]


**117. PLATANACEAE** Dumortier 1829 (Plane-tree Family) [in PROTEALES]


* Platanus Linnaeus 1753 (Plane-tree, Sycamore)

Identification notes: The exposed white inner bark on the middle and upper trunks make *Platanus* recognizable at long distances, especially in winter.

* Platanus occidentalis* Linnaeus, Sycamore, Plane-tree. Riverbanks and alluvial forests, streambanks, sometimes weedy on rocky roadcuts. April-May; September-November. S. ME west to s. ON, MI, and MN, south to w. FL and TX. One of the largest trees in e. North America, and probably the largest that is widespread in the Piedmont of our area. *P. palmieri* Kuntze, sometimes treated as *P. occidentalis* var. *palmieri* (Kuntze) Nixon & Poole ex Geerinck but better interpreted as a species (Grinn & Denk 2010), occurs from central TX south into Coahuila. [= Y; = *P. occidentalis* var. *occidentalis* – Z; < *P. occidentalis* – RAB, C, FNA, G, GW, K, S, W, WV; > *P. occidentalis* var. *occidentalis* – F; > *P. occidentalis* var. *glabrata* (Fernald) Sargent – F]
121. BUXACEAE Dumortier 1822 (Boxwood Family) [in BUXALES]

A family of 5 genera and about 100 species, mainly shrubs, mainly of the Northern Hemisphere. References: von Balthazar, Endress, & Qiu (2000); Channell & Wood (1987); Köhler in Kubitzki, Bayer, & Stevens (2007).

1 Plant a woody shrub; leaves opposite, < 1 cm wide .............................................................. Buxus
1 Plant a suffrutescent herb; leaves alternate, 1.5-7 cm wide ....................................................... Pachysandra

Buxus Linnaeus 1753 (Boxwood)

A genus of about 50-90 species, shrubs, of tropical to temperate areas of Europe, Africa, West Indies, Central America, and e. Asia; Köhler in Kubitzki, Bayer, & Stevens (2007).

* Buxus sempervirens Linnaeus, Boxwood. Persistent for decades at abandoned homesites; native of Europe. Popular for hedges and landscaping; also cultivated in the Mountains for wreathing. [= K]

Pachysandra Michaux 1803 (Pachysandra)

A genus of 4-5 species, 1 of e. North America, the others of e. Asia, suffruticose herbs and shrubs. References: Robbins (1968)=Z; Köhler in Kubitzki, Bayer, & Stevens (2007).

1 Leaves subcoriaceous, semi-evergreen, pubescent, mottled with several shades of green (more apparently so at some seasons than others); [native plant of rich forests] ................................................. P. procumbens
1 Leaves coriaceous, evergreen, glabrous, dark green; [cultivated alien plant, rarely persistent] ................................................. P. terminalis

Pachysandra procumbens Michaux, Mountain Pachysandra, Allegheny-spurge. Moist rich woods. March-April; July-August. C. KY south to w. NC, nw. SC, w. GA, Panhandle FL (Jackson County only), AL, MS, and e. LA (on loess in the Tunica Hills). Its distribution (and, for that matter, that of the genus as a whole) appears to be relictual and to reflect a poor ability to disperse itself and colonize new territory. Channell & Wood (1987) refer to P. procumbens as a "nonaggressive if not 'senile' species with a very low evolutionary potential." The only locations for this species in NC are in Polk County, NC, which has other notable disjunctions of species which normally occur west of the Blue Ridge (Veratrum woodii, Smilax lasioneura). [= RAB, C, F, G, K, S, W, WH, Z]

* Pachysandra terminalis Siebold & Zuccarini, Pachysandra, Japanese-spurge. Persistent after cultivation, and spreading vegetatively to adjacent forests; commonly cultivated, rarely persistent to naturalized, native of China and Japan. This species is a popular ground-cover, difficult to eradicate once well-established. [= RAB, C, F, G, K, Z]

127. ALTINGIACEAE Lindley 1846 (Sweet-gum Family) [in SAXIFRAGALES]

A family of 2 genera and about 12 species, trees, of e. Asia, Indomalaysia, e. North America, Central America, and e. Mediterranean. Various molecular studies show that Liquidambar is better separated from the Hamamelidaceae (Hoot, Magallón, and Crane 1999). References: Endress in Kubitzki, Rohwer, & Bittrich (1993); Hoot, Magallón, and Crane (1999).

Liquidambar Linnaeus 1753 (Sweet Gum)

A genus of 4-5 species, trees, north temperate, of e. North America, Central America (Mexico to Nicaragua), e. Asia (s. China, Taiwan, Vietnam), and e. Mediterranean (Turkey, Rhodos, Cyprus). References: Endress in Kubitzki, Rohwer, & Bittrich (1993); Li & Donoghue (1999).
**Liquidambar styraciflua** Linnaeus, Sweet Gum, Red Gum. Swamp forests, floodplains, moist forests, depresional wetlands, old fields, disturbed areas. April-May; August-September. CT west to s. OH, s. IL and OK, south to s. FL, TX, and Guatemala. One of the most spectacular of our trees in the fall; a single tree often has a mixture of green, yellow, orange, dark red, bronze, and purple leaves. The sap was previously gathered as a source of chewing gum. The bark is one of the favorite foods of beavers. Although sometimes thought of as a small and weedy tree, *Liquidambar* reaches its greatest abundance and size in Coastal Plain swamp forests, where it can reach 2 meters in diameter. Along with such species as *Pinus taeda*, *Quercus phellos*, and others, *Liquidambar* is a good example of a primarily bottomland tree which has proven to be an excellent colonizer of disturbed uplands. [= RAB, C, F, FNA, G, GW, K, S, W, WV]

### 128. HAMAMELIDACEAE R. Brown 1818 (Witch Hazel Family) [in SAXIFRAGALES]

A family of ca. 27 genera and ca. 87 species, trees and shrubs, tropical to temperate, and especially e. Asian. References: Meyer in FNA (1997); Endress in Kubitzki, Rohwer, & Bittrich (1993).

**Fothergilla** Murray in Linnaeus 1774 (Witch-alder)


**Identification notes:** *Fothergilla major* often occurs with *Hamamelis virginiana*, with which it is easily confused in vegetative condition; a reliable character is the base of the lateral veins (marginal in *Fothergilla*, included in leaf tissue in *Hamamelis*). Most of the cultivated material of *Fothergilla*, including the best known cultivar ‘Mount Airy,’ are *Fothergilla ×intermedia* Ranney & Fantz, a pentaploid hybrid of tetraploid *F. gardenii* and hexaploid *F. major* (Ranney et al. 2007; Darke 2008).

1 Leaves stellate-pubescent above, up to 6 cm long and 5 cm wide (the largest < 5.2 cm wide); stamens 12-24; capsules 6.5-10-5 (-13) mm long, the persistent hypanthium 3.4-5 mm long; seeds 4.8-6.3 mm long; [of wet savannas, pocosins, and pocosin margins of the Coastal Plain] ..................................................................................................................................................................................................................

**Fothergilla gardenii** Linnaeus, Coastal Witch-alder. Wet savannas, pocosins, and pocosin margins. March-May; September-October. Se. NC (and allegedly se. VA) south to Panhandle FL and s. AL. An ornamental prized for its small size and attractive fall color. [= RAB, F, FNA, GW, K, Z; > F. gardeni – S, orthographic variant; > F. parvifolia Kearney – S]

**Fothergilla major** (Sims) Loddiges, Large Witch-alder. Dry ridgetop forests of middle elevation ridges in the mountains, especially along the Blue Ridge Escarpment, summits and upper slopes of Piedmont monadnocks, north-facing bluffs in the lower Piedmont. April-May; July-October. C. NC west to ne. TN, south to nc. GA and nc. AL; disjunct in AR. [= RAB, FNA, K, S, W, Z; > F. monticola Ashe]

### Hamamelis Linnaeus 1753 (Witch-hazel)

HAMAMELIDACEAE

1 Outer surface of calyx scarlet; petals 7-14 mm long, red or reddish (often yellow-tipped), flowering late December to early February; leaves 12-24 cm long, 5-17 cm wide, densely stellate-pubescent below, usually with 11 lateral veins (6 on one side of the leaf, 5 on the other); [plants of pineland ravines in s. AL and s. MS]............................................................................................................................................ H. ovalis

1 Outer surface of calyx yellow; petals 6-8 mm long, yellow, flowering October-January; leaves 3.7-16.7 cm long, 2.5-13 cm wide, glabrous to densely stellate-pubescent beneath, usually with 9 or 10 lateral veins (5 on one side of the leaf, 4-5 on the other); [plants widespread in our area]

2 Stellate trichomes of the leaves moderately dense to dense, averaging 0.09 mm across, with 7-11 rays; leaves (3.6-) avg. 6.4 (-10.3) cm long, (1.8-) avg. 4.1 (-6.2) cm wide; petals 7-15 mm long, 0.5-0.8 mm wide; [e. SC south to Panhandle FL, west to se. LA in the Coastal Plain] ................................................................................................................................................................................................................................................. H. virginiana var. henryae

2 Stellate trichomes of the leaves sparse to moderately dense, averaging 0.16-0.40 mm across, with 3-6 (-8) rays; leaves (4.7-) avg. 9.9 (-14.0) cm long, (3.9-) avg. 6.6 (-9.2) cm wide; petals 15-20 mm long, 1 mm wide; [widespread in our area] ... H. virginiana var. virginiana

Hamamelis ovalis S.W. Leonard, Running Witch-hazel, Southern Red Witch-hazel, Bigleaf Witch-hazel. Dry-mesic pineland ravines. Late December-early February. Originally believed to be possibly endemic to se. MS (Perry County) (Leonard 2006), but recently found in s. AL (Keener & Webb, in prep.). [= X]

Hamamelis virginiana Linnaeus var. henryae Jenne ex C. Lane, Small-leaved Witch-hazel. Sandhill margins, xeric hammocks, streamheads, November-January. E. SC (Horry and Hampton counties), s. GA, and Panhandle FL west to se. LA. Though cited in Lane (2005) as var. henryi, the honoree is collector Mary G. Henry; thus the honorific epithet should be corrected to the feminine. Additional study is needed of these small-leaved Coastal Plain populations. [< H. virginiana – FNA, GW, K, S, WH; = H. virginiana var. henryi Jenne ex C. Lane – Y, Z, orthographic error]

Hamamelis virginiana Linnaeus var. virginiana, Northern Witch-hazel. Moist to dryish forests. October-December, October-November (of the following year). QC and NS west to n. MI and MN, south to FL and TX. The bark is still gathered in large quantities in the Southern Appalachians, as the source for witch hazel liniment. The name "witch-hazel" alludes to its superficial resemblance to Corylus, the true hazel, and to its " perverse" habit of flowering in the fall, as it drops its leaves. [= Y, Z; < H. virginiana – RAB, C, FNA, G, GW, K, S, WH, WV; > H. virginiana var. parvifolia Nuttall – F; > H. virginiana var. virginiana – F]

131. ITEACEAE J. Agardh 1858 (Sweetspire Family) [in SAXIFRAGALES]

A family of 1 genus and about 27 species, shrubs, of e. and se. Asia (about 25 species), e. North America (1 species), and sub-Saharan Africa (1 species). References: Kubitzki in Kubitzki, Bayer, & Stevens (2007).

Itea Linnaeus 1753 (Virginia-willow, Sweetspire, Tassel-white)

A genus of about 27 species, shrubs and trees, all but 2 (ours and 1 in sub-Saharan Africa) are in e. and se. Asia. The closest relative of our species is I. japonica Oliver, of Japan. Variously treated in a very broadly-conceived Saxifragaceae (RAB, F, G, GW, W), a less comprehensive Grossulariaceae (C, K), a narrow Escalloniaceae, or a very narrow (single genus) Iteaceae (S), the relationships of Itea remain problematic. Recent molecular data suggest that the relationship between Itea and other woody "saxifragaceous" genera (including Escallonia) is only distant (Morgan & Soltis 1993). Itea is here conservatively treated in a narrow Iteaceae. References: Morin in FNA (2009); Spongberg (1972); Morgan & Soltis (1993); Bohm et al. (1999); Kubitzki in Kubitzki, Bayer, & Stevens (2007).

Identification notes: Sometimes confused needlessly with Clethra, whose much more coarsely serrate, obovate leaves contrast with the serrulate, elliptic leaves of Itea. Also often confused with Eubotrys racemosa in vegetative condition.

Itea virginica Linnaeus, Virginia-willow, Sweetspire, Tassel-white. Moist forests and thickets, especially along the banks of small streams. May-June. S. NJ south to s. FL and west to e. TX and OK, north in the interior (especially in the Mississippi Embayment) to s. IL and se. MO. [= RAB, C, F, FNA, K, G, GW, S, W, WH

132. GROSSULARIACEAE A.P. de Candolle 1805 (Currant Family) [in SAXIFRAGALES]

A family of one genus, of the northern hemisphere and montane South America (Andes). The familial distinction from the Saxifragaceae is supported by recent molecular data, though the affinities of Grossulariaceae and Saxifragaceae (sensu stricto) are closer than those of many other groups traditionally included in the Saxifragaceae, such as Parnassia, Lepuropetalon, and Penicillus (Morgan & Soltis 1993). References: Weigend in Kubitzki, Bayer, & Stevens (2007).

Ribes Linnaeus 1753 (Currant, Gooseberry)

A genus of 150-200 species, temperate, of the Northern Hemisphere and montane South America. The genus is separated into distinctive subgenera, these sometimes maintained as full genera (as by S). Of the species treated here, the currents (subgenus Ribes) include R. americanum, R. aureum var. villosum, R. glandulosum, R. lacustre, R. nigrum, R. rubrum, and R. triste. The gooseberries (subgenus Grossularia) include R. curvatum, R. cynosbati, R. echinellum, R. hirtellum, R. missouriense, R.
rotundifolium, and *R. ova-crispa*. The dried "currants" commonly available in stores are actually raisins made from a small variety of grape, and have nothing to do with *Ribes*. A molecular study suggests that recognition of *Grossularia* as a genus distinct from *Ribes* is not warranted, though it does form a monophyletic group nested within *Ribes* s.l. (Senters & Soltis 2003; Weigend, Mohr, & Motley 2002). References: Morin in FNA (2009); Sinnott (1985)=Z; Weigend, Mohr, & Motley (2002); Spongberg (1972); Schultheis & Donoghue (2004); Senters & Soltis (2003); Weigend in Kubitzki, Bayer, & Stevens (2007). Key adapted from C, F, and Z.

1 Flowers solitary or in corymbs of 2-4; pedicels not jointed just beneath the ovary or fruit, the fruit not disarticulating at maturity and thus the fruit shed with the entire pedicel; stems generally with (0-)1-3 nodal spines and sometimes also with internodal bristles (especially on young, vigorous growth) (though these sometimes absent or nearly so in some species); [subgenus *Grossularia*].

2 Ovary and fruit glabrous.

3 Stamens (at full anthesis) 3-4.5 mm long, about equaling the calyx lobes............................................................. *R. hirtellum*

4 Calyx tube white; stamens 9-12 mm long; nodal spines 1-3 per node, 7-18 mm long, stout......................................................... *R. missouriense*

5 Stamens (at full anthesis) 6-12 mm long, exerted well beyond the calyx lobes.

6 Calyx lobes 7.5-9 mm long; stamens 6-7.5 mm long.................................................................................................................. *R. curvatum*

7 Fruit hispid; stamens 1-2 mm long; pedicels 7-25 mm long; pedicels 5-16 mm long; [of native habitats of the Mountains].......

8 Ovaries and fruits glabrous or with sessile glands; fruits black when mature .................................................. *R. glandulosum*

9 Stems (especially young, vigorous growth) with internodal bristles and sometimes internodal spines; racemes spreading to drooping; fruit purple or black when mature................................................................. *R. lacustre*

10 Lower leaf surface with scattered golden glands; fruit black when mature (except sometimes in *R. aureum var. villosum*).

11 Bracts of the pedicels 0.5-2 mm long; ovaries and fruits with sessile glands; fruits black when mature ..................... *R. nigrum*

12 Bracts of the pedicels 3-10 mm long; ovaries and fruits glabrous; fruits black, red, brown, or orange when mature.

13 Hypanthium narrowly tubular, 6-20 mm long; fruits black (rarely red, orange, brown, or yellow) when mature; sepals golden yellow................................................................. *R. aureum var. villosum*

14 Pedicels stipitate-glandular; petals reddish purple; anther sacs almost adjacent, the connective much narrower than the sacs; erect shrub [cultivated and sometimes persisting or escaping].... R. rubrum

15 Pedicels stipitate-glandular; petals reddish purple; anther sacs almost adjacent, the connective much narrower than the sacs; declining or ascending shrub; [native].................................................................................... *R. triste*

Auxiliary Key to widely distributed native *Ribes* of the Mountains

1 Leaves usually 5-10 cm long and wide, serrate or doubly serrate with sharp teeth; plants usually without nodal spines; inflorescence a raceme of 4-15 flowers; pedicel jointed below the fruit............................................................. *R. glandulosum*

2 Ovary with glabrous hairs which become stiff spines on the mature fruit; leaf bases cordate to deeply cordate (rarely truncate or cuneate), the angle of leaf tissue mostly 190-230°, moderately to sparsely silvery-pilosely beneath, usually on the surface as well as on the veins and in the vein axes; stamens at full anthesis equaling the petals .................................................. *R. cynosbati*

3 Leaves usually 5-10 cm long and wide, serrate with rounded teeth; plants usually with nodal spines; inflorescence a raceme of 1-4 flowers; pedicel not jointed below the fruit.

4 Ovary and fruit glabrous; leaf bases rounded or cuneate (rarely truncate or cordate), the angle of leaf tissue mostly 130-170°, glabrescent to sparsely pubescent beneath (mostly on the veins and in the vein axes); stamens at full anthesis exceeding the petals....... *R. rotundifolium*

*Ribes americanum* P. Miller, American Black Currant. Moist forests, marl marshes. April-June. NS west to AB, south to w. VA, WV, e. and nc. KY (Clark et al. 2005), ne. TN, IN, NE, and NM. [= C, F, FNA, G, K, W, WV]

*Ribes aureum* Pursh var. *villosum* A.P. de Candolle, Buffalo Currant. [habitats]. MA, ON, MN, ND, and MT south to MD, TN, AR, TX, and NM; the original eastern extent unknown because of occasional cultivation and naturalization. It is reported as occurring as a native species as far east as Montgomery County in ne. TN (Chester, Wofford, & Kral 1997). [= FNA, K, = *R. odoratum* H. Wendland – C, F, G, WV]
Ribes curvatum  Small, Granite Gooseberry. Rocky upland forests. E. TN, AR, and OK south to GA, AL, LA, and TX. Also reported for NC by Sinnott (1985); the specimens came from cultivated plants in a botanist's garden, so there is no evidence that *R. curvatum* is a native or naturalized component of NC's flora. [= FNA, K; = Grossularia curvata (Small) Coville & Britton – S]


Ribes echinellum  (Coville) Rehder, Miccosukee Gooseberry. Mesic, nutrient-rich forests. March-April; June-September. This species has a remarkable range, known only from a small area of McCormick County, SC and the vicinity of Lake Miccosukee, Jefferson County, FL. Godfrey (1988) has a detailed description of *R. echinellum*. Catling, Dumouchel, & Brownell (1998) discuss its pollination biology. [= FNA, K, WH; = Grossularia echinella Coville – S]

Ribes glandulosum  Grauer, Skunk Currant, Mountain Currant. Periglacial boulderfields, high elevation seeps, spruce-fir forests. May-June; June-September. NL (Newfoundland) west to AK, south to VT, MI, MN, and BC, and in the Appalachians south to w. NC and e. TN. [= RAB, C, F, FNA, G, K, S, W, WV]

Ribes hirtellum  Michaux, Northern Gooseberry. Rocky forests. NL (Newfoundland) west to AB, south to WV (Tucker County), n. NJ, s. PA, OH, IN, IL, IA, and NE. [= C, FNA, K; > R. hirtellum var. hirtellum – F, G]

Ribes lacustre  (Persoon) Poiret, Bristly Black Currant, Spiny Swamp Currant. Forests, acid swamps. May-June. NL (Labrador) to AK, south to MA, PA, w. VA, TN (allegedly), n. OH, MI, MN, SD, CO, UT, and CA. Reported for AL (FNA). The alleged documentation for the inclusion of *R. lacustre* in the flora of VA is a sterile specimen at WILLI that is not definitely identifiable (Wieboldt, pers. comm.). [= C, F, FNA, G, K, W, WV]

Ribes missouriense  Nuttall, Missouri Gooseberry. Forests, rock outcrops. April-June; May-July. W. WV, sw. OH, IN, WI, MN, and e. ND south to KY, e. TN (Roane and Grainger counties), s. IL, MO, n. AR, and KS, with scattered occurrences (perhaps escapes from cultivation) in CT, NJ, PA, MD, VA, and WV. [= C, F, FNA, G, K, WV, Z; = Grossularia missouriensis (Nuttall) Coville & Britton – S]

* Ribes nigrum  Linnaeus, Garden Black Currant, Cassis. Disturbed areas; native to Europe. Cultivated in ne. United States, rarely as far south as our area (in MD and NJ according to FNA); it may escape. [= C, F, FNA, G, K]


* Ribes rubrum  Linnaeus, Garden Red Currant. Persistent from cultivation and escaped to adjacent fence-rows and disturbed areas; native of Europe. [= FNA, K; > R. sativum Syme – C, F, G, WV]

Ribes triste  Pallas, Swamp Red Currant, Wild Red Currant. Boggy forests, seepage wetlands. May-July. NL (Labrador) west to AK, south to MD, WV (Mineral, Pocahontas, and Randolph counties), OH, MN, SD, MT, ID, and OR. [= C, F, FNA, G, K, WV]

1 Leaves serrate, the teeth sharp; fruit conic-lanceolate, tapering gradually, 4-5 mm long .................................................

2 Stem erect, the leaves mostly or entirely basal, alternate (stem leaves opposite in Mitella); leaves long-petioled, > 4 cm long (except short-petioled or sessile and sometimes < 4 cm long in Micranthes).

3 Basal leaves short-petioled or sessile, the petioles 0-1× as long as the blade; basal leaves cuneate or rounded at the base; leaf venation predominantly pinnate.

4 Corolla bilaterally symmetrical, the 3 upper petals distinctly clawed (the petal blade with a cordate or truncate base) and with 2 yellow spots, the 2 lower petals smaller, cuneate, and not spotted zygomorphic; leaf margins coarsely dentate ................................................................. Hydatica

7 Seeds winged, 1.3-1.5 mm long; leaves cleft < ½ way to base; hypanthium fused to the pistils only at their bases; stems normally with several petiolate leaves much like the basal leaves (though typically somewhat smaller)................................................................. A. bibernata

8 Stems normally with several petiolate leaves much like the basal leaves (though typically somewhat smaller); ovary with 2 locules; leaves cleft > ½ way to base.

9 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base...............

10 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

11 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

12 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

13 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

14 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

15 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

16 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

17 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

18 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

19 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

20 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.

21 Stems with only very reduced sessile bracts unlike the basal leaves; ovary with 1 locule; leaves cleft < ½ way to base; ovary with 2 locules; leaves cleft > ½ way to base.
SAXIFRAGACEAE

**Boykinia** Nuttall 1834 (Boykinia)

A genus of 7 species, herbs, of e. Asia, e. North America, and w. North America, a classic relictual distribution. The other species are distributed primarily in the Pacific Northwest or Rocky Mountains, with several endemics in Japan and an endemic in the unglaciated portions of AK and e. Siberia. References: Gornall in FNA (2009); Soltis in Kubitzki, Bayer, & Stevens (2007)

**Identification notes:** Sometimes mistaken in vegetative condition for **Trautvetteria**, which is a coarser plant, often occupying similar habitats.


**Chrysosplenium** Linnaeus 1753 (Golden-saxifrage)


**Heuchera** Linnaeus 1753 (Alumroot)


1 Calyx glandular-villous, white or pink, often with green-tipped lobes, 1.3-3.3 mm long, 1.1-2.9 mm in diameter; free hypanthium 0.1-0.4 mm long; petals linear or ob lanceolate, 2-3× as long as the calyx lobes, glabrous; plants flowering (June-) July-October.

2 Leaves with widely to narrowly triangular lobes and triangular teeth; petals linear, often coiled; seeds echinate; internodes of flora branches 0.3-2.9 mm long.

3 Leaves deeply and sharply lobed, the terminal lobe wider than long; bracts of the inflorescence oblong to spatulate, at least the lower ones toothed; [of the Alleghenies, Cumberlands, and Interior Low Plateau] .................................................. **H. villosa** var. macrorhiza

4 Petioles and peduncles more-or-less villous, the hairs 0.7-2.5 mm long; leaf blades slightly to fairly densely villous above and below, at least on the veins; [of ec. TN, KY, s. WV, sw. VA, w. NC, n. GA, n. AL, s. MO, s. IL, and s. IN] .................................................. **H. parviflora**

5 Free hypanthium > 2 mm long; calyx weakly to strongly zygomorphic; calyx subglobose, campanulate or tubular.

6 At the onset of anthesis stamens exserted 0.2-1.5 mm beyond the calyx and styles included or exserted up to 1.1 mm beyond the calyx; calyx subglobose ............................................................ **H. americana**

7 Petioles densely hisrurate; free hypanthium (1.1-) avg. 1.5 (-1.9) mm long .......................................................... **H. hirsuticaulis**

8 Petioles glabrous, short-pubescent, or scantly hisrurate; free hypanthium either (0.6-) avg. 1.1 (-1.5) mm long or (1.5-) avg. 1.7 (-1.9) mm long.

9 Stigmas included within the calyx (the calyx lobes extending 1.3-5.3 mm beyond the stigma tips); calyx tubular; calyx lobes and petals inflexed, closing the mouth of the flower .............................................. **H. longiflora**

10 Calyx 2.8-4.5 mm long, subglobose; [of the Piedmont of sc. VA southward to SC] .................................................. **H. caroliniana**

11 Flowers smaller, with greenish or purplish-green petals; [of lower elevations on circumneutral or subacidic substrates] .................. **H. alba**
**Heuchera alba** Rydberg. Quartzitic outcrops at high elevations. July-September. Further study of *H. alba* Rydberg is needed; its recognition as distinct from *H. pubescens* is probably warranted (R. Bartgis, pers. comm.). It apparently differs from *H. pubescens* in its larger flowers with white, exerted petals (vs. greenish or purplish-green petals), and occurs at higher elevations (usually over 1000 m) on acidic substrates, such as quartzitic sandstones (vs. at lower elevations on circumneutral or subacidic substrates). [= FNA, K, WV; < *H. pubescens* – C, F, S, W, Z; < *H. pubescens* var. brachyandra Rosendahl, Butters, & Lakela – F, G, Y]

**Heuchera americana** Linnaeus, American Alumroot. Rocky forests, rock outcrops, particularly where soils are subacidic to circumneutral. April-August. CT and NY west to s. ON, n. IN, s. IL, and sc. MO south to c. GA, c. AL, n. MS, n. LA, and ne. TX. *H. americana* is the most widespread species of *Heuchera* in e. North America. Within the range of *H. caroliniana*, *H. americana* is nearly absent. [= C; > *H. americana* var. americana – F, G, WV; = *H. americana* var. americana – FNA, K, Z; < *H. americana* – RAB, W; > *H. americana* var. heteradenia Fernald – F; > *H. americana* var. subtruncata Fernald – F; > *H. americana* var. brevipetala Rosendahl, Butters, & Lakela – G, Y; > *H. calycosa* Small – S; > *H. curtisi* – S; > *H. lancipetalal* Rydberg – S; > *H. americana* var. typica – Y; > *H. americana* var. calycosa (Small) Rosendahl, Butters, & Lakela – Y]

**Heuchera caroliniana** (Rosendahl, Butters, & Lakela) E.F. Wells, Carolina Alumroot. Rocky forests, rock outcrops, particularly where soils are subacidic to circumneutral. April-June. Endemic to the Piedmont of sc. VA, NC, and nc. SC; first found in VA (Henry County) by T.F. Wieboldt in 2002 (Belden et al. 2004). [= FNA, K, Z; = *H. americana* Linnaeus var. caroliniana Rosendahl, Butters, & Lakela – Y; < *H. americana* – RAB, S]

**Heuchera hirsuticaulis** (Wheelock) Rydberg. River bluffs (GA), bluffs and outcrops. S. MI west to n. IL and sw. MO, south to c. TN, nw. AR, and ne. OK; disjunct in e. GA (Screven County). Considered by Wells (1984) to represent fertile hybrids between *H. americana* americana and *H. richardsonii*; here regarded as a stabilized taxon, with numerous occurrences beyond the distribution of one or the other alleged parent. East to w. KY (Medley 1993), w. and c. TN (D. Estes, pers. comm. 2008), and e. GA (Screven County specimens at NCU). [= *H. americana* Linnaeus var. hirsuticaulis (Wheelock) Rosendahl, Butters, & Lakela – FNA, K, Z; > *H. americana* var. hirsuticaulis (Wheelock) Rosendahl, Butters, & Lakela – F, Y; > *H. americana* var. interior Rosendahl, Butters, & Lakela – F, Y] [add to synonymy, C, G, S]

**Heuchera hispida** Pursh, Purple Alumroot. Calcareous rocky forests, rock outcrops, particularly where soils are subacidic to circumneutral. April-June. S. PA south through MD, WV, and VA to nw. NC. This species is intermediate between *H. americana* and *H. pubescens*; it is almost certainly of hybrid origin. The treatment of this hybrid derivative of *H. americana* and *H. pubescens* as *H. americana* var. *hispida* (a variety of one parent) seems undesirable. Since it partly replaces its parents within its range, occurs in populations away from one or both parent, and is not strictly intermediate, it seems best to accord it species status. [= F, G, S, WV, Y; < *H. americana* – RAB, W; = *H. hispida* Pursh – C; = *H. americana* var. *hispida* (Pursh) E.F. Wells – FNA, K, Z]

**Heuchera longiflora** Rydberg, Long-flowered Alumroot. Rich shaded forests and woodlands over calcareous rocks such as limestone, dolostone, or calcite-cemented shales, silts, or sandstones, in circumneutral soils. May-June. *H. longiflora* is nearly limited to sedimentary rocks, occurring in e. and c. KY, s. OH, sw. WV, sw. VA, ne. TN, w. NC, and c. AL (?). In NC, it occurs primarily in the sedimentary window around Hot Springs, and is possibly limited to Madison, Buncombe, and Haywood counties. Wells (1984) calls it "most distinctive", "characterized by a unique combination of floral characters: long, tubular calyx, deeply included styles, inflexed calyx lobes and petals that close the mouth of the flower obliquely, and horizontal orientation of the flowers." [= C, F, FNA, G, K, W, WV, Z; < *H. pubescens* – RAB, misapplied; > *H. longiflora* – S; > *H. aceroides* Rydberg – S; > *H. scoparia* Rydberg – S; > *H. longiflora* Rydberg var. aceroides (Rydberg) Rosendahl, Butters, & Lakela – Y; > *H. longiflora* var. typica – Y]

**Heuchera parviflora** Bartling, Cave Alumroot. Shaded cliff bases, usually under overhangs, on grotto floors, behind waterfalls where humidity is high but not in the spray zone, nearly always in deeply shaded situations where little or no direct sunlight falls. July-September. An uncommon species throughout its range (ec. TN, KY, s. WV, sw. VA, w. NC, n. GA, n. AL, s. MO, s. IL, and s. IN). *H. parviflora* is probably most common in the gorge and waterfall country of sw. NC and in the Cumberland Plateau of TN and KY. In deeply shaded sites, it is often the only vascular plant present. The closely related species *H. puberaul* Mackenzie & Bush [*H. parviflora* var. *puberaul* (Mackenzie & Bush) E.F. Wells] occurs in s. MO and ne. AR, with scattered disjunct sites as far east as c. KY, c. TN, and s. IN. [= RAB, S, W; = *H. parviflora* var. *parviflora* – C, FNA, K, Z; > *H. parviflora* var. *parviflora* – F, G; > *H. parviflora* var. rugelii (Shuttleworth) Rosendahl, Butters, & Lakela – F, G, WV, Y; > *H. parviflora* var. typica – Y]

**Heuchera puberaul** Mackenzie & Bush. Shaded cliff bases, usually under overhangs, on grotto floors, behind waterfalls where humidity is high but not in the spray zone, nearly always in deeply shaded situations where little or no direct sunlight falls. C. KY (Medley 1993), s. IN, s. IL, and s. MO south to n. AL and c. AR. [= F, G, Y; = *H. parviflora* Bartling var. *puberaul* (Mackenzie & Bush) E.F. Wells – FNA, K, Z]
Heuchera pubescens Pursh, Marbled Alumroot. Rocky forests, rock outcrops, particularly where soils are subacidic or circumneutral. May-July. Primarily a species of the Ridge and Valley Province of PA, MD, WV, and VA. *H. pubescens* ranges south to only a few locations in the southern Piedmont of NC. See discussion under *H. alba*. The report in RAB of the occurrence of *H. pubescens* in Madison County is apparently erroneous; Wells (1984) shows *H. pubescens* reaching its southern limit just south of the VA border, and not occurring at all in KY, TN, or the mountains of NC. She found the bract characters used in the key in RAB to be unreliable. Reported by Hill & Horn (1997) for South Carolina {report needs verification}. [= FNA, K, WV; *H. villosa* var. typica – Y] *H. pubescens – C, S, W, Z (also see *H. alba*); > *H. pubescens* var. brachyandra Rosendahl, Butters, & Lakela – F, G, Y; > *H. pubescens* var. pubescens – F; > *H. pubescens* var. typica – Y] {not keyed; not mapped; rejected as a component of the flora}

Heuchera villosa Michaux var. macrorhiza (Small) Rosendahl, Butters, & Lakela, Giant Alumroot. Cliffs, riverbanks. July-October. S. WV, s. OH, and s. IN south through c. KY and c. TN to n. AL and ne. MS. This taxon has usually been disregarded in recent years, but is recognized by Chester et al. (1997). In its purest form, this plant seems to be very distinct from typical *H. villosa*, and actually may be more closely related to *H. arkansana*. The existence of intermediates and intergrades with *H. villosa* var. villosa muddies the taxonomic waters, however, and the overall best treatment seems to be at the varietal level. Some intermediates occur in the primary area, as in w. VA. [= G; < *H. villosa* var. villosa – C, FNA, K, Z; > *H. villosa* var. macrorhiza – F, WV, Y; = *H. macrorhiza* Small – S; > *H. villosa* var. intermedia Rosendahl, Butters, & Lakela – F, WV, Y] *H. villosa* Michaux var. villosa, Crag-jangle, Rock Alumroot. In crevices of rock outcrops, or in thin soil over boulders, a characteristic component of the flora of high elevation cliffs and summits (to at least 1920 m), not particular about the rock type, occurring on a wide range of rock types in our area, including felsic gneisses and schists, mafic gneisses, granites, quartzites, and others, probably the most acidophilic of our species of *Heuchera*. Late June-October. W. VA and s. WV south through w. NC and e. TN to nw. SC, n. GA, ne. AL (primarily a Southern Blue Ridge endemic). In the Ozarks of AR it is replaced by the related *H. arkansana* Rydberg [H. villosa var. arkansana (Rydberg) E.B. Smith] with shorter and narrower inflorescence, shorter pedicels, and larger flowers. [= G; < *H. villosa* – RAB, W; < *H. villosa* var. villosa – C, FNA, K, Z; > *H. villosa* var. villosa – F; = *H. villosa* – S; > *H. villosa* var. typica – Y; >< *H. villosa* var. intermedia Rosendahl, Butters, & Lakela – F, Y] *H. villosa* Michaux var. villosa, Cliff Saxifrage. In crevices in exposed rock outcrops at high elevations, other rock outcrops (moist to rather dry), periglacial boulderfields, rocky seeps. June-August. Mostly an inhabitant of the Ridge and Valley Province of PA, MD, WV, and VA. In seepage on granite. Endemic, so far as is known, to Pickens County, SC. Under study by Patrick McMillan. {not yet keyed; not mapped}

Hydatica Necker ex Gray 1821 (Appalachian Saxifrage)


Hydatica petiolaris (Rafinesque) Small, Cliff Saxifrage. In crevices in exposed rock outcrops at high elevations, other rock outcrops (moist to rather dry), periglacial boulderfields, rocky seeps. June-August. A Southern Appalachian endemic: nw. VA, WV, and KY south to e. TN, w. NC, sw. SC, and ne. GA. The orange anthers are an attractive contrast to the white petals (the three upper with two yellow spots each). [= S, Y; = *Micranthes petiolaris* (Rafinesque) Bush – FNA, Z; = Saxifraga michauxii Britton – RAB, C, F, G, GW, K, W, WV] *Hydatica petiolaris*. In seepage on granite. Endemic, so far as is known, to Pickens County, SC. Under study by Patrick McMillan. {not yet keyed; not mapped}

Micranthes Haworth 1812 (Saxifrage)

A genus of about 60-75 species, perennials, mostly of north temperate, boreal, and arctic regions of North America, South America, and Eurasia. As shown by molecular data, *Saxifraga*, as often broadly defined, is polyphyletic, and all of our species either belong in *Micranthes* (Soltis 1995, Soltis et al. 1996, Mort & Soltis 1999), or with further separation into *Micranthes* and *Hydatica*. Soltis et al. (1996) demonstrate that *Micranthes* is closely allied with *Heuchera, Mitella, and Tiarella*, less closely related to *Astilbe, Boykinia, Sullivantia*, and *Chrysothamnus*, and least closely related to the bulk of *Saxifraga*. References:

1 Larger leaf blades oblanceolate, 4-10× as long as wide.
2 Leaf margin entire to crenate; petals greenish-white, lacking yellowish spots .......................................................... *M. pensylvanica*
3 Leaf margin coarsely serrate; petals white, either 3 or 5 of them with yellowish spots.
4 Leaves with mostly 12-40 teeth per side; pubescence of the leaves and scapes mostly nonglandular; corolla radially symmetrical; filaments strongly clavate; [mostly of shaded seepages and brook-banks]. .......................................................... *M. micranthidifolia*
5 Leaves mostly with 4-8 teeth per side; pubescence of the leaves and scapes mostly gland-tipped; corolla bilaterally symmetrical, the 3 upper petals distinctly clawed (the petal blade with a cordate or truncate base) and with 2 yellow spots, the 2 lower petals smaller, cuneate, and not spotted; filaments filiform; [mostly of rock outcrops and seepages, often exposed, but sometimes shaded]....................... [Hydratica petiolaris]

**Micranthes**

*Micranthes careyana* (A. Gray) Small, Carey Saxifrage. Moist rock outcrops and cliffs, often under overhangs, often in moist soil at the base of a vertical or overhanging rock outcrop. May-June. A Southern Appalachian endemic: e. TN and nw. NC south to sw. NC and se. TN. Lanning (2009) has clarified the taxonomy of the *M. careyana / caroliniana* complex through molecular and morphological study. [= FNA, S, Z; = Saxifraga careyana A. Gray – RAB, C, F, G, GW, K, W]


*Micranthes micranthidifolia* (Haworth) Small, Branch-lettuce. Wet soils of seepages, in the beds of high elevation brooks, brookbanks; rocky seepages. May-June. A Southern and Central Appalachian endemic: e. PA and WV, south to e. TN, w. NC, nw. SC, and ne. GA. This plant is gathered in considerable quantities as a spring green in the mountains of our area, and can sometimes be seen for sale in local grocery stores. The common name refers to the plant's habitat; "branches" are mountain streams. [= FNA, S, Z; = Saxifraga micranthidifolia (Haworth) Steudel – RAB, C, F, G, GW, K, W, WV]

*Micranthes pensylvanica* (Linnaeus) Haworth, Swamp Saxifrage. Mountain bogs, mucky seeps. April-June. ME west to MN, south to e. VA, c. and w. NC, and MO. [= FNA, Z; = Saxifraga pensylvanica Linnaeus – RAB, C, F, K, W, WV; > S. pensylvanica ssp. pensylvanica – G]

*Micranthes texana* (Buckley) Small, Texas Saxifrage. Granite outcrops. Found in 1980 by Jim Allison on a small granite outcrop in McDuffie County, GA. It is uncertain whether its occurrence in GA represents a natural disjunction or a freak introduction (J. Allison, pers. comm.). [= FNA, S, Z; = Saxifraga texana Buckley – F, G, K]


**Mitella Linnaeus 1753** (Miterwort)

As traditionally circumscribed, a genus of about 20 species, herbs, of cold temperate e. North America, w. North America, and e. Asia. Soltis (2007) and Okuyama, Pellmyr, & Kato (2008) indicate that *Mitella* as currently circumscribed is polyphyletic and is
likely to be divided; our species will remain in Mitella. References: Soltis & Freeman in FNA (2009); Soltis in Kubitzki, Bayer, & Stevens (2007).

Mitella diphylla Linnaeus, Two-leaved Miterwort. Moist rich forests, especially in the Mountains, and especially rocky. April-June. QC west to MN, south to e. VA, w. NC, nw. SC, ne. GA, nw. GA, and MO. The fringed petals will reward a close look. [= RAB, C, F, FNA, G, GW, K, S, W, WV]

Sullivantia Torrey & A. Gray 1842 (Sullivantia)


Sullivantia sullivantii (Torrey & A. Gray) Britton, Sullivantia. Moist limestone cliffs. June-August. S. sullivantii has a very scattered, relictual distribution, known from w. VA (Russell County), e. KY, ne. TN (Claiborne County), s. OH, IL, sw. WI, ne. IA, se. MN, and MO. [= C, F, FNA, G, K, Z]

Tiarella Linnaeus 1787 (Foamflower)

A genus of 3-6 species, perennial herbs, of temperate North America and e. Asia. References: Jog in FNA (2009); Lakela (1937)=Y; Spongberg (1972)=Z; Wherry (1940, 1949)=X; Fernald (1943)=V; Soltis in Kubitzki, Bayer, & Stevens (2007).

Tiarella cordifolia Linnaeus. Moist forests, cove forests, rock outcrops. April-June. NS west to ON and WI, south to w. NC, nw. SC, sw. GA, AL, MS, and MO. Several taxa have been recognized (or not) in eastern North American Tiarella. The characters used to recognize additional species or varieties are often missing on herbarium sheets and also seem to be imperfectly correlated. T. wherryi (or var. collina) is alleged to differ from T. cordifolia s.s. in lacking stolons (vs. having stolons), capsules 6-10 mm long and round-tipped (vs. 8-12 mm long and subacuminate), and lower fruiting pedicels 6-10 mm long (vs. 7-13 mm long). Whether or not to recognize several taxa within what is here treated as T. wherryi, and at what level, has been controversial; see Lakela (1937), Wherry (1940, 1949), Fernald (1943), and Spongberg (1972) for discussion. Further study is needed. [> T. cordifolia – F, V, WV, Z; > T. cordifolia var. cordifolia – RAB, C, G, K; = T. cordifolia – FNA, S, W; > T. macrophylla Small – S (type a combination of Heuchera and Tiarella); > T. cordifolia var. typica – Y; > T. wherryi Lakela – F, V, Z; > T. cordifolia Linnaeus var. collina Wherry – RAB, C, G, K; > T. cordifolia var. collina – X; > T. wherryi – X, Y; > T. cordifolia var. austrina – K, X, Y]

134. CRASSULACEAE A.P. de Candolle 1825 (Stonecrop Family) [in SAXIFRAGALES]

A family of about 34-35 genera and 1100-1410 species, succulent shrubs and herbs, nearly cosmopolitan, but with centers of diversity in s. Africa and Mexico. References: Moran in FNA (2009); Thiede & Eggl in Kubitzki, Bayer, & Stevens (2007).

1 Leaves connate at the base, opposite; flowers solitary in the axils of leaves; flowers 3-4-merous; [subfamily Crassuloideae] Crassula

1 Leaves distinct, whorled or alternate; flowers in terminal cymose inflorescences; flowers 4-5 (-8)-merous.

2 Petals distinct or at most basally connate; leaves entire, crenate, or serrate, but not bearing plantlets along the margin; [subfamily Sempervivoideae].

3 Plants with spheroidal basal rosettes consisting of dozens or more spirally arranged leaves; flowers 8-16-merous [tribe Umbiliceae] Sempervivum

3 Plants with or without basal rosettes (if rosettes present, these not as above); flowers 4-6-merous

4 Perennials without rosettes, the stems 0.5-10 dm tall (dying back in winter to the rootstock); leaves large, relatively thin in texture, usually 5-25 times as wide as thick, often crenate; flowers pink, purple, white, or greenish.

5 Flowers 5-merous, bisexual; flowering stems 2-10 dm tall, from an underground, tuberous base; average leaves 3-11 cm long, 1-5 cm wide; ovaries attenuate at the base; [tribe Telephieae] Hylocomium

5 Flowers 4 (-5)-merous, usually unisexual and then the plants dioecious; flowering stems 0.5-4 dm tall, from axils of brown scale-leaves clothing a stout rootstock at least in part exposed aboveground; average leaves 1-5 cm long, 0.4-1.5 cm wide; ovaries not attenuate at the base; [tribe Umbiliceae] Diamorpha

4 Perennials or annuals with or without rosettes, the stems < 2 dm tall (the perennials with stems persistent through the winter); leaves smaller, flat or terete, relatively thicker, entire; flowers white or yellow; [tribe Sedeeae].

6 Carpels united basally (to about 1/3 their length); petals cuculate, initially partly enclosing 4 of the 8 stamens; follicles dehiscing by a tear-shaped valve on the abaxial (lower) surface; stem and leaves normally red; [of granitic flatrocks of the Piedmont of NC and SC] Sedum

6 Carpels free; petals flat, never enclosing any of the 8 anthers; follicle dehiscing by a longitudinal slit along the adaxial (upper) suture; stem and leaves normally green, sometimes somewhat pink or reddish; [collectively of various habitats, including granitic flatrocks of GA, NC, SC, and VA] Rhodiola

Bryophyllum Salisbury 1805
CRASSULACEAE


**Crassula** Linnaeus 1753


1 Seeds rugulose; leaves 2-6 mm long, the apex acute; sepals 0.5-1.5 mm long...................................................................................... *C. aquatica*

1 Seeds with sharp-pointed papillae; leaves 1.5-3 mm long, the apex acute; sepals 0.4-0.6 mm long .............................................. *C. drummondii*

**Crassula aquatica** (Linnaeus) Schönland, Pygmyweed. Tidal marshes and shores, artificial lake. Occurring in tidal marshes and shores, south to MD and se. PA, and also in GA and AL (Kartesz 1999, FNA). [= FNA, K; = *Tillaea aquatica* Linnaeus – GW; = *Tillaeastrum aquaticum* (Linnaeus) Britton – S]

* Crassula drummondii* (Torrey & A. Gray) Fedde. Waste area around wool-combing mill, perhaps merely a waif; native of sc. United States. [= FNA, K; = *Tillaea drummondii* Torrey & A. Gray]

**Crassula longipes** (Rose) Bywater & Wickens. {AL, GA}. {K} {not yet keyed; synonymy incomplete}

**Diamorpha** Nuttall 1818 (Elf-orpine)


**Diamorpha smallii** Britton ex Small, Elf-orpine. In very thin soil (generally less than 2 cm deep) of vernally wet depressions on granite flatrocks and other granitic outcrops. April-May; May-June. Primarily limited to granitic flatrocks of the Piedmont, ranging from sc. VA to ec. AL, and on sandstone from se. TN south into c. AL. This species is both one of the most typical and one of the most interesting of the dozens of species endemic (or largely so) to granite flatrocks of the southeastern Piedmont. See Wilbur (1988a) for a thorough discussion of the muddled nomenclatural history of this remarkable species, as well as for a detailed summary of systematic and ecological information. [= FNA, GW, K, Z; = *Sedum smallii* (Britton ex Small) Ahles – RAB, W; = *Diamorpha cymosa* (Nuttall) Britton ex Small – Y; > *Diamorpha cymosa* – S; > *Diamorpha smallii* – S]

**Hylotelephium** H. Ohba 1977 (Live-for-ever)


1 Petals 2× as long as the sepals; nectaries wider than long; flowers fertile; [native] ........................................................................... *H. telephioiodes*

1 Petals 2.5-4× as long as the sepals; nectaries longer than wide; flowers sterile (rarely fertile); [introduced].

2 Flowers white or greenish; cymes lax, subcorymbose; leaves not markedly reduced upward from base of plant upward ....... *H. erythrostictum*

2 Flowers deep pink to purple; cymes densely subglobose; leaves typically strongly reduced in size from base of plant upward ............

..........................................................................................................................................................................................................

* Hylotelephium erythrostictum* (Miquel) H. Ohba, Garden Orpine, Live-for-ever. Disturbed areas; native of Europe. August-September, September-October. [= FNA, K; = *Sedum spectabile* Boreau – RAB, misapplied; = *Sedum ×erythrostictum* – C; ? *Sedum alboroseum* Baker – F, G, Z]

**Hylotelephium telephioiodes** (Michaux) H. Ohba, Allegheny Live-for-ever. Rock outcrops, mostly at high to moderate elevations, ascending to 2000 m. July-September; August-October. Essentially a Central and Southern Appalachian endemic, *H.*
Rhodiola rosea Linnaeus (Roseroot)

A genus of about 200 species, of cold temperate and boreal areas of the northern hemisphere. Thiede & Eggli (2007) place Rhodiola in a separate tribe from Sedum s.s. References: Moran in FNA (2009); Clausen (1975)=Z; Thiede & Eggli in Kubitzki, Bayer, & Stevens (2007).

Rhodiola rosea Linnaeus, Roseroot. High elevation rocky summits. July-August; August-September. Circumboreal, widely distributed in northern Europe, Asia, and North America, south in e. North America to e. PA and thence disjunct to Roan Mountain (Mitchell County, NC) and Grandfather Mountain (Avery County, NC), where nearly (if not completely) extirpated. Dwarfed, high elevation forms of Rhodiola rosea; they are perhaps readily distinguished only in flower or fruit. [= FNA, K; = Sedum rosea (Linnaeus) Scopoli – Z; = Sedum rosea (Linnaeus) Scopoli var. rosea – C; < S. rosea var. rosea – F; < S. rosea – RAB, G, W; > Rhodiola roanensis Britton – S; > Sedum rosea (Linnaeus) Scopoli var. roanense (Britton) Berger]

Identification notes: Other species of Sedum are grown as ornamentals, especially in rock gardens; some are aggressive and rather weedy and can be expected eventually to become a naturalized part of our flora.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leaves primarily whorled in 3's or 4's (to 5's).</td>
</tr>
<tr>
<td>2</td>
<td>Largest leaves distinctly spatulate, much wider than thick, 8-20 mm wide; flowers and fruits 4-merous; petals white; [native, of moist forest and rock outcrops]; [section Ternata] .................................................. S. ternatum</td>
</tr>
<tr>
<td>3</td>
<td>Leaves 4-5 per whorl; flowering shoots erect ................................................................. S. mexicanum</td>
</tr>
<tr>
<td>4</td>
<td>Leaves 3-4 per whorl; flowering shoots pendulous, creeping, or ascending.</td>
</tr>
<tr>
<td>5</td>
<td>Flowering shoots pendulous or ascending; leaves linear-lanceolate ..................................... S. lineare</td>
</tr>
<tr>
<td>6</td>
<td>Flowering shoots creeping or ascending; leaves oblanceolate to elliptic ............................ S. sarmentosum</td>
</tr>
<tr>
<td>7</td>
<td>Leaves primarily alternate.</td>
</tr>
<tr>
<td>8</td>
<td>Flowers and fruits 5-merous; [plants aliens].</td>
</tr>
<tr>
<td>9</td>
<td>Leaves 2-5 mm long; petals yellow .................................................................................. S. acre</td>
</tr>
<tr>
<td>10</td>
<td>Leaves 6-15 mm long; petals yellow or white. .................................................................. S. album</td>
</tr>
<tr>
<td>11</td>
<td>Petals yellow; flowers 5-merous. .................................................................................... S. rupestre</td>
</tr>
<tr>
<td>12</td>
<td>Flowers and fruits 4-merous; [plants natives].</td>
</tr>
<tr>
<td>13</td>
<td>Leaves of flower-bearing stems linear, sagittate-spurred at the base (the spurs clasping the stem); petals pink to white; annual; [section Ternata] ................................................................. S. pulchellum</td>
</tr>
<tr>
<td>14</td>
<td>Leaves of flower-bearing stems narrow elliptic, oblanceolate, spatulate, cuneate or short-spurred at the base (not clasping); petals white; perennial or annual.</td>
</tr>
<tr>
<td>15</td>
<td>Plants annual; sepals 0.4-1 mm long; petals 1.4-4.2 mm long; [restricted to shallow soils of granitic flatrocks of the Piedmont, from s. NC south to w. GA]; [section Tetrovum] .................................................. S. pusillum</td>
</tr>
</tbody>
</table>
8 Plants perennial; sepals 2-9 mm long; petals 4-9 mm long; [of outcrops of various rocks, not as above]; [section Ternata].
9 Leaves of flowering stems with width/thickness ratio of >2.0; seeds averaging 0.8 mm long; leaves pale green or bluish green, sometimes with a glaucous coating; [of MD south through VA and WV to sc. and sw. NC].................................S. glaucophyllum
9 Leaves of flowering stems with width/thickness ratio of <1.7; seeds averaging 0.7 mm long; leaves green or gray-green, but not glaucous; [of se. TN south into AL and GA]...............................................................................................................................


* Sedum album Linnaeus, White Stonecrop. Disturbed areas; native of Eurasia. Introduced and naturalized as far south as se. PA and WV. [= C, F, G, K, Z; = Oreoosedum album (Linnaeus) Grulich]

Sedum glaucophyllum Clausen, Cliff Stonecrop. Rock outcrops, usually basic and/or sedimentary. Endemic to the Central and Southern Appalachians (extending into the Piedmont), known from MD, WV, VA, and NC (reports for GA are based on confusion with S. nevii). This species is complex, with several ploidies and morphologies represented, some at least showing geographic integrity and perhaps worthy of taxonomic recognition. Material in sw. NC (south of the Asheville Basin) has been identified as polyploid and differs in many ways from more typical S. glaucophyllum, in some ways suggesting the similar and closely related S. nevii A. Gray (known from nearby TN and AL). Further study is needed of this group. [= C, F, G, K, S, W, WH, Y, Z; < S. nevii A. Gray – RAB, G, S]

* Sedum lineare Thunberg. Margin of granitic flatrock; native of e. Asia. Duncan (1985) discusses the establishment of this species in Columbia County, GA. [= FNA, K, Z]

* Sedum mexicanum Britton, Mexican Stonecrop. Dry, disturbed areas; native of Mexico or perhaps e. Asia. [= FNA, WH]

Sedum nevii A. Gray, Nevius's Stonecrop. Gneiss rock outcrops on river bluffs. Endemic to se. TN (Polk County, just west of Cherokee County, NC) (Chester, Wofford, & Kral 1997), nc. and ec. AL, and wc. GA (where it occurs on gneiss outcrops along the Chattahoochee River in Muscogee and Harris counties), and reported for s. WV (Greenbrier County) by Harmon, Ford-Werntz, & Grafton (2006). [= FNA, K, W, Y, Z; < S. nevii – S (also see S. glaucophyllum)]

Sedum pusillum Michaux, Puck's Orpine. In very thin soil (generally less than of vernally wet depressions on granite flatrocks, often in mats of the moss Hedwigia ciliata. March-April; April-May. Endemic to granite flatrocks of the southeastern Piedmont, from sc. NC south to wc. GA. Superficially rather similar to Diamorpha smallii, and historically confused with it (see Wilbur 1988 for details). Wyatt (1983) discusses the reproductive biology of this species. [= RAB, FNA, GW, K, S, Z; = Tetrorum pusillum (Michaux) Rose]

* Sedum rupestre Linnaeus. Disturbed rock outcrops; native of Europe. Reported for nc. GA (Jones & Coile 1988), as S. reflexum Linnaeus. [= FNA; = S. reflexum Linnaeus – C, K, misapplied; = Petrosedum reflexum (Linnaeus) Grulich, misapplied]


* Sedum ternatum Michaux, Mountain Stonecrop. Moist forests, coves, bottomlands, shaded rock outcrops. April-June; May-July. NJ west to IA and AR, south to nw. GA and AL. [= RAB, C, F, FNA, G, K, S, W, WV, Y, Z; = Clausenellia ternata (Linnaeus) A. & D. Löve]

Sempervivum Linnaeus 1753 (Hen-and-chickens, Houseleek)

A genus of 40-100 species, perennials, of Eurasia. References: Lis in FNA (2009).

* Sempervivum tectorum Linnaeus, Hen-and-chickens, Houseleek. Disturbed areas, cultivated as a rock garden and potted plant, rarely persistent; native of Europe. S. tectorum is reported for VA by Massey (1961) as “escapes from cultivation;” the documentation of this is unknown, but the record has been perpetuated by Kartesz (1999), Lis in FNA (2009), and others. [= FNA, C, F, K]
A family of one genus and 2 species, herbs, of e. North America and e. Asia. Penthorum has been variously placed in the Crassulaceae, Saxifragaceae, or in the Penthoraceae. Haskins & Hayden (1987) concluded that Penthorum was best treated in a monogeneric Penthoraceae, a conclusion based on extensive anatomical evidence. Among those who do not favor a monotypic family, there is nearly evenly divided opinion between the Crassulaceae and Saxifragaceae; this in itself perhaps supports segregation in the Penthoraceae. Molecular evidence supports the recognition of the Penthoraceae, and suggests closer affinities with the Haloragaceae than with either the Crassulaceae or the Saxifragaceae (Morgan & Soltis 1993). References: Thiede in Kubitzki, Bayer, & Stevens (2007); Freeman in FNA (2009).

**Penthorum** Linnaeus 1753 (Ditch-stonecrop, Penthorum)

A genus of 2 species, herbs, of e. North America and e. and se. Asia. The only other species in the genus is *P. chinense* Pursh, of e. Russia, China, Korea, and Japan. References: Freeman in FNA (2009); Haskins & Hayden (1987)=Z; Thiede in Kubitzki, Bayer, & Stevens (2007).

**Penthorum sedoides** Linnaeus, Ditch-stonecrop, American Penthorum. Shores, drawdown areas, moist forests, floodplain forests, moist disturbed areas, ditches. June-October. NB west to MB, south to Panhandle FL and TX; introduced from BC south to OR. [= RAB, C, F, FNA, G, GW, K, S, W, WV, Z]

**138. HALORAGACEAE** R. Brown 1814 (Water-milfoil Family) [in SAXIFRAGALES]

A family of 8-9 genera and about 150 species, aquatic and wetland herbs, but also shrubs and trees, cosmopolitan but centered in the Southern Hemisphere, especially Australia. The family has sometimes spelled "Haloragidaceae." References: Kubitzki in Kubitzki, Bayer, & Stevens (2007).

**Myriophyllum** Linnaeus 1753 (Water-milfoil)


**Identification notes:** Stranded plants of *M. heterophyllum* and *M. humile* (and perhaps others) produce leaves that are reduced in size. Leaves and bracts become pectinate or pinnate, so that plants resemble *M. pinnatum*. Such plants are the source of nearly all inland records of *M. pinnatum* in the VA-NC-SC-GA area. *M. heterophyllum* usually flowers and fruits when stranded and may be distinguished from *M. pinnatum* by its much denser disposition of leaves and bracts, and by its dull red fruits obscurely tuberculate (vs. tan or pale brown fruits strongly tuberculate). From stranded *M. humile*, *M. heterophyllum* may be distinguished by leaves and bracts which are clearly whorled and much more densely disposed. *M. humile* differs from *M. pinnatum* by its wholly alternate leaves and bracts, and by its smooth fruits.

**Myriophyllum** Linnaeus 1753 (Water-milfoil)

(contributed by B.A. Sorrie and A.S. Weakley)
HALORAGACEAE

4 Leaves strictly alternate; flowers/fruits on submersed stems (forma capillaceum) or on emersed stems with pinnatifid or pinnate leaves (forma natans); [subgenus Brachytheca; section Tessaronia; subsection Spondylastrum] ................................................. M. humile

3 Flowers/fruits in erect spikes emersed from water, flowers/fruits subtended by bracts much smaller than the normally submersed leaves. 4 Uppermost flowers/fruits alternate; leaves alternate or whorled or both; [subgenus Brachytheca; section Tessaronia; subsection Spondylastrum] ................................................. M. humile

6 Bracts much shorter than floral internodes, varying from pinnate to entire; fruit surface smooth or papillose ......................... M. laxum

5 Bracts usually longer than floral internode, pinnatifid to pinnate; fruit surface strongly tuberculate .................................... M. pinnatum

7 Bracts usually > 2× as long as pistillate flowers; stems drying brown, pale brown, or reddish.

8 Bracts throughout inflorescence pinnatifid to pinnate; winter buds scattered along stem, elavate, falling by early winter; [of DE and northward]; [subgenus Myriophyllum; subsection Myriophyllum; subsection Isophylleae] ................................................. M. verticillatum

405

Alternate key

1 Leaves reduced to small scales or absent; stems short, erect from substrate; [subgenus Brachytheca; section Tessaronia; subsection Spondylastrum] ................................................. M. tenellum

1 Leaves well-developed, pinnately divided with filiform segments; stems elongate, suspended in the water column and/or floating.

2 Flowers/fruits produced in axis of submersed leaves; [subgenus Brachytheca; section Tessaronia; subsection Spondylastrum] ................................................. M. humile

2 Flowers/fruits produced in axis of emersed leaves or on emersed shoots with bracts (reduced bracteal leaves).

3 Emerged shoots with feathery leaves about same size and shape as submersed leaves; flowers/fruits rarely produced; [widespread alien] [subgenus Myriophyllum; section Pectinatum] ................................................................. M. aquaticum

3 Emerged shoots with bracts subtending flowers/fruits; these bracts much different in shape than submersed leaves. [stranded plants may produce bracts and leaves of similar size and shape, but these not feathery].

4 All flowers/fruits alternate; fruits smooth; [subgenus Brachytheca; section Tessaronia; subsection Spondylastrum] ................................................. M. humile

4 All flowers/fruits opposite or whorled (or the lower opposite and the upper alternate in M. pinnatum).

5 Bracts usually longer than the internodes; [subgenus Brachytheca; section Tessaronia; subsection Spondylastrum] ................................................. M. humile

5 Bracts usually shorter than the internodes.

6 Leaves whorled or pseudo-whorled; fruits with low bumps ................................................................. M. heterophyllum

6 Leaves strictly alternate; fruits strongly tuberculate ................................................................. M. pinnatum

7 All bracts pinnatifid to pinnatatifid; [subgenus Myriophyllum; section Myriophyllum; subsection Isophylleae] ................................................. M. verticillatum

7 Bracts vary from entire to pinnate.

8 Leaves alternate, pseudo-whorled, or both; plain green; [of se. VA and southward]; [subgenus Brachytheca; section Tessaronia; subsection Spondylastrum] ................................................. M. laxum

8 All leaves whorled, grayish green; [collectively widespread]; [subgenus Myriophyllum; section Myriophyllum; subsection Myriophyllum];

9 Midstem leaves with 11 or fewer segments on each side of rachis; leaves rounded at apex; stem diameter more-or-less uniform; stem tips usually green; winter buds produced; [native, of DE and northward] ................................................. M. sibiricum

9 Midstem leaves with 12 or more segments on each side of rachis; many leaves appear truncate or clipped at apex; stem diameter below inflorescence is up to 2× the diameter of lower stem; stem tips usually reddish; no winter buds; [widespread alien].

................................................. M. spicatum


Myriophyllum heterophyllum Michaux, Southern Water-milfoil. Ditches, slow-moving waters of rivers and streams, pools, ponds. April-July. NY west to ON and MN, south to FL and TX. [= RAB, C, F, G, GW, K, S, WV, X, Y, Z]

Myriophyllum humile (Rafinesque) Morong. Millponds, slow-moving water of streams. NS west to MN, south to DE, MD, VA, and IL. [= C, F, G, K, X, Y, Z]

Myriophyllum laxum Shuttleworth ex Chapman, Loose Water-milfoil. Limesink depression ponds (dolines), spring-runs, rarely also in lakes. June-October. Se. VA south to n. FL, s. AL, and s. MS (Sorrie & Leonard 1999). M. laxum and M. heterophyllum both have reddish submersed stems and present difficulties in identification when in sterile condition. M. laxum has a total of 7-15 (-17) segments per leaf, vs. (15-) 17-31 (-37) segments in M. heterophyllum. Documented for VA by a 1922 specimen from Princess Anne County at GH (Sorrie, pers. comm.). [= RAB, GW, K, X, S, Y]

**Myriophyllum sibiricum** Komarov, Common Water-milfoil. Quiet circumneutral to alkaline waters. NL (Labrador) west to AK, south to VA, WV, IL, MO, NM, and CA; also in n. Eurasia. [= C, G, K, X, Z; > *M. exalbescens* Fernald – F, Y]


**Myriophyllum tenellum** Bigelow, Leafless Water-milfoil. Natural lakes (Carolina bay lakes), typically growing on the sandy bottoms in water 1-2 meters deep. NL (Newfoundland) west to MN, south to PA and NJ, and disjunct south to a few occurrences in NC; report from Virginia Beach, VA is false. [= C, F, G, K, X, Y, Z]

**Myriophyllum verticillatum** Linnaeus. Quiet waters. A circumboreal species, south in North America to DE, MD, n. WV, IN, NE, TX, and CA. [= C, G, K, X, Y, Z; > *M. verticillatum* var. pectinatum Wallroth – F]

**Proserpinaca** Linnaeus 1753 (Mermaid-weed)


1. Bracteal (emersed) leaves serrate; submersed pectinate leaves with 8-14 pairs of divisions 5-30 mm long; fruits 2.3-6.0 mm wide.
2. Fruit 2.3-4.0 mm wide, acutely angled, not winged, the sides of the capsule more-or-less planar. .......... *P. palustris* var. *crebra*
3. Leaves with a flattened rachis 1-4 mm wide, the 7-12 pairs of divisions 2.0-3.5 mm long; fruits 2.3-3.6 mm wide. .......... *P. pectinata*
4. Leaves with a filiform rachis (midrib) 0.2-1.0 mm wide, the 4-9 pairs of divisions 2.0-7.5 mm long; fruits 2.0-2.8 mm wide. .......... *P. intermedia*

**Proserpinaca intermedia** Mackenzie, Intermediate Mermaid-weed. Wet places. July-September. NS to SC on the Coastal Plain; disjunct in sc. TN. This taxon is intermediate in morphology between *P. palustris* and *P. pectinata*; whether it warrants species status is unclear. If merely a rarely produced first-generation hybrid, it should be treated as a hybrid binomial (*P. ×intermedia*); if it forms independent, self-reproducing populations, it should probably be treated as a species. [= RAB, C, F, G, K, Z; < *P. palustris* – GW, S]

**Proserpinaca palustris** Linnaeus var. *amblyogona* Fernald. Swamps. Occurs east to KY, TN, and GA. [= C, F, G, K; < *P. palustris* – GW, S] {not yet keyed}


**Proserpinaca palustris** Linnaeus var. *palustris*, Coastal Mermaid-weed. Wet places, swamp forests. June-October. MA (?) to FL and west to LA, on the Coastal Plain. [= C, F, G, K, Z; < *P. palustris* – RAB, S, W, WH; < *P. palustris* – GW (also including *P. intermedia*)]

**Proserpinaca pectinata** Lamarck, Feathery Mermaid-weed. Bogs, savannas, ditches, other wet places. June-October. NS south to s. FL and west to w. LA, mostly on the Coastal Plain, but scattered inland as well, as in c. TN. [= RAB, C, F, G, GW, K, S, WH, Z]

**140. VITACEAE** A.L. de Jussieu 1789 (Grape Family) [in VITALES]

A family of about 14 genera and 750-850 species, vines (rarely small trees or herbs), of tropical, subtropical, and temperate regions of the Old and New Worlds. References: Soejima & Wen (2006); Wen in Kubitzki, Bayer, & Stevens (2007).
**Ampelopsis** Michaux 1803 (Peppervine)

A genus of about 25 species, woody vines, of temperate and subtropical America and Asia. Perhaps to be split based on molecular phylogenetics, with section **Leeaceifoliae** (**A. arborea** and **A. megalophylla**) elevated to a new genus (Soejima & Wen 2006). References: Soejima & Wen (2006); Wen in Kubitzki, Bayer, & Stevens (2007).

1 Branches and leaves distinctly fleshy, the leaves > 1 mm thick when fresh; leaves 3-foliolate. ................................................................. **Parthenocissus**
1 Branches and leaves herbaceous; leaves simple, 3-, 5-, or many-foliolate.
2 Leaves simple, sometimes shallowly or deeply 3-5(-7)-lobed. .......................... **Cissus**
3 Tendrils not twining, terminating in adhesive disks............................................ **Ampelopsis**
4 Petals separate at their tips, falling individually; pith continuous through the node. ................................................................. **Ampelopsis**
4 Petals connate at their tips, falling together; pith interrupted by a diaphragm at each node (except continuous in **V. rotundifolia**) .............. 

**Ampelopsis** aconitifolia Bunge. Planted as an ornamental, rarely escaping to suburban woodlands; native of n. China. [= K]

**Ampelopsis arborea** (Linnaeus) Koehne, Peppervine. Swamp forests, marshes, wet thickets, moist to wet maritime forests. June-October. Se. VA (and MD?) south to s. FL, west to TX and n. Mexico, north in the interior to s. IL and sw. WV. [= RAB, C, F, G, GW, K, S, W, WH, WV]

**Ampelopsis brevipedunculata** (Maximowicz) Trautvetter, Porcelain-berry. Thickets and disturbed areas, native of ne. Asia. June-July; September. [= RAB, C, F, K; < **A. heterophylla** (Thunberg) Siebold & Zuccarini – S; = **A. heterophylla** (Thunberg) Siebold & Zuccarini var. brevipedunculata (Maximowicz) C.L. Li]

**Ampelopsis cordata** Michaux, Raccoon-grape, False-grape. Moist forests, bottomlands, and thickets, particularly where disturbed. May-July. E. VA south to Panhandle FL, west to TX, north in the interior to s. OH, s. IN, s. IL, MO, and NE; also introduced at scattered sites inland. [= RAB, C, F, G, GW, K, S, W, WH]

**Ampelopsis megalophylla** Diels & Gilg. Bigleaf Peppervine. Planted in the Southeast, and has the potential to naturalize; native of China. Reports of its occurrence as naturalized in MS are based on Cayratia (S.W. Leonard, pers. comm., 2006). [not mapped; rejected as a component of our flora]

**Cayratia** A.L. de Jussieu 1818 (Bushkiller)

A genus of 50-63 species, woody and herbaceous vines, of the Old World tropics and subtropics. References: Kriens & Richardson (2006); Wen in Kubitzki, Bayer, & Stevens (2007).

**Cayratia japonica** (Thunberg) Gagnepain, Bushkiller, Sorrel Vine. Disturbed areas, suburban woodlands; native of temperate and subtropical se. Asia. July-August. Reported for NC from several suburban areas, as in Forsyth County (Kriens &
Richardson 2006) and Mecklenburg County (J. Matthews, pers. comm., 2007). Also reported as naturalized in AL (Hansen & Goertzen 2006), MS, LA, and TX. [= K]

**Cissus** Linnaeus 1753

A genus of about 350 species, woody vines, herbaceous vines, and rarely shrubs, of tropical and rarely warm temperate areas. References: Wen in Kubitzki, Bayer, & Stevens (2007).

*Cissus trifoliata* (Linnaeus) Linnaeus, Marine-ivy. Coastal hammocks, dunes, disturbed coastal areas, the more northerly occurrences introduced. Se. SC (Jasper County) south through GA, FL, and west along the Gulf Coast to TX, AR, and Mexico. [= K, S, WH; > C. incisa (Nuttall) Des Moulins – GW, S]

**Parthenocissus** Planchon 1887 (Virginia-creeper, Woodbine)


1 Leaves 3-lobed to 3-foliolate; [introduced ornamental, rarely escaped]................................................................. *P. tricuspidata*
2 Inflorescence with a well-developed (zigzag) central axis, the dichotomous branches very unequal, the inflorescence therefore paniculiform; tendrils many-branched, usually with numerous adhesive disks (though young shoots may not have the disks yet formed); leaves usually dull above; [widespread in our area]................................................................................................. *P. quinquefolia*
3 Mature leaves glaucous beneath (the glaucescence sometimes rather obscured by pubescence); nodes usually not glaucous; nodal diaphragms usually > 2 mm in diameter .......................................................... *V. aestivalis var. aestivalis*
4 Mature 3-4 seeded berries > 9 mm in diameter; mature leaves slightly to strongly arachnoid-pubescent beneath; nodes usually not glaucous; nodal diaphragms usually > 2 mm in diameter .......................................................... *V. rotundifolia var. rotundifolia*

**Vitis** Linnaeus 1753 (Grape)


1 Tendrils simple; bark adherent (on all but the largest stems), with prominent lenticels; pith continuous through nodes; leaves relatively small and coarsely toothed, never deeply lobed; [subgenus *Muscadinia*].
2 Mature fruits < 10 mm in diameter; infructescences with 12-30 berries; leaf blades 4-8 cm long; [of s. GA southward]........................ *V. rotundifolia var. rotundifolia*
2 Mature fruits > 12 mm in diameter; infructescences with 2-8 (-12) berries; leaf blades usually > 6 cm long; [widespread in our area]........ *V. rotundifolia var. monsoniana*
3 Mature leaves glaucous beneath (the glaucescence sometimes rather obscured by pubescence); nodes often glaucous; [series *Aestivales*].
4 Mature 3-4 seeded berries > 9 mm in diameter; mature leaves slightly to strongly arachnoid-pubescent beneath; nodes usually not glaucous; nodal diaphragms usually > 2 mm in diameter .......................................................... *V. aestivalis var. aestivalis*
Vitis aestivalis Michaux var. aestivalis, Summer Grape. Forests and woodlands, mostly upland. May-June; September-October. MA west to MO and IA, south to s. FL and e. TX. [= RAB, C, F, G, K, WV, Y, Z; = V. aestivalis – S; < V. aestivalis – GW, W, WH; > V. riparia Sm.; > V. simpsonii Munson]

Vitis aestivalis Michaux var. bicolor Deam, Silverleaf Grape. Forests and woodlands, mostly upland. May-June; September-October. ON and MN south to n. GA and n. AL. [= Z; = V. aestivalis var. argentinifolia (Munson) Fernald – RAB, C, F, G, K, WV; = V. bicolor Le Conte – S; < V. aestivalis – GW, W]


Vitis cinerea (Engelmann in A. Gray) Engelmann ex Millardet var. cinerea, Graybark Grape, Pigeon Grape. Hammocks, most forests. VA (?), w. KY, wc. TN, IN, and WI, south to Panhandle FL (Okaloosa County), sc. AL and TX. [= RAB, C, F, G, K, WH, Z; = V. cinerea labruscana var. floridana Munson, Florida Grape. Hammocks, floodplain and other moist forests. Late May-June; August-October. Se. VA south to s. FL, west to s. MS. [= RAB, C, F, G, K, WH, Z; = V. simpsonii Munson – S, Y; < V. cinerea – GW, W]

Vitis labrusca Linnaeus, Fox Grape. Forests and woodlands, wet, moist, and dry. May-June; September-October. ME west to s. MI, south to n. GA, n. AL, and n. MS. [= RAB, C, GW, K, S, W, Z; > V. labrusca var. labrusca – F, G; > V. labrusca var. subedentata Fernald – F, G]

* Vitis labruscana L.H. Bailey [aestivalis × labrusca], Concord Grape. Commonly cultivated as a table grape. It is sometimes persistent after cultivation. [= K; = V. labruscana L.H. Bailey – F] {not keyed; not mapped}

Vitis mustangensis Buckley, Mustang Grape. {habitats}. {Dates}. AR and s. OK south to s. LA and s. TX; disjunct in sc. AL. [= K] {add to synonymy; not yet keyed}

Vitis palustris Vahl, Red Grape, Cat Grape, Catbird Grape. Floodplain forests, riverbanks. Mid June-late June; late July-October. IN, sw. VA (Townsend, pers. comm., 2009), c. TN (Chester, Wofford, & Kral 1997), sc. GA (Jones & Coile 1988), and FL Panhandle west to MO, OK, and TX. [= C, F, G, GW, K, S, WH, Y, Z]

Vitis riparia Michaux, Riverbank Grape. Forests and woodlands, mostly moist to wet. April-June; August-September. NB west to se. SK, south to VA, NC, c. and w. TN, n. MS, LA, and e. TX, and in the Pacific Northwest. [= RAB, C, G, GW, K, Z, W, WV; > V. riparia var. riparia – F]
**VITACEAE**

*Vitis rotundifolia* Michaux var. munsoniana (Simpson ex Munson) M.O. Moore, Munson Grape, Bullace Grape. Floodplain forests, banks of blackwater rivers. Late April-May; late July-September. Sc. GA and s. AL south to s. FL. [= K, Y, Z; = Muscadina munsoniana (Simpson ex Munson) Small – S; < V. rotundifolia – WH; = Vitis munsoniana Simpson ex Munson]

*Vitis rotundifolia* Michaux var. rotundifolia, Muscadine, Scuppernong. Forests, swamps, dunes. May-June; August-October. DE west to s. WV, KY, and MO, south to FL and TX. Cultivars of this species are popular in the Southeastern United States as table grapes and the source of a distinctive wine. [= K, Y, Z; = V. rotundifolia – RAB, C, F, GW, W, WV; = Muscadina rotundifolia (Michaux) Small – S; < V. rotundifolia – WH]

*Vitis rupestris* Scheele. Along streams and in riverbank scour areas, especially in calcareous areas. April-June; August-September. MD, WV, sw. PA west to MO, south to VA, c. TN, and n. AR. [= C, F, K, W, S, WV, Z]

*Vitis vinifera* Linnaeus, European Wine Grape. Increasingly cultivated in our area, especially in VA and NC, now significant wine-producing areas. [= K] (not keyed)


**141. KRAMERIACEAE** Dumortier 1829 (Krameria Family) [in ZYGOPHYLLALES]

A family of a single genus and about 15-18 species, herbs, shrubs, and trees, of warm (and usually dry) parts of s. North America, Central America, South America, and the West Indies. References: Robertson (1973); Simpson et al. (2004); Simpson in Kubitzki, Bayer, & Stevens (2007).

*Krameria* Loefling 1758 (Ratany)


*Krameria lanceolata* Torrey, Trailing Ratany, Sandspur. Sandhills. AR, TX, and s. KS west to se. CO, se. AZ, Chihuahua, and Coahuila; disjunct eastward in the Coastal Plain of Panhandle FL, peninsular FL, and GA (east to Bulloch, Bryan, Evans, and Emanuel counties, GA). [= K, WH, Z; > K. spathulata Small – S]

**142. ZYGOPHYLLACEAE** R. Brown 1814 (Creosote-bush Family) [in ZYGOPHYLLALES]

A family of about 22-27 genera and 230-285 species, trees, shrubs, and (rarely) herbs, of tropical and subtropical regions of the Old and New Worlds. References: Sheahan in Kubitzki, Bayer, & Stevens (2007).

1 Fruit with tubercles, at maturity separating into 10 mericarps ................................................................................................................................. **Kallstroemia**

1 Fruit with spines, at maturity separating into 5 mericarps ................................................................................................................................. **Tribulus**

**Kallstroemia Scopoli 1777**


1 Ovary and fruit glabrous (rarely strigose) ................................................................................................................................. **K. maxima**

1 Ovary and fruit pubescent ................................................................................................................................................................. **K. pubescens**

*Kallstroemia maxima* (Linnaeus) Hooker & Arnott, Greater Caltrop. Disturbed areas, dunes; native status uncertain. SC south to FL; West Indies; Mexico (Sinaloa and Tamaulipas) south through Central America to northern South America (Venezuela, Colombia). Early collections from Charleston (Stephen Elliott) and Savannah suggest the likelihood of introduction via ballast. [= RAB, K, S, WH, Z]

*Kallstroemia pubescens* (G. Don) Dandy, Caribbean Caltrop. Disturbed areas; native of tropical America. [= WH]
**KEY A**  – woody legumes (trees, shrubs, or woody vines)

1. Leaves unifoliolate or trifoliolate, or reduced to phylloidi spines.
2. Tree; leaves unifoliolate and > 5 cm wide; [subfamily Caesalpinioideae, tribe Cercideae] 

**Key B**

3. Leaves palmately or pinnately compound.
4. Leaves pinnately compound.
5. Leaves trifoliolate.

**Key C**


**Key D**

7. Leaves all reduced to phylloidi spines; flowers axillary; calyx 10-15 mm long ............................................................................. *Erythrina*

**Key E**

8. Leaves with angulated or flanged green twigs; leaves palmately trifoliolate, unifoliate, or reduced to spine-tipped phyllodes; flowers bright yellow; [introduced, usually of roadsides or as remnants of cultivation]; [tribe Genisteae, subtribe Genistinae].

**Key F**

9. Shrubs with normal lamina, either unifoliolate or trifoliolate; flowers in terminal racemes; calyx 3-6 mm long.

**Key G**

10. Leaves odd-pinnate; legume 4-15 cm long; seeds brown; [tribe Millettieae] .................................................................................... *Wisteria*
9 Trees or shrubs.
11 Leaves 2-<even-pinnate; [subfamily Mimosoideae]
  12 Inflorescence cylindrical, elongate, bicolor; (the basal flowers sterile, with pink staminodes, the upper fertile, yellowish); [tribe Mimoideae]................................................................................................................................................................................................. Dichrostachys
  12 Inflorescence spherical or hemispheric, as wide as long, all the flowers fertile and of the same color.
     13 Stamens connate at the base; inflorescence pink, 2.5-5 cm in diameter; [tribe Ingeae]
     14 Petioles with glands; leaves with >4 pinnae pairs, each pinna with >10 pinnule pairs; inflorescence 2.5-5 cm in diameter........
 .................................Albizia
     14 Petioles lacking glands; leaves with 2 pinnae pairs, each pinna with <8 pinnule pairs; inflorescence 5-7 cm in diameter........
 .................................Calliandra
  13 Stamens free; inflorescence orange or yellowish-white, 1.0-2.2 cm in diameter.
  15 Inflorescence yellowish-white, 1.8-2.2 cm in diameter; stamens 10; [tribe Mimoseae]..............................................Leucaena
  15 Inflorescence orange, 1.0-1.3 cm in diameter; stamens many; [tribe Acacieae].........................................................Vachellia
11 Leaves otherwise.
15 [subfamily Papilionoideae].
  16 Leaves glandular-punctate; corolla of only 1 petal; inflorescence a spike; shrubs; [tribe Amorpheae].................................Amorpha
  16 Leaves not glandular-punctate; corolla of 5 petals; inflorescence a raceme or panicle; trees or shrubs.
     17 Leaflets alternate on the rachis; leaflets 4-15 (-20) cm long; [tribe Sophoreae].................................................................Chadratis
     17 Leaflets opposite on the rachis; leaflets (1-) 2-5 (-6) cm long.
     18 Flowers in an upright, stiff raceme or panicle; flowers creamy white with some blue; [tribe Sophoreae]....................Maackia
     18 Flowers in dangling racemes; flowers white or pink.
     19 Leaflets with persistent linear stipels; [tribe Robinieae].........................................................................................Robinia
     19 Leaflets lacking stipels; [tribe Sophoreae]..............................................................................................................Styphnolobium
  15 [subfamily Caesalpinioideae].
  20 Leaves all 2-pinnate, or a mixture of 2-pinnate and 1-pinnate on the same plant; shrub or tree; [tribe Caesalpineae].
  21 Leaves a mixture of 1-pinnate and 2-pinnate..........................................................Gleditsia
  21 Leaves all 2-pinnate.
     22 Leaves petiolate; leaflets 20-70 mm long..............................................................Gymnocladus
     22 Leaves subsessile (the pinnae simulating 1-pinnate leaves); leaflets 1-5 mm long......................................................Parkinsonia
  20 Leaves all 1-pinnate (or appearing so in Parkinsonia); herb, shrub, or tree.
     23 Shrub with prominent glands on the leafstalk; [tribe Cassieae].................................................................Senna
     23 Tree or shrub (if a shrub, then lacking prominent glands on the leafstalk); [tribe Caesalpineae].
     24 Leaflets 13-45 mm long; tree; leaves 1-pinnate ..........................................................Gleditsia
     24 Leaflets 1-5 mm long; shrub; leaves actually 2-pinnate, but subsessile, the pinnae simulating 1-pinnate leaves................Parkinsonia

Key B – herbaceous legumes with palmate leaves with 4 or more leaflets

Lupinus, Orbexilum, Pediomelum, Psoralidium, Zornia

Key C – herbaceous legumes with bipinnate leaves

1 Stamens > 10 ..................................................................................................................................................................................Acaciella
1 Stamens 10 or fewer,
  2 Petiole with 1-several glands; stems ascending to erect; flowers greenish-white ...................................................................Desmanthus
  2 Petiole without glands; stems prostrate to weakly arching; flowers pink-purple, yellow, or greenish-yellow.
     3 Flowers pink-purple; legume ribbed, the ribs with prickles ......................................................................................Mimosa
     3 Flowers yellow to greenish-yellow; legume not ribbed or prickly......................................................................................Neptunia

Key D – pinnate plus

Aeschynomene, Apios, Arachis, Astragalus, Chapmannia, Chamaecrista, Cicer, Clitoria, Dalea, Galactia, Glottidium, Glycyrrhiza, Lathyrus, Lens, Lotus, Pisum, Securigera, Sesbania, Tephrosia, Vicia

Key E – unifoliolate

Alysicarpus, Baptisia, Crotalaria, Lupinus, Orbexilum, Pediomelum, Rhynchosa, Scorpiurus

Key F – pinnately trifoliolate

Acmispon, Amphicarpaea, Canavalia, Centrosema, Clitoria, Cullen, Dalea, Desmodium, Erythrina, Galactia, Glycine, Indigofera, Lablab, Lespedeza, Lotus, Macroptilium, Medicago, Melilotus, Mucuna, Orbexilum, Pediomelum, Phaseolus, Rhynchosa, Stylosanthes, Strophostyles, Trifolium, Vigna

Key G – palmately trifoliolate
**Acmispon, Baptisia, Crotalaria, Kammerowia, Medicago, Orbexilum, Pediomelum, Thermopsis, Trifolium**

*Acmispon* Rafinesque 1832 (American Bird’s-foot-trefoil, Prairie-trefoil)


**Acmispon* helleri* (Britton & Rose) A.A. Heller, Carolina Prairie-trefoil. Dry woodlands and openings, originally probably limited to prairie-like sites (fire-maintained, post oak-blackjack oak savannas), generally on clayey soils, now primarily seen on roadbanks, along railroads, and in powerline rights-of-way, where mowing and bush-hogging have replaced fire as the force keeping the habitat open, sunny, and suitable for this plant of prairie affinities. (June-) July-August (-September).  

*Acmispon* hystrix* (Britton) F.E. & E.G. Clements var. americanus* (Beard & Cartwright) – C, I, SE, Z

**Abrus Adanson 1763 (Precatory Bean)**


* Abrus precatorius* Linnaeus, Precatory Bean, Rosary Pea, Crab’s Eye, Jequirity. Native of the Paleotropics, and apparently reported for GA, AL, and AR by Isely (1998) and Kartesz (1999), but this is actually based on mislabeling in Map 64 in Isely (1998). The species does occur in peninsular FL, south of our area. The beautiful black-and-red beans have been traditionally used for jewelry and rosaries; they are extremely poisonous, though, and should be used with caution.  

**Acaciella Britton & Rose 1928 (Acacia)**


**Acaciella hirta** Britton & Rose, Prairie Acacia. Sandhills, disturbed sandy areas. W. LA, AR, and MO west to KS, OK, and TX; disjunct in e. Panhandle FL and n. peninsular FL. [= S = *Acacia angustissima* (P. Miller) Kuntze var. *hirta* (Nuttall)] B.L. Robinson – I, K, SE, WH; = *Acacia hirta* Nuttall]

**Aeschynomene Linnaeus 1753 (Joint-vetch)**

Aeschynomene americana Linnaeus var. americana, Shyleaf. Moist, disturbed sites. S. GA (Jones & Coile 1988, SE), s. AL, s. LA south to Central America; West Indies; se. Asia. [= I, SE, Y; < A. americana – K, WH]

Aeschynomene histrix Poiret var. incana (Vogel) Bentham. Disturbed areas; native of tropical America. Probably introduced on ship’s ballast at Pensacola in the 19th century, but seemingly established as it was recollected in Escambia County, FL, in 1985 (Isely 1990). [= K, WH; = A. histrix var. incana – SE, orthographic variant]

Aeschynomene indica Linnaeus, Southern Joint-vetch Marshes, ditches, disturbed wetlands. July-October. Apparently native to se. North America, from NC west to AR, south to s. FL and TX, now widespread in the tropics and subtropics of the Old World and New World. Perry, Ware, & McKenney-Mueller (1998) discuss the occurrence of this species in VA. [= GW, I, K, SE, WH, Y, Z; < Ae. virginica – S]


Aeschynomene virginica (Linnaeus) Britton, Sterns, & Poggenburg, Northern Joint-vetch, Sensitive Joint-vetch. Fresh to brackish tidal marshes and adjacent ditches, fields, and disturbed areas. July-October. NJ to ne. NC. Generally not weedy in most of its range, but in NC (now) found mostly in weedy situations, such as ditches or fields hydrologically connected to tidal waters. See Tyndall, Holt, & Lam (1996) and Belden & Van Alstine (2003) for additional information on habitat, population biology, and survey techniques. See Baskin et al. (1998) for additional information about seed germination and viability. [= RAB, C, F, G, I, K, SE, Y, Z; < A. virginica – S (also see A. indica)]

Aeschynomene viscidula Michaux, Sticky Joint-vetch. Dry sandy areas, such as sandhills, dry pinelands, and barrier islands. From s. GA (Jones & Coile 1988; Carter, Baker, & Morris 2009; SE), panhandle FL, s. AL, s. MS, and s. TX south to s. FL; tropical America. [= I, K, SE, WH, Y; = Secula viscidula (Michaux) Small – S]

Albizia Durazzini 1772 (Silktree)


1 Leaflets 7-15 mm long; bark of mature trees smoothish, with small wart-like bumps ................................................................. A. julibrissin

1 Leaflets 15-30 mm long; bark of mature trees rough, with plates ........................................................................................................ A. kalkora


* Albizia kalkora (Roxburgh) Prain, Kalkora Mimosa. Naturalizing in suburban areas; native of e. Asia (Japan, Korea, Taiwan). Documented by herbarium specimens at DUKE and NCU. Apparently hybridizing with A. julibrissin (W. Cook, pers. comm.).

Alysicarpus Necker ex Desvaux 1813 (Alyce Clover)


* Alysicarpus ovalifolius (Schumacher) J. Léonard, Alyce Clover. Disturbed areas; native of the Old World Tropics, planted as a forage crop (at least formerly), and rarely naturalized. The VA occurrence is from chrome ore piles in Newport News – presumably a waif. It is possible that A. vaginalis (in the strict sense) is represented in our area as well. It differs from A. ovalifolius in having a densely congested inflorescence (with rachis internodes shorter than the flowers) vs. a lax inflorescence with the flowers much shorter than the rachis internodes. [= WH; < Alysicarpus vaginalis (Linnaeus) A.P. de Candolle – I, K, SE]
Amorpha Linnaeus 1753 (Indigo-bush, Leadplant)


1 Short shrubs, usually 0.3-1 (-1.5) m tall; petioles 1-15 (-20) mm long, usually shorter than the width of the contiguous leaflets (except in A. confusa); leaflets usually slightly or conspicuously revolute.

2 Leaflet mucros mostly swollen apically; plant usually glabrous or sparsely pubescent.

3 Upper portions of the plant (stems and leaves) glabrous; calyx tube glabrous to sparsely or densely minutely strigillose; fruit glabrous; [of s. GA southward].........................................................................................A. herbacea var. floridana, of s. GA and FL.

4 Leaflet mucros mostly swollen apically; plant usually glabrous or sparsely pubescent.

5 Calyx lobes (0-) 0.2-1.2 mm long (thus distinctly shorter than the calyx tube); racemes 5-20 (-25) cm long.

6 Calyx lobes obsolete to very small, (0-) 0.2-0.6 (-0.8) mm long; plants glabrous to glabrate; leaflets usually not mucronate, the midrib commonly panicled), 1 (-4) per flowering branch, (2-) 3-5 (-6) cm long; flowering April-May .............................................A. georgiana.

7 Foliage remaining green when dried; leaflets (7-) 9-23 (-31) per leaf, dull to somewhat shiny above; [widespread in our area] .................................................................A. fruticosa.

8 Foliage blackening when dried; leaflets (7-) 9-15 (-19) per leaf, usually shiny above; [of s. SC and southward].........................A. nitens.
Amorpha nitens  Boynton, Dark Indigo-bush.  Sandy woodlands, rocky slopes, bottomland forests.  April-June.  S. SC south to GA, west to LA, north in the interior to w. KY, s. IL, AR, and e. OK.  First reported for SC by Nelson & Kelly (1997).  [= I, K, S, SE, Y]


Amphicarpaea Ellriott ex Nuttall 1818 (Hog-peanut)

A genus of 5-6 species, of e. and se. Asia, North America, and montane Africa.  It now appears that 2-3 semi-cryptic taxa should be recognized in what has traditionally been considered a single species of Amphicarpaea (Callahan 1997, Parker 1996).  The genus name has been corrected to Amphicarpaea from the frequently used Amphicarpa.  References:  Callahan (1997)=Y; Parker (1996)=Z; Isely (1998)=I.

Identification notes:  Producing inflorescences of two types, one with chasmogamous flowers and aerial legumes, the other with cleistogamous flowers and subterranean legumes.

1  Petiole 3.5-5.3 cm long; petiolule of the terminal leaflet (not including the rachis extending from the point of connection of the lateral leaflets to the joint marking the beginning of the petiolule of the terminal leaflet) 1.0-1.4 mm long; terminal leaflet 4.2-5.2 cm long .......................................................... A. bracteata var. bracteata

1  Petiole 6.0-6.8 cm long; petiolule of the terminal leaflet 1.7-1.9 mm long; terminal leaflet 5.5-6.1 cm long ................ A. bracteata var. comosa

Amphicarpaea bracteata (Linnaeus) Fernald var. bracteata, Hog-peanut.  {Mt, Pd, Cp (DE, GA, NC, SC, VA, WV) {FL}: dry to moist forests, thickets; common (rare in FL?).  July-September; August-October.  {The distributions and habitats of the two varieties in our area require herbarium and field investigation}.  [= K; = Amphicarpa bracteata var. bracteata – F, G, orthographic variant; < Amphicarpaea bracteata – C, I, SE, WH; < Amphicarpa bracteata – RAB, orthographic variant; < Falcata comosa (Linnaeus) Kuntze – S]

Amphicarpaea bracteata (Linnaeus) Fernald var. comosa Fassett, Hog-peanut.  {Mt, Pd, Cp (DE, GA, NC, SC, VA, WV): dry to moist forests, thickets; common.  July-September; August-October.  {The distributions and habitats of the two varieties in our area require herbarium and field investigation}.  [= K; = Amphicarpa bracteata var. comosa – F, G, orthographic variant; < Amphicarpaea bracteata – C, I, SE, WH; < Amphicarpa bracteata – RAB, orthographic variant; < Falcata comosa (Linnaeus) Kuntze – S]

Anthyllis Linnaeus 1753 (Kidney-vetch)


Anthyllis vulneraria Linnaeus, Kidney-vetch.  Disturbed areas; native of Mediterranean Europe.  June-August.  [=I, K2]

Apios Fabricius 1759 (Groundnut)


1  Petiole 20-58 mm long; flower deep maroon to pale maroon and white; style glabrous; legume 6-10 (-12) cm long; seed 5-6 mm long; tubers several in a chain, each 2-10 cm in diameter ........................................................................................................................................ A. americana
**FABACEAE**

1 Legume 70-75 mm long; flower pale green and rose-purple; style bearded; legume 12-15 (-18) cm long; seed 7.2-11.0 mm long; tuber 1, 15-20 cm in diameter. ............................................................................................................................................. *A. priceana*


**Astragalus** Linnaeus 1753 (Peanut)

A genus of about 60 species, annual and perennial herbs, native of South America (especially Brazil). References: Isely (1998)=I.

1 Petiole 5-10 cm long; corolla 1.1-5 cm long; annual ............................................................................................................................................. *A. hypogaea*

1 Petiole 2.5-3.5 cm long; corolla 1.8-2 cm long; perennial ............................................................................................................................................. *A. prostrata*


**Astragalus** Linnaeus 1753 (Milkvetch)

A genus of 2300-2500 species, herbs and shrubs, most diverse in arid regions of w. North America and w. and c. Asia. The habitats of the southeastern species may be characterized as rocky or sandy, "relictual islands" of aridity in the generally moist landscape of eastern North America. References: Barneby (1964)=Z; Isely (1998)=I.

1 Legume pilose with > 1 mm or more long; stems conspicuously pubescent, the hairs spreading and simple; plants decumbent, spreading, or ascending, the stems 0.5-4 dm long.

2 Corolla 14-19 mm long; leaflets (5-) 7-15; legume unilocular; calyx lobes equaling or longer than the calyx tube [of dry sandy habitats from SC south] ............................................................................................................................................. *A. tennessensis*

2 Corolla 8-12 mm long; leaflets (5-) 7-15; legume unilocular; calyx lobes equaling or longer than the calyx tube [of dry sandy habitats from w. VA northward] ............................................................................................................................................. *A. villosus*

1 Legume glabrous; stems glabrous or inconspicuously pubescent, the hairs appressed, simple or dolabriliform; plants erect with stems (3-) 4-15 dm long, or decumbent with stems 1-3 dm long (A. *distortus* var. *distortus* and *A. bibullatus*).

3 Plants erect, stems (3-) 4-15 dm long; legume straight to moderately curved.

4 Lower stipules connate; pubescence dolabriliform; legumes 1-1.5 cm long, 4-5 mm in diameter; [typically of dry to mesic soils]. [.......................... *A. canadensis* var. *canadensis*]

4 Lower stipules free; pubescence simple; legumes either longer or wider (2-3 cm long and 4-6 mm in diameter in *A. michauxii*, 1.5-2.0 cm long and 8-18 mm in diameter in *A. neglectus*); [typically of notably dry, either rocky or sandy, soils].

5 Leaves with 21-31 coriaceous to somewhat fleshy leaflets, many of the leaflets alternate or subopposite; legumes 2-3 cm long, 4-6 mm in diameter; [of dry sandy habitats from NC south] ............................................................................................................................................. *A. michauxii*

5 Leaves with 11-23 thin-textured leaflets, all of the leaflets usually opposite; legumes 1.5-2 cm long, 8-18 mm in diameter; [of rocky calcareous habitats from VA north] ............................................................................................................................................. *A. neglectus*

3 Plants decumbent or ascending, stems 1-5 dm long; legume either dry and strongly curved (about 90 degrees), or globose and initially fleshy.

6 Legume globose, 1.3-2 cm in diameter, initially fleshy; corolla 18-25 mm long; [of calcareous glades of c. TN] .................. *A. bibullatus*

6 Legume lanceolate, 1.2-2.5 cm long, 4-7 mm wide, strongly curved; corolla (7-) 8-15 mm long; [of shaley habitats from w. VA northward or of dry sandy sites in FL and possibly adjacent GA].

7 Leaflets mostly 1-2× as long as wide, typically noticeably notched at the tip; mature legume reticulately textured; corolla 8-11 mm long; [of dry sandy sites in FL and possibly adjacent GA and s. MS] ............................................................................................................................................. *A. obcordatus*

7 Leaflets mostly 2-3.5× as long as wide, truncate or shallowly notched at the tip; mature legume lacking a reticulately textured surface; corolla 9-15 mm long; [either of shaley habitats from w. VA northward or of woodlands and prairies from MS westward]

8 Keel 7-9.5 mm long; legume usually 3-4× as long as wide, often curved 90°, grooved along sutures on both sides ................................................................. *A. distortus* var. *distortus*

8 Keel 6-7 mm long; legume usually 2.5-3.5x as long as wide, nearly straight or curved < 90°, grooved only along one suture ................................................................. *A. distortus* var. *engelmannii*


**Astragalus canadensis** Linnaeus var. *canadensis*, Canada Milkvetch. Forests, woodlands, streambanks, rocky slopes and bluffs. June-August; July-October. Ranging through much of North America, from QC and Hudson Bay west to BC, south to GA, TX, CO, and Utah; also apparently in Siberia. The other varieties occur further west. See Barneby (1964) for a detailed
discussion of taxonomic and nomenclatural problems involving *A. canadensis*. Barneby comments that "the eastern mountain race [in the Appalachians] is commonly distinguished from var. *canadensis* of the Mississippi Valley and northward by a narrower and more open flowering and fruiting raceme, and the flowers at the same time are relatively small. There is something to be said in favor of recognizing an eastern montane variety, so long as we confine its distinguishing characteristic to a loose raceme." The distribution, as mapped by Barneby, is suggestive of a composite map of 2 (or more) different taxa, one of them being centered in the Southern and Central Appalachians (extending out into nearby provinces). F and G separate var. *carolinianus*, basing the distinction, however, on a different set of characters, and considering var. *canadensis* to range south to VA (at least). Further study is needed; it seems we may have in our area 2 taxa worthy of distinction at the varietal level. [= I, K, SE, Z; < *A. canadensis* – RAB, C, W; > *A. canadensis* var. *canadensis* – F, G; > *A. canadensis* var. *carolinianus* (Linnaeus) M.E. Jones – F, G; > *A. carolinianus* Linnaeus – S]

*Astragalus distortus* Torrey & A. Gray var. *distortus*, Ozark Milkvetch, Bent Milkvetch. Shale barrens and other dry, shaley places. May-July. *A. distortus* is interpreted by Z (and followed by C and SE) to consist of 2 varieties: var. *distortus*, occurring in the s. Midwest from IL, MO, and OK south to MS, LA, and AR, and disjunct in n. and sc. VA, e. WV, and w. MD, and var. *engelmannii* (Sheldon) M.E. Jones, of TX and ne. LA. The two varieties seem fairly readily distinguishable morphologically in the Midwest. Appalachian var. *distortus* complicates the issue, since it approaches var. *engelmannii* in flower size and matches it in ovule number. The Appalachian plant, with a combination of morphologic characters not matching the two named varieties and far allopatric from them might better be considered a distinct variety. Further study is needed. [= C, I, K, SE, Z; < *A. distortus* – F, G; = *Holcophacos distortus* (Torrey & A. Gray) Rydberg – S]

*Astragalus distortus* var. *engelmannii* (Sheldon) M.E. Jones. {habitats}. AR, TX, and w. LA; disjunct eastward in MS (NatureServe 2007). [= I, K, SE, Z]

*Astragalus michauxii* (Kuntze) F.J. Hermann, Sandhills Milkvetch, Michaux's Milkvetch. Sandhills. Late April-June; June-October (and persisting). Sc. NC south through SC to GA, a Southeastern Coastal Plain endemic (reports from AL and FL are in error). "The Michaux milk-vetch is greatly isolated from any member of the genus morphologically similar" (Barneby 1964). [= RAB, I, K, SE, Z; = *Tium michauxii* (Kuntze) Rydberg – S]

*Astragalus neglectus* (Torrey & A. Gray) Sheldon, Cooper Milkvetch. Dry calcareous woodlands and barrens, over dolostone and limestone. June-September. Se. ON west to se. SK and ne. ND, south to w. NY, ne. PA, c. PA, n. OH, s. MI, se. WI, and e. SD; disjunct in w. VA and e. WV (Wieboldt et al. 1998). [= C, I, K, SE, Z]

*Astragalus obcordatus* Elliott, Florida Milk-vetch. Sandhills. S. MS south to c. peninsular FL. Reported for s. GA, but no specimen documentation is known (Barneby 1964). [= I, K, SE, WH, Z; = *Phaca obcordata* (Elliott) Rydberg ex Small – S]


*Astragalus villosus* Michaux, Bearded Milkvetech, Southern Milkvetech. Sandhills and other dry, sandy places. May-June; June-August. A Southeastern Coastal Plain endemic: s. SC south to Panhandle FL, west to s. MS. This species is described by Barneby (1964) as "a lowly but delightful little astragalus." [= RAB, I, K, SE, WH, Z; = *Phaca intonsa* (Sheldon) Rydberg ex Small – S]

*Baptisia* Ventenat 1808 (Wild Indigo)


Identification notes: Many of our species hybridize when they grow in proximity. They are generally recognizable (especially in context with their parents) by their intermediate morphology. Additional hybrids have been created by plant breeders and may be found in cultivation.

1 Leaves 1-foliolate, sessile or perforate.
2 Leaves perfoliately; plant glabrous; [widespread, from s. SC southward].................................................................B. perfoliata
3 Leaves sessile; plant glabrous or densely cobwebby pubescent; [narrow endemics of GA and FL].
4 Plant cobwebby-pubescent; leaves ca. 1× as long as wide, cordate at base; corolla 9-11 mm long, yellow; [of e. GA (Brantley and
Wayne counties)]..................................................................................................................................................B. arachnifera
3 Plant cobwebby-pubescent; leaves ca. 1× as long as wide, rounded to broadly cuneate at base; corolla 12-15 mm long, pale yellow to green; [of
the FL Panhandle (Franklin, Gadsden, Leon, Liberty, and Wakulla counties)].....................................................B. simplicifolia
1 Leaves 3-foliolate, petiolate or sessile.
2 Flowering or fruiting pedicels bracteolate; corolla 11-14 mm long
5 Calyx lobes as long as the calyx tube ..............................................................................................................................B. lecontei
5 Calyx lobes much > the calyx tube.
6 Plant glabrous; [of ne. FL (Clay and St. Johns counties)] .........................................................................................B. calycosa
6 Plant tomentose to hirsute; [of FL Panhandle (Escambia, Holmes, Okaloosa, Santa Rosa, and Walton counties)]..............B. hirsuta
4 Flowering or fruiting pedicels lacking bracteoles larger (except B. tinctoria).
7 Plants in flower.................................................................................................................................................................Key A
7 Plants in fruit............................................................................................................................................................................Key B

Key A – flowering Baptisia
1 Flowers lavender or blue.
2 Leaflets 2-4 (-5) cm long, mostly < 10 mm wide (if wider, then < 4 cm long); leaflets mostly oriented in a vertical plane; fertile stems
usually 0.4-1.0 m tall, the leafy branches horizontally spreading; racemes 1.25-2.5 (-4) dm long, rather densely flowered; pedioles 0-4 (-12)
mm long; [of diabase and limestone glades, barrens, and woodlands]. .................................................................B. australis var. abercans
2 Leaflets 4-6 (-9) cm long, mostly > 12 mm wide; leaflets not oriented in a vertical plane; fertile stems usually 1-1.5 m tall, the leafy
branches ascending; racemes 2-4 (-5) dm long, rather sparsely flowered; pedioles 20-40 (-40) mm long; [of flood-scoured riverside
cobblebars and rock outcrops, also frequently cultivated and sometimes persistent or escaped]..............................B. australis var. australis
3 Flowers white or cream-white.
4 Flowering pedicels 18-30 mm long, subtended by persistent bracts 10-25 mm long and 7-10 mm wide; flowers cream-white (to
pale-yellow).
5 Pedioles of median leaves 4-10 mm long..........................................................................................................................B. bracteata
5 Pedioles of median leaves 2-4 mm long
6 Leaves and stems glabrous; leaflets 1.5-2.5× as long as wide .....................................................................................B. leucophaea var. laevicaulis
6 Leaves and stems pubescent; leaflets (1.5-) 2.5-5× as long as wide .............................................................................B. leucophaea var. leucophaea
4 Flowering pedicels 3-10 mm long, subtended by caducous bracts 4-7 mm long and 1-2 mm wide; flowers white.
7 Calyx 4.5-6.5 mm long; corolla 13-16 (-18) mm long; pedioles 5-10 (-20) mm long .........................................................B. albenscens
7 Calyx 7-8 mm long; corolla 20-25 mm long; pedioles (of the lower leaves at least) 10-20 mm long.
8 Legume usually 15-20 (-30) mm in diameter, thin-walled and brittle; [of NC south through GA to FL and AL].................B. alba
8 Legume usually 10-12 (-15) mm in diameter, rigid and tough; [of c. TN, c. KY, and MS westward] .............................B. leucantha
3 Flowers yellow.
9 Flowering pedicels 14-18 (-30) mm long, subtended by persistent bracts 10-25 mm long and 7-10 mm wide; flowers pale-yellow (to
cream-white).
10 Pedioles of median leaves 4-10 mm long.........................................................................................................................B. bracteata
10 Pedioles of median leaves 2-4 mm long
11 Leaves and stems glabrous; leaflets 1.5-2.5× as long as wide .....................................................................................B. leucophaea var. laevicaulis
11 Leaves and stems pubescent; leaflets (1.5-) 2.5-5× as long as wide .............................................................................B. leucophaea var. leucophaea
9 Flowering pedicels 2-10 mm long, subtended by caducous bracts 2-10 mm long and 1-2 mm wide; flowers bright yellow.
12 Leaflets mostly 1-2.5 (-4) cm long, 1.5-2× as long as wide; the petioles 0-1 mm long; corolla 12-16 mm long; racemes numerous,
terminating most of the branches. .................................................................................................................................B. tinctoria
12 Leaflets mostly 4-9 cm long, 1.5-4× as long as the petioles 2-10 mm long; corolla 20-28 mm long; racemes solitary (-3) (B.
cineria) or numerous (B. lanceolata).
13 Inflorescences of many-flowered cylindrical racemes; stipules persistent or caducous.
14 Plant persistently cinereous-pubescent stipules (some of them at least) persistent..........................................................B. cinerea
14 Plant puberulent when young, soon glabrate to glabrous; stipules caducous; [of MS westward] ............................B. sphaerocarpa
15 Inflorescence of solitary axillary flowers or flowers in clusters of 2-4 in axils or terminal racemes; stipules caducous.
15 Petioles 2-3 mm long; leaflets 1.25-2× as long as wide; [of LA, AR, TX, and OK] ................................................B. nuttalliana
15 Petioles 4-10 mm long; leaflets 1.7-5× as long as wide; [of SC, GA, FL, and AL]. .........................................................B. lanceolata var. lanceolata
16 Leaflets 3-5× as long as wide, usually < 1.5 cm wide; flowers usually solitary or in clusters of 2-3; fruits broadly ellipsoid or
subspheroidal, < 2× as long as wide; [se. SC south through GA Coastal Plain to ne. FL] .........................B. lanceolata var. lanceolata
16 Leaflets 1.7-3.2 (-5×) as long as wide, the larger typically > 2 cm wide; flowers in racemes of (1-) 3-10 flowers; fruits
usually ellipsoid, often > 2× as long as wide; [FL Panhandle, s. AL, and c. peninsular FL] ............B. lanceolata var. tomentosa
{add B. megacarpa to key}

Key B – fruiting Baptisia
1 Legume 5-11 mm in diameter.
2 Legume cylindric, 20-30 (-35) mm long, 7-9 mm in diameter, yellow-brown, leathery in texture ........................................B. albenscens
2 Legume globose or subspheroidal, 7-25 mm long, 5-11 mm in diameter, black, woody in texture.
3 Leaflets mostly 1-2.5 (-4) cm long.................................................................................................................................B. tinctoria
3 Leaflets 3.5-10 cm long.
Echinacea laevigata

Unmistakable for its simple leaves and dense "cobwebby" pubescence.

Eastern plants referrable to Baptisia australis for separating it from typical Baptisia alba, B. leucantha, B. leucophaea var. laevicaulis, B. australis var. aberrans, B. australis var. australis

Baptisia alba (Linnaeus) Ventenat, Thick-pod White Wild Indigo. Dry woodlands, roadsides. May-July; June-October. NC south to n. peninsular FL, west to AL. B. leucantha (see below) is a western sibling, treated as either a species or a variety. In fruit, it is easily separated from Baptisia albescens and other Baptisia by its nearly spheroidal legume. B. alba and B. albescens have been nomenclaturally confused; Isely (1986a) corrects the application of the epithet "alba." [= S, WH; = B. alba var. alba – I, K, SE; = B. pendula Larisey – RAB; = B. lactea (Rafinesque) Thieret var. ovobata (Larisey) Isely – C (by implication), X, Y; = B. lactea var. pendula (Larisey) B.L. Turner – Q; > B. pendula var. pendula – Z; > B. pendula var. ovobata Larisey – Z]

Baptisia albescens Small, Narrow-pod White Wild Indigo, Spiked Wild Indigo. Dry woodlands, pine flatwoods, roadsides. May-July; June-October. SC to n. FL, e. AL and e. TN. The fruits are unlike any of our other species in being cylindrical, about 3× as long as the diameter, and yellowish-brown (rather than black) when mature. [= I, K, S, SE, WH; = B. alba – RAB, C, F, G, Q, W, X, Y, misapplied; > B. alba – Z; > B. albescens – Z]

Baptisia arachnifera Duncan, Hairy Rattleweed, Hairy Wild Indigo. Sandhills. Endemic to GA (Wayne and Brantley counties). Unmistakable for its simple leaves and dense "cobwebby" pubescence. [= I, K, Q, SE, X, Y]

Baptisia australis (Linnaeus) R. Brown var. aberrans (Larisey) M. Mendenhall, Eastern Prairie Blue Wild Indigo, Glade Wild Indigo. Glades, barrens, and open woodlands over limestone (or other calcareous rocks) and diabase (or other mafic rocks), in areas that were formerly barrens, barrens, glades, or oak savannas. April-May, June-August, C. and SE, TN, NW, GA, and C. NC (and possibly also s. KY and SC. VA). Blue-flowered Baptisia from mafic glades, barrens, and former prairies and oak savannas in NC has proven problematic to taxonomists. Larisey (1940a) treated B. australis and B. minor as separate species, and placed eastern plants resembling B. minor in B. minor var. aberrans Larisey, but without providing very satisfying characters for separating it from typical B. minor of nw. North America. RAB apparently (though tacitly) included B. minor within B. australis. Isely (1981, 1990) treated blue-flowered Baptisia as B. australis var. australis and var. minor, regarding var. minor as reaching its eastern limit in MO (the two varieties thus allopatric), and stating that "sporadic collections within the range of australis have the pods and some of the vegetative characters of var. minor... most of these collections are from dry or sterile habitats, e.g., cedar glades, that var. australis typically does not inhabit" (Isely 1990). His treatment of australis and minor at the varietal level remains largely based on the existence of minor carnations within his concept of the range of australis. NC plants from glade-like sites are morphologically more similar to midwestern prairie B. minor, occur in similar habitats, and grow with a large number of other plants with midwestern phytogeographic affinities, such as Eryngium yuccifolium var. yuccifolium, Echinacea laevigata (an eastern sibling of E. purpurea), Solidago ptarmicoides, Solidago rigida ssp. glabrata (an eastern sibling of S. rigida ssp. rigida), Silphium terebinthinaceum, and others. The affinities of these plants seem to be with B. minor; "shoeorning" them into the more eastern B. australis, which they do not resemble in morphology, habitat, or (indeed) range is not a desirable disposition. Eastern plants referable to B. minor do, however, as noted by Larisey and Isely, differ from midwestern plants in leaflet size and shape, branching, and pod shape; they are best treated as an eastern, reliculat variety in the complex, B. australis var. aberrans Larisey. Mendenhall (1994a, 1994b) found that the "aberrans" entity warranted taxonomic recognition, and indeed that it is less closely related to B. australis s.s. and B. minor than they are to one another; she chose to treat the three entities as varieties under B. australis. For now, the best treatment seems to be to follow Mendenhall, and acknowledge the existence of three varietal entities, with the phylogenetic affinities uncertain. The range of B. australis var. minor is thus largely midwestern, from se. NE, s. MO, and e. and c. KS south to w. AR, e. and c. OK, and ne. TX. [= K, X; = Baptisia minor Lehmann var. aberrans Larisey – Z; < B. australis (Linnaeus) R. Brown – RAB, S; < B. australis var. australis – I, Q, SE; < B. australis var. minor (Lehmann) Fernand – C, G; < B. minor – F]

Baptisia australis (Linnaeus) R. Brown var. australis, Tall Blue Wild Indigo, Steamside Blue Indigo. Riverbank scour areas, gravel bars, and disturbed areas (where persisting from cultivation). April-June; June-August. Native to w. and n. VA, w. MD, WV, w. PA, e. and c. KY, ne. TN, se. IN, and s. OH, and possibly native to other states, the original range somewhat obscured by its frequent cultivation. [= C, G, K, X; = B. australis – F, W, Z; < B. australis – RAB, S; < B. australis var. australis – I, Q, SE]
Baptisia bracteata Elliott, Creamy Wild Indigo. Sandhills, other dry woodlands. March-April; May-June. Ne. AL northwest through n. GA and n. SC to w. NC. The more western B. leucophaea Nuttall is better treated as a species than as B. bracteata var. leucophaea (Nuttall) Kartesz & Gandhi (Mendenhall 1994b). [= RAB, Q, S, W, X, Z; = B. bracteata var. bracteata – C, I, K, SE]

Baptisia calycosa Canby, Florida Wild Indigo. Dry pinelands. Endemic to ne. FL (Clay and St. Johns counties) and also reported for Lowdes County, GA (Kartesz 2010) (this record needing confirmation). [= Q, S, Z; = B. calycosa var. calycosa – I, K, SE, WH, Y] {synonymy incomplete: X}

Baptisia cinerea (Rafinesque) Fernald & Schubert, Carolina Wild Indigo. Sandhills, other dry sandy woods. Late April-June; June-July. Though common in the Coastal Plain of the Carolinas, B. cinerea is a narrow endemic, ranging only from s. VA south to s. SC. The large, yellow flowers are very showy. In fall, the leaves do not drop, but stay attached to the stems, the whole plant turning an ashy gray; these dried plants are conspicuous through the following winter. The report in Jones & Coile (1988) of B. cinerea in GA is in error; the specimen is of B. lanceolata. [= RAB, C, F, G, I, K, Q, SE, X; = B. villosa auct. non (Walter) Nuttall – S, Z]

Baptisia hirsuta Small, Hairy Wild Indigo, Panhandle Wild Indigo. Dry pinelands. Endemic to FL Panhandle (Escambia, Holmes, Okaloosa, Santa Rosa, and Walton counties) and adjacent AL (Covington County). May; June-September. [= Q, S, Z; = B. calycosa Canby var. villosa Canby – I, K, SE, WH, Y] {synonymy incomplete: X}

Baptisia lanceolata (Walter) Elliott var. lanceolata, Gopherweed. Sandhills. April-May; June-November. S. SC south to ne. FL and sw. GA, a Southeastern Coastal Plain endemic. Small (1933) alleges that B. lanceolata ranges north to NC, but no documentation is known. The plant is reminiscent of B. cinerea, but forms larger, bushier plants and is separable by characters in the key. [= I, K, Q, SE, X; < B. lanceolata – RAB, S, WH; = B. lanceolata – Z]

Baptisia lanceolata (Walter) Elliott var. tomentosa (Larisey) Isely. Sandhills. Panhandle FL and adjacent s. AL; disjunct in c. peninsular FL. Two forms have been recognized, the "narrow-leaved form," endemic to the Apalachicola Lowlands portion of the FL Panhandle, and the "typical form," occupying the FL Panhandle, s. AL, and disjunct in c. peninsular FL (Isely 1981). Mendenhall (1994b) included broad-leaved and narrow-leaved forms of var. tomentosa in her study, which provided some support for the taxonomic recognition of these unnamed entities. [= I, K, SE, Y; = B. lanceolata var. elliptica (Small) B.L. Turner – Q; = B. elliptica Small – S; < B. lanceolata – WH; > B. elliptica var. elliptica – Z; > B. elliptica var. tomentosa Larisey – Z]


Baptisia leucantha Torrey & A. Gray. Woodlands, prairies, roadsides. W. MY, MI, WI, MN, and e. NE, south to AL, MS, LA, e. TX, and sw. OK; alleged by S to occur in NC, presumably based on misinterpreted material of B. alba. [= S, X; = Baptisia alba var. macrophylla (Larisey) Isely – I, K1, K2, SE; = B. lactea (Rafinesque) Thieret var. lactea – C, Q, Y; > B. leucantha var. leucantha – Z; > B. pendula Larisey var. macrophylla Larisey – Z]

Baptisia leucophaea Nuttall var. leucophaea. Pinelands, woodlands. April-May. Nw. IN west to s. MN and e. NE, south to w. KY, c. MS, c. LA, se. LA (Turner 2006), and e. TX. [= B. bracteata var. leucophaea – I, K2, SE; < B. leucophaea var. leucophaea – F, G, Q; < B. bracteata Muhlenberg ex Elliott var. leucophaea (Nuttall) Kartesz & Gandhi – K1; = B. bracteata var. glabrescens (Larisey) Isely – Y; < B. leucophaea var. glabrescens Larisey – Z]

Baptisia leucophaea Nuttall var. laevicaulis A. Gray ex Canby. Pinelands, coastal prairies. April-May. < [B. bracteata Muhlenberg ex Elliott var. laevicaulis (Nuttall) Kartesz & Gandhi – K1; = B. bracteata var. laevicaulis (A. Gray ex Canby) Isely – I, K2, SE; < B. bracteata var. glabrescens (Larisey) Isely – Y; < B. leucophaea var. glabrescens Larisey – Z]

Baptisia megacarpa Chapman ex Torrey & A. Gray, Apalachicola Wild Indigo, Bigpod Wild Indigo. Moist floodplains and lower slopes. Late April-early June; June-July. E. Panhandle FL and sw. GA west to se. AL. [= I, K, Q, S, SE, WH, X, Y; > B. megacarpa – Z; > B. riparia Larisey var. riparia – Z; > B. riparia var. minima – Z]

Baptisia nuttalliana Small. Woodlands and prairies. S. AR and se. OK south to se. LA (Florida parishes) and se. TX. [= I, K1, K2, Q, S, SE, Y, Z] {synonymy incomplete}
Baptisia perfoliata (Linnaeus) R. Brown ex Aiton f., Catbells, Gopherweed. Sandhills. April-May; May-July. S. SC to e. GA; disjunct in e. peninsular FL (Orange and Osceola counties); disjunct in wc. AL (Sumter County) (Keener 2007), a Southeastern Coastal Plain endemic. [= RAB, I, Q, SE, X, Y, Z]


Baptisia sphaerocarpa Nuttall. Woodlands and prairies. S. MS west to se. MO, e. OK, and e. TX. [= I, K; > B. sphaerocarpa – Z; > B. viridis Larisey – Z] {synonymy incomplete}

Baptisia tinctoria (Linnaeus) Ventenat, Honesty-weed, Rattleweed. Sandhills, pine flatwoods, xeric woodlands, ridges, woodland edges, and roadbanks. April-August; July-November. Widespread in eastern United States, from NY and MN south to GA. The most widespread and common of our species of Baptisia, B. tinctoria is readily recognizable from its small, yellow flowers, small leaflets, and small fruits. The taxa synonymized need further investigation. [= RAB, C, I, K, Q, SE, W, X; > B. tinctoria var. projecta Femald – F, G, Z; > B. tinctoria var. tinctoria – F, G, Z; > B. tinctoria var. crebra Femald – F, Z; > B. tinctoria – S; > B. gibbesii Small – S]

Calliandra Bentham 1840

A genus of about 135 species, trees and shrubs, of the New World tropics and subtropics. References: Isely (1998)=I.

* Calliandra haematocephala Hasskarl, Powderpuff Tree. Disturbed areas; native of South America, cultivated in the souther part of our area and allegedly persistent or spreading. [= I, WH]

Canavalia deCandolle 1825

A genus of about 50 species, perennial or annual herbs or vines, pantropical. References: Isely (1998)=I.

Canavalia rosea (Swartz) deCandolle, Baybean. Ocean beaches. Pantropical, north to Dixie County on the west coast and Volusia County on the east coast of FL. [= I, K, SE, WH; ? Canavalia lineata (Thunberg) deCandolle – S, misapplied]

Centrosema (A.P. de Candolle) Bentham 1837 (Spurred Butterfly Pea)


Identification notes: Centrosema and Clitoria are unique among our legumes in having resupinate flowers, the pedicel twisted 180 degrees so that the large “standard” is lowermost. They are often confused; the following key includes both genera for easy differentiation.

1 Leaflets 5-7-foliolate; [rare alien] .................................................................................................................. Clitoria ternatea var. ternatea
1 Leaflets 3-foliolate.
2 Calyx tube 10-13 mm long, much longer than the lobes; bracteoles 3-7 mm long, not enclosing the calyx tube; legume 3-5 cm long, 5-7 mm broad; standard 4-6 cm long, not spurred. .......................................................... Clitoria mariana var. mariana
2 Calyx tube 4-5 mm long, shorter than or about as long as the lobes; bracteoles 5-12 mm long, partly enclosing the calyx tube; legume 6-12.5 cm long, 3-6 mm broad; standard 2.5-3.5 cm long, spurred near the base.
3 Lower calyx lobe 5-8 mm long, subulate to lanceolate; upper (bifurcate) calyx lobe 3-4 mm long; bracteoles 5-7 mm long; stems to 3 m long; [of n. FL southward] .................................................................................................................. Centrosema arenicola
3 Lower calyx lobe 8-11 mm long, subulate; upper (bifurcate) calyx lobe 7-8 mm long; bracteoles 8-12 mm long; stems to 1.5 m long; [widespread in our area] .............................................................................................................. Centrosema virginianum
**Cercis** Linnaeus 1753 (Redbud)


1 Flowering pedicels 10-20 mm long; flowers (11-) 12-14 mm long .................................................................[**C. chinensis**]

1 Flowering pedicels 6-8 mm long; flowers 8-13 mm long.

2 Leaves this, dull above (sun leaves slightly coriaceous, slightly glossy above); legumes 9-14 (-18) mm wide; flowers 8-11 mm long ..........

..................................................................................................................................................[**C. canadensis** var. **canadensis**]

2 Leaves coriaceous, glossy above; legumes (11-) 13-17 (-20 mm wide; flowers (9-) 10-13 mm long .............[**C. canadensis** var. **texensis**]

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**Chamaecrista** Moench 1794 (Partridge-pea)


1 Corolla 0.8-1.0 cm in diameter, the larger petals 4-7 (-8) mm long; functional stamens 5-8.

2 Petiole pilose with hairs 1-2 (-3) mm long; petiolar gland cylindric or clavate; functional stamens 5-8; leaflets 5-6× as long as wide ...........

..................................................................................................................................................[**C. nictitans** var. **aspera**]

2 Petiole incurved-puberulent with hairs 0-0.8 mm long; petiolar gland stalked-cupuliform or stalked-discoid; functional stamens 5; leaflets 3-5× as long as wide .................................................................[**C. nictitans** var. **nictitans**]

1 Corolla 2.5-3.5 cm in diameter, the larger petals 15-20 mm long; functional stamens 10.

3 Perennial from a horizontal woody root or crown; stems clustered .................................................................[**C. deeringiana**]

3 Annual from a taproot; stems solitary.

4 Pods 6.5-10 mm wide; seeds 4.7-6.3 mm across; [of tidal marshes in e. VA] ..........................................................[**C. fasciculata** var. **macrosperma**]

4 Pods 3-5 (-6.5) mm wide; seeds (2.6-) 3.2-4.8 mm across; [widespread geographically and ecologically] .................................................................[**C. fasciculata** var. **puberula**]

5 Surface of leaflets pubescent; [from w. Panhandle FL and s. AL westward] ..........................................................[**C. fasciculata** var. **brachiata**]

5 Surface of leaflets glabrous; [collectively widespread in our area].

6 Petiolar gland depressed, 1.5-2.5 mm wide, raised at both ends; pods 6-10 cm long; plant usually glabrous or glabrescent, to 24 dm tall ...........

..................................................................................................................................................[**C. fasciculata** var. **brachiata**]

6 Petiolar gland not depressed, <1.5 mm wide; pods 4-6 cm long; plant usually pubescent, to 10 dm tall ...........

..................................................................................................................................................[**C. fasciculata** var. **fasciculata**]

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**Chamaecrista deeringiana** Small & Pennell, Florida Senna. Sandhills, dry longleaf pine woodlands, disturbed sandy areas. June-July. Sw. and w. GA (Jones & Coile 1988) south to Panhandle FL and west to s. MS (Sorrive & Leonard 1999); disjunct in s. FL. [= I, K, S, SE, Y, Z; < **C. fasciculata** (Michaux) Greene – WH]

**Chamaecrista fasciculata** (Michaux) Greene var. **I.** Dunes, sandy disturbed areas. s. AL west to e. and s. TX. [= I; < Chamaecrista fasciculata var. **I.** = K; > Chamaecrista littoralis Pollard – S; > Chamaecrista mississippienis (Pollard) Pollard ex Heller – S; < Chamaecrista fasciculata var. **I.** – Y; = Cassia fasciculata Michaux var. **puberula** (Greene) J.F. Macbride (variants 1, 2, and 3) – SE, Z; > Chamaecrista puberula Greene] {synonymy incomplete}

**Chamaecrista fasciculata** (Michaux) Greene var. **brachiata** (Pollard) Isely. Fields, disturbed areas. E. GA south to s. FL, west to w. Panhandle FL. [= I, SE; < Chamaecrista fasciculata var. **brachiata** var. **I.** – K; = Cassia fasciculata var. **brachiata** (Pollard) Pullen ex Isely – X, Z; = Chamaecrista brachiata Pollard – S; < Chamaecrista fasciculata – WH, Y]
**Chamaecrista fasciculata** (Michaux) Greene var. fasciculata, Common Partridge-pea. Fields, disturbed areas, fencerows, and a wide range of other habitats. June-September; July-November. MA west to MN, south to s. FL and Mexico. See discussion of the *Chamaecrista fasciculata* complex under var. macrosperma. [<*Cassia fasciculata* Michaux – RAB, W; < *Chamaecrista fasciculata* – C, WH, Y; > *Cassia fasciculata* var. fasciculata – F, G, X; > *Cassia fasciculata* var. robusta (Pollard) J.F. Macbride – F, G, X; > *Chamaecrista robusta* Pollard – S; = *Chamaecrista fasciculata* var. fasciculata (variant 1, variant 2, and typical variant) – Z; > *Chamaecrista fasciculata* var. fasciculata – I, SE (also see var. macrosperma); < *Chamaecrista fasciculata* var. fasciculata – K (also see var. brachiata); > *Cassia fasciculata* var. littoralis (Pollard) J.F. MacBride – X]

**Chamaecrista fasciculata** (Michaux) Greene var. macrosperma (Fernald) C.F. Reed, Tidal-marsh Partridge-pea. Freshwater tidal marshes. Endemic to e. VA (Rappahannock, Mattaponi, Pamunkey, Chickahominy, James, and Appomattox Rivers and their major estuarine tributaries) and MD. Isely (1975) did not recognize this taxon formally, but treated it informally as "variant 1," commenting (incorrectly) that it is "apparently a local, saline-adapted ecotype." Irwin & Barneby (1982) treated *C. fasciculata* as a very polymorphic species in which it was impractical to recognize infraspecific taxa, concluding "a student of tropical *Chamaecrista* has the choice of accepting as a fact of life that sort of infraspecific variability that inspired the dissection of *C. fasciculata* or of retreating to the position of Britton & Urban who, driven by logic rather than sense, found a species in every particular combination of gland and hairiness that fell in their way. But in passing over the observed variation as taxonomically insignificant, it is well to bear in mind that its cause and its biological significance remain a mystery." Botanists familiar with var. macrosperma in the field contend that it shows a cohesion in morphologic characters, ecology, and distribution that is biologically and taxonomically significant; it warrants varietal status. [= K; < *Chamaecrista fasciculata* – C, S, Y; = *Cassia fasciculata* var. macrosperma Fernald – F, G; < *Chamaecrista fasciculata* var. fasciculata – I, SE; = *Cassia fasciculata* var. fasciculata "variant 1" – Z]

**Chamaecrista nictitans** (Linnaeus) Moench var. aspera (Muhlenberg ex Elliott) Irwin & Barneby, Southern Sensitive-plant. Savannas, pinelands, disturbed sandy soils. June-October; July-November. Var. aspera ranges from se. SC south to s. FL. [= I, WH; = *Cassia aspera* Muhlenberg ex Elliott – RAB, X, Z; = *Chamaecrista nictitans* ssp. nictitans var. aspera (Muhlenberg ex Elliott) Irwin & Barneby – K, SE, Y; = *Chamaecrista aspera* (Muhlenberg ex Elliott) Greene – S]

**Chamaecrista nictitans** (Linnaeus) Moench var. nictitans, Common Sensitive-plant. Forests, woodlands, disturbed areas, pine savannas, and a wide variety of other habitats. June-October; July-November. *C. nictitans* is widely distributed in e. North America, and (depending on the scope of what is included in it) south into South America. Var. nictitans ranges throughout se. United States, north to MA, NY, OH, and KA. [= I, WH; < *Cassia nictitans* Linnaeus – RAB, W, X, Z; < *Chamaecrista nictitans* – C; > *Cassia nictitans* var. nictitans – F, G; > *Cassia nictitans* var. hebecarpa Fernald – F, G; = *Chamaecrista nictitans* ssp. nictitans var. nictitans – K, SE, Y; > *Chamaecrista procmumbens* (Linnaeus) Greene – S; > *Chamaecrista multipinnata* Pollard – S]

**Chapmannia** Torrey & A. Gray 1838 (Alicia)

A genus of about 7 species, perennial herbs, shrubs and trees, of tropical America and Africa, most closely related in the Southeastern flora to *Stylosanthes* and the introduced *Arachis* (Lewis et al. 2005). References: Isely (1998)=I.

**Chapmannia floridana** Torrey & A. Gray, Alicia. Longleaf pine sandhills, scrub. N. FL (Clay County) south to s. FL. [= I, K, S, WH]

**Cicer** Linnaeus 1753 (Chick Pea, Garbanzo)


Cladrastis Rafinesque 1824 (Yellow-wood)

A genus of about 6 species, trees, of the se. United States and montane regions of Japan and China. Cladrastis is the only member of the tribe Sophoreae in our area, with the exception of the cultivated (and weakly, if at all, established) Styphnolobium and Maackia; additionally Sophora tomentosa Linnaeus var. truncata Torrey & A. Gray closely approaches our area in n. peninsular FL. References: Duley & Vincent (2003)=X; Isely (1981)=Z; Isely (1998)=I; Rudd (1972)=Y.

Cladrastis kentukea (Dumont de Courset) Rudd, Yellow-wood. Mountain forests, Piedmont bluffs, especially on calcareous or mafic rocks (introduced only in the Piedmont of NC). April-May; July-August. This small to large tree has a native range primarily in the Southern Appalachians (mostly on the west side), the Ozarks, and limestone regions in-between (such as c. TN), ranging from s. OH, s. IN, and s. MO south to sw. NC, sc. SC, n. GA, AL., c. AR, and e. OK, but is cultivated more widely. As discussed by Wyatt (1985), the SC occurrence on Fall Line bluffs of the Savannah River is an interesting disjunction, apparently relictual. Yellow-wood is a distinctive tree, distinguished by its smooth silvery-gray bark, peculiar leaves with alternate leaflets, and pendent panicles of white flowers. The genus Cladrastis has 4 other species, all of temperate e. Asia. [= K, W, X, Y; = C. latex (Michaux f.) K. Koch – RAB, C, F, G, I, S, SE, Z]

Clitoria Linnaeus 1753 (Butterfly Pea, Pigeonwings)


Identification notes: Centrosema and Clitoria are unique among our legumes in having resupinate flowers, the pedicel twisted 180 degrees so that the large "standard" is lowernest. They are often confused; see key under Centrosema.

<table>
<thead>
<tr>
<th></th>
<th>Leaves 3-foliate; standard 4.5-5.5 cm long............................................................... C. mariana var. mariana</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leaves 5-7-foliate; standard 3.5-4 cm long ................................................................................................. C. ternatea var. ternatea</td>
</tr>
</tbody>
</table>

Clitoria mariana Linnaeus var. mariana, Butterfly Pea. Dry woodlands and openings, roadsides. June-August; July-October. NY (Long Island), NJ west to s. OH, s. IL, MO, and OK, south to c. peninsular FL, TX, and South America; disjunct in s. AZ. Var. pubescentina Fantz is endemic in c. and s. peninsular FL. Var. orientalis Fantz is endemic in se. Asia. [= Z; < C. mariana – RAB, C, F, G, I, S, SE, Z; = C. latex (Michaux f.) K. Koch – RAB, C, F, G, I, S, SE, Z]

Clitoria ternatea Linnaeus var. ternatea, Blue-pea. Disturbed areas; native of the Paleotropics. Weakly naturalized in s. GA (Isely 1998) and southwards. [= Z; < C. ternatea – I, K, S, SE]

Crotalaria Linnaeus 1753 (Rattlebox)


<table>
<thead>
<tr>
<th></th>
<th>Leaves trifoliate; erect annual herb, typically 1-2 m tall.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leaflets obovate to elliptic-oblong, 1.5-3.5× as long as wide; legume conspicuously curved (or straight in C. incana).</td>
</tr>
<tr>
<td>2</td>
<td>Legume 10-15 mm in diameter, pilose; stem pubescence spreading ................................................................. C. incana</td>
</tr>
<tr>
<td>3</td>
<td>Legume 5-6 mm in diameter, minutely puberulent; stem pubescence appressed ................................................ C. pallida var. obovata</td>
</tr>
<tr>
<td>2</td>
<td>Leaflets lanceolate, often narrowly so, 3-15× as long as wide; legume straight or nearly so (or upcurved at the tip).</td>
</tr>
<tr>
<td>4</td>
<td>Corolla 8-10 mm long; legume 4-6 mm in diameter, upcurved at tip ................................................................. C. lanceolata</td>
</tr>
<tr>
<td>4</td>
<td>Corolla 18-20 mm long; legume 15 mm in diameter, not upcurved ................................................................. C. ochroleuca</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Leaves unifoliate; plants of various habits, mostly either perennial, smaller, or both.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Corolla 1.7-3.0 cm long; leaflets 4-15 cm long; stipules not decurrent on the stem and not conspicuously foliote; [exotic annual herbs, in disturbed habitats].</td>
</tr>
<tr>
<td>6</td>
<td>Bracts of the inflorescence 2-3 mm long, caducous; leaflets 4-8 cm long ................................................................. C. retusa</td>
</tr>
<tr>
<td>6</td>
<td>Bracts of the inflorescence 5-8 mm long, persistent; leaflets 5-15 cm long ................................................................. C. spectabilis</td>
</tr>
<tr>
<td>5</td>
<td>Corolla 0.7-1.4 cm long; leaflets 1-8 cm long; stipules of at least the upper leaves conspicuously decurrent on the stem, giving the impression of a downward-pointing arrowhead (this feature sometimes inconspicuous or essentially absent in C. rotundifolia); [native perennial or annual herbs, in natural or disturbed habitats].</td>
</tr>
<tr>
<td>7</td>
<td>Plant an erect annual; stems with spreading pubescence, the longer hairs 1-2 mm long; leaflets of the upper portion of the plant (4-8× as long as wide; [mostly of the Piedmont and Mountains (and Coastal Plain of VA)] ................................................................. C. sagittalis</td>
</tr>
<tr>
<td>7</td>
<td>Plant a decumbent, sprawling, or erect perennial; stems with appressed or spreading pubescence, the longer hairs &lt;1.2 mm long; leaflets of the upper portion of the plant averaging either (1-) avg. 1.2-4× or (5-) avg. 8-10 (-15)× as long as wide; [mostly of the Coastal Plain].</td>
</tr>
<tr>
<td>8</td>
<td>Leaflets glabrous above; leaflets of the upper portion of the plant usually (5-) 10 (-15)× as long as wide; plant erect or ascending ...... ................................................................. C. purshii</td>
</tr>
<tr>
<td>8</td>
<td>Leaflets pubescent above (the hairs sometimes sparse – check with hand lens); leaflets of the upper portion of the plant usually (1-) 2 (-4)× as long as wide; plant decumbent to low-ascending ................................................................. C. maritima</td>
</tr>
<tr>
<td>9</td>
<td>Stem pubescence appressed ................................................................................................................. C. maritima</td>
</tr>
<tr>
<td>9</td>
<td>Stem pubescence spreading ......................................................................................................................... C. rotundifolia</td>
</tr>
</tbody>
</table>
* Crotalaria incana* Linnaeus, Shake-shake. Disturbed areas; native of Africa. Also in peninsular FL, from Alachua County southward. \[= I, K, S, SE, WH\]

* Crotalaria lanceolata* E. Meyer, Lanceleaf Rattlebox. Sandy fields, roadsides, other disturbed areas; native of Africa. July-October; August-November. \[= RAB, I, K, SE, WH\]

*Crotalaria maritima* Chapman, Low Rattlebox, Rabbitbells. Sandy forests and woodlands, roadsides. E. SC south to s. FL, and west to e. LA, endemic to the Southeastern Coastal Plain. \[= S, X; = Crotalaria rotundifolia Walter ex J.F. Gmelin var. rotundifolia – Z; < C. rotundifolia – C, I, K, SE, WH, Y; < C. angulata – RAB, F, G, apparently misapplied\]

*Crotalaria ochroleuca* G. Don, Slenderleaf Rattlebox. Roadsides and sandy fields; native of Africa. July-August; August-October. All naturalized southeastern US material appears to be \(C. ochroleuca\), not \(C. brevidens\) var. intermedia (M. Woods, pers. comm., 2011). \[= I, K, SE, WH; ? C. intermedia – RAB, misapplied; ? C. brevidens Bentham var. intermedia (Kotschy) Polhill, misapplied\]


*Crotalaria purshii* A.P. de Candolle, Coastal Plain Rattlebox, Pursh's Rattlebox. Mesic to dry pinelands, sandy openings, roadsides. May-July; July-September. A Southeastern Coastal Plain endemic: se. VA south to n. FL, c. peninsular FL, and west to e. LA, with scattered locations inland. \[= RAB, C, G, I, K, S, SE, W, WH; > C. purshii var. purshii – F; > C. purshii var. bracteolifera Fernald – F\]

* Crotalaria retusa* Linnaeus, Rattleweed. Disturbed areas; native of the Old World tropics. July-September; August-October. \[= RAB, F, G, I, K, S, SE, WH\]

*Crotalaria rotundifolia* Walter ex J.F. Gmelin, Low Rattlebox, Rabbitbells. Sandy forests and woodlands, roadsides. Se. VA south to c. peninsular FL, west to se. LA; also widespread in Mexico. \[= X; = Crotalaria rotundifolia Walter ex J.F. Gmelin var. vulgaris Windler – Z; < C. rotundifolia – C, I, K, SE, WH, Y; < C. angulata – RAB, F, G, misapplied; = C. rotundifolia – S\]

*Crotalaria sagittalis* Linnaeus, Common Rattlebox. Woodlands, woodland edges, openings, fields. June-August; July-September. MA and VT west to s. MI, s. WI, and c. MN, south to c. SC, s. AL, s. MS, TX, Mexico and Central America; West Indies. \[= RAB, C, G, I, K, S, SE, W, WV; > C. sagittalis var. sagittalis – F; > C. sagittalis var. oblonga Michaux – F\]


* Cullen* Medikus 1787


* Cullen americanum* (Linnaeus) Rydberg, Scurf-pea. Waste areas around wool-combing mills, other disturbed areas, perhaps only a waif; native of the w. Mediterranean region (a misnomer). There are other (older) reports from other southeastern states, including FL and MS. \[= I, S; = C. americana – K1, K2, SE, orthographic variant\]

* Cullen corylifolia* (Linnaeus) Medikus, Malaysian Scurf-pea. On ships ballast, probably only a waif; native of s. Asia \[= K1, K2\] {add to synonymy; not yet keyed}

* Cytisus* Desfontaines 1798 (Broom)

A genus of about 165 species, herbs and shrubs, of temperate and tropical America, especially dry areas and most diverse in Mexico. References: Barneby (1977)=Z; Ward (2004c)=Y; Isely (1998)=I. Key adapted from SE.

Dalea Lucanus 1758 (Prairie-clover)

D. carnea (Michaux) Poiret = Petalostemon carneus (Michaux ex Willdenow) Michaux – I, SE, WH, Z; = Petalostemon candidus Michaux – S


D. candida Michaux ex Willdenow, White Prairie-clover. Limestone glades and barrens. Late May-August. WV, KY, IN, WI, MN, and SK south to nw. GA, e. TN, w. AL, sc. MS, s. LA, and ne. TX. [= I, SE (excluding D. occidentalis); = D. candida var. candida – C, K, Z; = Petalostemon candidum (Michaux ex Willdenow) Michaux – F, G; = Petalostemon candidus (Michaux ex Willdenow) Michaux – S]


**Dalea foliosa** (A. Gray) Barneby, Cedar Glade Prairie-clover. Calcareous glades. Late June-September. C. TN, n. AL, IL, and OH (?). [=C, I, K, SE, Z; = Petalostenum foliosum A. Gray – F, G; = Petalostemum foliosum A. Gray – S]


**Dalea pinnata** (J.F. Gmelin) Barneby var. trifoliata (Chapman) Barneby. Sandhills, dry to moist longleaf pine flatwoods. September-November. E. GA (near the Savannah River) south and west to w. Panhandle FL, s. AL, and s. MS. [=I, K, SE, WH, Z; < Kuhnistera pinnata (J.F. Gmelin) Kuntze – S; = Petalostemon pinnatus (J.F. Gmelin) Blake ssp. trifoliatus (Chapman) Wemple]

**Dalea purpurea** Ventenat var. purpurea, Purple Prairie-clover. Prairies, glades, and open woodlands. NY and ON west to BC, south to KY, TN, n. AL, c. MS, TX, and NM. [=C, I, K, SE, Z; = Petalostemon purpureum (Ventenat) Rydberg – F, G; < Petalostemon purpureus (Ventenat) Rydberg – S]

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**Desmanthus Willdenow 1806 (Bundleflower)**


**Desmanthus illinoensis** (Michaux) MacMillan ex B.L. Robinson & Fernald, Bundleflower, Prairie Mimosa. Prairies, marsh edges, disturbed areas. June-July; August-November. OH, MN, and ND south to Panhandle FL, TX, and NM; with scattered adventive occurrences east and west of the native distribution. [=RAB, C, F, G, I, K, SE, W, WH, Z; = Acuan illinoense (Michaux) Kuntze – S; = Mimosa illinoensis Michaux]

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**Desmodium Desvaux 1813 (Tick-trefoil, Tick-clover, Beggar's-ticks, Stick-tights)**

A genus of about 300 species, annual herbs, perennial herbs, and shrubs, nearly cosmopolitan (but lacking from Europe). In our area, Desmodium is a complex genus. Some of the species in our area are confusing and can be identified only with difficulty. References: Isely (1998)=I; Krings (2004). Key based on SE, C, RAB, F, and Krings (2004). Some parts adapted with little change from SE. Some parts, especially Key D, will likely be substantially revised, based on additional herbarium and field testing. [also see Hylodesmum]

1. Longest calyx lobes shorter than the calyx tube; stipe of the loment 4-20 mm long, about 3× or more as long as the calyx; mature leaves without stipels at the base of the petiolules of the leaflets; leaves subverticillate at the top of the stem (alternate in D. pauciflorum); stamens monadelphous; lower margin of the loment incised to the upper suture. [Key A]

2. Leaflets narrow, the terminal leaflet < 10 mm wide, and also 4-12× as long as wide, typically thick and strongly reticulate; petioles of midstem leaves 1-10 (-15) mm long; [primarily of the Coastal Plain and lower Piedmont (rarely Mountains) in our area] 

[Key A]
2 Leaflets broader, the terminal leaflet > 15 mm wide, or < 4× as long as wide, typically thin and not reticulate; petioles of midstem leaves various, but > 15 mm long if leaflet proportions are narrow; [collectively widespread in our area].

3 Stems trailing vine-like along the ground, and/or the plants stoloniferous-rhizomatous .................................................. Key B

3 Stems erect or ascending, not vine-like.

4 Stipules persistent (most or all of the stipules persisting through the year), 4-20 mm long, ovate to amplexicaul-clasping (to lance-attenuate, and if so, generally longer than 8 mm long, except in D. floridanum); leaflets 1.5-3× as long as wide ......................... Key C

4 Stipules caducous (most or all of the stipules falling soon after expansion of the leaves), 2-6 (-8) mm long, mostly linear-subulate or lance-attenuate (in some species narrowly ovate to triangular); leaflets 1-8 (-10)× as long as wide.......................... Key D

Key A: Desmodium with very narrow leaflets

1 Petioles (0-) 1-3 (-4) mm long, the leaves thus subsessile; leaflets 5-10 mm wide, strongly pubescent on the lower surface .... D. sessilifolium

1 Petioles 3-15 mm long, the leaves thus obviously petiolate; leaflets 2-5 (-8) mm wide, glabrate or inconspicuously puberulent on the lower surface.

2 Loment segments flat to distinctly concave along the upper (suture) margin; [of dry to mesic habitats] ........................................ D. strictum

2 Loment segments slightly convex along the upper (suture) margin; [of boggy, wet, or mesic habitats] .................................... D. tenuifolium

Key B: Desmodium with trailing stems or stoloniferous-rhizomatous habit

1 Flowers in axillary clusters; leaflets broadly obovate, 0.5-1 cm long ................................................................. D. triflorum

1 Flowers in axillary or terminal racemes; leaflets rotund, broadly ovate, broadly elliptic, or narrowly elliptic, the larger > 1 cm long.

2 Flowers either in axillary racemes or in terminal panicles; leaflets mostly 0.9-2.0× as long as wide.

3 Stipules ovate, persistent, slightly to strongly clasping at the base, 6-12 mm long.

4 Leaflets ovate, 1.2-1.9× as long as wide; flowers white to yellowish; loment uncinate-puberulent only along the sutures ...........

4 Leaflets ovate, 0.8-1.1× as long as wide; flowers blue-purple; loment uncinate-puberulent over the surface ............... D. rotundifolium

4 Stipules lanceolate to linear (or delate in D. humifusum), usually quickly deciduous, not clasping at the base, 2-8 mm long.

5 Terminal leaflet 1.4-2.0× as long as wide, 3.0-7.0 cm long; loment segments 6-8 mm long; stipules 4-8 mm long, ovate to lance-acuminate ................................................................. D. humifusum

5 Terminal leaflet 0.9-1.2× as long as wide, 1.5-2.3 cm long; loment segments 4-5 mm long; stipules lanceolate, 1-5 mm long .......... D. lineatum

Key C

1 Loment segments nearly symmetrical along the axis of the loment (the isthmi more or less equal above and below, thus each segment diamond-shaped, rounded-diamond-shaped, or essentially elliptical), each segment 3-3.5 mm long; annual from a taproot; [of NC and southward] ............................................................................................................................................... D. tortuosum

1 Loment segments asymmetrical along the axis of the loment (the isthmi deeper below than above; thus each segment triangular, rounded-triangular, or semi-circular), each segment 5-11 mm long; perennial; [collectively widespread in our area].

2 Corolla 6-7 mm long; loment with 2-4 segments, each 5-7 mm long; lower leaves often 1-foliolate; [of sc. SC and southward] ..........

2 Corolla 8-13 mm long; loment with 4-6 segments, each 6.5-11 mm long; lower leaves usually 3-foliolate; [collectively widespread in our area].

3 Stem densely spreading pilose (at least the upper stem) and also uncinate-puberulent; loment segments 6.5-10 mm long .... D. canescens

3 Stem glabrous or uncinate-puberulent; loment segments 9-11 mm long

4 Leaves glabrous or nearly so ............................................................................................................................... D. cuspidatum var. cuspidatum

4 Leaves evidently pubescent ............................................................................................................................... D. cuspidatum var. longifolium

Key D

1 Corolla 8-11 mm long; petioles mostly 1-8 mm long; [plants of the Mountains of VA and possibly NC] ......................... D. canadense

1 Corolla 3-8 (-9) mm long (or 8-10 mm long in D. laevigatum); petioles mostly longer, mostly 10-60 mm long (except D. ciliare and D. obtusum); [plants collectively widespread in our area].

2 Loment with 1-3 segments, rounded below.

3 Leaflets cincereous on the lower surface; corolla 6-7 mm long; loment with 3 (-4) segments ........................................... D. nutallii

3 Leaflets not cincereous on the lower surface; corolla 3.5-6 mm long; loment with 1-2 (-3) segments; ["Desmodium ciliare group"]

4 Leaflets 3-5.5× as long as wide .................................................. D. ciliare

4 Leaflets 1.2-3.5× as long as wide.

5 Terminal leaflet usually distinctly longer and narrower than the lateral leaflets; stem (near the middle) sparsely to densely unci nate-puberulent .............. D. obtusum

5 Terminal leaflet similar to the lateral leaflets; stem (near the middle) glabrous to pilose, or also with some uncinate-pubesce nece.

6 Petioles 3-13 (-5) mm long; pedicels 3-8 mm long; stem glabrous; leaflets sub-appressed pubescent (to glabrate) ............ D. ciliare

6 Petioles 10-25 mm long; pedicels 8-15 mm long; stem glabrous (to sparsely uncinate-puberulent); leaflets glabrous or with only a few scattered hairs .................. D. marilandicum

2 Loment with 3-5 segments, mostly obtusely angled below.
7 Leaves densely villous on the lower surface; stem densely pubescent with uncinate or non-uncinate hairs.

8 Leaflets 1.5-2.0 (2.2)- as long as wide; loment usually curved (the upper margin convex); loment with 2-4 segments; loment segments 4-5 mm long ................................................. D. nuttallii

9 Leaflets 1.0-1.5 (1.9)- as long as wide; loment straight; loment with (3-) 4-5 (-6) segments; loment segments (4-) 5-8 (-9) mm long ................................................................. D. viridiflorum

7 Leaves glabrous to moderately appressed-villous on the lower surface; stem glabrate, pilose or uncinate pubescent.

9 Bracts (subtending clusters of 2-3 flowers) usually villous; plants moderately to densely villous; loment usually incurved (the upper margin convex); loment with 2-4 segments, each segment 4-5 mm long ................................................................. D. laevigatum

10 Corolla 8-10 mm long; pedicels usually 10-15 (-20) mm long; stems and leaves glabrous; leaflets distinctly pale on the lower surface .............................................. D. cuspidatum

11 Leaflet lower surface glabrous, except for the conspicuous uncinate pubescence on the veins; stems and petioles glabrous or pubescent ......................................................... D. paniculatum var. epetiolatum

12 Leaflets (2.5-) 3-8 (-10)- as long as wide; leaflet pubescence usually sparse, of straight, appressed hairs < 0.5 mm long (or sometimes of longer spreading hairs); leaflets usually lacking uncinate pubescence on either surface; mid-stems glabrous or glabrate, the pubescence usually uncinate pubescence.

13 Loment segments rounded on the lower margin (thus semicircular to gibbous); leaflets subulate to short-petiolate; [plant restricted to Coastal Plain] ................................................. D. paniculatum var. paniculatum

14 Loment segments angled on the lower margin (thus triangular to sub-rhombic); leaflets long-petiolate; [plant widespread in our area] ................................................. D. paniculatum var. paniculatum

12 Leaflets 1.5-3 (-4)- as long as wide; leaflet pubescence usually evident, of spreading hairs > 0.5 mm long; leaflets usually with uncinate pubescence on the veins of the upper surface; mid-stems pubescent, either pilose or with uncinate pubescence (if not, evidently pubescent on the petioles).

13 Stem and petiole pubescence sparsely to densely uncinate-puberulent; upper surface of leaflets commonly uncinate-puberulent on the veins ........................................... D. glabellum

14 Stem and petiole pubescence pilose; upper surface of leaflets occasionally uncinate-puberulent on the veins ............................................................... D. perplexum

Desmodium canadense (Linnaeus) A.P. de Candolle, Showy Tick-trefoil, Canadian Tick-trefoil. Marl marshes, Thuya swamps, springs, seeps, hay meadows, streambanks. July-September; August-October. QC and NS west to AB, south to n. VA, sw. VA, NC (?), c. WV, MO, and OK. Small (1933) reports this species for NC; the documentation is not known. [= C, F, G, I, K, SE, W, WV; = Meibomia canadensis (Linnaeus) Kuntze – S]


Desmodium ciliare (Muhlenberg ex Willdenow) A.P. de Candolle. Fields, woodland borders, disturbed areas. June-September; August-October. MA west to IN, MO, and se. KS, south to s. FL and TX; also in Cuba. [= RAB, C, G, I, SE, W, WH, WV; > D. ciliare var. ciliare – F, K; > D. ciliare var. lancifolium Fernald – F, K; = Meibomia ciliaris (Muhlenberg ex Willdenow) Blake – S]

Desmodium cuspidatum (Muhlenberg ex Willdenow) A.P. de Candolle ex Loudon var. cuspidatum, Toothed Tick-trefoil. Fields, woodland borders, disturbed areas. June-August; August-October. VT and MA west to MI and WI, south to FL Panhandle and OK. [= C, F, G, I, K, SE; < D. cuspidatum – RAB, I, W, WH, WV; = Meibomia grandiflora (A.P. de Candolle) Kuntze – S]

Desmodium cuspidatum (Muhlenberg ex Willdenow) A.P. de Candolle ex Loudon var. longifolium (Torrey & A. Gray) Schubert. Forests and woodlands. OH west to MN and NE, south to GA and ne. TX. [= C, F, G, K, SE; < D. cuspidatum – RAB, I]

Desmodium fernaldii Schubert, Fernald's Tick-trefoil. Sandhills, dry flatwoods, woodland borders. June-September; August-October. Se. VA south to s. SC (and maybe e. GA and n. FL); Isely (1998) states that reports from the Gulf Coast are based on "glabrate forms of D. glabellum," and also suggests that D. fernaldii is only weakly differentiated from D. glabellum. [= RAB, C, F, G, I, K, SE, W, WH; < Meibomia rhombifolia Vail – S (also see D. floridanum)]

Desmodium floridanum Chapman, Florida Tick-trefoil. Sandhills, other dry sandy habitats. June-September; August-October. Se. SC south to s. FL. [= RAB, I, K, SE, WH; < Meibomia rhombifolia Vail – S (also see D. fernaldii)]

Desmodium glabellum (Michaux) A.P. de Candolle. Fields, woodland borders, disturbed areas. June-September; August-October. ME west to WI and NE, south to n. peninsular FL and TX. [= RAB, F, I, K, SE, WH, WV; < D. glabellum – C (also see D. perplexum); = Meibomia paniculata (Linnaeus) Kuntze – S, in part; = Meibomia pubens (Torrey & A. Gray) Rydberg – S (also see D. paniculatum var. paniculatum); < D. paniculatum var. dillenii (Darlington)]
Desmodium marilandicum (Linnaeus) A.P. de Candolle. Fields, woodland borders, disturbed areas. June-September; August-October. MA west to MI and MO, south to n. peninsular FL and TX. [= RAB, C, F, G, I, K, SE, W, WH, WV; Meibomia marilandica (Linnaeus) Kuntze – S]

Desmodium nuttalli (Schindler) Schubert. Fields, woodland borders, disturbed areas. July-September; August-October. NY west to IN, south to n. peninsular FL, Panhandle FL, and AR. [= RAB, F, I, K, SE, W, WH, WV; D. viridiflorum (Linnaeus) Kuntze – S (also see D. viridiflorum)]

Desmodium obtusum (Muhlenberg ex Willdenow) A.P. de Candolle. Dry pine woodlands, fields, woodland borders, disturbed areas. June-September; August-October. MA west to MI, south to Panhandle FL and TX. [= RAB, I, K, SE, W, WH; D. rigidum (Elliott) A.P. de Candolle – C, F, G, WV; Meibomia rigidida (Elliott) Kuntze – S]


Desmodium paniculatum (Linnaeus) A.P. de Candolle var. epetiolatum Schubert. Pine savannas and flatwoods, bogs. June-September; August-October. Var. epetiolatum ranges from se. VA south to se. NC or e. SC. It may reflect hybridization between D. paniculatum var. paniculatum and another species. Further study is needed. [= F, I, K, SE; D. paniculatum – RAB, C; D. paniculatum var. paniculatum – W]

Desmodium paniculatum (Linnaeus) A.P. de Candolle var. paniculatum. Fields, woodland borders, disturbed areas. June-September; August-October. S. ME west to s. ON, MI, and NE, south to s. FL and TX. [= RAB, F, I, K, SE, WH, WV; Meibomia paniculata (Linnaeus) Kuntze – S; Meibomia pubens (Torrey & A. Gray) Rydberg – S (also see D. glabellum); D. paniculatum var. paniculatum – W]

Desmodium perplexum Schubert. Fields, woodland borders, disturbed areas. July-September; August-October. [= RAB, F, I, K, SE, WH, WV; D. glabellum – C; Meibomia dillenii (Darlington) Kuntze – S; D. paniculatum var. dillenii (Darlington) Isely – W]


**Desmodium tortuosum** (Swartz) A.P. de Candolle. Fields, woodland borders, disturbed areas. July-August; August-October. E. NC south to s. FL, west to TX; perhaps only introduced in the southeastern United States. [= RAB, I, K, SE, WH; = *Meibomia purpurea* (P. Miller) Vail – S]

**Desmodium triflorum** (Linnaeus) deCandolle. Lawns, roadsides; native of the Old World tropics. Reported for Escambia County, FL Panhandle (Kunzer et al. 2009). [= I, K, SE; = *Sagotia triflora* (Linnaeus) Duchassaing & Walpers – S] [add to synonymy]

**Desmodium viridiflorum** (Linnaeus) A.P. de Candolle. Fields, woodland borders, disturbed areas. June-September; August-October. DE south to c. peninsular FL, west to TX, and inland to w. VA, w. NC, n. TN, and AR. [= RAB, F, I, K, SE, W, WH; < *D. viridiflorum* – C, G (also see *D. nuttallii*); < *Meibomia viridiflora* (Linnaeus) Kunze – S (also see *D. nuttallii*)]

*Dichrostachys* (de Candolle) Wight & Arnott (Sickle Bush)


* *Dichrostachys cinerea* (Linnaeus) Wight & Arnott ssp. africana Brenan, African Sickle Bush, Kalahari Christmas Tree. Disturbed areas; native of Africa. [= K2; < *D. cinerea* – I, SE]

*Erythrina* Linnaeus 1753 (Coral Bean)

A genus of about 120 species, trees, shrubs, and perennial herbs, of tropical and subtropical regions of the Old and New World. References: Isely (1998)=I.

1 Leaflets not lobed; [cultivated tree, persistent].................................................................................................................................................. *E. crista-galli*
1 Leaflets hastately lobed; [native herb or shrub]........................................................................................................................................ *E. herbacea*

* *Erythrina crista-galli* Linnaeus, Coral Tree. Cultivated, disturbed areas, roadside ditches; native of South America. [= I, K, SE; = *Microipteryx crista-galli* (Linnaeus) Walpers – S]

*Erythrina herbacea* Linnaeus, Coral Bean, Cardinal-spear. Maritime forests, dry sandy woodlands, sandhills in the outer Coastal Plain. May-July; July-September. Se. NC south to FL, west to se. TX, and south to e. Mexico (Tamaulipas and e. San Luis Potosi). [= RAB, I, K, SE, WH; > *E. herbacea* – S; > *E. arborea* (Chapman) Small – S]

*Galactia* P. Browne 1756 (Milkpea)


**Identification notes:** Definite identification of the taxa from key lead 4 on is problematic. Note also that the traditional application of *G. regularis* and *G. volubilis* is reversed.

1 Leaves with (5-) 7 (-9) leaflets; flowers white ........................................................................................................................................ *G. elliottii*
1 Leaves with 3 leaflets; flowers white, pink, red, or purple.
2 Plant erect, with 4-6 (-8) leaves.................................................................................................................................................. *G. erecta*
2 Plant prostrate, trailing, or twining, generally with numerous leaves.
3 Legumes villous with hairs 1-1.5 mm long; corolla when fresh bright reddish purple and white (drying dark on herbarium specimens); stems villous with hairs > 0.5 mm long ........................................................................................................................................ *G. mollis*
3 Legumes glabrous, or pubescent with hairs < 1 mm long; corolla pink to pink-purple (drying pale or the petals dropping on herbarium specimens); stems glabrate to villosulous with hairs < 0.5 mm long.
4 Inflorescences generally exserted, (2-) 4-15 (-20) cm long, the flowers well distributed along half or more of the length of the inflorescence axis; flower buds generally 5-8 mm long; corolla 8-12 (-14) mm long; plants twining (rarely trailing) .......... *G. regularis*
4 Inflorescences short or exserted, if exserted then the flowers generally from nodes crowded into the upper half of the axis; flower buds 5-10 mm long; corolla (11-) 12-16 (-18) mm long; plants trailing or twining.
5 Internodes short, 1-2 cm long, the stem thus appearing leafy; inflorescences with 1-3 flowers (or also with solitary axillary flowers); [plants of Coastal Plain of SC southward] .......... *G. minor*
5 Internodes generally longer; inflorescences with 1-3 or more flowers; [plants collectively widespread in our area].
6 Stems glabrescent to conspicuously pubescent with spreading hairs < 0.5 mm long; leaflets 1.5-3.5 (-4) cm long, the underside with hairs 0.4-0.7 mm long; [plants of e. GA southward] ................................................. G. floridana
6 Stems antorse- or retrorse-strigose; leaflets 1.5-5 (-7) cm long, the underside strigose with hairs < 0.3 mm long; [plants widespread in our area] ........................................................................... G. volubilis var. volubilis


*Galactia erecta* (Walter) Vail, Erect Milkpea. Sandhills. May-July; July-September. Se. NC south to Panhandle FL, west to e. TX. [= RAB, I, K, S, SE, WH, Y, Z]

*Galactia floridana* Torrey & A. Gray, Florida Milkpea. Sandhills and other xeric sands. S. GA south to s. FL, west to s. MS. [= Y; < G. floridana – I, K, SE, Z (also see G. volubilis var. fasciculata); = G. floridana var. floridana – S; < G. volubilis – WH]


*Galactia mollis* Michaux. Sandhills. May-July; July-September. Se. NC south to c. peninsular FL, west to Panhandle FL and se. AL. [= RAB, I, K, S, SE, WH, Y, Z]


*Galactia volubilis* (Linnaeus) Britton var. volubilis. Sandhills, other dry forests and openings. June-August; July-October. NJ and s. PA west to c. AR, south to s. FL and L.A. Var. baltzelliana D.B. Ward & D.W. Hall and var. fasciculata (Vail) D.B. Ward & D.W. Hall are localized endemics of the FL Peninsula. Duncan (1979) describes additional forms of this taxon (which he treated under the name *G. glabella*) that he considered to potentially warrant description as varieties or species; they need further study. [= Y; < G. regularis (Linnaeus) Britton, Sterns, & Poggenburg – RAB, C, F, G, I, K, SE, WH (misapplied); > G. regularis – S, misapplied; > G. brevipes Small – S; > G. brachypoda Torrey & A. Gray – S; < G. glabella Michaux – Z]

*Genista* Linnaeus 1753 (Dyer's Greenweed)


*Gleditsia* Linnaeus 1753 (Honey Locust, Water Locust)


**Identification notes:** The hybrid *Gleditsia ×texana* Sargent (pro sp.) [*G. aquatica × triacanthos*] occurs occasionally in the area of range overlap of its parents. It is intermediate between its parents.

1 Legume ovate, 3-5 (-8) cm long and 1-3-seeded; foliage glabrous (or slightly puberulent when young); [trees of frequently flooded swamps, often with *Taxodium*, rarely planted and escaped] ................................................. *G. aquatica*
1 Legume elongate, 20-40 cm long and multi-seeded; foliage puberulent (even in age); [trees of moist to dry forests, frequently planted and escaped in disturbed areas] ....................................................................................................................... *G. triacanthos*
Gleditsia aquatica Marshall, Water Locust. Swamp forests. April-May; July-November. E. SC south to c. peninsular FL, west to TX, and north in the interior to IN, IL, and MO; occasionally cultivated north of its native range. [= RAB, C, F, G, GW, I, K, S, SE, WH, Y, Z]

Gleditsia triacanthos Linnaeus, Honey Locust. Woodlands, forests (generally bottomland), fencerows, often planted as a street tree. April-May; July-November. Native distribution is believed to be from w. NY west to se. SD, south to Panhandle FL and TX (west of the Blue Ridge); its occurrence over much of our region appears to be as an adventive. The trunks are normally beset with lengthy, branched thorns, but thornless trees are encountered (and are usually favored for horticultural planting). [= RAB, C, G, GW, I, K, S, SE, W, WV, Y, Z]

Glycine Willdenow 1802 (Soybean, Soya)


* Glycine max (Linnaeus) Merrill, Soybean. Abundantly cultivated, rarely persisting as a waif; native of e. Asia. July-October. One of the most important legume crops in the world. [= RAB, F, I, K, SE]

Glycyrrhiza Linnaeus 1753 (Licorice)


Gymnocladus Lamarck 1785 (Kentucky Coffee-tree)


* Gymnocladus dioicus (Linnaeus) K. Koch, Kentucky Coffee-tree, Kentucky Mahogany. Native in rich bottomland and slope forests, also in disturbed areas, persistent and weakly spreading from horticultural plantings. April-June; August-November (and persistent). The original native range has been obscured, perhaps PA west to se. SD, south to w. VA, TN, n. AL, and OK. [= RAB, C, F, G, I, K, S, SE, WV, Y, Z]

Hylodesmum H. Ohashi & R.R. Mill 2000

A genus of ca. 15 species, perennial herbs, mainly of e. Asia and e. North America. This group has often been included in Desmodium as a section or subgenus, but is now shown to be amply distinct in morphology and also to form a monophyletic group based on molecular analysis. References: Raveill (2006); Ohashi & Mill (2000)=Z.

1 Stems dimorphic, the flowering stem normally lacking leaves (rarely with leaves), the sterile stem with a subverticillate cluster of 3-7 leaves near the top; pedicels 10-20 mm long .................................................................................................................................................... H. nudiflorum
1 Stems monomorphic, bearing both leaves and flowers, the leaves either subverticillate or not; pedicels 2-10 mm long.
2 Leaves subverticillate, clustered; leaflets conspicuously and strongly acuminate, 5-10 cm long; flowers usually distinctly pink or pink-purple; inflorescence 3-8 dm long, elongate, large, and conspicuous, much exceeding the leaves.................. H. glutinosum
2 Leaves alternate, scattered; leaflets acute to slightly acuminate, 3-7 cm long; flowers white; inflorescence 1-2 dm long, small and inconspicuous, often partly obscured by the leaves ........................................................................................................ H. pauciflorum


**Indigofera** Linnaeus 1753 (Indigo)

A genus of about 700 species, annual herbs, perennial herbs, and shrubs, nearly cosmopolitan in tropical and warm temperate regions. References: Isely (1998)=I.

1 Leaflets borne alternately or irregularly on the rachis.

2 Stipules subulate, < 1.5 mm wide; legumes divergent to deflexed, spaced on the rachis; flowers 6-10 per inflorescence.

3 Stem pubescence strigose-appressed.

4 Legume 7-9 mm long, ovoid, not falcate, indehiscent, with 2-3 seeds; corolla 6-9 mm long; [native species].

5 Corolla 5-6 mm long or 15-18 mm long; [introduced species].

6 Legume 15-20 mm long, strongly falcate.

7 Legume 28-36 mm long, slightly falcate.

8 Stipules deltate to lanceolate, 2-3 mm wide; legumes deflexed, crowded on the rachis; flowers many per inflorescence.

9 Stipules subulate, < 1.5 mm wide; legumes divergent to deflexed, spaced on the rachis; flowers 6-10 per inflorescence.

10 Leaflets borne opposite on the rachis.

**Indigofera caroliniana** P. Miller, Wild Indigo, Carolina Indigo. Sandy forests and woodlands, including sandhills and sandy maritime forests. June-August; July-October. E. NC south to s. FL, west to se. LA, a Southeastern Coastal Plain endemic. [= RAB, I, K1, K2, S, SE, WH]  


* **Indigofera hirsuta** Linnaeus, Hairy Indigo. Sandy disturbed areas, such as wildlife "food fields"; native of the Old World tropics. First reported for SC by Nelson & Kelly (1997). Also known from other scattered locations in the Southeast, such as s. MS (Leonard, 2006, pers.comm.) and AL (Diamond & Woods 2009). [= I, K1, K2, SE, WH]

**Indigofera miniata** Ortega var. leptosepala (Nuttall ex Torrey & A. Gray) B.L. Turner. Dunes, dry disturbed areas. S. KS south to s. TX, disjunct eastwards in FL and (?) GA (where reported by Chapman 1883). [= I, SE, WH; < I. miniata – K1, K2; = I. leptosepala Nuttall ex Torrey & A. Gray – S]


* **Indigofera suffruticosa** P. Miller, West Indian Indigo. Disturbed areas, dry sandy woodlands, formerly commonly cultivated, locally established as a weed at that time, perhaps no longer present in our area; native of the New World tropics, including s. FL. [= I, K1, K2, S, SE, WH; ? I. anil Linnaeus]

* **Indigofera tinctoria** Linnaeus, African Indigo. Formerly commonly cultivated, locally established as a weed at that time, perhaps no longer present in our area; native of Africa. Both this species and *I. suffruticosa* were cultivated as an important export crop in the Coastal Plain of GA, SC, and (less so) NC in the seventeenth and eighteenth centuries. [= I, K1, K2, S, SE, WH]

**Kummerowia** Schindler 1912 (Korean-clover, Japanese-clover)

A genus of 2 species, annual herbs, native to temperate e. Asia. *Kummerowia* differs from *Lespedeza* in its annual habit (vs. perennial), conspicuous stipules (vs. not conspicuous), inflorescence branching pattern (see Akiyama & Ohba 1985), and leaflets with striate, parallel, lateral veins (vs. with reticulate lateral veins). It is now generally regarded as distinct from *Lespedeza* at the generic level, though they are closely related. References: Akiyama & Ohba (1985)=Z; Isely (1998)=I. Key based closely on SE.


Lablab Adanson 1763 (Hyacinth-bean)

* Lablab purpureus (Linnaeus) Sweet, Hyacinth-bean. Disturbed areas; native of Africa. Cultivated and rarely may escape or persist as a waif in disturbed areas; it is reported from se. PA (Rhoads & Klein 1993). [= I, K, SE; = Dolichos lablab Linnaeus]

Lackeya Fortunato, L.P. Queiroz, & G.P. Lewis 1996

Lackeya multiflora (Torrey & A. Gray) Fortunato, L.P. Queiroz, & G.P. Lewis. Alluvial forests, prairies. S. GA and FL Panhandle west to e. TX, north in the interior to w. TN and w. KY. [= Z; = Dioslea multiflora (Torrey & A. Gray) C. Mohr – C, G, I, K, S, SE; = Galactia mohlenbrockii R.H. Maxwell – WH]

Lathyrus Linnaeus 1753 (Wild-pea, Vetchling)

**FABACEAE**

437


**Lathyrus japonicus** Willdenow, Beach Pea. Beaches. Circumboreal, south in eastern North America to NJ (or NC?) and the shores of the Great Lakes. Reported from ocean beaches in Dare County (NC), but without adequate documentation. [= I; > *L. maritimus* (Linnaeus) Bigelow var. *pellitus* (Fernald) Gleason C, G; > *Lathyrus japonicus* Willdenow var. *pellitus* Fernald – F, K1; < *L. japonicus* – I; > *L. japonicus* var. *maritimus* (Linnaeus) Kartesz & Gandhi – K2]


* **Lathyrus pratensis** Linnaeus, Meadow Pea. Disturbed areas; native of Eurasia. Reported for VA on the basis of "personal communication" (Kartesz 1999). [investigate] [= C, F, I, K]

**Lathyrus pusillus** Elliott, Tiny Pea. Open areas in bottomlands, disturbed areas. April-July. E. VA, MO and KS, south to FL Panhandle and TX. [= RAB, F, G, I, K, SE, WH]


* **Lathyrus tuberosus** Linnaeus, Tuberous Vetchling. Disturbed areas; native of Europe. Introduced in e. TN (Chester, Wofford, & Kral 1997), WV (Strausbaugh & Core 1978), and KY. [= C, F, G, I, K, SE, WV]


**Lens** P. Miller (Lentil)


* **Lens culinaris** Medikus, Lentil. Disturbed areas; native of Mediterranean Europe and w. Asia. {MD, NJ}. [= I, K1, K2]

**Lespedeza** Michaux 1803 (Lespedeza)

A genus of about 40 species, perennial herbs and shrubs, of temperate regions of e. Asia and e. North America. References: Clewell (1966a)=Z; Clewell (1966b)=Y; Isely (1986b)=X; Akiyama (1988)=Q; Clewell & Stickel (1990); Isely (1998)=I. Key based primarily on Z and SE. [also see *Kummerowia*]

**Identification notes:** Many species of *Lespedeza* hybridize, and most combinations may occur in our area. Some of the hybrids have been named in the past as varieties or species. Hybrids generally occur in mixed populations with both parents and can usually be identified by their intermediate morphology (identification much easier in the field where context is apparent than in the herbarium). See Isely (1990) and Clewell (1966a) for additional hints about identification of hybrids.

1 Plants annual; stipules ovate to ovate-lanceolate, conspicuous; leaflets with striate, parallel, lateral veins .................................................[Kummerowia]
1 Plants perennial, stipules subulate, setaceous, or lanceolate, not conspicuous; leaflets with reticulate lateral veins, joining before reaching the margin.

2 Leaflets distinctly widest toward the tip, 3-5× as long as wide, the base and apex very differently shaped (the base narrowly cuneate, the tip rounded, truncate or even retuse); racemes reduced, with 2-3 flowers, shorter than the subtending leaves; [plants alien] L. cuneata

3 Midrib of leaflets distinctly excurrent as a spinose bristle 0.5-1.5 mm long; [plant a rare introduction] L. virginiana

4 Midrib of leaflets not excurrent, or only as an obscure mucro, not at all spinose; [plants native].

5 Pubescence of the stem spreading (piloose) L. procumbens

6 Calyx of legumes produced from cleistogamous flowers 1/4-1/3 as long as the pod; stems usually lacking axillary leaves; keel subequal to the wings, or shorter; stipules 2-4 (-5) mm long L. repens

7 Plants in flower.

8 Coral primarily white or cream (often with a purplish throat).

9 Raceme peduncles short (shorter than the subtending leaf), the inflorescence itself barely if at all exceeding the subtending leaf; calyx lobes 6-10 mm long; leaflets either narrower or wider (see below).

10 Leaflets 4-8 (-10)× as long as wide......................... L. angustifolia

11 Leaves closely strigose on both surfaces with hairs 0.2-0.5 mm long, silvery when fresh; leaflets 1-2 cm long; petiole of midstem leaves not generally > 1 cm long, about the same length as the rachis; [plants of the Coastal Plain and, in NC and SC, the lower Piedmont] L. hirta var. curtissii

12 Peduncles of the racemes of chasmogamous (petaliferous) flowers longer than the subtending leaves; keel > 1 mm longer than the wings.

13 Stems to 7 dm long, not bushy-branched; petioles of medial leaves 0.5-2 cm long; chasmogamous panicles with 4-7 flowers; corolla 6-8 mm long; chasmogamous legumes glabrate or incompletely strigulose, 5-7 mm long; [native] L. capitata

14 Calyx lobes longer than the calyx tube (at least the lowest lobe); corolla (10-) 12-15 mm long; leaflets 2-3 × as long as wide; racemes erect or strongly ascending; stems many per crown, purplish when young L. thunbergii

15 Upper surface of the leaflets glabrate, or strigose above only, at least some of the hairs (especially those on the veins below) > 0.5 mm long, green or grey (to somewhat silvery) when fresh; leaflets 1.5-4 (-5) cm long; petiole of midstem leaves 1-1.5 (-2) cm long, much exceeding the rachis; [plants widespread in our area] L. virginica

16 Leaflets (4-) 5-7× as long as wide ......................................................... L. stuevei

17 Leaflets of average, mid-stem leaves > 4× as long as wide (L. capitata keyed here and below).

18 Petioles of mid-stem leaves 1-3 mm long L. virginica

19 Leaflets 4-8(-10)× as long as wide; pubescence of the stems and leaflets usually not silvery-cinereous L. angustifolia

20 Leaflets (2-) 2.5-5 (-8)× as long as wide; pubescence of stems and leaflets usually silvery-cinereous L. capitata

21 Central axis strongly dominant, branches divaricate, irregular; stems slender, wiry L. frutescens

22 Stems 10-30 dm tall, 1-many from the base; medial leaf petiole 2-4 cm long; [plants alien, planted in "wildlife food plots" and persisting or spreading]; [section Macrolespedeza].

23 Calyx lobes equal to or shorter than the calyx tube; corolla 8-15 mm long; chasmogamous legumes strigose, 7-8 mm long; [plants alien, planted in "wildlife food plots" and persisting or spreading]; [section Macroplega]

24 Leaflets (1.3-) 1.8-3 (-3.5)× as long as wide.

25 Upper surface of the leaflets pubescent; pubescence of the stem appressed or spreading; leaflets 1.3-7× as long as wide, L. curtissii

26 Upper surface of the leaflets glabrous; pubescence of the stem appressed or spreading; leaflets 1.3-7× as long as wide, L. virginica
Lespedeza angustifolia (Pursh) Elliott, Narrow-leaved Lespedeza. Sandhill-pocosin ecotones and dry to moist savannas, mountain bogs. August-October; September-November. MA south to c. peninsular FL, west to s. MS, essentially a Southeastern Coastal Plain endemic, rarely disjunct inland to w. NC, c. GA, and ec. TN (Chesser, Woford, & Král 1997). [= RAB, C, G, I, K, S, SE, W, WH, Y, Z; L. angustifolia – F; L. hirta var. intercursa Fernald – F]


Lespedeza hirta (Linnaeus) Hornemann var. curtissii (Clewell) Isely, Silvery Lespedeza. Sandhills and dry to moist savannas. August-October; September-November. Se. VA south to s. FL, west to Panhandle FL and se. AL, barely extending onto the Piedmont in NC, SC, and GA. Clewell (1966a) discusses apparent intergrades between the two varieties in s. NJ. [= C, I, SE, X; L. hirta – RAB, G, S, WH; = L. hirta var. appressipilis Blake – F (as to intent, but not the type); = L. hirta ssp. curtissii Clewell – K, Y, Z]

Lespedeza hirta (Linnaeus) Hornemann var. hirta. Hairy Lespedeza. Woodlands and woodland borders. August-October; September-November. S. ME and s. ON west to MI, n. IL, c. MO, and OK, south to c. peninsular FL and TX. [= C, I, SE, X; L. hirta – RAB, G, S, WH, WH, Y, Z; L. hirta var. hirta – F; L. capitata var. calycina (Schindler) Fernald – F; = L. hirta var. curtissii – K, Y, Z]


Lespedeza stuevei Nuttall, Velvet Lespedeza. Woodlands and woodland borders. July-September; August-November. MA south to n. peninsular FL, west to c. and n. TX, north in the interior to. NC, TN, s. IN, s. IL, c. MO, and ne. KS. [= RAB, C, F, G, I, K, SE, W, WH, Y, Z; = L. stuevei – S, orthographic variant]


FABACEAE


Leucaena Bentham 1842 (Leadtree, *Leucaena*)


* Leucaena leucocephala* (Lamarck) de Wit ssp. *leucocephala*, Leadtree, Leucaena, Jumbie-bean. Disturbed areas; native of the New World tropics. E. GA (Kartesz 1999, voucher at UGA), south into FL and the New World tropics. [= Z; *L. leucocephala* – I, K, SE, WH; < *L. glauca* (Linnaeus) Bentham – S, misapplied]

Lotus Linnaeus 1753 (Birdsfoot-trefoil)

A genus of about 120-130 species, annual and perennial herbs and shrubs, of temperate Eurasia. New World taxa often referred to Lotus are not closely related to *Lotus*, and should be segregated (Degtjareva et al 2006; Allan & Porter 2000). References: Isely (1981)=Z; Isely (1998)=I; Degtjareva et al. (2006); Allan & Porter (2000); Grant & Small (1996). [also see *Acmispon*]

1 Leaves 3-foliolate; the upper commonly 1-foliolate; flowers solitary in leaf axils; [native annual herbs] ......................... [see *Acmispon helleri*]

2 Calyx tube 2.8-3.5 mm long; corolla usually 10-14 mm long; leaflets of the medial leaves mostly 1.5-2.5 (-5)x as long as wide ............

3 Legumes 27-42 mm long, 8.1-8.5 mm wide; plants to 7 dm tall; living plants grey-green; [of se. NC south to s. FL, west to s. MS] ............

4 Hairs of the petioles 0.5-1 (-1.5) mm long; corolla blue; plants 8-15 dm tall; [of FL Panhandle] ...........................................

5 Corolla yellow; plant annual; [alien] ................. [see *L. villosus*]

6 Leaflets 5-9, linear, 5-9x as long as wide; plant perennial; [native or alien].

7 Stem short; leaves clustered, nearly whorled; leaflets narrow; racemes long exerted; flowers small; [plants of e. GA southward and westward] ................................................ [see *L. perennis* ssp. *gracilis*]

8 Leaflets 7-11, oblanceolate, 3-5x as long as wide; plant perennial; [native]

9 Leaves palmately compound; leaves and stems deciduous, dying back in winter; plant inconspicuously pubescent.

5 Corolla blue; plant perennial or annual; [native or alien].

6 Leaflets 5-9, linear, 5-9x as long as wide; plant annual; [alien] ................. [see *L. angustifolius*]

7 Stem short; leaves clustered, nearly whorled; leaflets narrow; racemes long exerted; flowers small; [plants of e. GA southward and westward] ................................................ [see *L. perennis* ssp. *gracilis*]

8 Leaflets 7-11, oblanceolate, 3-5x as long as wide; plant perennial; [native]

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7 Stem short; leaves clustered, nearly whorled; leaflets narrow; racemes long exerted; flowers small; [plants of e. GA southward and westward] ................................................ [see *L. perennis* ssp. *gracilis*]

8 Leaflets 7-11, oblanceolate, 3-5x as long as wide; plant perennial; [native]

9 Leaves palmately compound; leaves and stems deciduous, dying back in winter; plant inconspicuously pubescent.
**Lupinus angustifolius** Linnaeus, Narrowleaf Lupine. Fields, disturbed areas; native of Mediterranean Europe. [= I, K, WH]

**Lupinus cumulicola** Small. Sandhills and scrub. Peninsular FL. [= K, S; < *L. diffusus* – I, SE, WH]

**Lupinus diffusus** Nuttall, Blue Sandhill Lupine. Sandhills, sandy roadsides. March-May; June-July. Se. NC south to s. FL, west to s. MS. I concur with Duncan & McCartney (1992) in recognizing *L. cumulicola* Small of peninsular FL as distinct from *L. diffusus*. [= RAB, K, S; < *L. diffusus* – I, SE, WH]

**Lupinus luteus** Linnaeus, Yellow Lupine. Disturbed areas; native of Mediterranean Europe. [= I, K, SE, WH]

**Lupinus perennis** Linnaeus ssp. *gracilis* (Nuttall) Dunn, Southern Sundial Lupine. Sandhills and sandy or dry rocky roadsides. E. GA (immediately across the Savannah River from SC), south to n. FL and west to s. AL. The validity of this taxon is uncertain; the differences may be only clinal. [= K, SE; < *L. perennis* – RAB, C, G, WH; = *L. perennis* var. *gracilis* (Nuttall) Chapman – I; = *L. nuttallii* S. Watson – S]


**Lupinus villosus** Willdenow, Pink Sandhill Lupine. Sandhills, sandy roadsides. April-May; June-August. Se. NC south to n. FL, west to se. LA. [= RAB, I, K, S, SE, WH]

**Lupinus westianus** Small, Gulf Coast Lupine. Coastal dunes, sandhills. Endemic to Panhandle FL. The related *L. aridorum* McFarlane ex Beckner is endemic to sand pine scrub in the central FL peninsula. [= *L. westianus* var. *westianus* – I, K, WH; < *L. westianus* – S]

### Maackia

Ruprecht & Maximowicz 1856 (Maackia)

A genus of about 8 species, trees and shrubs, of e. Asia.


### Macroptilium

(Bentham) Urban 1928


**Macroptilium lathyroides** (Linnaeus) Urban. Disturbed areas; native of tropical America. [= I, K, SE, WH; = *Phaseolus lathyroides* Linnaeus]

### Medicago

Linnaeus 1753 (Medick, Bur-clover)

A genus of about 80 species, annual and perennial herbs, of Eurasia and Africa. References: Isely (1998)=I. Key based largely on SE.

1. Legume 1-seeded, reniform, black at maturity; corolla 2-3 mm long ................................................................. *M. lupulina*
2. Legume several-seeded, spirally coiled or falcate, tan to dark brown; corolla 3-11 mm long.
3. Plants perennial, mostly erect or ascending; 2-8 (-10) dm tall; corolla 6-11 mm long, violet, yellow, or varicolored; legumes spineless.
4. Legume falcate; corolla yellow ................................................................. *M. falcata*
3 Legume spiral; corolla violet or varicolored (rarely yellow).......................................................................................................................... M. sativa

2 Plant annual, mostly prostrate or ascending, 1-6 dm tall; corolla 3-6 mm long, yellow; legumes spiny (except lacking spines in M. orbicularis).

4 Stipules entire or slightly dentate (M. minima) or the base only of the stipule lacerate (M. laciniata); plants pilose (M. minima) or glabrous (M. laciniata).

5 Stipules lacerate at the base; plant glabrous.............................................................................................................................................. M. laciniata

5 Stipules entire or slightly dentate; plant pilose ............................................................................................................................................. M. minima

4 Stipules lacerate; plants glabrous or sparsely pubescent.

6 Legume lacking spines; stipules deeply lacerate, the sinuses extending nearly to the base........................................................................ M. orbicularis

6 Legume spiny; stipules either deeply lacerate (M. polymorpha) or shallowly lacerate (M. arabica).

7 Leaflets 0.7-1.1× as long as wide, usually marked with a central dark spot; leaflet tip usually strongly notched; stipules shallowly lacerate, the sinuses extending < ½ way to the base ........................................................................................................................................ M. arabica

7 Leaflets 1-2× as long as wide, not marked with a central dark spot; leaflet tip not strongly notched, stipules deeply lacerate, the sinuses extending > ½ way to the base ........................................................................................................................................ M. polymorpha


* **Medicago laciniata** (Linnaeus) P. Miller. Waste areas around wool-combing mills; rare, native of Europe, perhaps merely a waif. [= F, I, K]


**Melilotus** P. Miller 1754 (Melilot, Sweetclover, Sourclover)


1 Corolla white .................................................................................................................................................................................. M. albus

1 Corolla yellow.

2 Corolla 2-3.5 mm long; fruits < 3 mm long ............................................................................................................................................. M. indicus

2 Corolla > 4 mm long; fruits > 3 mm long ............................................................................................................................................. M. officinalis

* **Melilotus albus** Medikus, White Melilot, White Sweetclover. Fields, roadsides, disturbed areas; native of Eurasia. April-October. M. albus and M. officinalis, nearly identical except in flower color, are apparently incompatible (Isely 1998); they should not be synonymized, as was done by Kartesz (1999). Other differences useful in the determination of faded herbarium specimens are given by Isely (1998): corolla 3.5-5 mm long, the wing petals about as long as the keel (M. albus) vs. corolla 5-7 mm long, the wing petals generally longer than the keel (M. officinalis). [= I, WH, Z; = M. alba – RAB, C, F, G, S, SE, WH, WV, orthographic variant; < M. officinalis – K]


* **Melilotus sulcatus** Desfontaines, Mediterranean Sweetclover. Reported for AL by Kartesz (2010) based on misidentified specimens. {not keyed; not mapped; rejected as a component of our flora}
FABACEAE

Mimosa Linnaeus 1753 (Mimosa)

A genus of about 500 species, herbs, shrubs, trees, and vines, of tropical, subtropical, and warm temperate areas, especially America. Barneby (1991) and Beard (1963) argue that there are no characters which serve to separate Schrankia from Mimosa.


Identification notes: Unmistakable in our flora for its bipinnate leaves, with tiny (2-4 mm long) leaflets, responding to touch by closing.

1 Plant unarmed............................................................................................................... M. strigillosa
1 Plant armed.
2 Pinnae (1-) 2 pairs per leaf................................................................................................ M. pudica
2 Pinnae 6-16 (-22) pairs per leaf.
3 Woody shrubs, to 4 m tall ................................................................................................................................................................. M. pellita
3 Sprawling vines.
4 Leaflets without apparent secondary veins; pinnae 4-8 (-11) pairs per leaf ................................................................. M. microphylla
4 Leaflets with evident (sometimes weakly so) secondary veins; pinnae 3-5 (-6) pairs per leaf.................. M. quadrivalvis var. floridana

Mimosa microphylla Dryander, Eastern Sensitive-briar. Dry woodlands and forests, especially sandhills, disturbed areas. June-September; August-November. DE, WV, and MO south to FL and e. TX. A form with smaller fruits (3-5 cm long vs. 5-12 cm long) has been variously treated as a species [Leptoglottis chapmanii – S, Schrankia chapmanii] or a "recurrent fruit-form genotype" [phase brachycarpa of Isely (1973)]. [= K; = Mimosa quadrivalvis Linnaeus var. angustata (Torrey & A. Gray) Barneby – C, I, WH, Y; = Schrankia microphylla (Dryander) J.F. Macbride – RAB, F, G, W; = Schrankia microphylla (Dryander)J.F. Macbride var. microphylla – SE; > Leptoglottis microplatoehtshilla (Dryander) Britton & Rose – S; > Leptoglottis chapmanii Small ex Britton & Rose – S; > Schrankia microphylla "phase brachycarpa" – Z; > Schrankia chapmanii (Small ex Britton & Rose) F.J. Hermann]

Mimosa pudica Linnaeus, Sensitive Plant, Shameplant. Disturbed areas; perhaps only a waif in our area. [= I, K, S, SE, WH]

Mimosa quadrivalvis Linnaeus var. floridana (Chapman) Barneby, Florida Sensitive-briar. Xeric sandhills and other dry, sandy habitats. A Southeastern Coastal Plain endemic: GA south into FL. This taxon is distinct at the specific level from M. quadrivalvis and nomenclatural adjustments are forthcoming (Flores-Cruz et al. 2004). [= I, K, WH, Y; = Leptoglottis floridana (Chapman) Small ex Britton & Rose – S; = Schrankia microphylla (Dryander) J.F. MacBride var. floridana (Chapman) Isely – SE]

Mimosa strigillosa Torrey & A. Gray, Powderpuff Mimosa. Floodplain forests, open wet areas. A Southeastern Coastal Plain endemic: e. GA south to FL, west to TX. It might be expected in se. SC (see SE, Y, Z). [= I, K, S, SE, WH, Y, Z]

Mucuna Linnaeus 1763 (Velvetbean)


* Mucuna pruriens (Linnaeus) A.P. de Candolle. Velvetbean, Bengal Bean, Florida Bean. Disturbed areas, fields, cultivated and sporadically established in disturbed areas; native of se. Asia. [= I, SE; > M. pruriens var. pruriens – K; > Stizolobium deeringianum Bort – S; > M. deeringiana (Bort) Merrill]

Neptunia Loureiro 1790 (Neptunia)

1 Leaflets 9-15 pairs per pinna; stipules 2-4 mm long; all flowers perfect, with functional stamens; stipe of fruit 4-14 mm long. \( \ldots N. \text{ lutea} \)

1 Leaflets (12-25 pairs per pinna; stipules 4-10 mm long; flowers in the lower part of the inflorescence with flattened staminodes; stipe of fruit 2.5 mm long. \( \ldots N. \text{ pubescens var. pubescens} \)

Neptunia lutea (Leavenworth) Bentham, Yellow Neptunia. Savannas, prairies, roadsides. AL west to OK and TX. [= I, K, S, SE, Z]

Neptunia pubescens Bentham var. pubescens, Tropical Neptunia. Savannas, sandhills, scrub, prairies, roadsides. AL and FL west to TX and south to Argentina. [= I, K, SE, Z; > N. floridana Small – S; < N. pubescens – WH; > Neptunia pubescens var. floridana (Small) B.L.Turner]

Orbexilum Rafinesque 1832 (Scurfpae, Sampson’s-snakeroot)


<table>
<thead>
<tr>
<th>Leaflets</th>
<th>Leaflet size</th>
<th>Stipule length</th>
<th>Flower location</th>
<th>Stamineo length</th>
<th>Calyx teeth</th>
<th>Petal length</th>
<th>Habitat</th>
<th>Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Leaflets 9-15 pairs per pinna</td>
<td>2-4 mm long</td>
<td>All flowers perfect</td>
<td>Lower part of the inflorescence</td>
<td>4-14 mm long</td>
<td>2.5 mm long</td>
<td>8-10 mm long</td>
<td>Savannas, prairies, roadsides</td>
<td>AL west to OK and TX</td>
</tr>
<tr>
<td>1 Leaflets 12-25 pairs per pinna</td>
<td>4-10 mm long</td>
<td>Flowers in the lower part of the inflorescence</td>
<td>Flattened staminodes</td>
<td>2.5 mm long</td>
<td>1.0-1.5 mm long</td>
<td>5-7 mm long</td>
<td>Savannas, prairies, roadsides</td>
<td>AL west to TX and south to Argentina</td>
</tr>
</tbody>
</table>

Orbexilum lupinellum (Michaux) Isely, Lupine Scurfpea. Sandhills. May-July; July-October. This peculiar species is a Southeastern Coastal Plain endemic, ranging from sc. and se. NC, south to c. peninsular FL, s. AL, and e. GA. The very peculiar leaves, palmately 5-7-foliolate, make the species unmistakable. First reported for SC by McMillan et al. 2002. [= K; = Psoralea lupinellus Michaux - RAB; = Orbexilum lupinellus – I, SE, WH, Z, orthographic variant; = Rhytidomene lupinellus (Michaux) Rydberg – S]

Orbexilum macrophyllum (Rowlee in Small) Rydberg, Bigleaf Scurfpea. Wooded slopes of mountain on Blue Ridge escarpment, precise habitat not known (probably nutrient-rich dry woodlands). June; July-August? This species was discovered on 18 June 1897 and subsequently collected on 8 June 1899 by E.C. Townsend, somewhere on the double peak of Tryon Mountain and White Oak Mountain, Polk County, NC, a phytogeographically interesting area with disjunct, endemic, and relictual species largely of midwestern affinities. It is currently presumed to be extinct, following a number of unsuccessful attempts to relocate it. Isely (1990) states that the assignment of “this distinctive species” to Orbexilum is "reasonably assumptive," since fruits have never been seen. [= I, K, S, SE, Z; = Psoralea macrophylla Rowlee in Small – RAB, W]

Orbexilum onobrychis (Nuttall) Rydberg, Lanceleaf Scurfpea. In nutrient-rich, open or semi-open areas. June-July; August-October. Primarily a species of prairies and prairie-like areas of OH and KY west to se. IA and e. MO. O. onobrychis also occurs (at least formerly) as a rare disjunct in the mountains of w. NC, nw. SC, w. VA, and e. TN. The only report for NC was in the 1800’s. [= G, I, K, S, SE, Z; = Psoralea onobrychis Nuttall – RAB, F, G, W]
Orbexilum pedunculatum (P. Miller) Rydberg var. pedunculatum, Western Sampson's-snakeroot. Open woodlands. May-July; July-September. Var. pedunculatum, the western and more widespread variety, occurs primarily west of the Blue Ridge, with scattered occurrences in and east of the Blue Ridge. Its range is s. OH, s. IN, s. IL, c. MO, and se. KS, south to sw. NC, sc. SC, sw. GA, s. AL, l. LA, and e. TX. [= C, I, K, SE, Z; = Psoralea psoralioides (Walter) Cory var. eglandulosa (Elliott) F.L. Freeman – RAB, F, G, GW, W; = Orbexilum pedunculatum – S]

Orbexilum pedunculatum (P. Miller) Rydberg var. psoralioides (Walter) Isely, Eastern Sampson's-snakeroot. Savannas, open woodlands. May-July; July-September. Var. psoralioides, the eastern variety, occurs primarily on the Atlantic Coastal Plain, ranging from e. VA to ne. FL and Panhandle FL, inland to the Piedmont of NC and SC. [= K; = Psoralea psoralioides (Walter) Cory var. psoralioides – RAB, F, G, GW; = Orbexilum pedunculatum var. gracile (Torrey & A. Gray) Grimes – C, I, SE, Z; = Orbexilum gracile (Torrey & A. Gray) Rydberg – S; < Orbexilum pedunculatum – WH]

Orbexilum simplex (Nuttall ex Torrey & Gray) Rydberg. Prairies, open woodlands. AR and OK south to s. AL, MS, e. and w. LA, and e. TX; perhaps disjunct in IL. [= I, K, S, SE, Z]

Orbexilum stipulatum (Torrey & Gray) Rydberg. Rocky limestone glade. So far as is known, once endemic to Rock Island in the Ohio River, Jefferson Co., KY, and now presumed extinct because of near obliteration of the only known site by dam-building and industrial construction (Baskin, Isely, & Baskin 1986). [= C, I, K, SE, Z; = Orbexilum stipulatum Torrey & Gray – F, G]

Orbexilum virgatum (Nuttall) Rydberg, Slender Leather-root. Sandhills. Se. GA (or SC?) south to ne. FL. A collection by Curtiss is labeled as from South Carolina. [= I, K, S, SE, WH, Z; = Psoralea virgata Nuttall]

Parkinsonia Linnaeus 1753 (Jerusalem Thorn)


* Parkinsonia aculeata Linnaeus, Jerusalem Thorn, Retama, Horse-bean, Mexican Palo Verde. Disturbed areas; native of sw. North America. May. Rarely established or spread from cultivation in our area, more commonly so in much of FL. [= I, K, S, SE, Y, WH, Z]

Pediomelum Rydberg 1919 (Buckroot, Prairie-turnip)


1 Flowering calyx 1.5-2.5 mm long, the legume exserted out of it at maturity; leaves 3-5-foliolate; [of MS and KY and westward]; [former genus Psoralidium] .............................................................................................................................................................................. P. species 1

1 Flowering calyx 7-10 mm long, the legume mostly included within it even at maturity; leaves (1-) 3-7 foliolate; [of TN and AL and eastward].

2 Plants caulescent, 1-2 dm tall; leaves (4-) 5-7-foliolate; [plants of calcareous glades of the Interior (nw. GA, TN, n. AL)]; [subgenus Disarticulatum] .............................................................................................................................................................................. P. subacaulis

2 Plants caulescent, 3-10 dm tall; leaves (1-) 3 (-5)-foliolate; [plants of sandhills of the Coastal Plain and rocky woodlands of the lower Piedmont]; [subgenus Pediomelum].

3 Inflorescence loose (much of the axis exposed); leaflets (1-) 3; leaflets < 2× as long as wide, petiolules 5-9 mm long; [of longleaf pine sandhills of the Coastal Plain] .............................................................................................................................................................................. P. canescens

3 Inflorescence congested (the axis usually concealed); leaflets 3 (-5); leaflets > 2× as long as wide, petiolules 1.8-3 mm; [of rocky woodlands of the lower Piedmont] .............................................................................................................................................................................. P. piedmontanum

Pediomelum canescens (Michaux) Rydberg, Buckroot, Eastern Prairie-turnip, Hoary Scurfpea. Sandhills. May-July; July-October. A southeastern Coastal Plain endemic: se. VA south to c. peninsular FL, Panhandle FL, and s. AL. This uncommon species tends to occur as very widely scattered individuals in sandhill habitats, rarely with more than a few seen at a time. It is related to P. esculentum (Pursh) Rydberg, the "prairie potato," prized by early travelers across the prairies for its edible tubers. An interesting collection label (by R.E. Wicker, collected in 1942, the specimen at NCU) mentions both the edible tubers and the characteristically sparse population structure of the species. "Not uncommon near Pinehurst in ... open places in sandy pine woods... but usually only one plant at a time. Tuber hard, dark brown, about size of a medium-sized Irish potato, somewhat ventral-elongated with roots coming from pointed base. Internal pure white, apparently almost entirely starch... Mr. Wicker says that he rather likes to take a bit of it and chew when fresh, has a rather condiment taste, but does not think it well to eat..."

Because of its rarity, P. canescens should not (of course) be eaten. Because of its habit, that of a very bushy, tumbleweed-like
plant, it superficially most closely resembles various *Baptisia* species, but it is easily separated by its rather dense and soft pubescence (our *Baptisia* are all glabrous or rather inconspicuously puberulent, except the very unifoliolate *B. arachnifera*). [= C, I, K, S, SE, WH, Y; Z = *Psoralea canescens* Michaux – RAB, F, G]


**Pediomelum species 1**, Gray Scurf-pea. Prairies. KY to MT, south to TX and n. Mexico; disjunct in MS. A recent study (Egan & Crandall 2008) shows that this species belongs in *Pediomelum*, not *Psoralidium*; the new combination has not yet been made. [= *Psoralidium tenuiflorum* (Pursh) Rydberg – C, I, K, SE; Z = *Psoralea tenuiflora* Pursh – F, G]

**Pediomelum subcaule** (Torrey & A. Gray) Rydberg, Nashville Breadroot. Limestone glades. E. TN and nw. GA west to c. TN and nw. AL. [= I, K, SE, Z; *P. subacutus* – S, orthographic variant]

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**Phaseolus** Linnaeus 1753 (Bean)


1 Raceme axes slender, flexuose; [plants native perennials]; [section *Paniculati*; subsection *Volubili*].
2 Stems climbing and twining on other vegetation; leaflets 3-10 cm long, usually not lobed and only slightly reticulate; [plants of various habitats].
3 Corolla 1.5-2 cm long, scarlet red or bright lavender; racemes exserted; plants twining; [section *Coccineae*].
4 Legumes distinctly flattened at maturity, 15-20 mm wide; corolla usually greenish white; [section *Paniculati*; subsection *Volubili*].

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* **Phaseolus lunatus** Linnaeus, Lima Bean. Frequently cultivated (both commercially and in home gardens), rarely found as a wild; native of tropical America. [= I, K, S, SE, WH, Y, Z; *P. limensis* Macfadyen – F]


**Phaseolus sinuatus** (Nuttall) Torrey & A. Gray, Sandhills Bean. Sandhills. July-September; August-October. Sc. NC south to s. FL, west to s. MS, a Southeastern Coastal Plain endemic. Freytag & DeBouck (2002) describe *P. sinuatus* and *P. polystachios* as being “very distinct and there seems to be no intergradation,” yet treat them as only subspecifically distinct; I choose to recognize them as species. Not easy to distinguish in sterile condition from *Strophostyles*. [= RAB, I, S, SE, W; = *P. polystachios* (Linnaeus) Britton, Sterns, & Poggenburg var. *sinuatus* (Nuttall) R. Marechal, J.M. Mascherpa, & F. Stainier – K, WH; = *P. polystachyus* ssp. *sinuatus* (Nuttall) Freytag – Y; = *P. polystachyus* var. *sinuatus* (Nuttall) R. Marechal, J.M. Mascherpa, & F. Stainier – Z]

* **Phaseolus vulgaris** Linnaeus, Garden Bean, Green Bean, Snap Bean, String Bean, Kidney Bean, Pole Bean, Bush Bean. Frequently cultivated (both commercially and in home gardens), rarely found as a wild; native of tropical America. [= C, F, G, I, K, S, SE; > *P. vulgaris* var. *vulgaris* – F; > *P. vulgaris* var. *humilis* Alefeld – F; < *P. vulgaris* var. *vulgaris* – Z]

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**Pisum** Linnaeus 1753 (Pea)

* Pisum sativum * Linnaeus, Pea, Garden Pea, English Pea. Commonly cultivated in home gardens, rarely found as a waif; native of w. Asia and Mediterranean Europe. March-May. [= I, K, SE, WH; > *P. sativum var. sativum* – F; > *P. sativum var. arvense* (Linnaeus) Poiret – RAB, F]

**Rhynchosia** A.P. de Candolle 1879 (Snoutbean)


1 Leaves trifoliolate (rarely with a few lowermost leaves unifoliolate, these generally withering before flowering and fruiting).

- **Rhynchosia** A.P. de Candolle 1879 (Snoutbean)

2 Plant prostrate, trailing, usually with many leaves; stipels absent; [plant very rare in our area, probably introduced] .................. *R. michauxii*

3 Plant trailing or twining; pubescence of the lower leaf surface mostly restricted to the veins.

- **Rhynchosia** cytisoides (Loureiro) A.P. de Candolle

4 Calyx 14-25 mm long; inflorescence (including peduncle) 5-25 cm at anthesis, elongating further in fruit, with flowers scattered; [MS and w, TN westward] ................................................................. *R. minima*

5 Calyx 8-14 mm long; inflorescence (including peduncle) 1-2 cm long at anthesis, elongating to 4(-8) cm, the flowers tightly packed; [collectively widespread in our area].

- **Rhynchosia** reniformis

6 Pubescence of petiole of mostly incurved hairs 0.2-0.4 mm long; terminal leaflet 1-3(-3.5) cm long; plants generally trailing; [of ne. FL southward] ................................................................. *R. reniformis*

- **Rhynchosia** difformis

7 Terminal leaflet elliptic 1.6-2.5× as long as wide; plants erect. ................................................................. *R. difformis*

- **Rhynchosia** tomentosa

* Rhynchosia cinerea * Nash, Sandhill Snoutbean. Sandhills, scrub. Ne. FL (Columbia County) south to s. FL. [= I, K, S, SE, WH, Y]


**Rhynchosia latifolia** Nuttall. Pinelands and woodlands, roadsides. May-July. W. TN s. MO, and OK south to c. MS, s. LA, and se. TX. [= I, K2, SE]

**Rhynchosia michauxii** Vail. Sandhills, dry hammocks, disturbed areas. June-August; August-October. Se. NC (one record) and e. GA (one record) south to s. peninsular FL, west to Panhandle FL. The disjunct sites are of uncertain origin. [= I, K, S, SE, WH; = R. americana (Houston ex P. Miller) M.C. Metz – RAB (the identification as *R. americana* based on misidentification of the specimen)]

**Rhynchosia tomentosa** (Linnaeus) Hooker & Arnott. Dollarweed. Sandhills. June-September; August-October. Se. NC south to s. FL, west to e. TX; disjunct (introduced?) in e. TN (Chester, Wofford, & Kral 1997). [= RAB, K, SE, WH, Y; = R. simplicifolia (Walter) Wood – S]

**Rhynchosia mollissima** (Elliott) S. Watson. Hammocks, dry pine flatwoods, coastal sands. E. GA, south to s. FL, west to s. TX. The species also occurs in the Old World, and the New World distribution is sometimes considered a result of introduction. [= I, K, SE, WH, Y; = Dolicholoma mollissima (Linnaeus) Medikus – S]

**Rhynchosia minima** (Linnaeus) A.P. de Candolle. Hammocks, dry pine flatwoods, coastal sands. E. GA, south to s. FL, west to s. TX. The species also occurs in the Old World, and the New World distribution is sometimes considered a result of introduction. [= I, K, S, SE, WH, Y; = R. hispida (Elliott) Torrey & A. Gray – I, K, SE, WH, Y; = R. mollissima (Elliott) S. Watson – S]

**Rhynchosia reniformis** A.P. de Candolle, Dollarweed. Sandhills. June-September; August-October. Se. NC south to s. FL, west to e. TX; disjunct (introduced?) in e. TN (Chester, Wofford, & Kral 1997). [= RAB, K, SE, WH, Y; = R. simplicifolia (Walter) Wood – S]

**Rhynchosia tomentosa** (Linnaeus) Hooker & Arnott. Xeric woodlands and forests, sandhills, edges, open areas. June-August; August-October. SE south to n. peninsular FL, west to LA, and north in the interior to e. and c. TN. [= Rhynchosia tomentosa (Linnaeus) Hooker & Arnott var. tomentosa – C, I, K, SE, WH, Y; < R. tomentosa – RAB, F, G, W; > R. erecta (Walter) A.P. de Candolle – S; > R. intermedia (Torrey & Gray) Small – S]

**Robinia** Linnaeus 1753 (Locust)

A genus of 5-8 species, shrubs and trees, of e. and sw. North America. The Southern Appalachians are a center of diversity of *Robinia*, with active hybridization, introgression, and formation of local (sterile) races involved; a fully satisfying taxonomic treatment of such a situation is not possible. Isely & Peabody’s (1984) treatment seems a reasonable approach, and I have largely followed it here, differing in the rank of some of the taxa. References: Isely & Peabody (1984)=Z; Ashe (1922)=Y; Isely (1998)=I.

Identification notes: The key is differently structured than that in RAB or SE; it is presented as an alternative. This treatment may be altered substantially prior to publication. A variety of hybrids (including some cultivars) are known, including the following: Robinia ×longiloba Ashe (pro sp.) [R. hispida × viscosa], known from NC and SC; Robinia ×margaretae Ashe (pro sp.) [R. hispida × pseudoacacia], known from NC, SC, and GA; Robinia ×umbigua Poir (pro sp.) [R. pseudoacacia × viscosa], known from NC; Robinia hartwigii × hispida, known from Whiteside Mountain, Jackson County, NC; Robinia hartwigii × viscosa, known from Whiteside Mountain, Jackson County, NC.

1 Corolla white, 1.5-2.0 cm long; peduncles, pedicels, and calyces velvety-puberulent, the hairs neither glandular nor hispid; plant a small to large tree...........................................................................................................................................................................R. pseudoacacia

1 Corolla pink to pink-purple (rarely white or nearly so), (1.5-) 2.0-2.5 cm long; peduncles, pedicels, and calyces glandular-pubescent, hispid, or short-stalked to sessile glands; plant a shrub to small tree.

2 Twigs and leafstalks conspicuously hispid with hairs 1-5 mm long, these stiff, thick-based, and typically persistent several years.

3 Plants fruited abundantly; shrubs 0.6-2 (-3) m tall; leaflets relatively broad, mostly 1.2-1.8× as long as wide;... R. hispida var. fertilis

3 Plants sterile (rarely fruited scantly); shrubs 0.5-1.5 m tall; leaflets relatively narrow, mostly 1.8-2.5× as long as wide;... R. hispida var. hispida

2 Twigs and leafstalks either viscid with sessile or short-stalked glands, or densely glandular-pubescent (the hairs 0.5-2 mm long), or tomentulose, or sparsely hispid with weak, non-persistent hairs.

4 Leaflets usually 13-21, permanently but inconspicuously appressed-pubescent beneath; bracts (evident only before anthesis) aristate; plants never with long, hispid pubescence.

5 Twigs and peduncles finely glandular-pubescent with hairs 1 (-2) mm long; plants abundantly pod-forming....................... R. hartwigii

5 Twigs and peduncles viscid with sessile or short-stalked glands (the racemes sometimes with some glandular pubescence); plants sterile or forming pods.................................................. R. viscosa

4 Leaflets usually 9-13, initially appressed-silky but later glabrate beneath; bracts (evident only before anthesis) not aristate; plants with or without sparse long, hispid pubescence.

6 Plants fruited abundantly; shrubs 1-3 m tall ................................................................. R. hispida var. kelseyi

6 Plants sterile (rarely fruiting scantly); shrubs or small trees, 0.4-3 (-8) m tall.

7 Shrubs or small trees, 1-3 (-8) m tall, much branched, the stems and branches relatively straight, the nodes usually lacking spines; leaflets 1.5-3 cm long................................................................. R. hispida var. rosea

7 Shrubs, 0.4-1 m tall, little branched, the stems and branches typically zigzag (bent at each node), the nodes usually with spines; leaflets 1-2 (-3) cm long................................................................. R. nana
Robinia hartwigii Koehne, Granite Dome Locust, Highlands Locust, Hartwig's Locust. Forests and outcrop edges on high elevation granitic domes, also clearings. June-July; August-September. Apparently endemic to several mountains within a 5 km radius of Highlands, NC. While certainly related to and apparently hybridizing with R. viscosa, R. hartwigii seems worthy of recognition as a species. The original spelling (in Koehne 1913) is "hartwigii;" it is not clear why the variants (see synonymy) arose. [= RAB, S; = R. viscosa var. hartwegii (Koehne) Ashe – K, orthographic variant; = R. viscosa var. hartwegii – SE, Z; < R. viscosa – W; = R. viscosa var. hartwegii – Y, orthographic variant]

Robinia hispida Linnaeus var. fertilis (Ashe) Clausen, Arnot Bristly Locust. Woodlands and forests. May-June; July-August. Apparently endemic to the Southern Appalachians of w. NC and e. TN. A horticultural selection of var. fertilis, the Arnot Bristly Locust, is used as a soil binder. [= C, F, K, SE, Z; < R. hispida – RAB; > R. fertilis Ashe – S; > R. grandiflora Ashe – S, Y; > R. pedunculata Ashe – S; < R. hispida – W]


Robinia hispida Linnaeus var. kelseyi (Cowell ex Hutchinson) Isely, Kelsey's Locust. Mountain woodlands, introduced elsewhere. April-July; July-October. Traditionally considered an endemic originally restricted to w. NC, but SE and Z suggest that var. kelseyi may have been only of horticultural origin. [= K, SE, Z; = R. kelseyi Cowell ex Hutchinson – RAB, G, S, Y; < R. hispida – W]

Robinia hispida Linnaeus var. rosea Pursh, Boynton's Locust. Mountain woodlands. April-July. Originally distributed from w. NC and e. TN south to nw. SC, n. GA, and ne. AL, now occasionally found outside that range as an escape from cultivation. [= C, K, SE, Z; = R. boyontii Ashe – RAB, G, S, Y; < R. hispida – W]


Robinia viscosa Ventenat, Clammy Locust. Mountain forests and woodlands, roadsides, disturbed areas, rare in wild, uncommon as an escape. May-July; July-August. Originally a Southern and Central Appalachian endemic, ranging from PA south through w. MD, w. VA, e. WV, w. NC, and e. TN, to n. GA and n. AL, now much more widespread as an escape from cultivation. Reported for GA Coastal Plain (Marion County) (Carter, Baker, & Morris 2009). [= RAB, F, G, S, WV; = R. viscosa var. viscosa – C, K, SE, Y, Z; < R. viscosa – W (also see R. hartwigii)]

Scorpiurus Linnaeus 1753 (Scorpion’s-tail)

A genus of 2-4 species, herbs, of Mediterranean Europe west into w. Asia.

* Scorpiurus muricatus Linnaeus. Disturbed areas; native of Mediterranean Europe. [= K] {add synonymy}

Securigera A.P. de Candolle 1805 (Crown-vetch)
A genus of about 12-13 species, annual and perennial herbs, of Eurasia. This genus is sometimes included in Coronilla, but is apparently better separated (Isely 1998). References: Isely (1998)=I.

1 Corolla white and pink; perennial; [common alien, planted and established]..........................................................S. corymbosa

*Securigera securidaca* (Linnaeus) Degen & Dörfler. Disturbed areas; native of Europe. Reported by Small (1933); rejected by Isely (1990) on the basis of no material seen to document the occurrence. This taxon's status as part of our flora is uncertain. [= I, SE, = Bonaveria securidaca (Linnaeus) Reichenbach – S; = Coronilla securidaca Linnaeus – K]

*Securigera varia* (Linnaeus) Lassen, Crown-vetch. Roadbanks, woodland borders; native of Europe. This species, generally known as *Coronilla varia*, is now widely used to stabilize road-cuts. [= I; = Coronilla varia Linnaeus – RAB, C, F, G, K, SE, W, WH, WV]

Senna P. Miller 1754 (Senna, Sicklepod, Wild Coffee)


1 Racemes spike-like, 3-6 (-10) dm long; legume winged; [section Senna, series Piacea] .....................................................S. alata

2 Racemes not spike-like, <3 dm long; legume not winged; [section Chamaefistula].

2 Plant a shrub, 1-3 m tall; gland between the lowest pair of the acute or acuminate leaflets; [plants aliens, barely established in the vicinity of cultivation]; [section Chamaefistula, series Coluteoideae].

3 Gland between the lowest pair of leaflets only; leaflets 3-5× as long as wide.......................................................S. corombose

4 Glands between each pair of leaflets; leaflets 2-3× as long as wide, acuminate.....................................................S. septemtrionalis

5 Plant an herb, 0.1-1.5 m tall; gland near the base of the petiole (except in *S. occidentalis* which has leaflets rounded to emarginate at the apex); [plants natives, or aliens generally well-established and weedy].

4 Leaflets obovate, the apex rounded to emarginate, 1.3-2× as long as wide; gland between the lowest pair of leaflets; [section Chamaefistula, series Trigonolliodeae] .................................................................S. obtusifolia

4 Leaflets ovate or narrowly elliptic, the apex acute or acuminate, 2-3.5× as long as wide; gland near the base of the petiole.

5 Leaflets 1.5-3.0 cm wide, in 3-6 pairs; racemes with 1-5 flowers; [section Chamaefistula, series Bassiglandulosae] ..................S. occidentalis

6 Leaflets 0.7-2.0 cm wide, in 6-10 pairs; racemes with 5-10 (-25) flowers; [section Temperate]........................................S. hebecarpa

6 Legume 5.5-8 mm wide, with broad, nearly square segments, usually pilose initially, the hairs up to 0.8-2 mm long (sometimes glabrate); ovary lanate with hairs to 1 mm long; ovules 10-15 (-18); petiolar gland broadest above the middle...........................................S. varia

6 Legume 8-11 mm wide, with narrow segments (much shorter than broad), glabrous (or with a few hairs, these < 0.6 mm long); ovary striagulose with hairs to 0.5 mm long; ovules 20-25 (-30); petiolar gland usually broadest at or below the middle..............S. corymbosa

* Senna alata* (Linnaeus) Roxburgh, Emperor's Candlesticks, Candlestick Plant. Disturbed areas; native of tropical America. September-November. Planted and slightly naturalized from s. AL and FL west to OK and TX. [= I, K, SE, WH, Y; = Cassia alata Linnaeus – Z]

* Senna corymbosa* (Lamarck) Irwin & Barneby. Cultivated as an ornamental, rarely persistent or spreading to disturbed areas; native of South America. August-September. reported for AL (Diamond & Woods 2009). [= I, K, SE, WH, Y; = Adipera corymbosa (Lamarck) Britton & Rose – S; = Cassia corymbosa – X, Z]

*Senna hebecarpa* (Fernald) Irwin & Barneby, Northern Wild Senna. Open wet habitats, moist forests. July-August; August-November. MA and s. NH west to s. WI, south to sc. NC, e. TN, s. IN, and c. IL. [= C, I, K, SE, Y; = Cassia hebecarpa Fernald – RAB, G, W, X, Z; > C. hebecarpa var. hebecarpa – F, WV; > C. hebecarpa var. longipila E.L. Braun – F, WV; = Ditremexa marilandica (Linnaeus) Britton & Rose – S, misapplied]

*Senna liguistrina* (Linnaeus) Irwin & Barneby, Privet Wild Senna. Hardwood hammocks, wet disturbed habitats. N. peninsular FL south to s. FL; Central America; West Indies. [= I, K2, SE, WH; = Cassia liguistrina Linnaeus; = Peiranisia bahamensis (P. Miller) Britton & Rose - S] [not yet keyed; add X, Y, Z synonymy]

* Senna marilandica* (Linnaeus) Link, Maryland Wild Senna. Dry to moist forests, especially on greenstone and diabase barrens and rocky woodlands, thickets, woodland borders, sometimes somewhat weedy. July-August; August-November. S. MA and s. NY west to c. NE, south to c. peninsular FL and c. TX. [= C, I, K, SE, WH, Y; = Cassia marilandica Linnaeus – RAB, F, G, W, WV, X, Z; = Ditremexa medigeri (Shafer) Britton & Rose – S]

* Senna obtusifolia* (Linnaeus) Irwin & Barneby, Sicklepod, Coffeeweed. Fields (especially soybean fields), disturbed areas; probably native of the New World Tropics. July-September; August-November. The species is now pantropical. [= C, I, K, SE,
WH, X, Y; = *Cassia obtusifolia* Linnaeus – RAB, W, Z; *Cassia tora* Linnaeus – F, G, misapplied; *Emelista tora* (Linnaeus) Britton & Rose – S, misapplied


* Senna septemtrionalis* (Viviani) Irwin & Barneby. Disturbed areas; native of the tropics, probably originally from tropical America, perhaps not truly established, though Isely (1990) states that “the weedy nature of this species suggests that it is almost certainly somewhat established.” [= I, K, Y; = *Cassia laevigata* Willdenow – Z]

Sesbania Adanson 1760 (Rattlebox, Sesan)

A genus of about 50-60 species, annual herbs, perennial herbs, shrubs, and trees, of tropical, subtropical, and less commonly warm temperate regions of the Old and New World, here circumscribed to include *Glottidium*, following Lewis et al. (2005).


1 Corolla 8-9 mm long; legume flat; leaves with 8-13 pairs of leaflets ................................................................. *S. vesicaria*

1 Corolla 9-25 mm long; legume quadrangular or 4-winged; leaves with 10-35 pairs of leaflets.

2 Legume quadrangular in cross-section, the corners not winged, 15-20 cm long, 0.3-0.5 cm wide; corolla 10-15 (-20) mm long, yellow, often marked with purple; leaves with 15-35 pairs of leaflets; [plant a robust herb, to 4 m tall] ................................................................. *S. herbacea*

2 Legume quadrangular or conspicuously 4-winged longitudinally, 3-8 cm long, 0.5-1.5 cm wide; corolla 9-25 mm long, yellow, orange, or scarlet; leaves with 10-20 pairs of leaflets; [plant a shrub, to 4 m tall].

3 Legume quadrangular or slightly flanged, 0.5-0.7 cm wide; corolla 9-12 mm long................................................................. *S. virgata*

3 Legume conspicuously 4-winged longitudinally, 1-1.5 cm wide; corolla 13-25 mm long.

4 Corolla yellow; pedicels 0.5-1.0 cm long; legume blunt or abruptly acuminate to a beak ................................................................. *S. drummondii*

4 Corolla orange or red; pedicels 0.5-1.2 (-1.5) cm long; legume acuminate or tapering to a beak ................................................................. *S. punicea*

*Sesbania drummondii* (Rydberg) Cory, Rattlebox, Poison-bean. Disturbed areas, spoil, marsh edges, ditches. Native on the Gulf Coast west to s. TX and Mexico, the exact eastern edge of the native range uncertain, perhaps w. FL Panhandle. First reported for GA and SC by Townsend et al. (2000), where clearly introduced. [= GW, I, K1, K2, SE, WH; = *Daubentonia drummondii* Rydberg – S]


*Sesbania punicea* (Cavanilles) Bentham, Rattlebox, Scarlet Wisteria-tree, Purple Sesban. Ditches, wet fields, marshes, ponded wetlands, wet pinelands; presumably native of South America. June-October; August-November. [= GW, I, K1, K2, SE, WH; = *Daubentonia punicea* (Cavanilles) A.P. de Candolle – RAB, S]

*Sesbania vesicaria* (Jacquin) Elliott, Bladderpod, Bagpod. Ditches, marshes, disturbed wet areas. July-September; August-November. The original native distribution of *S. vesicaria* is uncertain; its distribution is from ne. NC south to s. FL, west to e. OK and se. TX, and Isely (1998) states that it is unknown from outside the United States; occurrences in provinces inland of the Coastal Plain seem to represent introductions into artificial wetlands (such as ditches). [= GW, K2, WH; = *Glottidium vesicarium* (Jacquin) R.M. Harper – RAB, I, K1, S, SE]

*Sesbania virgata* (Cavanilles) Poiret. Disturbed areas; native of South America. June-October; August-November. [= I, K1, K2, SE, WH]

*Sperostyles* Elliott 1823 (Sand Bean, Woolly Bean, Wild Bean)

1. Legumes 2-4 cm long, permanently pubescent; corolla 5-8 mm long; leaves permanently pubescent on the upper surface; seeds glabrous......

..............................................................................................................................................................................................................

*S. leiosperma*

1. Legumes 3-8 cm long, glabrate at maturity; corolla 8-15 mm long; leaves usually glabrate on the upper surface; seeds pubescent.

2. Bracteoles (immediately subtending the calyx) 2-3 mm long, equaling or exceeding the calyx tube; leaflets usually prominently 3-lobed; terminal leaflet 2.5-3.5 cm wide; plant an annual..............................................................................................................................................

*S. helvola*

2. Bracteoles (immediately subtending the calyx) 0.5-1.0 (-1.5) mm long, shorter than the calyx tube; leaflets not lobed; terminal leaflet 0.3-2.0 cm wide; plant a perennial..............................................................................................................................................

*S. umbellata*

Strophostyles helvola (Linnaeus) Elliott, Annual Sand Bean. Coastal dunes, beaches, dry sandy woodlands, disturbed areas. June-September; August-October. QC west to MN and SD, south to n. peninsular FL and e. TX. See Isely (1986b) for a discussion of the orthography of the epithet. [= RAB, C, G, S, WH, WV; = *S. helvula* (Linnaeus) Elliott – K, SE, W, Z, orthographic variant; > *S. helvola* var. helvola – F; > *S. helvola* var. missouriensis (S. Watson) Britton – F]

Strophostyles leiosperma (Torrey & A. Gray) Piper, Small-flowered Sand Bean. Prairies, glades, barrens, sand bars, disturbed areas. June-September; August-October. IN, WI, MN, and ND, south to FL Panhandle, AL, MS, LA, TX, NM, and AZ; also scattered eastward presumably as introductions. This species is native east to KY and TN; it should be sought inland in prairies, glades, and barrens with midwestern affinities. [= C, F, G, K, SE, WH, Z; = *S. pauciflora* (Bentham) S. Watson – S]

Strophostyles umbellata (Muhlenberg ex Willdenow) Britton, Perennial Sand Bean. Dry sandy or rocky woodlands, disturbed areas. June-September; August-October. S. NY west to s. IN, s. MO, and KS, south to c. peninsular FL and s. TX. [= RAB, C, F, G, K, S, SE, W, WH, Z; > *S. umbellata* var. umbellata – F; > *S. umbellata* var. paludigena Fernald – F]

Stylosanthes Swartz 1788 (Pencil-flower)


Stylosanthes biflora (Linnaeus) Britton, Sterns, & Poggenburg, Pencil-flower. Sandhills, dry to moist (but not wet) pine savannas and flatwoods, dry forests, woodlands, woodland borders, glades, barrens, rock outcrops. June-August; July-October. S. NY west to OH, s. IL, and KS, south to c. peninsular FL and e. TX. The large, adnate stipules are distinctive. Variation in this species (see synonymy) needs additional study. [= RAB, C, I, K, SE, W, WH, WV; > *S. biflora* var. biflora – F, G; > *S. biflora* var. hispidissima (Michaux) Pollard & Ball – F, G; > *S. riparia* Kearney – G, S; > *S. riparia* var. riparia – F; > *S. riparia* var. setifera Fernald – F; > *S. biflora* – S]

Styphnolobium Schott 1830 (Pagoda Tree)


1. Flowers in terminal panicles; leaflets 13-17 per leaf.............................................................................................................................................................

*S. affine*

1. Flowers in axillary racemes; leaflets 9-15 per leaf.............................................................................................................................................................

*S. japonicum*

Styphnolobium affine (Torrey & A. Gray) Walpers, Eve’s Necklace. Woodlands, disturbed areas. April-June. SW, AR and OK south to sw. LA and c. TX; disjunct eastwards in se. LA. [= K2; = Sophora affinis Torrey & A. Gray]

* Styphnolobium japonicum (Linnaeus) Schott, Pagoda Tree. Cultivated ornamental, rarely persistent; native of China. Reported as "slightly escaped" in the United States by Isely (1981), but all specimens seen are from cultivated plants. Also reported for VA, MD, PA, and OH (Kartesz 1999). [= Y; = Sophora japonica Linnaeus – I, K, Z]

Tephrosia Persoon 1807 (Goat’s-rue)

Corolla bicolor, the standard yellow and the wings pink; racemes terminal; stamens erect; stamens monadelphous; leaves with (9-)13-23 (-37) leaflets.

Inflorescence reduced, foliaceous, flowers solitary or in small clusters overtopped by leaves; plants < 25 cm tall; leaflets generally < 10 mm long and < 5 mm wide; [restricted to the West Gulf Coastal Plain of sw. GA, adjacent FL and westward]. ...........................................T. mohrii

Inflorescence terminal, not foliaceous and overtopped by leaves; plants > 25 cm tall; leaflets generally > 10 mm long and > 5 mm wide; [widespread in our area]. .................................................................T. virginiana

Corolla unicolored, initially white or pink, darkening in age to a dark maroon or purple; racemes opposite the leaves (the uppermost appearing terminal); stems decumbent or ascending; stamens diadelphous; leaves with (3-)5-23 (-27) leaflets.

Upper stamen fused with the staminal sheath for part or most of its length (submonadelphous); leaves with (9-)13-23 (-27) leaflets; [plants from s. AL westward] ......................................................................................................................................................................................................T. onobrychoides

Upper stamen completely separate from the staminal sheath (diadelphous); leaves with (3-)5-17 (-19) leaflets; [plants collectively widespread in our area].

Inflorescences with 1-7 several reduced leaves, mainly borne terminally on the principal axis or branches; bracts generally deciduous.

Inflorescences lacking leaves (sometimes with 1 reduced leaf), mainly borne leaf-opposed; bracts persistent.

Petiole 1-4× as long as the lowest leaflets of the leaf; peduncle and rachis of inflorescence strongly flattened (2-angled, or rarely, 3-angled) in cross-section; leaflets averaging 25 mm long and 12 mm wide .................................................................................................................................T. florida

Petiole 1/3-1× as long as the lowest leaflets of the leaf; peduncle and rachis of inflorescence terete or inconspicuously 2-4-angled in cross-section; leaflets averaging smaller.

Leaves with (3-)5-7 leaflets; petiole 0-5 mm long; stem and fruit hairs < 0.5 mm long .........................................................T. chrysophylla

Leaves with (7-)9-17 (-19) leaflets; petiole 2-15 mm long; some stem and fruit hairs > 0.5 mm long.

Inflorescence with 1-3 (-5) nodes; plants inconspicuously pubescent with gray hairs (the hairs appressed or spreading, short to fairly long); leaflets (3-)avg. 5-6 (-7) mm wide, mostly acute; [plants of the Coastal Plain of NC and SC] ....................T. hispidula

Inflorescence with 2-20 nodes; plants conspicuously tawny long-pilose with rusty brown hairs; leaflets (6-)avg. 8 (-12) mm wide, mostly obusate; [plants widespread in our area]. .................................................................T. spicata

Tephrosia chrysophylla Pursh, sprawling Goat's-rue. Sandhills. E. GA s. to s. FL, and west to s. MS. Rather frequent hybrids between T. chrysophylla and T. florida are intermediate in morphology and have been found in AL< FL, GA, and MS; they have been given a hybrid binomial, T. ×intermedia (Small) G.L. Nesom & Zarucchi, replacing later name T. ×floridana (Vail) Isely, which has been in regular use in the southeastern United States (Neson & Zarucchi 2009). [= I, K, SE, WH, Y; = Cracca chrysophylla (Pursh) Kuntze – S]

Tephrosia cinerea (Linnaeus) Persoon, Ashen Hoary-pea. Disturbed areas; native of South America. Reported from an 19th century ballast collection from Mobile, AL. [= I, K2, SE] {not keyed; not mapped; rejected as a component of our flora}


Tephrosia hispidula (Michaux) Persoon. Pine savannas and other pinelands. May-August; July-October. E. NC (se. VA?) south to c. peninsular FL, west to se. LA, a Southeastern Coastal Plain endemic. Fernald (1950) reports this species from se. VA. [= RAB, F, I, K, SE, WH, Y; = Cracca hispidula (Michaux) Kuntze – S]


Tephrosia onobrychoides Nuttall. Dry pinelands. S. AL, n. AR, e. OK, south to s. LA, and sc. TX. [= I, K, SE, Y; = Cracca onobrychoides (Nuttall) Kuntze – S]

Tephrosia rugelii Shuttleworth ex B.L. Robinson. Sandhills. Ne. and Panhandle FL (Jefferson County) south to s. FL. [= I, K, SE, WH; = Cracca rugelii (Shuttleworth ex B.L. Robinson) A.A. Heller – S]

Tephrosia spicata (Walter) Torrey & A. Gray. Woodlands. June-August; July-October. S. DE south to s. FL, west to w. LA, north in the interior to se., sc., and sw. TN and se. KY. [= RAB, C, G, K, SE, WH, WH, Y; > T. spicata var. semitonsa Fernald – F; > T. spicata var. spicata – F; = Cracca spicata (Walter) Kuntze – S]

Tephrosia virginiana (Linnaeus) Persoon, Virginia Goat's-rue. Sandhills, other pinelands, xeric and/or rocky woodlands and forests, outcrops, shale barrens and other barrens, dry roadbanks. May-June; July-October. S. NH west to WI, se. MN, and c. KS, south to c. peninsular FL, c. TX, and nw. TX. [= RAB, C, I, K, SE, W, WV; > T. virginiana var. glabra Nuttall – F, G; > T. virginiana var. virginiana – F, G; < T. virginiana – I, SE, WH, Y (also see T. mohrii); = Cracca virginiana Linnaeus – S; = T. virginiana var. virginiana – Z]

Thermopsis R. Brown ex Aiton & Aiton f. 1811 (Golden-banner)

1 Legumes erect or strongly ascending, densely villous; stipules clasping, those of the principal leaves (20-) 35-65 mm long, 10-30 mm wide; pedicels 2-3 mm long; plants mostly 6-20 dm tall, strict or few-branched..............................\textit{T. villosa}

1 Legumes spreading to ascending, glabrate or pubescent; stipules not clasping, those of the principal leaves 12-25 (-32) mm long, 1-5 mm wide; pedicels 4-20 mm long; plants mostly 3-10 dm tall, branched.

2 Plants from a single woody rootstock, mostly 5-10 dm tall; calyx glabrous or very sparsely pubescent, often also glaucous, the lobes often only 1-1.5 mm long; pedicels glabrate, (4-) 7-20 mm long (as long as or longer than the bracts); racemes terminal or lateral; plants flowering (late) May-

2 Plants from extensive rhizomes, mostly 3-6 dm tall; calyx pubescent, the lobes 2-2.5 mm long; pedicels villosulous, 2-6 (-10) mm long (shorter than the bracts); racemes terminal; plants flowering late April-early May (-June); [plants of low to moderate elevations, 200-800 m]..............................\textit{T. fraxinifolia}

1 Flowers bright yellow (fading brown); [section \textit{Chroosemium}].

2 Leaves palmately trifoliolate (all leaflets essentially sessile); heads 10-13 mm in diameter; flowers 5-7 mm long; petiolule of the terminal leaflet ca. 1 mm long.\\n
1 Flowers not bright yellow.

4 Flowers borne on distinct pedicels, (1-) 2-10 mm long, these often curving or reflexing in age; flowers white, fading pink with age in most species; [native and alien species]; [section \textit{Lotoidea}].

5 Plants stoloniferous, all or some of the leaves alternate from ground level and long petioled.

6 Calyx lobes narrowly triangular, about as long as the calyx tube; pedicules axillary along the stolons; stipules scarious-membranaceous; [plant an abundant introduced weed]..............................\textit{T. repens}

6 Calyx lobes subulate, distinctly longer than the calyx tube; pedicules terminal, either at tips of the stolons, or at tips of erect flowering branches; stipules green, foliaceous; [plants rare natives].

7 Pedicule terminal, at the tip of the stolon, lacking leaves; pedicels 2-3 mm long.\\n
7 Pedicule terminal at tip of erect flowering branches, subtended by a pair of opposite or subopposite, short-petioled leaves; pedicels (2-) 4-8 mm long..............................\textit{T. stoloniferum}

5 Plants not stoloniferous, clumped (though sometimes with prostrate or lax stems).

Trifolium carolinianum additional information, see Collins & Wieboldt (1992). [not yet keyed]

J.L. Collins & Wieboldt. Limestone glades. In c. TN (Chester, Wofford, & Kral 1997). For August. [not yet keyed]

Of Mediterranean Europe and w. Asia. Reported for SC (Kartesz 1999), based on specimen at NCU. [not yet keyed]

* FABACEAE

4 Flowers sessile or on very short pedicels (usually < 1 mm long); flowers pink, purplish, white, or scarlet; [alien species].

12 Plants stoloniferous, all or some of the leaves alternate from ground level and long petioled.

13 All flowers with petals; fruiting heads enlarging, becoming a reddish brown, pubescent ball ca. 2 cm in diameter, remaining aerial; [section Viscaria] ................................................................. T. fragiferum

14 Heads not subtended by a pseudo-involucre of leaves or expanded stipules.

15 Flowers white (fading pink), 7-8 mm long; calyx tube both externally glabrous and 20-nerved (externally pubescent, or 10-nerved, or both).

16 Flowers 4-6 mm long. 15 Flowers red, pink-purple, or bicolor, either 11-20 mm long or 4-6 mm long; calyx tube not both externally glabrous and 20-nerved (externally pubescent, or 10-nerved, or both).

17 Stipules gradually tapering to a longer slender tip, longer than the fused part; calyx densely hispate; stem soft pubescent with deflexed to spreading hairs; [section Lactuca] .......................................................................................................................................................................................... T. hirtum

18 Heads axillary, sessile, in the axils of subtending leaves; calyx tube glabrous (except for a few hairs at apex); [section Lotoidea].......................... T. pratense

19 Calyx not bladdery-inflated in fruit; corolla orientation normal (standard uppermost). 18 Heads terminal or axillary; calyx tube pubescent.

20 Inflorescence subsessile to shortly peduncled; head spherical in fruit .......................................................................................................................... T. arvense

21 Calora 3-6 mm long; [section Trifolium] .............................................................................................................................. T. arvense

22 Corolla crimson, 10-13 (-15) mm long; floral bracts absent; heads 1-1.5 (-2) cm in diameter; [section Trifolium].................. T. incarnatum

23 Calora white, 15-18 mm long; floral bracts present; heads 2.5-3 cm in diameter; [section Mistyllus]............ T. vesiculosum

* Trifolium angustifolium Linnaeus, Narrowleaf Clover. Waste areas near wool-combing mills, perhaps only a waif; native of Mediterranean Europe and w. Asia. Reported for SC (Kartesz 1999), based on specimen at NCU. [= I, K] [not yet keyed]


* Trifolium cernuum Brotero, Nodding-head Clover. Waste areas near wool-combing mills, perhaps only a waif; native of Mediterranean Europ and n. Africa. [= K] [not yet keyed]

* Trifolium depauperatum Desvauvar. Depauperatum. Cowbag Clover, Balloon-sack Clover, Poverty Clover. Waste areas near wool-combing mills, perhaps only a waif; native of w. North America (BC south to CA). [= I, K] [not yet keyed]

* **Trifolium fragiferum** Linnaeus, Strawberry Clover. Disturbed areas; native of Middle East. Introduced in c. GA (Jones & Coile 1988) and reported from an old collection from se. PA (Rhoads & Klein 1993). [= C, F, G, I, K, SE]

* **Trifolium glomeratum** Linnaeus, Cluster Clover. {habitat}; native of Mediterranean region. Also reported for SC by Kartesz (1999), but the specimen is actually *T. cernuum*. [= I, K1, K2, S, SE]

* **Trifolium gracilentum** Torrey & A. Gray. Waste areas near wool-combing mills, perhaps only a waif; native of w. North America. [> *T. gracilentum* var. *gracilentum* – K1, K2] {not yet keyed; add synonymy}


* **Trifolium lappaceum** Linnaeus, Lappa Clover. Disturbed areas; native of Mediterranean Eurasia and Africa. April-August. [= RAB, I, K, S, SE, WH]

* **Trifolium medium** Linnaeus, Zigzag Clover. Reported as introduced in MD and NJ (Kartesz 1999; Kartesz 2010). Native of Europe. [= K] {not keyed; rejected as a component of our flora}

* **Trifolium michelianum** Savi, Big-flower Clover. Disturbed areas; native of Mediterranean Europe. [> *T. michelianum* var. *balansae* (Boiss.) Ponert – K2] {not keyed}


* **Trifolium spumosum** Linnaeus, Pink Clover. Disturbed areas; rare, native of Mediterranean Europe. [= K, WH] {not yet keyed}

* **Trifolium stoloniferum** Muhlenberg ex Eaton, Running Buffalo-clover. Dry upland woodlands and prairies. WV, OH, n. IN, IL, MO, and e. KS, south to KY and AR, now extirpated from significant portions of its range. [= C, F, G, I, K, S, SE, WV]

* **Trifolium subterraneum** Linnaeus, Subterranean Clover. Disturbed areas, waste areas near wool-combing mills; native of Europe, Asia, and n. Africa. Reported for NC and SC by Isely (1990); reported for Piedmont of GA by Jones & Coile (1988), and collected in MS (Stone County) (S.W. Leonard, pers. comm. 2007). [= I, K, SE]


**Trifolium virginicum** Small, Kates Mountain Clover, Shale-barren Clover. Shale barrens, other rock outcrops. May-June. Sc. PA through w. MD south to w. VA and e. WV. [= C, F, G, I, K, SE, W, WV]

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**Ulex** Linnaeus 1753 (Gorse)


* **Ulex europaeus** Linnaeus, Gorse, Furze. Disturbed areas; native of Europe. June. Not cited in Harvill et al. (1992), but naturalized in sandy soils in York County, VA. Also reported from WV and PA. [= C, F, G, I, K, SE]

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**Vachellia** Wight & Arnott 1834 (Acacia)


1 Leaves with 2-4 (-6) pairs of pinnae; each pinna with 10-20 pairs of leaflets ..........................................................**V. farnesiana** var. *farnesiana*

1 Leaves with 10-15 (-20) pairs of pinnae; each pinna with 20-30 pairs of leaflets .........................................................**V. macracantha**


* **Vachellia macracantha** (Humboldt & Bonpland ex Willdenow) Seigler & Ebinger, Apopanax, Longspine Acacia. Planted as an ornamental and rarely naturalized; native of further south in FL. [= X; = *Acacia macracantha* Humboldt & Bonpland ex Willdenow – I, K, SE, WH, Z]

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**Vicia** Linnaeus 1753 (Vetch, Tare)


1 Inflorescence nearly sessile, of 1-4 flowers clustered in the leaf axil; [alien species].

2 Leaves with 2-6 leaflets, succulent; leaflets 3-7 cm long; legume with pectinate sutures ..................................................**V. narbonensis**

2 Leaves with 4-20 leaflets, not succulent; leaflets 0.3-3.5 cm long; legume not pectinate (except *V. lutea*).

3 Corolla 5-6 mm long; leaves with 4-6 (-8) leaflets ..............................................................................................................**V. lathyroides**

3 Corolla 10-30 mm long; leaflets 6-16 (-20).

4 Calyx lobes conspicuously unequal; legumes pilose with pustulate-based hairs .............................................................**V. lutea**

4 Calyx lobes more or less equal; legumes glabrous at maturity, or very finely pubescent with non-pustulate-based hairs.

5 Calyx lobes all shorter than the calyx tube; corolla yellow, often streaked with purple, 25-30 mm long ................. **V. grandiflora**

5 Calyx lobes (at least the longer) about as long as the calyx tube; corolla pink, purple, lavender, white, or creamy yellow, 10-25 (-30) mm long.

6 Standard pubescent dorsally; corolla 15-25 (-30) mm long, creamy yellow to purple; legume pubescent, with a basal stipe ....... .................................................................**V. pannonica**

6 Standard glabrous; corolla 10-25 (-30) mm long, pink, purple, lavender, or whitish; legume glabrous, sessile.

7 Calyx 7-11 (-12) mm long; corolla pink-purple to whitish, 10-18 mm long; leaflets 4-10× as long as wide .................

..........................................................................................................................**V. sativa** ssp. nigra
Inflorescence pedunculate, of 2-20 flowers along a well-developed raceme; [alien and native species].

Peduncles 1-10 mm long; raceme axis 2-10 mm long, with 2-7 (-10) flowers.

Plant a robust annual, 10-20 dm tall; tendrils absent; leaves 2-4-6 leaflets; leaflets 5-10 cm long; corolla 20-30 mm long.

Plant a trailing perennial, 3-10 dm tall; tendrils present; leaves 8-16 leaflets; leaflets 2-3.5 cm long; corolla 10-15 mm long.

Peduncles usually >10 mm long; raceme axis usually >10 mm long, with (1-2) many flowers.

Corolla 10-25 mm long.

Stipules dimorphic, one of each pair entire, the other palmately lacerate; flowers 1 (-2) per inflorescence.

Flowers 15-22 (-25) mm long; legumes with a basal stipe 2-5 mm long; leaves with 8-16 leaflets.

Flowers 8-16 (-18) mm long; legumes with a basal stipe 1-3 mm long; leaves with 8-22 leaflets.

Calyx swollen on one side; plant an annual; inflorescence secund.

Calyx not swollen on one side; plant a rhizomatous perennial; inflorescence not secund.

Flowers white to lavender, the keel spotted; legumes 4-5 mm wide; inflorescence not second.

Flowers blue-violet or purple; legumes 6-8 mm wide; inflorescence generally second.

Corolla 2-5.8 (-10) mm long.

Plant a rhizomatous perennial.

Leaves with 2-4 (-6) leaflets; [plants of s. SC southward, native, of the Coastal Plain].

Legumes 2.5-3.0 cm long; leaflets 1.5-4.5 cm long, oblong to linear, 8-20x as long as wide.

Legumes 0.8-1.5 cm long; leaflets 1-1.5 cm long, usually elliptic, 2-4 (-10) times as long as wide.

Leaves with 10-25 leaflets; [plants collectively widespread in our area, native or alien].

Flowers white to lavender, the keel spotted; legumes 4-5 mm wide; inflorescence not second.

Flowers blue-violet or purple; legumes 6-8 mm wide; inflorescence generally second.

Plant an annual.

Legume symmetrically rounded at the apex; inflorescence with 1-2 (-4) flowers.

Legume asymmetrically acute at the apex; inflorescence with 1-15 flowers.

Leaves with 2-4 leaflets; legume glabrous to inconspicuously puberulent.

Leaves with (8-) 10-20 leaflets; legume glabrous or finely pubescent; leaves with 2-4-6 leaflets.

Legume finely hisrute; calyx 2-2.5 mm long; corolla 2.5-4.5 mm long.

Legume glabrous; calyx 2.8-3.7 mm long; corolla 4.5-8 mm long.

Racemes (2-) 4-9 (-12) flowered; corolla blue-purple; leaves with (4-) 8-12 (-14) leaflets.

Racemes 1-6-flowered; corolla pinkish-white or lavender; leaves with (6-) 12-14 (-18) leaflets.

Vicia acutifolia Elliot, Fourleaf Vetch. Pond margins, pine flatwoods, ditches. April-May; May-June. Se. SC south to s. FL, west to e. Panhandle FL. [= RAB, GW, I, K, S, SE, WH]

Vicia americana Willdenow var. americana, American Vetch, Purple Vetch, Tare. Moist soils. May-June. Var. americana ranges from QC west to AK, south to w. VA, s. WV, MO, OK, TX, Mexico. Var. minor Hooker occurs in w. North America. The report for AL (Woods & Diamond 2006) has been shown to be a misidentification (Spaulding, pers. comm.). [= C, F, G, I, SE = f. americana ssp. americana – K; < f. americana – W, WV]

* Vicia artuculata Hornemann, Monantha Vetch, Oneflower Vetch. Perhaps only cultivated; native of Europe. [=I, K, SE]


Vicia floridana S. Watson, Florida Vetch. Moist soils of hammocks, ditches, roadbanks. E. GA (McIntosh Co.) south to c. peninsular FL. [= GW, I, K, S, SE, WH]


Vicia ludoviciana Nuttall ssp. leavenworthii (Torrey & A. Gray) Lassetter & Gunn. Woodlands, prairies, dunes, disturbed areas. MS and MO west to NM and TX. In our area is Race 2 (“louisianica” race) of ssp. leavenworthii (Isely 1998). [= I, K, SE] {add to synonymy}

Vicia ludoviciana Nuttall ssp. ludoviciana, Louisiana Vetch. Woodlands, prairies, dunes, disturbed areas. AL and Panhandle FL west to OR and CA. In our area is Race 1 (“ludoviciana” race) of ssp. ludoviciana (Isely 1998). [= I, K, SE; = V. ludoviciana – WH] {add to synonymy}

* Vicia lutea Linnaeus, Yellow Vetch. Disturbed areas; native of Europe. [= I, K, SE]


* Vicia pannonica Crantz, Hungarian Vetch. Disturbed areas; native of Europe. Introduced in c. GA. Reported for NC (Isely 1998). {investigate} [= I, K, SE]

* Vicia sativa Linnaeus ssp. nigra (Linnaeus) Ehrhart, Narrowleaf Vetch. Disturbed areas; native of Mediterranean Europe. March-June; May-July. [= I, K, SE; = V. angustifolia Linnaeus – RAB, C, S, W; = V. sativa var. angustifolia (Linnaeus) Ehrhart; > V. angustifolia var. angustifolia – F, G, WV; > V. angustifolia var. segetalis (Thuill.) Ser. – F, G, WV; > V. angustifolia var. uncinata (Desv.) Rouy – F]

* Vicia sativa Linnaeus ssp. sativa, Common Vetch. Disturbed areas; native of Mediterranean Europe. April-June; May-July. [= I, K, SE; = V. sativa – RAB, C, G, S; > V. sativa var. sativa – F; > V. sativa var. linears Lange – F]

* Vicia sepium Linnaeus, Bush Vetch, Wild Tare. Disturbed areas; native of Europe. Introduced south to WV and in e. PA (Rhoads & Klein 1993). [= C, G, I, SE; > L. sepium var. sepium – F, K]

* Vicia tetrasperma (Linnaeus) Schreber, Slender Vetch, Smooth Tare, Lentil Vetch. Disturbed areas; native of Europe. April-June; May-July. [= RAB, C, G, I, K, S, SE, WH; > V. tetrasperma var. tetrasperma – F; > V. tetrasperma var. tenuissima Drace – F]


Vigna Savi 1824 (Cow Pea)

A genus of about 100-150 species, annual and perennial herbs, pantropical, rarely extending into warm temperate regions. References: Isely (1998)=I; Maréchal, Mascherpa, & Stainier (1978)=Z.
1 Corolla yellow, 1.5-1.7 cm long; leaves somewhat fleshy-thickened; [plant native or introduced in maritime situations]; [section *Vigna*] ..........................................................

1 Corolla pink to purple, 1.5-2.5 cm long; leaves herbaceous; [plant a cultivated introduction]; [section *Catjang*] .......................................................... *V. unguiculata*

**Vigna luteola** (Jacquin) Bentham, Wild Cow Pea. Edges of freshwater tidal marshes, beaches, hammocks, disturbed areas, railroad embankments, low fields, in the outer Coastal Plain. July-September; August-October. Se. NC south to s. FL, west to se. TX, and in the New World tropics. Often weedy in appearance, and its nativity at a particular location difficult to judge. [= RAB, GW, I, K, Z; ? V. repens (Linnaeus) Kuntze – S; = V. marina (Burmarrd) Merrill (the correct name according to some authors, based on uncertain typification)]

* *Vigna unguiculata* (Linnaeus) Walpers, Black-eyed Pea, Field Pea, Cow Pea. Cultivated in commercial and home gardens, rarely persistent or occurring as a waif in disturbed areas; native of tropical Africa or Asia. June-August; July-September. [= RAB, I, K; ? V. *sinensis* (Linnaeus) Savi – F, S; > *V. unguiculata* var. *unguiculata* – Z]

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**Wisteria** Nuttall 1818 (Wisteria)


**Identification notes:** Twining direction can be determined by looking at (or imagining) the vine twining around a branch or pole. Look at the pole or branch from the base (from the direction from which the vine is growing). If the vine is circling the branch or pole in a clockwise direction, that is dextrorse; if counterclockwise, that is sinistrorse. Identification of the two alien species and their hybrids is uncertain. Genetic sorting of morphological characters and horticultural selection mean that morphology is only poorly correlated with genetic origin. Trusty et al. (2007) found that 24 of 25 individuals tested from scattered sites around the Southeast showed genetic admixture (sometimes complicated) between *W. floribunda* and *W. sinensis*. Probably the great majority of material in the Southeast could be called *W. ×formosa*; the below key may work poorly or not at all for some material encountered.

1 Legume and ovary glabrous; pedicels 5-10 (-15) mm long; standard reflexed near the middle; seeds reniform; leaflet margins plane; leaflet apices acute to slightly acuminate; [native species of swamps and bottomland forests and thickets] ........................................................................... *W. frutescens*

1 Legume and ovary velvety pubescent; pedicels 15-20 mm long; standard reflexed at the base; seeds lenticular; leaflet margins undulate; leaflet apices acute to strongly acuminate; [introduced species, naturalized in a wide variety of situations].

2 **Standard 16-18 mm long, 16-18 mm wide; leaflets (7-) 13-17 (-19) per leaf; racemes to 72 cm long, with 25-170 flowers opening nearly simultaneously; vine twining clockwise (dextrorse; from lower left ascending to upper right) .......................................................... *W. sinensis*

2 Standard 20-23.5 mm long, 23-25 mm wide; leaflets (7-) 9-11 (-13) per leaf; raceme to 33 cm long, with 25-95 flowers opening nearly simultaneously; vine twining clockwise (dextrorse; from lower left ascending to upper right). ........................................................................... *W. floribunda*

3 **Auricles of the standard’s callosity 0.7-0.8 mm long; leaflets 7-17 per leaf; racemes to 36 cm long.** ....................................................................................... *W. ×formosa*

3 **Auricles of the standard’s callosity 1.1-1.2 mm long; leaflets (11-) 13-17 (-19) per leaf; racemes to 132 cm long, with the 50-170 flowers opening successively from base to the tip of the inflorescence, those at the base withering before those at the tip have opened.** ........................................................................... *W. floribunda*


**Zornia** J. F. Gmelin 1792 (Zornia)


Identification notes: The palmately 4-foliolate leaves are unique in the flora of our area.

**Zornia bracteata** Walter ex J.F. Gmelin, Zornia. Flatwoods, sandhills, sandy roadsides. June-August; July-October. Se. VA south to s. FL, west to TX and e. Mexico, endemic to the Southeastern Coastal Plain. [= RAB, C, F, G, K, S, SE, WH]

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### 146. POLYGALACEAE

R. Brown 1814 (Milkwort Family) [in FABALES]

A family of 17-21 genera and 800-1000 species, trees, shrubs, woody vines, and herbs, nearly cosmopolitan, but most diverse in tropical and subtropical areas. References: Miller (1971b); Eriksen & Persson in Kubitzki, Bayer, & Stevens (2007).

**Polygala** Linnaeus 1753 (Milkwort)


Identification notes: *Polygala* has a distinctive flower structure which can be confusing. The corolla consists of 3 fused petals, partly fused into a tubular form, and also fused with the stamens. The lower petal is called the keel; it is usually boatlike, and also lacerate, fringed, or lobed at its tip. The calyx is 5-lobed, the lobes usually of 3 distinct sizes. The two lateral sepals are called wings; they are generally large and petaloid (colored like petals). The upper sepal is usually the next largest; the two lower sepals are usually the smallest.

1. Fresh flowers orange, yellow, greenish-yellow, or greenish white (if greenish white, then the inflorescence a terminal many-branched cyme); [subgenus *Polygala*, series Decurrentes].
2. Inflorescence a dense pom-pom-like raceme, terminating leafy branches.
   3. Fresh flowers lemon-yellow or greenish yellow; subulate bracts of the inflorescence 2-4 mm long; plants 5-80 cm tall; lobes of lower petal (keel) 0.5-1.1 mm long.
   4. Racemes ca. 1.5 cm in diameter; flowers bright orange (rarely individual plants within a population with bright yellow flowers); plants 5-40 cm tall; [widespread] ..............................................................................................................................................................
   5. Fresh flowers cream-white to greenish-white; [of GA southward] ..............................................................................................................................................................
5. Fresh flowers bright yellow; [collectively widespread in the Coastal Plain of our area].
   6. Plants 4.5-12 dm tall, the stem solitary; basal leaves 3.5-14 cm long, linear-lanceolate, about 15-20× as long as wide, persistent as a basal rosette; stem leaves linear-subulate, sharp-tipped, much reduced from the basal leaves, becoming bractlike upward; seeds pubescent, 0.5-0.7 mm long ...............................................................
   7. Plants 1-4 dm tall, the stems 1-several from the base; basal leaves 3-7 cm long, spatulate, about 10× as long as wide, usually not persistent after flowering; stem leaves narrowly spatulate to linear, blunt-tipped, only slightly reduced from the basal leaves; seeds pubescent, 0.5-0.7 mm long...............................................................
11. Seeds hirsute; pedicels ⅓-⅓ as long as the fruit; raceme peduncles 0.5-4 cm long ...........

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**Z. ambigua** Michx. 1803 (Milkwort)

- Leaves few, clustered near the tip of the stem; wings 13-20 mm long; stamens 6; [of moist soils of forests in the Mountains]; [subgenus *Chamaebuxus*] ..............................................................................................................................................................
- Leaves many, evenly distributed along the stem, or not at least strongly clustered near the tip; wings < 10 mm long; stamens 8; [collectively of a wide variety of habitats, but generally not as above, either in more open, drier, or non-montane habitats].
- Racemes 3-6 mm in length, pointed in outline.
- Racemes 2-5 cm long, becoming interrupted below through persistence of the fruits on the axis; wings equaling the fruit............
- Racemes 0.5-1.5 cm long, the fruits falling promptly, thus the inflorescence compact and truncate below; wings shorter than the fruit.
- Seeds finely pubescent; pedicels ⅗-⅗ as long as the fruit; raceme peduncles 0.5-4 cm long ..................
- Seeds hirsute; pedicels ⅗-⅗ as long as the fruit; raceme peduncles 2-7 cm long ..................
Polygala ambigua Nuttall, Loose Milkwort. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, NC, SC, VA): fields, woodlands, openings; uncommon. June-September. ME west to MI, south to GA, AL, and OK. Through most of its range P. ambigua has wings 1.3-1.7 mm long; plants from se. VA south to SC and from the Ozarks have wings 2.0-2.6 mm long. These plants have been named as a variety of P. verticillata, var. dolichoptera Fernald. They may warrant taxonomic recognition, but need additional study, including resolution of our Coastal Plain plants and those of the Ozarks. [= C, G, K, S; = P. verticillata Linnaeus var. ambigua (Nuttall) Wood – RAB; > P. verticillata var. ambigua – F, WV; > P. verticillata var. dolichoptera Fernald – F, WV; < P. verticillata – W]

Polygala baldwinii Nuttall var. baldwinii, White Milkwort, Baldwin's Milkwort. Cp (FL, GA): wet pine savannas; uncommon (rare in GA). E. GA south to s. FL, west to s. MS; e. TX; Cuba; the Bahamas (Andros Island). Var. carteri (Small) R.R. Smith & D.B. Ward occurs in s. FL. [= GW; Z; < Polygala baldwinii – K, WH; = Pilostaxis baldwinii (Nuttall) Small – S, orthographic variant; = Pilostachya baldwinii (Nuttall) Small]


Polygala cruciata Linnaeus var. aquilonia Fernald & Schubert, Northern Drumheads. Cp (DE), Mt (NC, SC, VA, WV): bogs, damp or wet soil in openings; uncommon (rare in DE). June-October. ME west to MN, south to e. VA, w. NC, n. AL, and TN. [= F, K; < P. cruciata – RAB, C, G, GW, S, W, WV; = P. cruciata ssp. aquilonia (Fernald & Schubert) A. Haines – Y]


Polygala cymosa Walter, Tall Pinebarren Milkwort. Cp (DE, FL, GA, NC, SC): pond-cypress savannas, Coastal Plain depression ponds, clay-based Carolina bays, other sites with seasonally flooded hydrology; common (rare in DE). May-July. E. NC south to s. FL, west to s. MS; disjunct in s. DE. [= RAB, C, F, G, GW, K, WH, Z; = Pilostaxis cymosa (Walter) Small – S; = Pilostachya cymosa (Walter) Small]

Polygala grandiflora Walter var. grandiflora, Showy Milkwort. Cp (GA, NC, SC): sandhills, dry sandy soils of roadsides and fields; uncommon (NC Rare). May-July. S. NC south to s. FL, west to s. MS. [= K; < P. grandiflora – RAB, WH; > Asemeia grandiflora (Walter) Small – S; > Asemeia cumulicola Small – S; < Polygala violacea Aublet [investigate]]
Polygala hookeri Torrey & A. Gray, Hooker's Milkwort. Cp (FL, GA, NC, SC): pine savannas; rare (NC Rare). June-August. Sw. GA and adjacent Panhandle FL, west to s. MS, disjunct in se. NC and ne. SC. [= RAB, GW, K, S, WH]


*Polygala nana* (Michaux) A.P. de Candolle, Dwarf Milkwort, Candyroot. Cp (FL, GA, SC), Pd (GA, SC), Mt (GA, NC): longleaf pine flatwoods, other open moist areas; common (rare in NC and SC). E. GA south to s. FL, west to e. TX, with scattered populations inland to n. SC, w. NC, nw. GA, n. AL, c. TN (Chester, Wofford, & Kral 1997), and ne. MS. This species is primarily a Coastal plain species of the deeper south; *P. nana* may be introduced in parts of our area. [= RAB, GW, K, WH; = Pilostachya nana (Michaux) Rafinesque; = Pilostachya nana (Michaux) Rafinesque]

*Polygala nuttallii* Torrey & A. Gray, Nuttall's Milkwort. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, VA), Mt (VA): pocosins, pine savannas, also in depression ponds (in Augusta and Rockingham counties, VA); common (uncommon in GA, NC, SC, and VA, rare in Mountains, rare in FL). In June-August. MA south to ne. FL and e. Panhandle FL; disjunct inland in w. VA, c. TN (Chester, Wofford, & Kral 1997), sc. KY, and allegedly c. AR. [= RAB, C, F, G, GW, K, W, WH]


*Polygala polyantha* Walter var. obtussata Chodat, Northern Bitter Milkwort. Mt (VA, WV), Pd (VA): woodlands and woodland borders; uncommon. May-July, June-July. ME west to MI and MN, south to n. WA, OH, c. IN, c. IL, and IA. [= C, F, G, WV; < P. polyantha – RAB, K, S, WH]


*Polygala ramosa* Elliott, Short Pinebarren Milkwort, Low Pinebarren Milkwort. Cp (FL, GA, NC, SC, VA), Mt (NC): wet savannas, pocosin margins, bogs; common (rare in DE and VA). June-September. S. NJ south to s. peninsular FL, west to e. TX, disjunct inland (as in Henderson County, NC). [= RAB, C, F, G, GW, K, WH, Z; = Pilostachya ramosa (Elliott) Small – S; = Pilostachya ramosa (Elliott) Small]


*Polygala senega* Linnaeus var. latifolia Torrey & A. Gray, Seneca Snakeroot. Mt (VA, WV), Pd (DE), Mt (GA, NC, SC), Pd (NC, SC, VA): woodlands, openings, especially over calcareous or mafic rocks; uncommon (rare in NC and WV)). May-June. DE, PA, and MN, south to NC, TN, and MO. Truth-Nare & Nacci (1998) studied the two varieties of *P. senega* and concluded that the taxa should be recognized at the specific level. The relative distributions, habitats, and phenology of the two taxa need assessment for our area. [= F, G, WV; < P. senega – RAB, C, K, S, WH]

*Polygala senega* Linnaeus var. senega Linnaeus, Seneca Snakeroot. Mt (WV), Mt (GA, NC, SC, VA), Pd (NC, SC, VA): woodlands and openings, especially over calcareous or mafic rocks; uncommon (rare in NC). April-May. QC west to AB, south to n. GA, TN, AR, and SD. The relative distributions, habitats, and phenology of the two taxa need assessment for our area. [= F, G, WV; < P. senega – RAB, C, K, S, WH]

*Polygala verticillata* Linnaeus var. isocycla Fernald, Whorled Milkwort. Cp (FL), Mt (WV), Mt (Pd, Cp (DE, GA, NC, SC, VA): dry woodlands, woodland borders, openings, fields; uncommon. June-September. The validity and relative distributions, habitats, phenology of the two varieties need additional assessment in the herbarium and the field.) VT west to MB, south to Panhandle FL (Kunzer et al. 2009), s. FL, and TX. [= C, F, G, K, WH, WV; < P. verticillata var. verticillata – RAB; = P. verticillata – S, apparently misapplied; < P. verticillata – W]

*Polygala verticillata* Linnaeus var. verticillata, Whorled Milkwort. Mt (WV), Mt (Pd, Cp (DE, GA, NC, SC, VA): dry woodlands, woodland borders, openings, fields; uncommon. June-September. The validity and relative distributions, habitats, phenology of the two varieties need additional assessment in the herbarium and the field.) ME west to MI, south to w. VA, w. NC, and TN. [= C, F, G, K, WV; < P. verticillata var. verticillata – RAB; = P. pretzii Pennell – S; < P. verticillata – W]


**POLYGALACEAE**

*Polygala crenata* C.W. James. Cp (FL, GA): wet pine flatwoods, bogs, bayheads; uncommon (rare in GA). FL Panhandle and AL west to TX; reported for GA (Sorrie, pers. comm.). [= GW, K, WH] [not yet keyed; synonymy incomplete]

*Polygala leptocaulis* Torrey & A. Gray, Swamp Milkwort. Cp (FL): bogs and pond margins; rare. Ne. and Panhandle FL west to e. TX; Mexico, Central America, and South America; Cuba. [= GW, S, WH; = P. tenella Willdenow]

*Polygala leptostachys* Shuttleworth ex A. Gray, Georgia Milkwort. Cp (FL, GA): sandhills; rare (GA Special Concern). Ne. FL south to c. peninsular FL, west to sw. GA (Jones & Coile 1988), s. AL (Sorrie & LeBlond 2008), s. MS (Sorrie & Leonard 1999). [= K, S, WH] [not yet keyed; synonymy incomplete]

*Polygala setacea* Michaux, Coastal Plain Milkwort. Cp (FL, GA): pine flatwoods and bogs; uncommon. E. GA and Panhandle FL south to s. FL. Reported by Small (1933) as occurring north to NC and west to s. MS (apparently an error). [= GW, K, S, WH] [not yet keyed; synonymy incomplete]

**147. ROSACEAE** A.L. de Jussieu 1789 (Rose Family) [in ROSALES]

A family of about 85-95 genera and 2000-3000 species, trees, shrubs, and herbs, nearly cosmopolitan, but mainly boreal and temperate. References: Potter et al. (2007); Eriksson et al. (2003); Kalkman in Kubitzki (2004); Erter (2007).

Subfamily Rosoideae

_Filipendula_

_Supertribe Rosoideae_

_Rosa_

_Rubus_

_Tribe Sanguisorbeae: Agrimonia, Poterium, Poteridium, Sanguisorba_

_Tribe Potentilleae: Potentilla, Alchemilla, Aphanes, Dasiphora, Drymocallis, Fragaria, Sibbaldia_

_Tribe Coluria: Geum_

Subfamily Spiraeoideae

_Tribe Amygdaleae: Prunus_

_Tribe Neilliae: Neillia, Physocarpus_

_Tribe Spiraeae: Aruncus, Spiraea_

_Supertribe Kerriodae_

_Tribe Kerrieae: Kerria, Neviusia, Rhodotypos_

_Supertribe Pyrodae_

_Gillenia_

_Tribe Pyreae: Amelanchier, Aronia, Chaenomeles, Cotoneaster, Crataegus, Cydonia, Eriobotrya, Malus, Photinia, Pyracantha, Pyrus, Raphiolepis, Sorbus_

1 Herbs or subshrubs (if woody at base, then < 3 dm tall).
2 Leaves simple........................................................................................................ Key A
3 Leaves compound (at least the lower and better developed) ................................. Key B
1 Trees, shrubs, or woody vines (with arching "canes" or climbing, arching, or scrambling stems).
2 Leaves simple.......................................................... Key C
3 Leaves compound .......................................................... Key D

**Key A – Herbs and subshrubs with simple leaves**

1 Leaves crenate, unlobed; inflorescence of a solitary flower; [tribe Rubeae] ................................................................. **R. dalibarda**
2 Leaves 3-many lobed; inflorescences cymose.
3 Leaf blades 0.3-1.0 cm long and wide, deeply 3-lobed, each lobe further lobed or deeply toothed; petals 0; [tribe Potentilleae]........... **Aphanes**
4 Leaf blades 3-8 cm long and wide, 3-lobed, each lobe toothed; petals 5; [tribe Colurieae] ................................................. **Geum lobatum**

**Key B – Herbs and subshrubs with compound leaves**

1 Leaves 2- to 3-ternately compound; [tribe Spiraeae] ................................................................................................. **Aruncus**
2 Principal leaves, either simply pinnately compound or simply palmately compound, with (5-) 7-many leaflets (stem leaves sometimes 3-foliolate, especially in _Geum_).
3 Principal leaves with leaflets of markedly disparate shape and size (large leaflets alternating with much smaller leaflets, or a large terminal leaflet and much smaller lateral leaflets).
4 Lateral leaflets alternating between small and large, the terminal leaflet similar in size and shape to the larger lateral leaflets; terminal leaflet < 3 cm wide; hypanthium either conical or turbinate, armed with hooked bristles, the pistils 2, or hemispheric, the pistils > 5.
5 Leaves glabrous or sparsely pubescent beneath; flowers many in racemes; hypanthium conical or turbinate, armed with hooked bristles, the pistils 2; [tribe Sanguisorbeae] ....................................................... **Agrimonia**
6 Leaves silvery sericeous beneath; flowers solitary and axillary; hypanthium hemispheric, the pistils > 5; [tribe Potentilleae]............. **Potentilla anserina**
7 Leaflets variable in size and shape, usually the terminal leaflet much larger than any of the lateral leaflets; terminal leaflet 3-20 cm wide; hypanthium either saucer-shaped or hemispheric to conical; pistils 5 or more.
8 Pistils 5-15, in a circle on a saucer-shaped hypanthium, ripening into upright fruits that resemble follicles but are indehiscent; corolla white or pink; plant 10-20 dm tall; [tribe Ulmarieae] .............................................................................. **F. ulmaria**
9 Pistils many, densely covering the hemispheric to conical hypanthium, ripening into achenes terminated by the persistent style; corolla white, cream, pale yellow, bright yellow, lavender, maroon, or purple; plant 2-10 dm tall; [tribe Colurieae] ............... **Geum**
1 Ovary superior; fruit dehiscent (aggregate of follicles, or capsule) or indehiscent (drupe, or aggregate of drupelets).  
7 Foliage and stems viscid-pubescent with brownish hairs; inflorescence a cyme; petals 5, cream-colored; [tribe Potentilleae] ................................................................. Drymocallis
8 Leaves pinnatifid (each leaflet incised nearly to the midvein); stamens 2 or 4 per flower ................................................ Pterocarya
8 Leaves entire, except for 3 (-5) teeth at the apex; [Mountains]; [tribe Potentilleae] ................................................................. Potentilla
11 Principal leaves 5-7 (-9)-foliolate; [tribe Potentilleae] .............................................................................................................. Potentilla indica
2 Principal (basal-most) leaves palmately compound, with 3-7 (-9) leaflets.  
10 Principal leaves subsessile, 3-foliolate; fruit of follicles; leaves cauline; [tribe Gilleneae] ................................................................. Gillene
10 Principal leaves distinctly petiolate, the petiole often longer than the leaflets, 3-7 (-9)-foliolate; fruit of achenes; leaves basal and cauline.
11 Principal leaves 3-foliolate.  
12 Plants in flower.
13 Petals yellow.
14 Pistils 2-6; [tribe Colurieae] ................................................................................................................................................. Colurie
14 Pistils (10-) numerous; [tribe Potentilleae] ................................................................................................................................. Potentilla
13 Petals white (or slightly pinkish).
15 Calyx lobes not subtended by bractlets; [tribe Rubieae] .............................................................................................................. Rubus pubescens
15 Calyx lobes subtended by 5 sepaloid bracts; [tribe Potentilleae].
16 Leaves evenly serrate with many serrations; [widespread].
16 Leaves with 3 (-5) teeth at the apex, otherwise entire; [Mountains] .................................................................................. Sibbaldia
12 Plants in fruit (or sterile).
17 Leaves entire, except for 3 (-5) teeth at the apex; [Mountains]; [tribe Potentilleae] ................................................................. Sibbaldia
17 Leaves evenly serrate or crenate, each well-developed leaflet with 7 teeth.
18 Calyx lobes not subtended by bractlets.
19 Fruit an aggregate of dry, non-adherent achenes; leaflets obtuse at apex; [tribe Colurieae] ..................................................... Geum
19 Fruit an aggregate of fleshy, adherent drupelets; leaflets acuminate at apex; [tribe Rubieae].
18 Calyx lobes subtended by 5 sepaloid bracts; [tribe Potentilleae].
20 Fruit an aggregate of dry achenes........................................................................................................................................ Potentilla
20 Fruit an accessory fruit of achenes borne on the surface of a fleshy, red receptacle.
21 Fresh fruit reddish inside; leaflets serrate, 2.5-12 cm long; sepaloid bracts narrowing to apex, untoothed .......... Fragaria
21 Fresh fruit whitish inside; leaflets crenate, 2-4 cm long; sepaloid bracts widest at apex, 3-5-toothed .... Potentilla indica

Key C – Shrubs and trees with simple leaves

1 Ovary superior; fruit indehiscent (aggregate of follicles, or capsule) or indescent (drupe, or aggregate of drupelets).
2 Leaves opposite; [tribe Kerrieae] ................................................................................................................................................. Kerria
2 Leaves alternate.
3 Corolla yellow; stems arching, green; [tribe Kerrieae] .............................................................................................................. Kerria
3 Corolla white to pink or rose; stems not arching and green.
4 Leaves large, > 10 cm wide, palmately lobed; fruit an aggregate of drupelets; [tribe Rubieae].
4 Leaves smaller, < 7 cm wide, not lobed, or pinnately lobed; fruit a drupe, a capsule, or an aggregate of follicles.

{Exochorda, Neillia, Neviusia, Physocarpus, Prunus, Rhodotypos, Spiraea]

1 Ovary inferior; fruit indescent (pome); [tribe Pyraeae].  
9
9

{Amelanchier, Aronia, Chamaemelum, Crataegus, Cydonia, Erionotrya, Malus, Photinia, Pyracantha, Pyrus, [Rhaphiolepis]}

Key D – Shrubs and trees with compound leaves

1 Leaflets < 5 mm wide, entire; densely-branched shrub to 1 m tall; flowers yellow; [tribe Potentilleae] ......................................................... Dasiphora
1 Leaflets > 10 mm wide, serrate or crenate; shrubs, trees, or woody vines (see below); flowers white, pink, or purplish (rarely yellow in Rosa).
2 Leaves pinnately compound, generally with > 11 leaflets; inflorescence a terminal panicle or corymb with numerous (> 100) flowers, the petals white and < 4 mm long; fruit a pome or follicle; upright tree or shrub with unarmed stems.
3 Inflorescence an panicle; fruit a follicle; shrub, to 2 m tall; [tribe Sorbarieae] ...................................................................................... Sorbaria
3 Inflorescence a corymb; fruit a pome; tree, generally > 2 m tall; [tribe Pyraeae] ...................................................................................... Sorbus
2 Leaves palmately or 1-pinnately compound, generally with < 11 leaflets; inflorescences axillary or terminal panicles or corymb with few (<15) flowers, the petals white, pink, or purplish (rarely yellow) and > 6 mm long; fruit a hip or aggregate of drupelets; arching or upright shrubs or climbing or sprawling woody vines, the stems usually armed with prickles.
4 Fruit a hip, developing from a globose to urceolate hypanthium, enclosing the ovaries and achenes, except for the apical orifice; leaflets usually acute to obtuse at the apex; leaflet margins crenulate or serrulate; [tribe Rosae] ............................................ Rosa
4 Fruit an aggregate of druplets, developing from a flatish or hemispheric hypanthium, with the ovaries and druplets exposed; leaflets usually acuminated at the apex; leaflet margins serrate or doubly serrate; [tribe Rubeae].................................................**Rubus**

*Agrimonia* Linnaeus 1753 (Agrimony)


1 Stem and inflorescence axis lacking sessile or short-stalked glistening glands (but with spreading or ascending non-glandular hairs).

2 Stipules deeply incised, half-ovate; hirsute hairs of the stem 3 mm or longer; 0-1 pair minor leaflets between major; mature fruiting hypanthium as broad as long or broader; hypanthium ridges rarely with eglandular hairs.........................**A. microcarpa**

3 Glistening glands of the stem and inflorescence axis only sessile.

4 Lower inflorescence rachis with mostly erect hirsute eglandular hairs ca. 2 mm long; minor leaflets rarely only one pair between all major leaflet pairs; roots merely fibrous..............................................**A. gryposepala**

5 Mid-cauline leaf with 5-7 major leaflets; stipule proximally incised or nearly entire .................................................................**A. striata**

6 Major leaflets obovate to elliptic, apex obtuse to acute; flowers mostly alternate along inflorescence axis; [Coastal Plain pinelands; c. SC south to c. peninsular FL and west to e. TX].........................................................**A. incisa**

**Agrimonia gryposepala** Wallroth, Common Agrimony. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE): mesic forests, thickets, marshes, bogs, wet meadows, wet forests; common (uncommon in DE and WV, rare in GA). July-August; July-October. ME and ON west to MT, south to NJ, w. NC, e. TN, IN, and KS; also in CA and NM. [= RAB, C, F, FNAG, K, S, W, Y, Z]

**Agrimonia incisa** Torrey & A. Gray, Pineland Agrimony. Cp (FL, GA, NC?, SC): pinelands, disturbed areas associated with pinelands; rare. July-early September. E. SC south to c. peninsular FL and west to e. TX (also reported from NC, but no specimen has been seen). [= RAB, C, FNA, K, S, WH, Y, Z]

**Agrimonia microcarpa** Wallroth, Low Agrimony. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA, WV): dry to moist forests; petioles usually at least 10 mm; [bottomlands, marshes; CT west to s. MI and SD, south to FL, TX, the West Indies and Mexico]..........................................................**A. platycarpa** Wallroth – S

**Agrimonia parviflora** Aiton, Southern Agrimony. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, NC, SC, VA): marshes, bottomland forests, wet pastures; common (rare in DE Coastal Plain). July-September; July-October. CT west to s. MI and SD, south to FL, TX, the West Indies and Mexico. [= RAB, C, FNA, G, K, S, W, Y, Z]


*Amelanchier Medikus 1789

(Serviceberry, Sarvis, Shadbush, Juneberry, "May Cherry", "Currant")


1 Inflorescences 1-3 (-4)-flowered; leaves imbricate in bud, bases cuneate; petioles 2-10 (-15) mm; [WV northward] ..................**A. bartramiana**

2 Inflorescences usually 4-many-flowered; leaves conduplicate in bud, bases truncate or rounded to cordate (rarely cuneate); petioles usually at least 10 mm; [collectively widespread].
2 Margins of mature leaves with 2-6 teeth per cm; lateral leaf veins or their forks usually extending into teeth (as readily visible without magnification); ovary summit densely lanuginose. 
3 Petals 6-10 mm; hypanthium campanulate .......................................................... A. humilis
3 Petals 11-18 mm; hypanthium saucer-shaped ...................................................... A. sanguinea
2 Margins of mature leaves with 4-6 (-10) teeth per cm; lateral leaf veins mostly becoming indistinct near margin and not entering teeth; ovary summit glabrous, sparsely pubescent, or densely lanuginose.
4 Ovary summit densely lanuginose; expanding leaves densely tomentose below.
5 Petals 2.6-5.8 mm long, 1-3 mm wide, sometimes andropetalous; plants cespite; primary stems tending to be stiffly erect ................. A. nantucketensis
5 Petals 2.6-10 mm long, 2.5-4 (-5) mm wide, not andropetalous; plants rhizomatous and in loosely scattered colonies; stems straggling-ascending................................. A. spicata
4 Ovary summit glabrous or sparsely pubescent; expanding leaves glabrous to densely tomentose below.
6 Plants rhizomatous, shrubs 0.2-2.5 m tall; petals 2.6-7.7 mm long.
7 Petals 2.6-5.8 mm long, 1-3 mm wide, sometimes andropetalous; leaves elliptic to oblanceolate or oblong-elliptic; sepals ± recurving. .......................................................... A. nantucketensis
7 Petals 5.9-7.7 mm long, 2.6-3.6 mm wide, rarely andropetalous and much narrower than sterile stamens; leaves elliptic or oval to oblong or often obovate; sepals spreading; petals 10-20 mm long. ...................................................... A. obovata
6 Plants not rhizomatous, shrubs to 8 m tall or trees to 20 m tall; petals (6-) 8-20 mm long.
8 Inflorescences erect; petals 6-12 mm.
9 Young leaves at flowering half-expanded and unfolded, green, abaxially densely tomentose; proximal flowering pedicels 0.5-2 cm long; sepals erect or loosely spreading .............................................. A. canadensis
9 Young leaves at flowering half-expanded or more and unfolding, often reddish, and sparsely pubescent or glabresecent abaxially; proximal flowering pedicels 1-1.5 cm long; sepals ascending to recurving .............................................. A. intermedia
8 Inflorescences drooping; petals 10-20 mm long.
10 Young leaves at flowering folded, green or brownish, and densely tomentose below; proximal flowering pedicels 0.8-1.7 cm long; pomes maroon-purple, insipid. ......................................................................................... A. arborea
10 Young leaves at flowering unfolding, reddish, and glabrous (or nearly so) below; proximal flowering pedicels 1.5-3 cm long; pomes blackish purple, sweet. ......................................................................................... A. laevis


Amelanchier bartramiana (Tausch) M.J. Roemer, Oblong-fruited Serviceberry. Mt (WV): (habitat); rare. May-August; July-September. NL (Labrador) west to MN, south to PA, WV, WI, and MI. [= C, F, FNA, G, K]


Amelanchier humilis Wiegand. Mt (WV): rocky, calcareous areas; rare. QC west to ND, south to montane MD, WV, WI, and ML. [= FNA, K; < A. sanguinea var. sanguinea – C, G; > A. humilis var. humilis – F]

Amelanchier intermedia Spach. Mt (NC), {VA}: moist to wet areas; rare. May-June; June-August. NL (Newfoundland) west to MN, south to VA, w. NC, and ML. [= F, FNA, < A. canadensis (Linnaeus) Medikus – C, G; = A. ×intermedia – K]

Amelanchier laevis Wiegand, Smooth Serviceberry. Mt (GA, MD, NC, SC, TN, VA, WV), Pd (DE, NC, VA), C (DE, MD, VA), Ip (AL, KY, TN): forests, balds; common (uncommon in DE, rare in Coastal Plain of VA, rare in Piedmont of NC). April-May; June-July. NS west to MN, south to VA, w. NC, w. SC, AL, w. TN, and IA. [= C, FNA, G, K, W, S, Z; > A. arborea var. laevis – RAB; > A. laevis var. laevis – F]


Amelanchier sanguinea (Pursh) A.P. de Candolle, Roundleaf Serviceberry, New England Serviceberry. Mt (GA, NC, VA, WV), Pd (VA), C (VA): (VA); rare in w. NC and NC Mountains, rare in VA Piedmont, rare in VA Coastal Plain. April-May; May-June. ME west to MN, south to w. NC, TN, n. AL, and IA. [= RAB, F, FNA, S, W, Z; = A. sanguinea var. sanguinea – C, G, K]

Amelanchier spicata (Lamarck) K. Koch, Dwarf Serviceberry. C (NC, SC, VA), Pd (NC, VA), Mt (VA, WV), {GA}; dry, acidic, rocky sites; uncommon. March-April; May-June. NL (Newfoundland) west to ND, south to w. NC, w. SC, GA, AL, WI, and MI. [= RAB, C, FNA, G; = A. stolonifera Wiegand – F, K, S, W, Z]

Aphanes Linnaeus 1753 (Parsley-piert)

A genus of about 20 species, herbs, of tropical and temperate Old World. Aphanes has usually been accepted by Europeans as distinct from Alchemilla, but Kalkman (in Kubitzki 2004) retains it (with some doubt) in Alchemilla, as a subgenus and Eriksson
et al. (2003) and Gehrke et al. (2008) include it in *Alchemilla* based on molecular evidence. *Aphanes* appears to be monophyletic and is morphologically distinctive; Gehrke et al. (2008) prefer a broad circumscription of *Alchemilla* to naming an additional monophyletic clade of African species as a separate genus. References: McNeill & Erter in FNA (in press); Robertson (1974)=Z; Kalkman in Kubitzki (2004); Eriksson et al. (2003).

1 Fruiting hypanthium > 2 mm long; leaf blades 7-10 mm long and wide................................................................. *A. arvensis*
1 Fruiting hypanthium < 2 mm long; leaf blades 3-5 mm long and wide................................................................. *A. australis*

**Aphanes arvensis** Linnaeus. Cp (DE) disturbed areas; rare, native of Europe. April-June. Also reported for SC and TN by Kartesz (1999), but the only documentation consists of generalized range maps published in Hultén & Fries (1986); rejected as a component of those state’s flora without additional documentation. [= C, FNA, K; = *Alchemilla arvensis* (Linnaeus) Scopoli – F, G]

**Aphanes australis** Rydberg, Parsley-piert. Pd (GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA), Mt (NC, SC, VA, WV); lawns, fields, pastures, roadsides; common (uncommon in Piedmont of VA and Mountains of NC and VA, rare in DE, FL, and WV), native of Europe. Late March-May. This plant is inconspicuous and often overlooked. [= FNA, S; = *Aphanes microcarpa* (Boissier & Reuter) Rothmaler – C, K, WH, ms; misapplied; = *Alchemilla microcarpa* Boissier & Reuter – RAB, F, G, W, Z, misapplied; = *Aphanes inexpectatus* W. Lippert]

*Aronia* Medikus 1789 (Chokeberry)

A genus of 3 species, of e. North America (south into Central America). *Aronia* has sometimes been treated as a component of *Sorbus* or *Prunus*. More recently, Robertson et al. (1991) have included *Aronia* in *Photinia*. Kalkman in Kubitzki (2004) agrees that *Aronia* and *Photinia* should be combined, but points out that *Aronia* is the older name and therefore must be used for the combined genus. Guo et al. (2011) separate *Photinia, Aronia*, and *Paurthieae*. References: Guo et al. (2011)=V; Pankhurst in FNA (in press); Hardin (1973)=Y; Robertson (1974)=Z; Robertson 1991=X; Kalkman in Kubitzki (2004).

**Identification notes:** All our species of *Aronia* can be distinguished from other shrubs in our flora by the presence of several dark (usually purplish-black) trichomes on the upper surface of the midrib, mostly toward the base of the leaf.

1 Lower surfaces of leaves, twigs, and inflorescence rachis glabrous; fruit black ................................................................................................. *A. melanocarpa*
1 Lower surfaces of leaves, twigs, and inflorescence rachis pubescent; fruit bright red or dark purple.

2 Fruit dark purple; leaves sparsely pubescent beneath ........................................................................................................ *A. arbutifolia*
2 Fruit bright red; leaves densely pubescent beneath ........................................................................................................ *A. prunifolia*

**Aronia arbutifolia** (Linnaeus) Persoon, Red Chokeberry. Cp (DE, FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA): bogs, pocosins, wet savannas, swamps, other wet habitats; common. March-May; September-November. NL (Newfoundland) south to c. peninsular FL and west to TX, mainly in the Coastal Plain, but extending inland in the south to WV and KY. [= C, FNA, G, GW, S, V, W; = *Sorbus arbutifolia* (Linnaeus) Heynhold var. arbutifolia – RAB; = *Pyrus arbutifolia* (Linnaeus) Linnaeus f. – F, Z; = *Photinia pyrifolia* (Lamarck) K. Robertson & J.B. Phipps – K, WH, WV, X]


**Aronia prunifolia** (Marshall) Rehder, Purple Chokeberry. Pd (DE?, NC, VA), Mt (NC, VA, WV), Cps (DE?, VA): balds, bogs, seepages, swamp forests; uncommon, rare south of VA (NC Watch List). April-May; September-October. Widespread but local in ne. North America, south to NC, FL?, and OH. While apparently originating as a hybrid between our other two species, *A. prunifolia* exists in populations independent of the two parent species, apparently reproducing successfully. It seems best to treat a now independent lineage such as this as a separate taxon. [= C, G, GW, V; = *Sorbus atropurpurea* var. atropurpurea (Britton) Schneider – RAB; = *Aronia floribunda* (Marshall) Rehder – FNA; = *Pyrus floribunda* Lindley – F, WV, Z; = *Aronia atropurpurea* Britton – S; < *A. melanocarpa* – W; = *Photinia floribunda* (Lindley) J.B. Phipps – K, X]

*Aruncus* Linnaeus 1758 (Goat’s-beard)


**Identification notes:** *Aruncus dioicus* can be distinguished from the superficially closely similar *Astilbe biternata* by the following characteristics: trichomes of foliage not glandular (vs. glandular in *Astilbe*), stamens 20 (vs. 10), carpels 3-4 (vs. 2), seeds < 1.5-2 mm long (vs. ca. 4 mm long), terminal leaflets usually unlobed (vs. terminal leaflets usually trilobed).

1 Follicles 2.5-3.5 mm long .......................................................................................................................... *A. sylvester*
1 Follicles 1.5-2.0 mm long.

2 Follicles semi-ovoid, strongly convex on the back, about 1/2 as thick (measured radially) as long; leaves somewhat lustrous, the lower surface glabrous to sparsely pubescent................................................................. *A. dioicus var. dioicus*
2 Follicles nearly cylindric, about 1/3 as thick (measured radially) as long; leaves dull, the lower surface pubescent.

**Aruncus dioicus** (Walter) Fernald var. *pubescens* (Rydberg) Fernald, Midwestern Goat's-beard. Mt (WV): moist, nutrient-rich forests and woodland borders?; rare. May-June; June-September. W. VA, KY, and IL west to IA, south to TN, AR, and OK. The validity of this variety and its attribution to our area (by G, K, and S) need further evaluation. Robertson (1974) states that the "two varieties intergrade completely, and it is questionable whether they should be maintained." [= C, F, FNA, K, Z; < *A. dioicus* – W; = *A. pubescens* Rydberg – S]

* Aruncus sylvester Kosteletzky ex Maximowicz is attributed to our area by Small (1933). This European species is occasionally cultivated in e. North America. [= C, G; = *A. dioicus* var. *vulgaris* (Maximowicz) Hara – FNA, K; = *A. aruncus* (Linnaeus) Karsten – S]

**Crataegus** Lindley 1821 (Flowering Quince)


* *Chaenomeles speciosa* (Sweet) Nakai, Flowering Quince. Pd (NC), Cp (VA), Mt (WV): frequently persisting and rarely spreading from horticultural plantings to suburban woodlands; rare, native of China. January-April. The "fruiting" or Common Quince, *Cydonia oblonga* P. Miller, native of the Caucasus, is widely cultivated in Europe and formerly in e. North America. It has fallen out of favor, and is now rarely cultivated in our area. [= C, FNA, K]

**Crataegus** Linnaeus 1753 (Hawthorn, Haw, Thornapple)

(Contributed by R. Lance)


**Identification notes:** SUBSTANTIAL CHANGES TO THIS TREATMENT ARE PENDING. All references to leaves and petioles pertain to foliage on short shoots (floral shoots), unless otherwise specified.

1 Leaf bases cordate, truncate, rounded, or very abruptly contracted from a rounded base .................................................... Key A
2 Leaf base acute to cuneate.
3 Leaves eglandular, or if glandular then twigs relatively straight, not conspicuously geniculate ........................................ Key B
4 Leaves conspicuously glandular on petiole and teeth, especially when young; twigs and branchlets geniculate .......................... Key C

**Key A – hawthorns with leaf bases cordate, truncate, rounded, or very abruptly contracted from a rounded base**

1 Primary lateral veins of lobed leaves run to sinuses of lobes, as well as to points of lobes.
2 Leaves thin, dull, hairy at least on petiole, deeply laciniate; fruit oblong ................................................................. *C. marshallii*
3 Leaves subcoriaceous, glossy, glabrous, often 3-lobed; fruit globose ........................................................................... *C. phaenopyrum*

**Key B – hawthorns with leaf bases subcordate**

1 Leaves and petioles longer, glandular or not, but twigs not geniculate.
2 Leaf blades on terminal shoots often > 9 cm long.
3 Petiole eglandular, pubescent or tomentose; leaf veins distinct on adaxial surface, slightly sunken ................................... *C. mollis*
4 Leaf blades longer than wide; calyx lobes evenly serrate .................................................................................. *C. coccinea*
5 Leaf blades often as wide as long; calyx lobes deeply and irregularly serrate ............................................................... *C. dilatata*
6 Petiole glandular, sparsely hairy or glabrous; leaf veins not as conspicuous ......................................................... *C. lepida*
7 Petiole eglandular, pubescent or tomentose; leaf veins distinct on adaxial surface, slightly sunken ................................... *C. mollis*
8 Lobe tips acute or obtuse, not reflexed; young leaves hairy or glabrous; leaves firm.
9 Fruit calyx sessile; leaves may bear hairs when young; stamens usually 10 ............................................................... *C. iracunda*
10 Fruit calyx elevated; leaves glabrous; stamens usually 20 .............................................................................. *C. pruinosa*
11 Lobe tips acuminate, often reflexed; young leaves searate adaxially; leaves thin.
12 Stamens 5 to 10 .......................................................................................................................................................... *C. macrosperma*
13 Stamens 15 to 20 ....................................................................................................................................................... *C. schuettei*
1 Leaves mostly widely elliptic or broadly obovate, base acute to short-cuneate.

2 Leaves sharply-toothed and shallowly lobed.

3 Leaves sparsely hairy to glabrous ................................................................. C. alleghaniensis

4 Leaves with short, blunt teeth, mostly unlobed.

5 Leaves > 2 cm long; twigs very slender; thorns mostly < 2 cm ................................................................. C. lepida

6 Fruit yellow ................................................................................................................................................. C. flavia

7 Fruit red.

8 Branches mostly ascending and crooked ........................................................................................................... C. visienda

9 Branches recurved or drooping ........................................................................................................................... C. visienda

Key B – hawthorns with acute to cuneate leaf bases; leaves conspicuously glandular on petiole and teeth; and twigs and branchlets geniculate

1 Leaves mostly ovate or broadly elliptic.

2 Leaves not as above, or pyrenes > 4 mm long.

3 Leaves thin, dull yellow-green, usually pubescent at least abaxially; pedicels tomentose ........................................ C. aprica

4 Leaves > 3 cm long; calyx lobes foliaceous, deeply toothed; spines slender ............................................................ C. anisophylla

5 Fruit small, usually < 8 mm, calyx elevated ........................................................................................................... C. senta

6 Fruit yellow-green; hairs scattered along veins of abaxial side, esp. when young; fruit 10-15 mm diameter........... C. aemula

7 Fruit firm, glossy or bright green, with hair tufts in abaxial main vein axils; fruit usually < 10 mm diameter. ...... C. viridis

8 Leaves toothed along most of margin.

9 Leaves obscurely toothed to entire on margin, especially lower half of blade .............................................................................................................................. C. viridis

10 Leaves not widely obovate; lobes acute or lacking; calyx lobes elongate.

11 Leaves mostly ovate or broadly elliptic.

Key C – Leaves eglandular, or if glandular then twigs relatively straight, not conspicuously geniculate

1 Leaves spatulate or oblanceolate, < 13 mm wide; petiole winged to base; pyrenes < 4 mm long ........................ C. spatulata

2 Leaves not as above, or pyrenes > 4 mm long.

3 Inflorescence simple, 1 to 5-flowered; fruit > 1 cm diameter, mature in late spring ................................. C. aestivalis

4 Inflorescence compound, 5 to 20-flowered; fruit usually < 1 cm, mature in autumn. ................................. C. aestivalis

5 Petiole and leaf undersides pubescent to tomentose ........................................................................................... C. aestivalis

6 Leaves thin, dull yellow-green, usually pubescent at least abaxially; pedicels tomentose ........................................ C. aprica

7 Leaves mostly < 3 cm long; calyx lobes foliaceous, deeply toothed; spines slender ............................................................ C. anisophylla

8 Leaves commonly > 3 cm long and with not above combination of characters.

9 Leaves mostly obovate, with rounded lobes and blunt teeth; calyx lobes broadly triangular .......................... C. margarettae

10 Leaves not widely obovate; lobes acute or lacking; calyx lobes elongate.

11 Leaves mostly ovate or broadly elliptic.

12 Petiole and leaf undersides glabrous or sparsely hairy ............................................................................. C. aprica

13 Petiole and leaf undersides pubescent to tomentose .................................................................................. C. mollis

14 Petioles eglandular.

15 Leaves not widely obovate; lobes acute or lacking; calyx lobes elongate.

16 Leaves mostly ovate or broadly elliptic.
13 Leaf veins impressed axially, prominent abaxially; leaves dull green.
14 Leaves pubescent abaxially; branches dark gray; fruit usually <12 mm; calyx and fruit stem hairy.................C. collina
14 Leaves sparsely hairy to glabrous abaxially after maturity; branches ashy gray; fruit 12-22 mm; calyx and fruit stem glabrous................................................................................................................C. punctata
15 Leaf veins obscure; leaves lustrous.
15 Leaves, petioles, pedicels hairy.................................................................C. berberifolia
15 Leaves, petioles, pedicels glabrous.............................................................C. crus-galli
9 Petioles glandular (3 or more glands visible).
16 Leaves distinctly hairy or pubescent abaxially.
17 Leaves lobed 1/3-2/3 to midrib on terminal shoots; fruit calyx elevated ............................................................C. intricata
17 Leaves shallowly lobed to unlobed on terminal shoots; fruit calyx sessile.
18 Leaves thin; inflorescence simple, 3 to 5-flowered; stamens usually 30 or more..................C. triflora
18 Leaves firm; inflorescence compound, > 5-flowered; stamens 20 or fewer.
19 Leaves shallowly lobed on terminal shoots, usually > 5 cm wide.................................C. harbisonii
19 Leaves unlobed, most < 5 cm wide.
20 Leaf veins slightly impressed axially; fruit calyx deeply glandular-serrate; petiole conspicuously glandular......
20 Leaf veins distinctly impressed axially; fruit calyx remotely serrate to entire; petiole sparsely glandular........
..........................................................................................................................................................C. ashei
21 Stamens 5-10.............................................................................C. intricata
21 Stamens 15-20.
22 Leaves shallowly lobed on terminal shoots (1/4-1/3 to midrib), usually unlobed on floreal shoots..............C. mendoza
22 Leaves shallowly to moderately lobed on all shoots.
23 Leaves mostly ovate-lanceolate.................................................................C. sargentii
23 Leaves ovate or widely ovate.
24 Twigs short; petiole often winged 1/2 its length; fruit often 10 mm or more in diameter..................C. pallas
24 Twigs elongate; petiole winged 1/3 or less of length; fruit usually <10 mm in diameter............C. pulcherrima

Crataegus aemula Beadle, Rome Hawthorn. Cp, Pd (GA, SC): upland hardwood and pine-hardwood forests, over sandstone, calcareous rock or circumneutral clay soils; uncommon (but may be locally abundant). April, September. Nw. GA and ne. AL. principally, disjunct in McCormick Co, SC. Related to C. iracunda Beadle, but foliage of C. aemula differs in having frequent rounded bases, thin texture, yellow-green coloration. Fruits are lustrous light red, 12-18 mm diameter. C. aemula has been shown to be triploid, possibly apomictic, producing a high percentage of fertile seed with little seedling variation. The possibility of its being of hybrid origin between C. iracunda Beadle and C. collina Chapman has been suggested. [= K, Q, X; < C. macrosperma – S]

Crataegus aestivalis (Walter)Torrey & A. Gray, Mayhaw, Eastern Mayhaw. Cp (GA, NC, SC): swamp forests, generally where flooded for much of the year, often flowering and fruiting while standing in water, often associated with Taxodium distichum, Nyssa aquatica, Nyssa biflora, and Planera aquatica; uncommon but sometimes locally abundant; occasionally growing as groves or stands in ‘mayhaw flats’. March-April; June-July. Se. NC south to n. FL and se. AL. A historic record of C. aestivalis in VA appears to be based on a single specimen collected 22 July 1934 by M.L. Fernald & B. Long, in Princess Anne County; this specimen is actually C. crus-galli. A related species, C. opaca Hooker & Arnott, occurs west of the range of C. aestivalis, in similar habitats. Plants with copious growth of reddish pubescence on the leaf undersides are included under C. rugula. The fruits of all three species are traditionally gathered for preserves, pies, and jelly. See Phipps (1988) for extensive additional discussion of C. aestivalis and relatives. [= K, Q, X; < C. aestivalis – S]

Crataegus alabamensis Beadle, Alabama Hawthorn. Pd (GA, SC, NC). Cp (GA, NC, SC): sandhills, upland pine and pine-oak forests, rocky woodlands, xeric or subxeric habitats with sandy or well-drained clay soils; uncommon. April; August-September. E. NC, c. SC south to n. FL, west to c. MS. Often reaching treelike proportions (4-8 m tall, trunk 10-30 cm diameter). Some local genotypes may produce palatable fruit to 22 mm in diameter. The typical form of C. alabamensis has pubescent foliage and tomentose inflorescence parts, but the similar C. floridana, C. attrita, and C. teres are progressively more glabrate, in this order; they may be interpreted as separate species as in Phipps & Dvorsky (2008). [= X; < C. flava Aiton – RAB, K, S; > C. aduncu Beadle - Q; > C. attrita Beadle – Q; > C. floridana Beadle - Q; > C. teres Beadle – Q]

Crataegus alleghaniensis Beadle, Allegheny Hawthorn. Mt, Pd (GA, NC, SC), Cp (GA, SC); upland pine and pine-oak forests, disturbed woodlands, rocky bluffs and slopes; uncommon. April; August-September. W. and sc. NC to c. SC, c. GA, west to c. AL, ne. MS, e. TN. A variable species if broadly considered, displaying leaf and flower characters which suggest intermediacy between members of series Intricatae and Apricae. The stamen counts can vary from 10 in typical C. alleghaniensis, 12-17 in C. ignava and C. extraria, and 20 in C. cullasagensis, C. agrestina, and C. frugiferas. A narrower view might hold some of this synonymy to specific levels. [= X; < C. flava Aiton – RAB; > C. americana – Q; > C. ignava Beadle – K, Q; >C. extraria Beadle – K, Q; > C. impar Beadle – K,Q; > C. cullasagensis Ashe – Q; > C. agrestina Beadle – Q; > C. miru Beadle – Q; > C. frugiferas Beadle (= C. rigens Beadle) – Q]

Crataegus anisophylla Beadle. Cp (GA): upland pine forests, pine-oak scrub, sandhills, disturbed woodlands, roadsides, abandoned fields; uncommon. Late March-April; late August-September. Late March-April; late August-September. Se GA to c. peninsula FL, west to s. AL. This is a poorly understood taxon among the group of hawthorns often categorized under C. flava Aiton in many earlier floral treatments. Related to C. lassa Beadle. [= X; < C. anisophylla – Q; > C. viaria Beadle – Q; > C. cullasagensis Ashe – Q; > C. punctata Beadle – K, Q; > C. versuta Beadle – K, Q; > C. resina Beadle – K, Q; < C. flava – S]

Crataegus aprica Beadle, Sunny Hawthorn Min, Pd, Cp (GA, NC, SC) {VA?}: upland pine forests, pine-oak forests, mixed hardwood forests over rocky or sandy substrates, abandoned fields, roadsides; common. Late March-April; September.
NC south to s. GA and n. FL, west to e. AL and e. TN. This species is most common in the southern Appalachians of NC and SC and extending to the sandhills region of SC. The 10 stamens separate this species from the closely related and similar C. sororia, and both these taxa have long been included under the collective name of C. flava Aiton in many earlier treatments (see discussion of C. flava) [=W, X, Phipps 2007; < C. flava Aiton – RAB; > C. aprica – Q; > C. shallottii Ashe]

_Crateagus berberifolia_ Torrey & Gray var. berberifolia, Barberry Hawthorn. Pd, Cp (GA, NC, SC, VA): mixed hardwood and pine forests of uplands, usually in subxeric to xeric habitats, especially over basic to calcareous soils; common. April-May; August-October. C. VA south to n. FL, west to MO, most common in LA, s. AR. Closely related to C. crus-galli and differing primarily from that species by the consistent pubescence or stiff hairs on foliage, twigs, floral and fruit parts. 10-stamened forms of the normally 20-stamened C. berberifolia have been called C. engelmannii Sargent, which see below. [= C, K, Q, S, X]

_Crateagus berberifolia_ Torrey & Gray var. engelmannii (Sargent) Eggleston Pd, Cp (GA, NC, SC): mixed hardwood and pine forests of uplands, usually in subxeric to xeric habitats, especially over basic to calcareous soils; common. April-May; August-October. Similar to the typical variety in most respects except for the presence of 10 stamens. Appears most common in MO and AR, mixed sporadically with the species eastward to e. TN, c. NC. [> C. engelmannii Sargent – Q; > C. berberifolia var. engelmannii (Sargent) Eggleston; > C. torva Beadle – Q; > C. sinistra Beadle – Q]

_Crateagus boytonii_ Beadle, Boynton Hawthorn. Mt, Pd (GA, NC, SC, VA): upland forest understories, pastures, rock outcrops, shrubby thickets; uncommon. W. VA south to c. GA, west to n. MS, n. to IL, KY, and WV. April-May; September-October. Related to C. intricata Lange, from which C. boytonii differs chiefly in having an abundance of broadly ovate to deltoid leaves 5-8 cm long and 3-5 cm wide, more robust thorns, and more treelike habit (4-6 m tall, less prone to develop root suckering and multiple stems). [= Q, X; < C. flabellata – RAB; > C. boytonii – F, G, orthographic variant; < C. intricata Lange – C, K]

_Crateagus brachycanthana_ Sargent & Engelmann, Blueberry Hawthorn. Cp (GA): open pinelands; rare (GA Special Concern). April; September. In sw. GA, one historic record, disjunct from a main range further west (primarily LA and e. TX). The only eastern hawthorn bearing black fruit, appearing blue due to an exterior waxy bloom. [= K, Q, S, Y, X]

_Crateagus buckleyi_ Beadle. Buckley Hawthorn. Mt, Pd (GA, NC, SC): upland pine and hardwood forests, rock outcrops; uncommon. April-May; August-October. W. NC, w. SC, n. GA west to n. AL, north to e. TN (and perhaps WV and VA). Most similar to C. boytonii Beadle, but with purplish anthers, more glandular-serrate calyx lobes, russet fruit, and smaller leaves (3-6 cm long x 2-4 cm wide). [= Q, X; < C. flabellata – RAB; < C. intricata Lange – C, K]

_Crateagus calpodendron_ (Ehrhart) Medikus, Pear Hawthorn. Mt (VA, NC), Pd (GA, NC, SC): mixed hardwood forests, open slopes, wooded ravines, streamsidey, especially over basic or calcareous rocks; uncommon. April-March; June; September-October. From a generally northern limits extend the Appalachian region and adjacent Piedmont of VA to n. GA, c. AL, n. MS and AR. Often found as a solitary specimen, or in very small local populations. One of the latest hawthorns in our area to flower. Fruit production appears scant in its southern range. [= RAB, C, K, S, W, X; > C. calpodendron var. calpodendron – F, G; > C. calpodendron var. microcarpa (Chapman) Palmer – F, G; > C. calpodendron var. globosa (Sargent) Palmer – F, G; > C. chapmani Beadle – Q; > C. somentosa Du Roi]

_Crateagus coccinea_ Linnaeus, Scarlet Hawthorn. Mt, Pd (NC, VA): deciduous forest understories, pastures, upland thickets; rare; May; October. Distributed southward along the Appalachian Plateau from a predominantly northern range. The combination of large, pubescent leaves (9-12 cm long) on terminal shoots, evenly toothed calyx lobes, and 5-10 stamens per flower are distinctive. C. coccinea may attain treelike proportions, to 10 m tall. [= RAB, C, X; < C. pennsylvanica W.W. Ashe – F, G; > C. pedicellata Sargent – K, W]

_Crateagus collina_ Chapman, Hillside Hawthorn. Mt (GA, NC, SC, VA), Pd (GA, NC, SC): hillside forests and young woodlands, especially over calcareous rocks; uncommon. March-April; August-October. Sw. VA west to KS, south to c. GA, s. AL, c. MS, AR and OK. Closely allied to C. punctata Jacquin, but more widespread in range and habitat tolerance across the Southeast. The fruits rarely reach 12 mm in diameter, whereas those of C. punctata often range from 12-23 mm. C. collina occupies sub-xeric uplands in the Appalachian Region and is tolerant of lowland floodplains in GA, AL, TN. It is one of the earliest hawthorns to flower in spring. Foliage may be conspicuously pubescent in some local genotypes. [= S, W, X; > C. collina var. collina – F, G; > C. collina var. collicola (W.W. Ashe) – F, G; > C. collina – Q; > C. ingens Beadle – Q; > C. amnicola Beadle – Q; < C. punctata Jacquin – RAB, C]

_Crateagus colonica_ Beadle. Cp, Pd (GA,NC, SC): scrublands, roadsides, xeric woodlands with sandy soils; uncommon. Late March-April; August-September. Se. & sc. NC south and west to e. GA, perhaps to n. FL. A poorly understood taxon, appearing closely related to C. integra Beadle, but with smaller flowers and fruit and an abundance of long thorns (2-5 cm). The thorniness of the plants combined with the obovate, nearly entire-margined leaves and pyriform-shaped fruit is usually diagnostic. A similarly thorny entity but with leaves distinctly serrated is C. pexa Beadle (see C. munda Beadle).

_Crateagus crassifolia_ Beadle, Crayton Hawthorn. Mt (GA, NC, VA): wooded slopes, roadsides, streamsidey; rare. Late April-May; September. Sw. VA, w. NC to n. GA, n. AL, possibly e. TN. A poorly known taxon, appearing most closely related to C. intricata Lange, but unique in its combination of 20 stamens and distinctly pubescent foliage and inflorescence parts. Alternatively, this hawthorn could be assigned varietal status within C. intricata, but it has not been published as such in any floral treatments. [= Q]

_Crateagus crus-galli_ Linnaeus var. crus-galli, Cockspur Hawthorn. Mt, Pd, Cp (GA, NC, SC, VA): pastures, thickets, disturbed woodlands and forests, fencerows; common. April-May; September-October. Ranges throughout the eastern US, except c. and s. peninsular FL. C. crus-galli sometimes forms extensive local colonies and likely apomictic clonal populations. Variation occurring in this wide-ranging species, mostly in size and shape of leaves and minor flower and fruit characters, has accounted for an extensive synonymy, with most earlier names applied by Charles Sargent. Plants having 3 to 5 styles and as many pyrenes have been alternatively placed under C. reverchonii Sargent, these also exhibiting a tendency to have smaller, more often suborbicular leaves (see C. reverchonii). Typical forms of C. crus-galli tend to have 1 to 2 styles and pyrenes, and...
with a range of leaf shapes from narrow to nearly suborbiculate. [= C, W, X; < C. crus-galli – RAB; > C. crus-galli – K; > C. macra Beadle - Q; > C. regalis Beadle var. regalis – F; > C. albens Beadle – Q; > C. arborea Beadle – K; > C. canbyi Sargent; > C. crus-galli var. crus-galli – F, G; > C. crus-galli var. exigua (Sargent) Eggleston – G; > C. crus-galli var. macra (Beadle) Palmer – F; G; > C. crus-galli – S]

**Crataegus crus-galli** Linnaeus var. pyracanthifolia (Aiton) Sargent. Cp (GA, NC, SC, VA): bottomland forests, swamp borders, lowlands; uncommon though at times locally abundant. April-May; October. DE south to n. FL, west to MO, e. TX. The narrow leaves may be glabrous or pubescent on the abaxial side, varying as local genotypes. [ > C. crus-galli var. pyracanthifolia (Aiton) Sargent – F, G; > C. limnophylla Sargent – K; > pyracanthoides Beadle var. arborea (Beadle) Palmer – G; > C. pyracanthoides Beadle – Q]

**Crataegus dispar** Beadle, Aiken Hawthorn. Cp (FL, GA, SC), Pd (GA, SC): upland pine or pine-oak forests, usually of sub-xeric to xeric conditions, in well-drained clay or sandy soils; uncommon.  Late March-April; September.  Nc & sc SC, n. GA, wc. AL. serrated, tomentose leaves, often pale bluish-green in color.  [= K, Q, X; > sub-xeric to xeric conditions, in well-drained clay or sandy soils; uncommon.  Late March-April; September.  Nc & sc SC, n. GA, wc. AL.]

**Crataegus flava** Aiton, Yellow Hawthorn. Cp (FL, GA, SC), Pd (SC, GA): dry woodlands; rare. A problematic taxon, originally described from a plant under cultivation in Europe, and assumed native from central SC s. to n. FL; few naturally-occurring plants have been located in the Southeastern US which match closely the type specimen. The likelihood of the type of **Crataegus flava** being of hybrid origin, involving members of the *Apricaceae* or *Intricatae* series seems probable. Unfortunately, the name **Crataegus flava** Aiton and the ambiguous taxon which it historically represents has been widely misapplied and confused for more than a century. It is included here due to its persistent inclusion in several floral treatments in the past. [= F, K; > C. <disperma Ashe – K]

**Crataegus dodgei** Ashe, Dodge Hawthorn. Mt (NC) {VA ?}; mesic hardwood forests, streamside thickets, pastures; rare. May; September-October. A northern species predominately of the Great Lakes Region, east to CT, sporadic southward in the Appalachians to WV and possibly e. TN, w. VA, with one collection in Ashe Co, NC. [= C. mercerensis Sargent]

**Crataegus flava** Aiton, Yellow Hawthorn. Cp (FL, GA, SC), Pd (SC, GA): dry woodlands; rare. A problematic taxon, originally described from a plant under cultivation in Europe, and assumed native from central SC s. to n. FL; few naturally-occurring plants have been located in the Southeastern US which match closely the type specimen. The likelihood of the type of **Crataegus flava** being of hybrid origin, involving members of the *Apricaceae* or *Intricatae* series seems probable. Unfortunately, the name **Crataegus flava** Aiton and the ambiguous taxon which it historically represents has been widely misapplied and confused for more than a century. It is included here due to its persistent inclusion in several floral treatments in the past. [= F, K; > C. <disperma Ashe – K]

**Crataegus inferior** Beadle var. integra Beadle – Q; > C. integrum Beadle – K; > C. integrum Beadle – Q; > C. audens Beadle – Q

**Crataegus intricata** Lange var. boyontoni (Beadle) Kruschke, Boyonton Hawthorn. Mt, Pd (GA, NC, SC, VA): upland forest understories, pastures, rock outcrops, shrubby thickets; uncommon. W. VA south to c. GA, west to n. MS, n. to IL, KY, and WV. April-May; September-October. **Crataegus intricata** differs from typical **C. intricata** by having an abundance of broadly ovate to deltoid leaves 5-8 cm long × 3-5 cm wide, and more robust thorns. [= Q, X; < C. flabellata – RAB; > C. boyontoni – F, G; orthographic variant; < C. intricata Lange; > C. intricata var. boyontoni (Beadle) Kruschke – C, K]

**Crataegus intricata** Lange var. intricata, Entangled Hawthorn. Mt, Pd (GA, NC, SC, VA): pastures, wooded hills, rock outcrops, thickets; common. Late April-May; August-October. Widespread range from northern states s. to c. SC, c. GA, c. AL, n. MS, west to AR and OK. Broadly defined, a variable species incorporating many minor forms and potentially apomictic local clones. The basic defining characters are the presence of 10 stamens with pale anthers, hard greenish or ruddy-blushed fruits with an elevated calyx, and glabrous, slightly glandular foliage. Leaf shape is highly variable. Some variants commonly having yellow fruits are **C. fortunata** Sargent and **C. straminnea** Beadle, conspicuous pubescence is seen in **C. bitimoreana** Beadle and **C. craytonii** Beadle, and shallowly lobed leaves often occur in **C. rubella** Beadle; these have been treated as varieties here (except for **C. craytonii**), but have been variously interpreted in other floras. Typically, **C. intricata** exhibits a shrubby habit, and may form colonies by root sprouts. It is most common in the Appalachian region. [= C, K, S, W, X; < C. flabellata – RAB; > C. intricata var. intricata – F, G; > C. foetida Ashe]

**Crataegus intricata** Lange var. bitimoreana (Beadle), Biltmore Hawthorn. Mt, Pd (GA, NC, SC, VA): wooded hills, rock outcrops, thickets; uncommon. Late April-May; September-October. VT south to c. GA, west to AR, MO. The leaf shape is variable, but the hairiness of its vegetative and floral parts, as well as the normally deeply glandular-serrate calyx lobes make this taxon fairly distinctive among the *Intricatae* series. [ > C. bitimoreana Beadle – F, G; Q; > C. confusa Sargent – F; C. villicarpa Sargent – F]

**Crataegus iracunda** Beadle, Red Hawthorn. Pd, Pd (GA, PA, NC, SC, VA): swamps, bottomlands, moist slopes; wooded hills; uncommon (though locally abundant). April-May; September-October. Southern range limits appear to extend south to c. SC,
GA, AL (and possibly MS). A difficult species to distinguish vegetatively, appearing most closely allied to *C. macroperasma* Ashe. The typically scabrous young leaves, 10 pink to purplish stamens, and firm-textured fruit with sessile calyx can vary among some local populations of *C. iracunda* to the extent that it may be confused with *C. schweitei*, *C. pruinosa*, or *C. boyntonii*. [= K, X; < *C. flabellata* (Bosc) K. Koch – RAB; C – C. iracunda var. iracunda – F, G; > C. iracunda var. silicicola (Beadle) Palmer – F, G; > C. iracunda – Q; > C. silicicola Beadle – Q; > C. drymophila Sargent; > C. populnea Ashe – F, G; > C. riparia Ashe; > C. sectilis Ashe; > C. shollate Ashe]

**Crataegus lassa** Beadle, Sandhill Hawthorn. Cp, Pd (GA, NC, SC): pine forests, oak-pine scrub, upland scrublands, xeric woodlands, especially in deep sand and soils of rapid drainage; common. Here *C. lassa* is broadly defined to include a wide range of minor species, most described by Beadle. Late March-April; August-September. *C. lassa* is most often shrubby in habit (2–4 m tall), with a rounded or open crown reaching close to the ground, commonly with multiple stems. [= X; < *C. flava* Aiton – RAB; > < *flava* – K; > *lassa* – Q; > *lousa* Beadle – Q; > *laxa* Beadle – Q; > *flugula* Beadle – Q; > *integra* Beadle – Q; > *dolosa* Beadle – Q; > *inops* Beadle – Q; > *meridiana* Beadle – Q; > *colonica* Beadle – Q; > *invisida* Beadle – K, Q; > *pulla* Beadle – Q; > *egens* Beadle – Q; > *pearsonii* Ashe – K, Q; > *michauxii* Persoon – Q, S]

**Crataegus lepida** Beadle. Cp (GA): xeric, sandy soils of open pinelands, wiregrass-dominated roadside and forest edges, oak-pine scrub; uncommon. Late March-April; August-September. S. GA south to c. peninsular FL. Allied to *C. munda*, *C. lepida* is distinctive in bearing a preponderance of oval to orbicular, 1–2 cm leaves. [= X; > *lepida* – Q; > *condigua* Beadle – K, Q]

**Crataegus macroperasma** Ashe, Fanleaf Hawthorn. Mt, Pd, Cp (GA, NC, SC, VA): mesic or subxeric hardwood forests, wooded slopes, rock outcrops, pastures, thickets, mountain balds and rocky summits; common. April–early May; September–October. VA south to c. GA, west to n. LA, W. KY, and WV. *C. macroperasma* is often confused with *C. pruinosa* (Wendl.) K. Koch and *C. iracunda* Beadle, due to similar leaf shape, but *C. macroperasma* appears consistent in its adaxially scabrous young leaves, 5–10 stamens, and soft-textured mature fruit. The pyrenes are not unusually large (5–8 mm), despite the name. [= K, W, X; < *C. flabella* (Bosc) K. Koch – RAB; > *flabella* – C; > *macroperasma* var. macroperasma – F, G; > *macroperasma* var. roanensis (W.W. Ashe) Palmer – F, G; > *macroperasma* – Q; > *brainerdii* – C, misapplied to material in our area; > *roanensis* Ashe – Q; > *macroperasma* – S]

**Crataegus margarettae** Ashe. Mt (VA): mesic hardwood forests, streamside thickets, pastures; rare. April-May; September-October. WV [TN, W. VA] west to MO, IO, north to WI and ML. *C. margarettae* is related to the wide-ranging *C. chrysocarpa* Ashe, but is distinctive in its widely obovate to nearly orbicular leaves, rounded or obtuse lobes, cuneate base, and petals often as long as the blade. [= C. margaretta – Q, S, X; > C. margaretta var. margaretta – F, G; > C. margaretta var. brownii (Britton) Sargent – F; > C. margaretta var. brownii – G (orthographic variant); < C. chrysocarpa Ashe – C; > C. chrysocarpa – K, Q; = C. margarettae – K, orthographic variant]

**Crataegus marshallii** Eggleston, Parsley Hawthorn, Parsley Haw. Cp (GA, NC, SC, VA), Pd (GA, NC, SC): swamp forests (especially over calcareous soils), alluvial forests, dry and mesic upland slopes (especially over mafic or calcareous rocks). April–early May; September–October. Se. VA south to c. peninsular FL, west to c. TX, and north in the interior to sc. TN, n. AL, n. MS, w. TN, s. IL, sc. MO, n. AR, and sc. OK (Phipps 1998); common. *C. marshallii* is distinctive and immediately recognizable among *Crataegus*, by its deeply lobed leaves, small flowers, and small fruits (4–6 mm long by about 3 mm wide, with only 1–3 pyrenes). [= RAB; > C. F, G, K, S, W, X, Y; = *C. apifolia* (Marshall) Michaux – Q]

**Crataegus mendoza** Beadle. Cp, Pd (GA), [SC]: mesic hardwood forests, mixed pine-hardwood forests, upland wooded hills over calcareous substrates and well-drained clays; uncommon. Lower Piedmont and upper Coastal Plain of sc. SC, WC. GA, ne. and c. AL, and c. and s. MS. April; September. Allied to *C. pulcherrima* Ashe, and perhaps only a variety of it, *C. mendoza* is distributed well northward and eastward beyond the bulk of the range of *C. pulcherrima*. Related *C. venusta* Beadle and *C. australis* Beadle occur in central AL. [= K, N, Q, S, X]

**Crataegus mollis** Scheele, Downy Hawthorn. Mt (VA), Pd (GA): mesic forests, alluvial forests, wooded uplands over basic or calcareous soils; rare in our area. Late March-April; September-October. The unusual occurrence of this species in the Mountains of VA is atypical of the majority of the range, which is north and west of VA and AL; ME to ND, s. to s. TX, e. to nw. GA. *C. mollis* shows wide variability in size and shape of leaves and fruit, but the tomentose young petioles and pubescent leaf undersides are consistent. The fruits of some local genotypes can reach 24 mm diameter, among the largest of the genus in the U.S. *C. mollis* often reaches treelike dimensions, to 10 m tall and trunk diameters to 30 cm. [= C, S, X; > *C. mollis* var. mollis – F, G; > *C. mollis* – K, Q; > C. cibaria Beadle – Q; > C. gravida Beadle – Q; > C. cibils Ashe; > C. meridionalis Sargent – K; > C. albicans W.W. Ashe – S]

**Crataegus mundia** Beadle. Mt, Pd, Cp (GA, NC, SC): xeric or subxeric forests, scrublands, disturbed woodlands; uncommon. Late March-April; September-October. NC south to n. FL, west to s. and c. AL. *C. mundia* as here considered includes in synonymy several shrubby taxa, with small (1–3 cm), predominately spatulate leaves, slender geniculate twigs, and inflorescences of 1 to 3 (<5) flowers. [= X; < *C. flava* Aiton – RAB; W; > *munda* – K, Q; > *geniculata* Ashe – Q; > C. yadkinensis Ashe – Q; > *pexa* Beadle – Q; > *invicta* Beadle – K, Q; > C. floridana Sargent – S]

**Crataegus pallens** Bealle. Mt (NC): subxeric forests, slopes, rock outcrops, especially over mafic or calcareous substrates; rare. Late April-May; September-October. W. NC, e. TN, ne. AL, and perhaps n. GA. *C. pallens* is allied to *C. intricata* Lange, as well as exhibiting characters of the native affixed with *C. pulcherrima* Ashe. The oblong-ovate leaves with 2 to 3 pairs of straight-sided lobes, 15-20 stamens, yellowish oval fruit, dark furrowed bark, and somewhat twiggy crown atop these multi-stemmed shrubs is here considered diagnostic. A closely related taxon, *C. pinetorum* Beadle (Pineland Hawthorn), of ne. AL and uncertain distribution beyond, exhibits subglobose reddish fruit on pedicels 1–2 cm. [= X; < *C. flabella* – RAB; < *C. intricata* Lange – K, S]

**Crataegus phaeophyrum** (Linnaeus f.) Medikus, Washington Hawthorn. Mt, Pd (GA, NC, SC, VA), Cp (NC, SC, VA): upland forests, floodplain forests, pastures, thickets, disturbed areas; uncommon (though locally abundant). May–early June; September-October. One of our most distinctive hawthorns, and commonly cultivated across the eastern U.S. Native range presumed to be PA s. to FL, w. to IL, MO, MS; naturalized populations originating from widespread cultivation may be
involved in parts of this range, and expansions elsewhere. [= RAB, C, G, K, W, X; > C. youngii Sargent – F; > C. phaenopyrum – F, S; > C. populifolia – S]

**Crataegus pruinosa** (Wendl.) Koch, Frosted Hawthorn. Mt, Pd (NC, SC, GA, VA), Cp (NC, SC, GA): upland forests, pastures, rock outcrops, mountain summits and balds, floodplain forests; uncommon (though locally abundant). April-May; September-October. Broadly defined, a variable species with many closely related taxa here considered synonymous. This species may occur as a loose shrub or tree, or become colonial in regularly disturbed areas. The presence of a waxy bloom on the mature fruit (pruinosa) is not a dependable trait, and fruits can vary from green to bright red, glaucous or not. Foliage and floral parts are usually entirely glabrous on plants in our area. [= C, S, W, X; < C. flabellata – RAB; > C. pruinosa var. pruinosa – F, G; > C. pruinosa var. delawarensis (Sargent) Palmer – F, G; > C. rugosa – F, G; > C. pruinosa – K; > C. arcana Beadle – K, Q; > C. rustica Beadle – Q; > C. vicinalis Beadle – Q; > C. gattingeri Ashe – Fe; > C. gattingeri var. gattingeri – Gt; > C. gattingeri var. rigidica Palmer – Gt; > C. georgiana Sargent – Q]

**Crataegus pulcherrima** Ashe, Beautiful Hawthorn. Cp (GA), Mt (GA): upland hardwood forests and hardwood-pine mixtures, ravines, mesic slopes, especially over iron-rich soils and rolling terrain with soils high in clay or loam content; uncommon (though locally abundant). Se, GA, c. Panhandle FL, west to LA (and perhaps e. TX), north to c. MS and n. AL. April; September-October. Defined broadly, C. pulcherrima includes many closely related species described by Beadle, most not clearly distinct and here considered synonymous. Some may deserve varietal status following further study. Foliage of C. pulcherrima display a consistency of evenly-lobed leaves with straight, parallel primary veins and obscure secondary venation. The inflorescences are compound, with 20 stamens per flower; fruits are usually small (5-10 mm diameter), with dense flesh; bark of main trunk brown, furrowed. [= X; > C. pulcherrima – K, N, Q; > C. macilenta Beadle – Q; > C. lenis Beadle – Q; > C. ancisa Beadle – K, Q; > C. opinia Beadle – N, Q; > C. inanis Beadle – K, Q; > C. illustris Beadle – Q; > C. incilis Beadle – N, Q; < C. intricata Lange – S]

**Crataegus punctata** Jacquin, Dotted Hawthorn. Mt. (VA, NC): high elevation forests, balds, rock outcrops; uncommon (though locally abundant). The majority of range is north of our area, with southern limits along the higher Appalachian elevations of NC, TN (perhaps n. GA), and west to KY, MO, and IL. May; September-October. C. punctata is considered here distinct from C. collina, which has a wider Southeastern range and habitat tolerance. C. punctata, often in company with C. macro sperma, comprises the majority of hawthorn forests, "orchards," and thickets seen in the high elevations of the North Carolina Blue Ridge, in openings and disturbed Picea rubens and Abies fraseri forests. [= K, Q, W, X; < C. punctata – RAB, C; > C. punctata var. punctata – F, G; > C. punctata var. aurea Aiton – F, G; > C. punctata var. canescens Britton – F, G; > C. punctata var. paustica (W.W. Ashe) Palmer – F, G; ? C. punctata – S]

**Crataegus sargentii** Beadle, Sargent's Hawthorn. Pd (GA): mesic upland forests over calcareous or circumneutral substrates; rare. W. GA, c. and n. AL (and perhaps se. TN). April; September. C. sargentii displays intermediate characteristics between the range of variation seen in C. intricata and that of C. pulcherrima. It is also on the northern range limits of the latter group. Although this might suggest hybrid origin, the genetics of C. sargentii has not been carefully investigated. Fruit production is usually scanty in C. sargentii, and seed viability appears to be very low. [= K, Q; > C. sargentii – N, Q; > C. eximia Beadle – N, Q; > C. silva Beadle – N, Q; > C. gilva Beadle – N, Q; < C. intricata Lange – S]

**Crataegus schuetzei** W.W. Ashe, Schuette's Hawthorn. Mt (VA, NC): mesic hardwood forests; uncommon (though may be locally abundant). April-May; September-October. C. schuetzei occupies a range predominately north of our area, in NH, NY, WI, n. IL, n. WV; known to extend s. to w. NC (and perhaps also to e. TN and n. GA), but the extent of distribution is poorly understood. Closely related to C. macro sperma. Foliage of juvenile shoots of C. schuetzei in w. NC often are laciniate, with deep, acute sinuses nearly reaching the midrib. [= K, Q; < C. flabellata (Bosc) K. Koch – RAB, C; > C. basilica Beadle – F, G, Q, W]

**Crataegus senta** Beadle. Mt (NC), Cp (SC) (GA?): upland hills, disturbed forests, pastures; uncommon. W. NC and c. SC (perhaps south to GA and n. FL). April-May; September. C. senta appears to be one of the most northerly distributed hawthorns allied closely to the group to which C. alabamensis Beadle, C. lassa Beadle, and C. lactuca Small belong. The drooping branches, red fruit, and small, sharply 3-lobed or 3-pointed, obovate leaves are distinctive. [= Q, X; < C. flava Aiton – RAB, K, S, W; > C. pentasperma Ashe]

**Crataegus spathulata** Michaux, Littlehip Hawthorn. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, NC, SC): bottomland forests, extending upslope to drier sites or on calcareous or calcareous substrates; uncommon in NC, common southward. April-May; September-October. E. NC south to Panhandle FL, west to e. TX, north in the interior to w. NC, c. TN, s. MO, and e. OK (Platts 1998). This species is distinctive for its small spattulate leaves (tending to be trilobed) and thin, flaking bark (multicolored green, brown, and brownish gray). [= RAB, C, F, G, K, Q, S, W, X, Y]

**Crataegus succulenta** Schrader ex Link, Fleshy Hawthorn. Mt (NC, VA): high elevation rocky summits, mesic forests, high pastures, especially over basic soil or mafic substrates; rare. May; October. Widespread across the northern U.S. states, extending s. along the Appalachians to WV, w. VA, w. NC, and s. in the interior to MO. An attractive species, with bright red fruit, obovate to orbicular leaves with reticulate venation, widely spreading branches, and numerous long thorns (5-9 cm long). [= RAB, C, K, S, W, X; > C. succulenta var. succulenta – F, G; > C. succulenta var. neofluvialis (Ashe) Palmer – F, G; > C. neofluvialis Ashe – Q; > C. vernans Ashe]

**Crataegus triflora** Chapman, Threeflower Hawthorn. Mt, Pd, Cp (GA): wooded ravines and slopes under mesic forests, limestone outcrops, flatwoods, prairies; rare. April-May; September-October. Nw. and wc. GA, west to AL, MS, LA; (possibly in TN?). Usually a multi-stemmed shrub 1-3 m tall, but occasionally to 6 m. C. triflora produces some of the largest flowers in the genus (to 3 cm diameter), though frequently only 3 flowers borne per inflorescence; occasional vigorous plants may bear 3-5 flowers per inflorescence. The orange-red, soft fruit is palatable and may reach 22 mm diameter. [= K, W, X; > C. triflora – Q, U; > C. austromontana Beadle – Q, U]

**Crataegus uniflora** Muenchhausen, Oneflower Hawthorn. Mt, Pd, Cp (GA, NC, SC, VA): upland forests, disturbed lands, roadsides, rock outcrops, often in xeric or sub-xeric conditions; common. April-May; September-October. PA and NJ south to n. FL, w. to e. TX, OK, and MO. Normally a shrubby species, 0.5-2 m in height, though local forms may reach 4 m, particularly in

**ROSACEAE** 475
Crateagus visinda Beadle. Pd, Cp (GA, NC, SC): upland pine and pine-oak forests, disturbed lands, wooded hills with clay or sandy soils, often in xeric or sub-xeric conditions; uncommon. April; late August-September. Central & upper Coastal Plain of NC south to n. FL, west to s. & e. MS, n. AL, and nw. GA. C. visenda is related closely to C. aprica Beadle, but the foliage tends to have a higher percentage of nearly orbicular blades and branches are more recurved or drooping. Often attaining the dimensions of a small tree (4-8 m tall and with a trunk 7-20 cm diameter).
**Drymocallis** Fourier ex Rydberg 1908 (Drymocallis, Wood-beauty)

A genus of about 30 species, best segregated from *Potentilla*. Molecular phylogenetic studies indicate that this genus is more closely related to *Alchemilla, Aphanes, Dasiphora, Fragaria, Sibbaldiopsis*, and other genera outside our area than to *Potentilla* (Eriksson et al. 2003). References: Ertter in FNA (in press); Ertter (2007)=Z; Eriksson, Donoghue, & Hibbs (1998); Eriksson et al. (2003); Kalkman in Kubitzki (2004).

**Drymocallis arguta** (Pursh) Rydberg, Tall Drymocallis, Tall Wood-beauty. Mt (VA, WV): greenstone barrens, other barrens; rare. QC west to NT, south to w. VA, IN, MO, and AZ. Reported for e. TN by Gattinger (1901); the documentation unknown. [= FNA, Z; = *Potentilla arguta* Pursh – F, G, WV; > *P. arguta* var. *arguta* – C; > *P. arguta* ssp. *arguta* – K]

**Eriobotrya** Lindley 1821 (Loquat)


**Exochorda** Lindley 1858 (Pearlbush)


**Filipendula** P. Miller 1754 (Queen-of-the-Prairie)


1 Lateral leaflets lobed and toothed; flowers pink; fruit straight; rootstock with long subterranean runners; [native plant of wetlands, also sometimes cultivated]; [section Albicoma].............................................................................................................................................................................. *F. rubra*  
2 Lateral leaflets merely coarsely toothed; flowers white; fruit twisted; rootstock short, without runners; [introduced species, sometimes cultivated, rarely naturalized, native of ec. China. Reported for Lowndes County, GA (Carter, Baker, & Morris 2009). Also reported for L.A. [= FNA, K, WH]

**Filipendula ulmaria** (Hill) B.L. Robinson, Queen-of-the-Prairie. Mt (NC, VA, WV), Pd (VA): bogs, wet meadows, over mafic or calcareous rocks; rare. June-July; July-September. PA west to n. IL and MN, south to WV, w. VA, w. NC, e. TN (Roane County, fide Gattinger 1901), and MO (reports from GA appear to be unsubstantiated). The closest relatives are the other two members of section *Albicoma*: *F. palmata* (Pallas) Maximowicz and *F. angustifolia* (Turezaninow) Maximowicz, both of ne. Asia. [= RAB, C, F, FNA, G, GW, K, S, W, WV, Y, Z]  
* Filipendula ulmaria* (Linnaeus) Maximowicz, Meadowsweet, Queen-of-the-Meadow. Mt (WV): disturbed areas; rare, native of Europe. Cultivated and sometimes escaped or persistent. It is reported for KY, WV, PA, and NJ (Kartesz 1999). [= FNA, WY, Y; > *F. ulmaria* var. *ulmaria* – C, F, G; > *F. ulmaria* ssp. *ulmaria* – K]

**Fragaria** Linnaeus 1753 (Strawberry)


1 Fruit (at least the larger on a plant) usually > 1.5 cm thick; petals 10-15 mm long; leaves evergreen; [cultivated, rarely persistent].......................... *F. xananassa*  
2 Fruit 1-1.5 cm thick; petals 3-10 mm long; leaves deciduous (at least tardily so); [native].  
3 Achenes set in pits on the mature receptacle; calyx lobes appressed to the developing fruit (after petal drop); petals (5-) 7-10 mm long; principal lateral veins diverging from the midrib of the leaflet at an angle of ca. 30 degrees; terminal tooth of leaflets > ½ as wide as the adjacent teeth, as long as or surpassing them in length............................................................................................................. *F. virginiana*  
3 Achenes superficial on the mature receptacle; calyx lobes spreading to reflexed from the developing fruit (after petal drop); petals 3-7 mm long; principal lateral veins diverging from the midrib of the leaflet at an angle of ca. 45 degrees; terminal tooth of leaflets < ½ as wide as the adjacent teeth, and surpassed by them in length.  
4 Long hairs of the petioles and peduncles spreading to retrorse............................................................................................................. *F. vesca* var. *americana*  
4 Long hairs of the petioles and peduncles ascending to appressed............................................................................................................. *F. vesca* var. *vesca*
**Fragaria ×ananassa** ThUILler (pro sp.) **[chiloensis × virginiana]**, Garden Strawberry, Cultivated Strawberry. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): gardens, persistent on garden edges; commonly cultivated; rare. An octoploid garden hybrid of the two octoploid species, *F. chiloensis* and *F. virginiana*. [= RAB, F, FNA; = *F. ×ananassa* var. *ananassa* – K; = *F. ×ananassa* var. *ananassa* – C; WV; = *F. chiloenis* Duchesne var. *ananassa* – G]

**Fragaria vesca** LINnaeus var. **americana** Porter. Mt (NC, VA, WV), Pd (DE), Cp (DE, VA): woods, fields, roadsides; uncommon (rare in NC and VA). April-June. NL (Newfoundland) and BC south to e. VA, w. NC, TN, MO, NE, CO, NM, and AZ. [= C, F, G; < *F. vesca* – RAB; = *F. vesca* sp. *americana* (Porter) Staudt – FNA, K, W; = *F. americana* (Porter) Britton – S; > *F. vesca* var. *americana* – W; > *F. vesca* var. alba (Ehrhart) Rydberg – F]


**Fragaria vesca** LINnaeus var. *vesca*. NL (Newfoundland), QC and MI south to PA, WV (?), KY, and IL. [= C, F, G; = *F. vesca* sp. *vesca* – FNA, K]

**Geum** LINnaeus 1753 (Avens)

A genus of 40-60 species, herbs, mainly of north temperate areas. Many researchers have advocated breaking *Geum* into varying numbers of segregate genera; even the most conservative divisions place *G. radiatum* in a genus separate from our other species (such as *Parageum*; see synonymy) and some would place *G. vernum* in *Stylitus*. Molecular studies (Smedmark 2006; Smedmark & Eriksson 2002) make a strong case for a broad circumscription of *Geum*, including *Waldsteinia*, as many of the segregates are complexly and reticulately interrelated. References: Rohrer in FNA (in press); Phipps in FNA (in press); Robertson (1974)=Z, Bolle (1933)=Y; Král (1966)=X; Smedmark (2006)=V; Weakley & Gandhi (2009)=Q; Smedmark & Eriksson (2002); Kalkman in Kubitzki (2004). [including *Parageum* and *Waldsteinia*]

<table>
<thead>
<tr>
<th>1</th>
<th>Style deciduous; leaves 3-foliolate or 3-lobed, lacking small leaflets towards the base; [subgenus or genus <em>Waldsteinia</em>]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Leaves trilobate (the sinuses cleft 1/4 to 3/4 the way to the midrib); leaves rather densely pubescent with stiff hairs, these distributed mostly or strictly on the veins, the intervein surfaces glabrous to very sparsely pubescent; [more widespread].</td>
</tr>
<tr>
<td>3</td>
<td>Petals 2.5-4 mm long (about as long as the sepals), 1.5-1.5 mm wide; [of VA and KY southwards].</td>
</tr>
<tr>
<td>4</td>
<td>Style persistent; leaves various (see below).</td>
</tr>
<tr>
<td>5</td>
<td>Calyx lobes 2-4 mm long, lacking bractlets between the lobes; head of achenes elevated above the calyx on a 1-2 mm stipe; flowering April-May; fruiting May-June; [subgenus or genus <em>Stylitus</em>].</td>
</tr>
<tr>
<td>6</td>
<td>Calyx lobes 3-15 mm long, with bractlets between the lobes; head of achenes more-or-less sessile; flowering May-August; fruiting late May-September; [subgenus or genus <em>Geum</em>].</td>
</tr>
<tr>
<td>7</td>
<td>Petals bright yellow, 5-9 mm long.</td>
</tr>
<tr>
<td>8</td>
<td>Larger stipules &gt; 10 mm wide, coarsely toothed or even lobed; mid-cauline leaves very coarsely toothed, with 1-5 teeth per cm of margin.</td>
</tr>
<tr>
<td>9</td>
<td>Plant in flower.</td>
</tr>
<tr>
<td>10</td>
<td>Petals bright yellow, 5-9 mm long.</td>
</tr>
<tr>
<td>11</td>
<td>Larger stipules &gt; 10 mm wide, entire to toothed; mid-cauline leaves less coarsely toothed, with 3-7 teeth per cm of margin.</td>
</tr>
</tbody>
</table>

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### Notes

- *Fragaria ×ananassa*: Hybrid of *F. chiloensis* and *F. virginiana*.
- *Fragaria vesca*: Native to North America.
- *Geum*: Includes freshwater and upland species, with a wide range of leaf shapes and flower colors.

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**References**

- Rohrer in FNA (in press).
- Phipps in FNA (in press).
- Robertson (1974)=Z, Bolle (1933)=Y.
- Král (1966)=X.
- Smedmark (2006)=V.
- Weakley & Gandhi (2009)=Q.
- Smedmark & Eriksson (2002).
11 Petals (2-) 2.5-4 (-5.5) mm long; pedicels densely hirsute with spreading or slightly reflexed hairs, and also puberulent; [of wetlands] ................................................................. G. laciniatum

9 Plant in fruit.

12 Pedicel predominantly puberulent, also sometimes with scattered longer hairs; cauleine leaves mostly 3-foliolate or simple; receptacle densely hirsute with yellowish, stiff hairs (best seen by removing a several achenes to expose the receptacle surface); [widespread and common in our area, primarily occurring in moist to wet forests] ........................................... G. canadense

12 Pedicel moderately to densely hirsute with spreading to reflexed hairs 1-2.5 mm long, and also puberulent; cauleine leaves mostly pinnately compound, the leaflets mostly elongate and often also lateri-acuminate divided; receptacle glabrous or sparsely to densely hirsut; [rare in our area, occurring in the Mountains of NC and the Mountains, Piedmont, and Coastal Plain of VA, primarily in bogs and boggy meadows].

13 Hairs on the achene extending upward onto the lower portion of the style; pedicel sparsely hirsute with spreading hairs; receptacle densely hirsut .......................................................... G. aleppicum

13 Hairs on the achene absent or at least not extending upward onto the lower portion of the style; pedicel densely hirsute with spreading to reflexed hairs; receptacle glabrous to sparsely hirsut ......................................................... G. laciniatum


Geum canadense Jacquin. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, NC, SC, VA): moist slope forests, bottomland forests, swamp forests; common. May-July; July-September. NS west to ND, south to c. GA and TX. Some authors have recognized a number of varietes in G. canadense (see synonymy); some (at least) of these may warrant recognition. [= RAB, C, FNA, G, GW, S, W, Z; > G. canadense var. canadense – K, F, WW, Y; > G. canadense var. brevipes Fernald – F, Y; > G. canadense var. camorum (Rydberg) Fernald & Weatherby – F, Y; > G. canadense var. grimesii Fernald & Weatherby – F, Y]


Geum fragarioides (Michaux) Smledmark, Northern Barren Strawberry. Pd (NC, VA), Mt (WV): forests, streambanks; rare. Late March-May; May-June. NB west to MN, south to NC, TN, IN, MO, and AR. [= Q = Waldsteinia fragarioides (Michaux) Trouetnick var. fragarioides – C, F; < W. fragarioides – RAB, W, WW, Y; = W. fragarioides ssp. fragarioides – K, Z; = Waldsteinia fragarioides – FNA, G, S; < Geum fragarioides (Michaux) Smledmark = V]

Geum geniculatum Michaux, Bent Avens. Mt (NC): seeps, seepy boulderfield forests, grassy balds, cliff bases, banks of cool streams up to about 5 m wide, at high to moderate elevations on Grandfather Mountain (Avery, Watauga, and Caldwell counties, NC), the Roan Mountain massif (Avery and Mitchell counties, NC and Carter County TN), and Rich Mountain (Watauga County, NC); rare, though locally fairly common (US Species of Concern, NC Threatened). Late June-August; August-September. G. geniculatum is apparently restricted to the few highest peaks in nw. NC and ne. TN: the Roan Mountain massif (Roan High Knob, Roan High Bluff, Round Bald, Jane Bald, Grassy Ridge, Little Hump Mountain, Big Yellow Mountain, and Big Hipp Mountain), Grandfather Mountain, and Rich Mountain. It may be found on a few other peaks, such as Snake Mountain. The distribution of this species is peculiar. While limited to the several highest and coldest mountains in the Southern Appalachians, it extends downslope on Roan Mountain and Grandfather Mountain nearly to their bases, in environmental situations that are apparently duplicated on many other Southern Appalachian peaks. Perhaps G. geniculatum was more widespread in the Southern Appalachians in the cooler, moister conditions of the post-Pleistocene, but became restricted to the few coldest peaks during the warmer, drier conditions of the Hypsithermal Interval (7000-2000 B.C.). Following climactic cooling, it was able to disperse downslope from its several refugia, but has not dispersed successfully to other peaks. G. geniculatum is most closely related to the circumboreal G. rivale, with which it shares such characteristics as purplish, non-reflexed sepals, a relatively long terminal style segment, upper pedicel with long glandular hairs, and basal style segment with long glandular hairs. [= RAB, FNA, KS, S, W, Y, Z]

Geum lacinatum Murray, Rough Avens. Mt (NC, SC, VA, WV), Cp (DE, VA), Pd (DE, VA): bogs and wet meadows; uncommon (rare in NC, SC, and VA). June-July; July-August. Two varieties are sometimes recognized: var. lacinatum has glabrous achenes and is generally more northern and more restricted in distribution than var. trichocarpum, which has achenes sparsely to densely pubescent with long stiff trichomes, and ranges from NS west to s. ON, south to MD, VA, w. NC, TN, OH, IL, MO, and KS. The difference appears to be that of a single trait, uncorrelated with other traits, and with largely overlapping geographic distributions; the varieties are not recognized here. [= RAB, C, FNA, GW, W, Y; > G. lacinatum var. lacinatum – F, G, K, WW, Z; > G. lacinatum var. trichocarpum Fernald – F, G, K, Z]

Geum lobatum (Baldwin ex Elliott) Smledmark, Lobed Barren Strawberry. Mt (GA, NC, SC), Pd (GA, SC): forests, streambanks; rare. March-May; May-June. SW. NC south to nw. SC and n. and c. GA. Some populations appear to be morphologically intermediate between G. lobatum and G. donianum; further study is needed. [= Q, V; = Waldsteinia lobata (Baldwin ex Elliott) Torrey & A. Gray – FNA, KS, S, Y, Z]

Geum raditatum Michaux, Spreading Avens, Cliff Avens. Mt (NC): high elevation rocky summits, in thin soil at tops of cliffs and on ledges (where not tramplled), in pockets of soil on nearly vertical portions of cliffs, in open grassy balds, around Rhododendron catawbiense in grassy balds, or in grassy areas at bases of cliffs (where succession by shrubs is prevented by accumulation of seepage ice and by stone fall); rare. June-August; July-September. Ranging from Ashe County, NC (Phoenix Mountain) south and west to Sevier County, TN (Mount Leconte) and Transylvania County, NC (the Devil's Courthouse), restricted to "pseudo-alpine" rock outcrops and grassy meadows near the summits of the higher peaks of the Southern Blue Mountains.
Gillenia Moench 1802 (Indian-physic, Bowman's-root)

A genus of 2 species, herbs, of e. North America. The contention that Gillenia is a later homonym of Gillena and must therefore be rejected for the later name Portanthenus has been ruled against (see Robertson 1974; Brummitt 1988; Parkinson 1988). References: Nesom in FNA (in press); Robertson (1974)=Z; Kalkman in Kubitzki (2004).

1 Stipules ovate, 10-20 (125) mm long; lower leaf surface densely glandular; leaves trifoliolate, the leaflets of the lower leaves laciniate-toothed
   to divided .................................................................................................................................................................................................
   G. trifoliata

1 Stipules linear, 6-8 mm long; lower leaf surface glabrous or sparsely glandular; leaves trifoliolate, the leaflets of the lower leaves merely
toothed, like the upper leaves ...........................................................................................................................................G. stipulata

Gillenia stipulata (Muhlenberg ex Willdenow) Nuttall, Midwestern Indian-physic. Pd (GA, NC, VA), Mt (GA, WV): dry to mesic woodlands and forests, especially over circumneutral soils derived from diabase (in NC) or greenstone (in VA); uncommon (rare in GA, NC, and VA). May-June; July-October. NY to KS, south to nw. GA and TX, and disjunct east of the Blue Ridge in sc. VA, c. NC, and c. GA. [= RAB, F, FNA, G, WV; = Portanthenus stipulatus (Muhlenberg ex Willdenow) Britton – C, K, S, W, Z]


Kerria A.P. de Candolle 1818 (Kerria)


Malus P. Miller 1754 (Apple, Crabapple)


* Neillia incisa* (Thunberg) S.H. Oh, Lace Shrub. Pd (VA): suburban woodlands; rare, establishing from horticultural plantings, native of Japan and Korea. [= FNA, Z; = Stephanandra incisa (Thunberg) Zabel – K]

**Neviusia** A. Gray 1858 (Snow-wreath)


**Neviusia alabamensis** A. Gray, Alabama Snow-wreath. Mt (GA): limestone woodlands, where there is seasonal moisture; rare. Sc. TN (Chester, Wofford, & Kral 1997), nw. GA (Jones & Coile 1988), and n. AL; disjunct in AR and MO. [= K, S]

**Photinia** Lindley 1821 (Photinia, Redtip)

A genus of about 40 species, trees and shrubs, of Asia and Central America. References: Nesom in FNA (in press); Kalkman in Kubitzki (2004). [also see *Aronia* and *Pourthiaea*]

1 Leaves evergreen, coriaceous, (6-) 9-20 cm; inflorescences 4-18 cm wide; pedicels without lenticels ........................................... *P. serratifolia*

1 Leaves deciduous, herbaceous, 4-9 cm long; inflorescences 3-6 cm wide, pedicels with warty lenticels ........................................... [see *Pourthiaea*]
Physocarpus (Cassinian Gooseberry)

1 Follicles stellate-pubescent ................................................................. P. opulifolius var. intermedius
1 Follicles glabrous ................................................................................. P. opulifolius var. opulifolius

Physocarpus opulifolius (Linnaeus) Maximowicz var. intermedius (Rydberg) B.L. Robinson, Midwestern Ninebark. Cp (FL), Pd (SC, NC?): mesic hammocks, streambanks; rock outcrops; rare. W. NY west to MN and CO, south to SC, FL, AL, and AR. It is unclear whether the southern species recognized by Small (1933) are best allied with this taxon. Additional study is needed. [= C, F, G, K, Z; < P. opulifolius – RAB, W, WH; = P. intermedius (Rydberg) C.K. Schneider – FNA; > Opulaster alabamensis Rydberg – S; > Opulaster stellatus Rydberg – S; > Opulaster intermedius Rydberg]

Physocarpus opulifolius (Linnaeus) Maximowicz var. opulifolius, Eastern Ninebark. Mt (NC, SC, WV), Pd (DE, NC, SC), {GA, VA}: stream banks, riverside thickets, rock outcrops, cliffs, especially over mafic or calcareous rocks; common. May-July. QC west to WI, south to SC, TN, and n. IL. [= C, F, G, K, Z; < P. opulifolius – RAB, W, WV; = P. opulifolius – FNA; > Opulaster opulifolius (Linnaeus) Kunze – S; > Opulaster australis Rydberg – S]

Potentilla Linnaeus 1753 (Cinquefoil, Five-fingers, Potentilla)

1 Flowers in terminal cymes; leaves palmately 3-9-foliolate.
2 Leaves 3-foliolate; [section Rivasae].
3 Petals and sepals subequal; stamens (15-) 20; achenes usually ridged ................................................................. P. norvegica
3 Petals much shorter than the sepals; stamens 5-10 (-15); achenes smooth ................................................................. P. rivialis
2 Leaves 5-9-foliolate.
4 Leaves (5-) 7-9-foliolate; petals 8-15 mm long, pale (sulfur) yellow; [section Rectae] ................................................................. P. recta
4 Leaves 5 (-7)-foliolate; petals 3-7 (-8) mm long, medium yellow; [section Terminales].
5 Leaves pubescent beneath, the green surface not concealed; petals 4-5 mm long ................................................................. P. intermedia
5 Leaves densely tomentose beneath, the surface concealed; petals either 2.5-4 mm long or 5-7 (-8) mm long.
6 Pubescence of the stem and veins of the leaf undersurface tomentose only; lower leaf surface silvery-white tomentose; leaves revolute; petals 2.5-4 mm long. ................................................................. P. argentea
6 Pubescence of the stem and veins of the leaf undersurface tomentose and also with long, spreading hairs; lower leaf surface somewhat to strongly grayish-tomentose; leaves not revolute; petals 5-7 (-8) mm long. ................................................................. P. inclinata
1 Flowers solitary, on naked, axillary pedicels; leaves either palmately 3-5-foliolate or pinnately (5-) 7-21 (-31)-foliolate.
7 Leaves pinnately (5-) 7-21 (-31)-foliolate; [section Anserinae] ........................................................................................................ P. anserina
7 Leaves palmately 3-5-foliolate.
8 Leaves 3-foliolate; fruit strawberry-like, fleshy and red, consisting of an expanded fleshy receptacle bearing superficial achenes; [formerly genus Duchesnea]. ................................................................................................. P. indica
8 Leaves primarily 5-foliolate on a plant (some poorly developed leaves may be 3-4-foliolate); fruit a head of achenes, dry; [section Potentillae].
9 Plants lacking rhizomes; petals (6-) 8-12 mm long; anthers 1.3-2.0 mm long ................................................................. P. reptans
9 Plants with horizontal rhizomes; petals 4-10 mm long; anthers 0.6-1.0 mm long.
10 Terminal leaflet toothed for > ½ its length; plant flowering at 2nd node of stolon, typically with 2 leaves and 1 pedicel at each subsequent node; plants only flowering on elongating stolons ................................................................. P. simplex
10 Terminal leaflet toothed for < ½ its length; plant flowering at 1st node of stolon, typically with only 1 leaf and pedicel at each subsequent node; plants often flowering on short stolons obscured by basal leaves.
11 Middle leaflet of larger leaves 2.5-4 mm long; plants pale-pilate, the pubescence apressed or loosely ascending ................................................................. P. canadensis var. canadensis
11 Middle leaflet of larger leaves 3-6 mm long; plants long-villoso, the pubescence loosely spreading to reflexed ................................................................. P. canadensis var. villosissima

* Potentilla anserina Linnaeus, Silverweed. Lawns, disturbed areas. Circumboreal, south in North America to MA, NY, nw. PA, OH, IN, IL, IA, NE, NM, AZ, and CA; also scattered further south, apparently as an introduction, as in Sevier County, TN (Chester, Wofford, & Kral 1997), se. PA (Rhoads & Klein 1993), MD (BONAP 2010), and n. NJ (BONAP 2010). [= C, F, G; > Potentilla anserina ssp. anserina – FNA; = Argentina anserina (Linnaeus) Rydberg – K]

* Potentilla argentea Linnaeus, Silvery Five-fingers, Hoary Five-fingers. Mt (NC, VA, WV), Pd (NC, VA), Cp (NC, VA): disturbed areas; uncommon (rare in NC and VA), naturalized from Europe. May-July. [= RAB, C, F, FNA, G, W; > P. argentea var. argentea – K]


* Potentilla inclinata Villars. Cp (NC): disturbed areas; rare, naturalized from Europe. May-June. [= C, FNA, K; ? P. canescens Bess. – RAB, F, G]

* Potentilla indica (Andrews) T. Wolf, Indian-strawberry. Cp (DE, FL, GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): disturbed areas, lawns, gardens; common (uncommon in FL and WV), native of Asia. February-frost. Duchesnea is apparently not closely related to Fragaria, and is best combined with Potentilla, which does have other species with accrescent fruits (Eriksson, Donoghue, & Hibbs 1998). The strawberry-like fruit is not sweet; it can also be distinguished from Fragaria by its whitish interior flesh. The leaves are more coarsely toothed than Fragaria. [= Duchesnea indica (Andrews) Focke – RAB, C, F, G, K, S, W, WH, WV]

* Potentilla intermedia Linnaeus. Mt (NC, VA), Pd (VA), Cp (VA), {MD}: disturbed areas; rare, naturalized from Europe. May-July. [= RAB, C, F, FNA, G, K]

Potentilla norvegica Linnaeus, Strawberry-weed, Rough Cinquefoil. Mt (GA, NC, VA, WV), Cp (DE, NC, VA), Pd (DE, GA, NC, SC, VA): pastures, fields, disturbed areas, especially where moist; common (uncommon in GA, NC, SC, and VA Piedmont, uncommon in GA, NC, SC, and VA Coastal Plain). Late May-frost; June-frost. This species is apparently a complex circumboreal species complex, with both native and introduced elements now present in NC. [= RAB, C, FNA, G, W, WV; > P. norvegica var. norvegica – F; > P. norvegica ssp. monspeliensis (Linnaeus) Aschers & Grabe – K; > P. monspeliensis Linnaeus – S; > P. norvegica ssp. hisuta (Michaux) Hylander]


* Potentilla rivalis Nuttall, Brook Five-fingers. Mt (VA, WV), Pd (VA), Cp (VA): habitat not known; rare, adventive from further west. [= C, FNA, G, K; > P. millegrana Engelmann ex Lehmann – F; > P. rivalis var. millegrana (Engelmann ex Lehmann) S. Watson]


Poteridium Spach 1846 (American Burnet)


Poterium Linnaeus 1753 (Salad Burnet)


* Poterium sanguisorba Linnaeus ssp. muricatum (Spach) Rouy, Salad Burnet, Garden Burnet, Fodder Burnet. Mt (NC, VA, WV), Cp (DE, VA): cultivated as an herb and salad green, escaped to moist, disturbed areas; rare, native of Europe. June-July. [= FNA; = Sanguisorba minor Scopoli ssp. muricata (Spach) Nordborg – K, Y, Z; > Sanguisorba minor – RAB, C, F, G, WV; > Poterium sanguisorba Linnaeus – S; = Poterium polygonum Waldstein & Kitaibel]

Pourthiaea Decaisne 1874 (Photinia)

A genus of about 25 species, shrubs, of e. Asia. Guo et al. (2011) indicate that Pourthiaea should be separated from both Photinia and Aronia. References: Guo et al. (2011).

* Pourthiaea villosa (Thunberg) Decaisne, Oriental Photinia. Mt (NC), Pd (DE, NC): uncommonly cultivated, sometimes escaping to suburban woodlands; uncommon (rare in NC), native of e. Asia. [= Z; = Photinia villosa (Thunberg) A.P. de Candolle – FNA, K]
Prunus Linnaeus 1753 (Plum, Cherry, Sloe, Peach, Apricot)


1 Flowers in elongate racemes of (12-)20-many flowers.
2 Leaves evergreen, entire or serrate with few or rather many (but widely spaced) prominent teeth; petioles lacking 2 glands near junction with leaf blade; [native in maritime situations from e. NC southward, but cultivated and escaped inland]; [laurel cherries, subgenus Laurocerasus] .............................................................................................................................................. P. caroliniana
2 Leaves deciduous, regularly and rather finely toothed; petioles with 2 glands near the junction with the leaf blade; [collectively widespread, native and alien]; [black cherries, subgenus Padus] .............................................................................................................................................. Key A
1 Flowers solitary, in fascicles, in umbellate or corymbose inflorescences, or in short racemes (P. mahaleb) of 1-12 flowers.
3 Flowers and fruit pedicellate, the pedicel > 4 mm long; fruit glabrous, ovary glabrous or pubescent initially.
4 Stones globose, not 2-edged; sepals hairy or not; inflorescences subtended by leafy bracts arising from the same bud as the flowers (except P. pensylvanica, P. susquehanna, and P. pumila var. depressa); cherries .............................................................................................................................................. Key B
4 Stones somewhat to strongly flattened, 2-edged; sepals hairy on the upper surface (except P. domestica, P. insititia, and P. persica); inflorescences without leafy bracts arising from the same bud as the flower; plums .............................................................................................................................................. Key C
3 Flowers and fruit sessile or on a pedicel < 2 mm long
5 Fruit scarlet-red, 1 cm in diameter; twigs densely tomentose; fruit and ovary glabrous or somewhat pubescent (but not velvety); leaves < 5 (-7) cm long; petals white (pink in bud), < 13 mm long; [subgenus Lithocerasus, section Armeniacerasus] ..........P. tomentosa
5 Fruit yellow, peach, or orange-colored, > 2 cm in diameter; twigs glabrous; fruit and ovary velvety pubescent; leaves > 5 cm long; petals white or pink, > 11 mm long.
6 Leaves 8-15 cm long, > 4x as long as wide, falcate; fruit peach-colored, > 5 cm in diameter; [peach, subgenus Amygdalus] ......................P. persica
6 Leaves 5-10 cm long, 1-1.5x as long as wide, not falcate; fruit yellow to orange, 3-5 cm in diameter; [apricots, subgenus Prunus, section Armeniaca]
7 Twigs reddish-brown; fruits 3-5 cm in diameter, the flesh sweet when ripe ...................................................................................... P. armeniaca
7 Twigs bright green; fruits 2-3 cm in diameter, the flesh sour and/or bitter when ripe ............................................................................................. P. mume

Key A – BLACK-CHERRIES, subgenus Padus

1 Petals 6-10 mm long; hypanthium pubescent within; stone sculptured; [alien, rarely naturalizing] ......................................................... P. padus
1 Petals 4-7 mm long; hypanthium glabrous within; stone smooth; [native]
2 Leaf teeth triangular, pointing outwards; leaves dull above; sepals conspicuously glandular-eroded on the margin, not persistent on the fruit; colonial, thicket-forming shrub from rhizomes; [montane in our area] ............................................................................................................... P. virginiana var. virginiana
2 Leaf teeth curved, appressed, leaves shiny above; sepals entire or slightly glandular-eroded on the margin, persistent on the fruit; small to large tree, not clonal; [collectively widespread]
3 Leaves mostly 1.5-2x as long as wide, often blunt-tipped (except in shoot leaves); lower leaf surface rather uniformly pubescent, the midrib lacking conspicuous tufts or fringes; branchlets reddish hairy ...................................................................................... P. alabamensis
3 Leaves mostly 2.2-5x as long as wide, slightly acuminate; lower leaf surface glabrous except for tufts or fringes along the midrib; branchlets glabrous .................................................................................................................................................. P. serotina var. serotina

Key B – CHERRIES, subgenera Cerasus and Lithocerasus

1 Plants shrubs, to 1.5 (-3) m tall; [subgenus Lithocerasus; section Microcerasus]
2 Inflorescences of 1-2 flowers; [exotic, persistent from cultivation] ........................................................................................................... P. glandulosa
2 Inflorescences of 2-4 flowers; [native]
3 Youngest twigs glabrous; leaf blades (1.6-)3-4x as long as wide; plants decumbent; stones fusiform, (5.5-)7.3-9.5 (-10.2) mm long; [plants of calcareous shores and gravel bars] ............................................................................................................... P. pumila var. depressa
3 Youngest twigs minutely pubescent; leaf blades mostly 1.7-2.5x as long as wide; plants erect, stones mostly orbicular, (5.3-)5.8-7.8 (-9.2) mm long; [plants of acid sandy or rocky upland sites] ............................................................................................................... P. susquehanna
1 Plants trees, well over 3 m tall when mature; [subgenus Cerasus]
4 Leaf serrations single to double, the tips of the serrations acuminate to attenuate.
5 Leaf serrations attenuate; tree with upright form; [section Sargentella] ................................................................................................. P. serrulata
5 Leaf serrations acuminate; tree usually with weeping form; [section Microcalymma] ...................................................................................... P. subhirtella
6 Petals 4-7.5 mm long; fruit < 1 cm in diameter; [section Phyllomahaleb]
7 Inflorescence with a central axis, thus nearly or actually racemose; fruit blackish; leaves 1-1.5x as long as wide; [exotic tree] ..........P. mahaleb
7 Inflorescence umbellate to corymbose, the central axis absent or poorly developed; fruit red; leaves 2-5x as long as wide; [native tree] ......................................................................................................................... P. avium
6 Petals 9-15 mm long; fruit 1.3-2.5 cm in diameter; [section Eucerasus]
8 Leaves 7-15 cm long, persistently hairy beneath, at least along the midrib and veins; pair of petiolar glands on the petiole near the blade; fruit sweet when ripe .................................................................................................................. P. avium
8 Leaves 4-8 cm long, glabrous beneath once fully-expanded; pair of petiolar glands on the base of the leaf blade; fruit sour when ripe. ......................................................................................................................... P. cerasus
1. Flowers 1-2 (-3) per inflorescence; stone somewhat sculptured; [exotic]; [section Prunus].

2. Leaves 4-6 cm long; fruits 2-3 cm long, yellow to red when ripe; inflorescence of a solitary flower. [P. cerasifera]

3. Leaves 5-10 cm long; fruits 3-7 cm long, blue-black, yellow, or greenish when ripe; inflorescence of (1-) 2-3 flowers. [P. domestica var. domestica]

4. Fruit 5-7 cm long; single-trunked small to medium tree, usually thornless. [P. domestica var. insititia]

5. Fruit 3-4 cm long; thicklet-forming shrub to small tree, often thorny. [P. domestica var. insititia]

1. Flowers (3-) 4-5 per inflorescence; stone nearly smooth; [native]; [section Prunocerasus].

4. Leaf teeth gland-tipped (or with a scar where the gland has fallen); sepals with marginal glands (except P. angustifolia); fruit yellow to red when ripe.

5. Leaves 3-6 cm long, often folded longitudinally; sepals lacking marginal glands. [P. angustifolia]

6. Leaves < 2x as long as wide; petals 10-15 mm long; [of w. VA northward]. [P. nigra]

7. Leaves > 2x as long as wide; petals 4-7 mm long; [of nw. United States, eastward into KY, TN, MS, and present as an introduction still farther eastward in NC, SC, VA, and GA].

8. Leaf teeth triangular, ascending, the gland terminal; flowers opening with the leaves. [P. hortulana]

9. Leaf teeth depressed, the gland near the sinus; flowers opening before the leaves. [P. munsoniana]

4. Leaf teeth glabrous; sepals without marginal glands; fruit yellow, red, purple-red, purple, or black when ripe.

8. Petals 10-15 mm long; leaves 6-10 cm long, acuminate; fruit 2-2.5 cm long, red or yellow.

9. Leaves narrowly to broadly cuneate at the base; petiole usually lacking glands near its junction with the leaf blade; sepals glabrous on the lower side. [P. americana]

9. Leaves broadly rounded at the petiole; usually with glands near its junction with the leaf blade; sepals pubescent on the lower side. [P. mexicana]

10. Twigs and pedicels pubescent, often densely so; leaf apices acute to obtuse. [P. nigra]

11. Plants often suckering and forming thickets, less often single plants, shrubs or less often trees; leaf apices short acuminate (merely acute); pedicels usually < 10 mm long; [Mountains and Piedmont from nw. NC northward].

11. Plants usually not suckering, often single plants but sometimes in small colonies, generally trees; leaf apices mostly acute; pedicels usually > 10 mm long; [Coastal Plain, Piedmont, and Mountains of s. NC, SC, GA, FL, AL, MS, LA, and westward]. [P. umbellata]

Prunus alchemensis C. Mohr, Alabama Black Cherry. Cp (AL, FL, GA, SC), Pd (GA), Mt (AL, GA): sandhills, other xeric sandy or rocky forests and woodlands, often associated with Pinus palustris (even in the Piedmont and Mountains); uncommon (rare north of GA). April-May; July-August. C. SC, nw. GA, n. AL south to Panhandle FL and s. AL; the NC record is based on a misidentified specimen. [= K; = Prunus serotina Ehhrart var. alchemensis (C. Mohr) Little – RAB, WH; > Padus alchemensis (C. Mohr) Small – S; > Padus cuthbertii Small – S; > Padus australis Beadle – S; = Prunus serotina ssp. hirsuta (Elliott) McVaugh – FNA, Y, Z]

Prunus alleghaniensis Porter var. alleghaniensis, Allegheny Plum, Allegheny Sloe. Mt (NC, VA, WV), Pd (VA): dry rocky woodlands, shale barrens, primarily over calcareous or mafic rocks; rare. MA and NY south to w. VA, w. NC, and e. TN. Var. davissii (W. Wight) Sargent is endemic to MI. [= K; < Prunus alleghaniensis – C, F, G, W, WV; = Prunus umbellata Elliot var. alleghaniensis [in press] – FNA]


Prunus angustifolia Marshall, Chickasaw Plum. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, VA, WV): roadsides, fencerows, abandoned fields, especially sandy; common (uncommon in DE and FL, rare in WV). March-April; May-early July. NJ, PA, IN, IL, MO, NE, and CO, south to FL, TX, and e. NM. The original native distribution is unclear; much of its eastern distribution may be the result of early spread by native Americans. [= RAB, C, FNA, G, S, W, WH, WV, Z; > Prunus angustifolia var. angustifolia – F, K]

* Prunus armeniaca Linnaeus, Apricot. Cp (VA): persistent around old home sites; rare, native of n. China. [= C, FNA, K; = Armeniaca vulgaris Lamark]

* Prunus avium Linnaeus, Sweet Cherry, Mazzard Cherry, Bing Cherry. Pd (DE, NC, VA), Mt (VA, WV), Cp (VA), [NC, SC]: common (uncommon in DE Piedmont, rare in DE Coastal Plain), native of Eurasia. [= RAB, C, F, FNA, G, K, S, W, WV, Z; = Prunus serotina var. serotina (Elliott) McVaugh – FNA, Y, Z]

* Prunus caroliniana (P. Miller) Aiton, Carolina Laurel Cherry. Cp (FL, GA, NC, SC), Pd* (GA*), Mt* (GA*): native in maritime forests and sandy hammocks near the coast, escaped cultivation to fencerows and suburban forests and thickets in more inland areas; common (uncommon in GA, NC, SC). March-April; September-October. Se. NC south to FL, west to TX, near the coast. [= RAB, FNA, K, WH, Z; = Laurocerasus caroliniana (P. Miller) M. Roemer – S]

* Prunus cerasus Linnaeus, Sour Cherry, Pie Cherry. Mt (NC, VA, WV), Pd (DE, VA), Cp (VA), [GA]: commonly cultivated, disturbed areas; fencerows, suburban forests; rare, native of Eurasia. April-May; June. [= RAB, C, F, FNA, G, K, S, W, WV, Z; = Cerasus vulgaris P. Miller]
* Prunus domestica Linnaeus *var.* *domestica*, European Plum. Pd (VA): suburban forests; rare, native of Europe. Introduced at scattered locations; reported for Manassas National Battlefield Park (Virginia Botanical Associates 2005); also reported for MD, PA, NJ. Depypere et al. (2009) found that *P. domestica* and *P. insititia* were genetically very similar, but generally separable morphologically; they favored combining the two into a single species based on their similarity, variability and likely origin from complicated hybridization and domestication by man. [= K; = Prunus domestica ssp. domestica – C; < Prunus domestica – FNA]

* Prunus domestica Linnaeus *var.* *insititia* (Linnaeus) Fiori & Paoletti, Damson, Bullace. Cp (DE), Pd (VA): uncommonly cultivated, suburban woodlands; rare, native of Europe. [= K; = P. insititia Linnaeus – F, G, Z; = Prunus domestica ssp. insititia (Linnaeus) C.K. Schneider – C; = Prunus domestica Linnaeus *var.* *insititia* (Linnaeus) Fiori & Paoletti – K; < Prunus domestica – FNA]

* Prunus glandulosa* Thunberg, Dwarf Flowering Almond. Cp (NC), Mt (WV): persisting at abandoned homesteads; rare, native of c. and n. China and Japan. [= FNA, K; = Cerasus glandulosa (Thunberg) Sokolov]


* Prunus mahaleb* Linnaeus, Mahaleb Cherry, Perfumed Cherry, St. Lucie Cherry, Rock Cherry. Mt (NC, VA, WV), Pd (DE, NC, VA): roadsides, old homesteads; rare, native of Europe. April-May; July. [= RAB, C, F, FNA, G, K, W, WV, Z; = Cerasus mahaleb (Linnaeus) P. Miller]

**Prunus maritima** Marshall, Beach Plum. Cp (DE, MD, VA?): ocean dunes and sandy coastal soils (from c. MD northward), disturbed dune-like area on shore of Chesapeake Bay (in e. VA); uncommon (rare in MD and VA). Native from NB south to e. MD, along the coast; somewhat disjunct in e. VA in an ambiguously native occurrence. [= C, FNA; > Prunus maritima var. maritima – C; > Prunus maritima – F, G]

* Prunus mume* (Siebold) Siebold & Zuccarini, Japanese Apricot. Pd (NC): suburban forests; rare, native of s. Japan. April-March. Documented as naturalizing in Battle Park, University of North Carolina, Chapel Hill, where apparently spread from cultivation and reproducing as early as 1939. [= Armeniaca mume Siebold]

*? Prunus munsoniana* W. Wight & Hedrick, Munson Plum. Pd (GA, NC, VA), Mt (VA): roadsides; rare. OH, IL, MO, and KS, south to MS and TX; disjunct (introduced?) in GA, NC, VA, and NJ. [= C, F, G, K, S, Z]

* Prunus nigrum* Aiton, Canada Plum. Mt (VA, WV), Pd (VA): old fields, hedgerows, forest edges; uncommon. May-June. NL (Newfoundland) west to MB, south to NY, OH, IN, IL, and IA; apparently disjunct in VA and WV. [= C, F, FNA, G, K, WV]

* Prunus padus* Linnaeus, European Bird Cherry. Pd (DE): suburban woodlands; rare, native of Europe. Cultivated and rarely escaped at least as far south as se. PA (Rhoads & Klein 1993) and DE (Kartesz 1999). [= C, FNA, K]

* Prunus pennsylvanica* Linnaeus f., Fire Cherry, Pin Cherry. Mt (GA, NC, VA, WV): high elevation forests, thickets at high elevations resulting from fire or logging; common (rare in GA). April-May; August-September. NL (Newfoundland) west to BC, south to w. NC, n. GA, e. TN, n. IL, IA, SD, and CO. [= RAB, C, F, FNA, G, K, W, WV, Z; > Prunus pennsylvanica var. pennsylvanica – C; > Prunus pennsylvanica – S (an orthographic variant)]


* Prunus pumila* Linnaeus *var.* *depressa* (Pursh) Gleason, Prostrate Dwarf-cherry, Northern Sand Cherry. Mt (WV): sandy or gravelly shores and islands; rare. NL (Labrador) west to ON, south to NJ, s. PA (Rhoads & Klein 1993), c. WV, and TN. [= C, G, FNA, K, X; = Prunus depressa Pursh – F; < Prunus pumila – WV]

* Prunus serotina* Ehrhart *var.* *serotina*, Black Cherry. Mt (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): rich coves, bottomlands, northern hardwood forests, and in a wide variety of lower elevation habitats from dry to mesic, and weedy in fencerows; common. North-May; July-August. NS west to ND, south to c. peninsular FL and e. TX. Several other varieties occur in sc. and sw. America, from c. TX westwards. In the Piedmont and Coastal Plain, *P. serotina* is generally a small, scrubby tree of fencerows and an understory tree in forests and woodlands, but in the Mountains reaching large sizes and full canopy stature. [= K, WH; > Prunus serotina var. serotina – RAB; < Prunus serotina – C, F, G, W; < Padus virginiana – S, misapplied; = Prunus serotina ssp. serotina (FNA, Y, Z)

* Prunus serrulata* Lindley, Japanese Flowering Cherry. Pd (NC): suburban forests; rare, native of Japan. [= FNA, K; = Cerasus serrulata (Lindley) Loudon]

* Prunus subhirtella* Miquel, Higan Cherry, Weeping Higan Cherry, Winter-flowering Cherry. Pd (VA), Mt (NC), Cp (FL): floodplain forests in suburban areas, other disturbed areas; rare, native of e. Asia, commonly planted, rarely escaped, but locally invasive. [= FNA, K; > Prunus subhirtella var. pendula (Maximowicz) = Cerasus subhirtella (Miquel) S.Y. Sokolov]

* Prunus susquehanae* Willdenow, Appalachian Dwarf-cherry, Appalachian Sand Cherry, Susquehanna Cherry. Pd (NC, VA), Mt (NC, VA): open rocky or sandy sites; rare. Sw. ME and sw. QC west to MB, south to nc. and sw. NC, sc. TN (the Barrens region of the Eastern Highland Rim), and IL. Catling (1997) supports species status, based on the greater distinctions of this entity from the other three in the complex. [= F, X; = Prunus pumila Linnaeus var. susquehanae (Willdenow) H. Jaeger – RAB, FNA, K; = Prunus pumila var. cuneata (Rafinesque) L.H. Bailey – C, G; = Prunus cuneata Rafinesque – S; < Prunus pumila – W, Z]

* Prunus umbellata* Elliott, Hog Plum, Flatwoods Plum. Cp (FL, GA, NC, SC), Pd (GA, NC, SC): upland, usually xeric, sandy or rocky forests and woodlands; common. March-April; August-September. S. NC, TN, and AR south to c. peninsular FL and TX. Fox, Godfrey, & Blomquist (1952) report *Prunus mitis* for s. NC (Cleveland County). It is presently unclear how best to treat variation in this complex. [> Prunus umbellata Elliott var. umbellata – K; > Prunus umbellata Elliott var. injuncta (Small) Sargent – K; > Prunus umbellata – RAB, WH, Z; > Prunus umbellata – S; > Prunus mitis Beadle – S; > Prunus injuncta Small – S; = Prunus umbellata var. umbellata – FNA]
**Prunus virginiana** Linnaeus var. virginiana, Choke Cherry. Mt (GA, NC, VA, WV): forming clonal thickets in oak and northern hardwood forests; common (uncommon in WV, rare in GA). Late April-June; July-August. NL (Newfoundland) and NL (Labrador) west to MB, south to w. NC, n. GA, AR, and OK. Other varieties occur in w. North America. [= FNA, K, Z; < *Prunus virginiana* – RAB, C, F, G, W, WV; = *Padus nana* (Du Roi) Roemer – S]

* Prunus cerasifera Ehnhart, Cherry Plum, Flowering Plum, Purpleleaf Plum. Introduced at scattered locations; reported for TN, PA, NJ (Kartesz 1999). [= F, FNA, K]

* Prunus mexicana S. Watson, Big-tree Plum, Mexican Plum. {AL, KY, LA, MS}: streamsides, upland forests, fencerows; rare. IN, IL, and IA, south to AL, MS, LA, TX, and Mexico; reports from further east are apparently in error and based on pubescent material of *P. americana*. [= C, FNA, G, K, S, Z; = *Prunus americana* Marshall var. lanata – F]

* Prunus sargentii Rehder, Sargent Cherry, North Japanese Hill Cherry. Mt (WV): disturbed areas, rare, native of e. Asia. {not yet keyed}

* Prunus tomentosa Thunberg, Nanking Cherry, Korean Cherry. Disturbed areas, suburban forests and woodlands. Naturalized at least as far south as MD Piedmont and PA; native of Asia. April. [= FNA, K]

**Pyracantha** M.J. Roemer 1847 (Firethorn, Pyracantha)


1 Leaf blades ovate to lanceolate or oblanceolate, margins finely crenulate-serrulate, apices acute; young twigs grayish pubescent... *P. coccinea*

1 Leaf blades obovate, oblong-oval, or elliptic, margins remotely serrulate-crenulate or entire, apices obtuse, notched, or apiculate; young twigs brownish or rusty pubescent.

2 Pedicels and hypanthia glabrate at flowering. ................................................................. *P. fortuneana*

2 Pedicels and hypanthia pubescent.

3 Leaf apices obtuse, apiculate, or aristate. .............................................................................. *P. atlantoides*

3 Leaf apices notch ed or truncate. ............................................................................................... *P. koidzumii*

* Pyracantha atlantoides* (Hance) Stupf. {AL, GA}; rarely escaped or persistent, native of China. [= Y]


* Pyracantha fortuneana* (Maximowicz) H.L. Li, Chinese Firethorn. Cp (AL, FL), Pd (AL), Mt (SC). {GA, NC}: planted, rarely escaped or persistent, native of China. May-July; October-December. Reported for AL, SC, and TX (Nesom 2010a). [= K, WH, Y; > *P. crenatiflora* (Hance) Rehder]


**Pyrus** Linnaeus 1753 (Pear)


1 Fruit pyriform; flowers 2.5-3 cm across; leaves crenate; styles 5 .................................................. *P. communis*

1 Fruit subglobose; flowers either 2.25 cm or 3-3.5 cm across; leaves serrate; styles 2 or 5 (rarely 3 or 4).

2 Fruit ca. 1 cm in diameter; styles 2 (-3). ....................................................................................... *P. calleryana*

2 Fruit 3-10 cm in diameter; styles (4-) 5. ............................................................................................ *P. pyrifolia*


* Pyrus pyrifolia* (Burmann f.) Nakai, Oriental Pear, Japanese Pear, Chinese Pear. Cp (VA), Pd (VA), Mt (WV): planted, persistent around old houses and in orchards; uncommon, native of Asia. April; August-October. [= F, K, Z]

Rhaphiolepis Lindley 1820 (Asian-hawthorn)

A genus of about 15 species, shrubs, of e. Asia.
Rhodotypos Siebold & Zuccarini 1841 (Jetbead)


Identification notes: Distinguished by its opposite leaves and black, beadlike fruits.

* Rhodotypos scandens (Thunberg) Makino, Jetbead. Pd (DE, NC, SC, VA), Mt (WV), Cp (DE, VA): suburban woodlands, disturbed areas, road sides, old house sites, well established locally; uncommon (rare in NC, SC, VA, and WV, rare in DE Coastal Plain), native of e. Asia. Late March-May. [= C, F, G, K, WV; ? R. tetrapetalus (Siebold) Makino]

Rosa Linnaeus 1753 (Rose)

A genus of more than 100 species, shrubs or woody vines; mainly of north temperate regions. Many cultivars cannot be readily identified to species. References: Joly & Bruneau (2007)=Y; Lewis (2008); Robertson (1974)=Z; Kalkman in Kubitzki (2004). Key adapted in part from FNA and Y.

1 Stipules adnate to the petiole only basally, for < ½ their length; vigorous climbing vines, 3-5 (-10) m tall; petals white.

2 Stems brown-tomentose, stipitate-glandular; terminal leaflet petiolules 3-5 mm; pedicels tomentose, 3-6 mm; hypanthium subglobose, white tomentose; [section Bracteatae] ................................................................. **R. bracteata**

3 Styles connate into a column which protrudes from the orifice by 3-6 mm (sometimes separating in fruit); stipule margins and auricles deeply laciniate (or entire to ciliate in *R. setigera*); vines, climbing and scrambling to 4 m tall; [section Systylae].

4 Leaflets 3-5; stipule margins and auricles mostly entire or ciliate; inflorescences laxly corymbose; flowers 3-5 cm in diameter, petals single, rose-purple to pink; carpels 20-25, styles glabrous, exserted 5-6 mm beyond the orifice; [native] ................................. **R. setigera**

5 Petioles 5-12 mm, tomentose, stipitate glandular at least near the base; flowers 1.5-2.5 cm in diameter; hypanthium 2 mm × 1-1.5 mm, eglandular or stipitate-glandular; carpels 6-11, styles glabrous, exserted 3-4 mm beyond the orifice (0.5-1 mm in diameter) of conical discs (2-3 mm in diameter) ................................................................. **R. luciae**

6 Sepals either lobed or with broadened apices, or if entire then spreading, reflexed, or deciduous from fruit; flowers solitary or corymbose.

7 Fruit blackish when ripe, 8-16 mm in diameter; petals 1-2.5 mm long; pedicel lacking a clasping bract, though often with a modified 3-foliolate leaf; [section Pimpinellifoliae] ................................................................. **R. spinosissima**

8 Inflorescence of a solitary flower (rarely with a few laterals), the paired bracts on the pedicel caducous; [section Gallicae].

9 Leaves not glandular-ciliate (or only remotely so); leaves not rugose ................................................................. **R. ×damascena**

10 Inflorescence either corymbose, or of a solitary flower and its pedicel subended by persistent bracts.

11 Sepals disparate in size and shape, the outer pinnatifid with leafy segments; orifice of the hypanthium ca. 1 mm in diameter, the styles slightly exerted; [aliens]; [section Caninae].

12 Sepals 5 mm tall, prickles all similar; leaflets abaxially glabrous or rarely pubescent on midveins, eglandular; bracts 6-18 mm × 4-5 mm, glabrous; sepals abaxially eglandular ................................................................. **R. canina**

13 Stems to 5 m tall, prickles of varying sizes; leaflets abaxially pubescent or tomentose, rarely glabrous, glandular; bracts 13-15 mm × 5-7 mm, tomentose; sepals abaxially densely stipitate-glandular.

14 Sepals 6-10 mm × 2-4 mm, margins mostly stipitate-glandular; leaflet blades 10-22 mm × 8-15 mm, abaxial surfaces glabrous or pubescent; glands of the leaves apple-scented; bracts caducous, glabrous, margins stipitate-glandular; pedicels 6-9 mm long, densely stipitate- or setose-glandular; flowers 2.5-4 mm in diameter, hips red, 10-25 mm × 10-22 mm, sepals subpersistent ................................................................. **R. rubiginosa**

15 Sepals 10-16 (-20) mm × 3-4 mm, margins densely glandular-ciliate; leaflet blades 15-30 (-60) mm × 8-22 (-50) mm, abaxial surfaces tomentose; glands of the leaves resin-scented; bracts persistent, tomentose, margins ciliate-glandular; pedicels (11-) 20-35 mm long, densely stipitate-glandular; flowers 3.5-5 cm in diameter, hips dark red, 10-15 mm × 10-12 mm, sepals caducous before hips mature ................................................................. **R. tomentosa**

16 Sepals 5 or more; [native to North America (some populations may be locally introduced)].

17 Sepals (3-) 4-7 (-9); [native to North America (some populations may be locally introduced)].
14 Hypanthium glabrous.
15 Long and straight prickles present throughout the stems. .............................................. R. acicularis ssp. sayi
15 Prickles absent from the stems, or present and short or curved.
16 Infrastipular prickles stout and broad-based. ................................................................. R. carolina
16 Infrastipular prickles absent or not especially stout or broad-based.
17 Lower leaf surface with generally < 2 hairs per mm²; infrastipular prickles always absent on new stems; bristles always present on new stems; leaflets 7-9 ................................................................. R. arkansana
17 Lower leaf surface with generally > 2 hairs per mm²; infrastipular prickles present or absent on new stems; bristles generally absent on new stems; leaflets 5-7 ................................................................. R. blandia
14 Hypanthium with glands.
18 Bristles present on new branches.
19 Infrastipular prickles absent. ............................................................................................. R. arkansana
19 Infrastipular prickles present. ......................................................................................... R. carolina
20 Fertile branches armed with straight, thin or rarely stout, circular or somewhat flattened infrastipular prickles, lacking internodal prickles or aciculi (or if these present, few and scattered); stems mostly thin, pendent or upright; hypanthia (later hips) and pedicels stipitate-glandular (rarely eglandular) ........................................... R. carolina ssp. carolina
20 Fertile branches armed with straight, thin or often stout, circular or flattened infrastipular prickles, with internodal prickles of small prickle, aciculi, or stipitate glands, usually densely covering branches and adjacent stems; stems mostly thick, or upright; hypanthia (later hips) and pedicels stipitate-glandular or eglandular ................................................................. R. carolina ssp. subsperrulata
18 Bristles absent on new branches.
21 Leaflets 3.5-5× as long as wide; leaves with (5-) 7-9 (-11) leaflets; [c. MS westwads] .................. [R. foliolosa]
21 Leaflets 1-3× as long as wide; leaves with (3-) 5-7 (-9) leaflets; [collectively widespread].
22 Hypanthium typically with > 86 glands; terminal leaflet oblong, generally with 20-30 small teeth per side. ...........
22 Hypanthium typically with < 86 glands; terminal leaflet ovate, elliptic, or obovate, with 10-18 (<23) small teeth per side.
23 Bristles absent on new stems; auricles > 3.8 mm long; stipules > 1.1 mm wide; infrastipular prickles stout, broad-based, and often curved ................................................. R. virginiana
23 Bristles present or absent on new stems; auricles < 3.8 mm long; stipules < 1.1 mm wide; infrastipular prickles slender and not especially broad-based or curved.
24 Fertile branches armed with straight, thin or rarely stout, circular or somewhat flattened infrastipular prickles, lacking internodal prickles or aciculi (or if these present, few and scattered); stems mostly thin, pendent or upright; hypanthia (later hips) and pedicels stipitate-glandular (rarely eglandular) ........................................... R. carolina ssp. carolina
24 Fertile branches armed with straight, thin or often stout, circular or flattened infrastipular prickles, with internodal prickles of small prickle, aciculi, or stipitate glands, usually densely covering branches and adjacent stems; stems mostly thick, upright; hypanthia (later hips) and pedicels stipitate-glandular or eglandular ................................................................. R. carolina ssp. subsperrulata


Rosa blanda Aiton, Smooth Rose, Meadow Rose. Mt (WV), Pd (VA): rocky forests; rare. QC west to MB, south to s. PA (Rhoads & Klein 1993), MD, VA, WV (Harmon, Ford-Wernitz, & Grafton 2006), OH, IN, IL, MO, KS, and MT. [= C, F, N, G, Y; > R. blanda var. blanda – K]


Rosa × damascena P. Miller (pro sp.) [R. gallica Linnaeus × moschata J. Herrmann], Damask Rose. Mt (NC): disturbed areas; rare, persistent after cultivation, native of Europe. May-June; September-October. [= K; = R. damascena P. Miller – RAB]

Rosa gallica Linnaeus, French Rose. Cp (DE), Mt (NC, VA), Pd (SC, VA): disturbed areas; uncommon (rare in NC, SC, and VA), native of Europe. May-June; September-October. There is a question as to whether the name R. gallica can be used; if not, it would be replaced with R. austrica. Represented by many cultivated forms, some involving complex hybridization with...
other species. *R. × damascena* P. Miller is apparently a hybrid of *R. gallica* and *R. moschata* J. Hermann. = RAB, C, F, G, K, Z; *R. austriaca* Crantz

**Rosa laevigata** Michaux, Cherokee Rose. Cp (FL, GA, NC, SC), {VA}: roadsides, moist forests; common (rare in NC, rare [if present] in VA), native of China. Late March–April; September–October. = RAB, FNA, K, S, WH, Z


**Rosa spinosissima** Linnaeus, Scotch Rose. Mt (VA): cultivated and rarely escaped; rare, native of Eurasia. = F, FNA, G, K; > *R. pimpinellifolia* Linnaeus – C

**Rosa tomentosa** J.E. Smith. {NC} = C, F, FNA, K, S

**Rosa virginiana** P. Miller, Virginia Rose. Pd (DE, VA), Cp (DE, WV), {GA, NC}: moist to dry forests and woodlands; uncommon (rare in DE, VA, and WV). May–June; August–October. NL (Newfoundland) and ON south to GA, AL, and MO. C. TN (Chester, Wofford, & Krul 1997), e. and c. KY (Clark et al. 2005). = C, F, G, K, S, W, Y; > *R. virginiana var. virginiana* – K

**Rosa chinensis** Thunberg, Chinese Rose. Cp (AL, MS), {VA}. Reported for AL, MS, and VA (BONAP 2010). = K [not yet keyed]

**Rosa × dametorum** Thuillier (pro sp.). {KY} Introduced in KY. = K [not yet keyed]


**Rosa moschata** J. Hermann, Musk Rose. Allegedly introduced in AL. = K, S [not yet keyed; investigate]

**Rosa rubifolia** Villars, Red-leaf Rose. (SC) Reported for SC (Kartesz 1999). = K

**Rosa xanthina** Lindley, Yellow Rose. Reported for SC (Kartesz 1999). = K [not yet keyed]

**Rubus** Linnaeus 1753 (Blackberry, Raspberry, Dewberry, Wineberry, Bramble)

A genus of about 250 species (if treated conservatively) or 2000-3000 microspecies, shrubs (and a few herbs), almost cosmopolitan in temperate areas. References: Robertson (1974)–Z; Alice & Campbell (1999); Widrlechner (1998); Kalkman in Kubitzki (2004).

**Identification Notes:** All of our species of *Rubus* except *R. dalibarda*, *R. odoratus*, and *R. pubescens* have biennial stems. The first year the stems remain sterile and are termed **primocanes**. The second year, these stems produce lateral branches with flowers and are termed **floricanes**. Primocane and floricanes leaves differ.

1 Leaves simple.
   2 Leaves unlobed, elliptic to ovate-oblanceolate, finely toothed, 1.5-3 cm long; plant an herb, < 1 dm tall; petals white = *R. dalibarda* – flowering raspberries
   2 Leaves palmately lobed, orbicular, coarsely toothed, 9-30 cm long; plant a shrub, 10-20 dm tall; petals deep pink; > *subgenus Anopolobatus*

1 Leaves 3-9-foliolate (reduced simple leaves may also be present in the inflorescence).
   2 Upright stems herculean, annual, not differentiated into primocanes and floricanes, unarmed or with a few weak bristles; stipules ob lanceolate; C. WV northwards; > *subgenus Cylactus – dwarf raspberries* = R. odoratus
   2 Upright stems woody, biennial, differentiated into primocanes and floricanes, these usually well-armed with bristles and/or curved prickles; stipules linear; [collectively widespread]

3 Fruit separating from the receptacle, the receptacle remaining on the pedicel; stems either strongly white-glaucous (*R. occidentalis*), or densely beset with slender-based prickles and bristles (*R. ideoeus*), or densely pubescent with 3-5 mm long glandular hairs (*R. phoenicolasius*), or if not as above then the leaves pinnately 5-9-foliolate (*R. illecebrosus*); > *subgenus Idaeobatus – raspberries*

4 Floricanes leaves pinnately 5-9-foliolate
   5 Flowering raspberries
   5 Floricanes leaves 1-3-foliolate.

5 Inflorescence panicleiform, many-flowered; berries sticky, purplish-red, lacking a glaucous bloom = R. phoenicolasius

6 Fruit black (rarely yellow); pedicels with stout curved prickles; stems (at least the primocanes) strongly white-glaucous


Rubus canadensis Linnaeus, Smooth Blackberry, Thornless Blackberry. Mt (GA, NC, SC, VA, WV): forests, woodlands, grassy balds, especially at high elevations; common. June-July; July-August. NL (Newfoundland) west to MN, south (primarily in the Appalachians) to w. NC, e. TN, and n. GA. [= RAB, C, G, K, S, W, WV]

Rubus cuneifolius Pursh, Sand Blackberry. Cp (DE, FL, GA, NC, SC), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): woodlands, forests, disturbed areas; common (rare in Mountains). Late April-early June; June-July. CT and NY (Long Island) south to s. FL and AL, MS, and sc. LA, primarily on the Coastal Plain. [= RAB, C, G, GW, S, W; > R. cuneifolius var. cuneifolius – F; > R. cuneifolius var. subellipticus Fernald – F; > R. cuneifolius – K; > R. longii Fernald – F; K; > R. probabilis L.H. Bailey – K; > R. sejunctus L.H. Bailey – F]

Rubus dalibarba Linnaeus, Dewdrop, Robin-runaway, Star-violet. Mt (NC, VA, WV): bog margins and mountain swamp forests, often along spring seeps, mostly in dense shade beneath *Rhododendron maximum*; rare. June-September. NL (Newfoundland) west to MI and MN, south to NJ and OH, and disjunct to WV, sw. VA, and w. NC. [= Dalibarda repens Linnaeus – RAB, C, G, GW, S, W, WV; > R. repens (Linnaeus) Kunze]


**ROSACEAE**


*Sanguisorba* Linnaeus 1753 (Burnet)


1 Leaflets pinnatifid (each leaflet incised nearly to the midvein).................................................................[Poterium annuum]
2 Leaflets toothed (the incisions not nearly to the midvein).
ROSACEAE

2 Leaflets 3-10 cm long; inflorescence 6-30 cm long, spike-like; stamens 4 per flower, the filaments 8-10 mm long; sepals white (sometimes fading greenish); [native] .........................................................Sanguisorba canadensis

2 Leaflets 0.8-2 cm long; inflorescence 1-2 cm long, globose; stamens 15-20 per flower, the filaments 3-4 mm long; sepals green to pinkish-purple; [cultivated, occasionally escaped] .........................................................[Poterium minor ssp. mucicata]

Sanguisorba canadensis Linnaeus, Canada Burnet, American Burnet, White Burnet. Mt (GA, NC, SC, VA, WV), Cp (DE): fens, seepage over mafic or ultramafic rocks (such as amphibolite, greenstone, serpentinite), spray zones around waterfalls, other seepage wetlands, wet meadows; rare. Late July-September. NL (Newfoundland) and NL (Labrador) west to MB, south to NJ, PA, OH, and IN; disjunct southwest in KY, nc. VA, and from sw. VA south to sw. NC, ne. TN, and ne. GA. First reported for SC by Hill & Horn (1997) and Hill (1999). [= RAB, C, F, FNA, G, GW, K, S, W, WV, Z]

Sibbaldia Linnaeus 1753 (Sibbaldia, Mountain-cinquefoil)

A genus of 5-7 species, subshrubs, circumboreal, of n. Eurasia and n. North America. Our single species, has been variously also treated in Potentilla and Sibbaldiopsis. Many recent studies (see references) have shown that it is not closely related to Potentilla, and falls into a group of genera including Sibbaldia, Comarum, Alchemilla, Aphanes, Drymocallis, Dasiphora, and Fragaria (Lundberg et al. 2009; Potter et al. 2007; Eriksson et al. 2003). I here follow Lundberg et al. (2009) and Paule & Sojak (2009), who further demonstrate that Sibbaldiopsis is embedded in Sibbaldia and is best transferred there. References: Paule & Sojak (2009)=Z; Lundberg et al. (2009); Potter et al. (2006); Eriksson, Donoghue, & Hibbs (1998); Eriksson et al. (2003); Kalkman in Kubitzki (2004).

Sibbaldia tridentata (Aiton) Paule & Sojak, Mountain-cinquefoil, Three-toothed Cinquefoil, Mountain White Potentilla, Wine-leaf Cinquefoil, White Sibbaldia. Mt (GA, NC, TN, VA, WV): grassy balds, crevices of rock outcrops at high (rarely moderate) elevations, high elevation glades; rare (though sometimes very locally abundant). June-August; July-September. Greenland and NL (Newfoundland) west to NT, south to ND, IA, WI, MI, s. ON, and NS, and in the mountains to w. VA, ne. TN, and ne. GA. (at progressively higher elevations southward). Showy in flower, and also in leaf from late summer on, when the leaves tend to turn a rich burgundy red. Though appearing herbaceous, *S. tridentata* is really an evergreen sub-shrub. [= Z; = Sibbaldiposis tridentata (Aiton) Rydberg – K, S; = Potentilla tridentata Aiton – RAB, C, F, G, W, WV]

Sorbaria (Seringe) A. Braun 1860


*Sorbaria sorbifolia* (Linnaeus) A. Braun, False Spiraea. Mt (WV): disturbed areas; rare, native of Asia. Cultivated and naturalized at least as far south as s. PA (Rhoads & Klein 1993), MD, and WV. Reports of it in VA (Massey 1961, repeated in Kartesz 1999) are apparently based only on cultivated plants. [= C, F, G, K]

Sorbus Linnaeus 1753 (Mountain-ash, Rowan)

A genus of about 250 species, trees and shrubs, of mainly temperate Northern Hemisphere. References: McAllister (2005)=Y; Jones (1939)=Z; Aldasoro et al. (2004). [also see Aronia]

1 Branches and lower leaf surfaces glabrous (or inconspicuously and sparsely pubescent); winter buds glutinous; [native tree] ......S. americana
1 Branches and lower leaf surfaces densely white-villous; winter buds white-villous; [introduced tree] .......................S. aucuparia ssp. aucuparia

Sorbus americana Marshall, Mountain-ash, American Rowan. Mt (GA, NC, VA, WV), Pd (NC): high elevation forests, balds, and high elevation rock outcrops, often with Picea, Abies, and/or Betula alleghaniensis; common (rare in NC Piedmont, rare in GA). June-July; September-October (persisting well into winter). NL (Newfoundland) west to MN, south to PA, w. NC, e. TN, ne. GA, and n. IL. This small-to-medium tree is showy in most seasons; in the summer its creamy-white corymbs are attractive, the leaves turn a bright orange-red in fall, and the red berries persist well into winter. [= RAB, C, G, K, S, W, Y, Z; = Pyrus americana (Marshall) A.P. de Candolle – F, WV]

*Sorbus aucuparia* Linnaeus ssp. aucuparia, Rowan, European Mountain-ash. Mt (WV): disturbed areas; rarely cultivated; rare, native of n. Europe. A planted tree and escape (sometimes appearing naturalized), south to s. PA (Rhoads & Klein 1993), MD, DE, WV (Kartesz 1999), and DC (Jones 1939). Also reported for SC by Kartesz (1999), supposedly based on Jones (1939), but Jones (1939) does not mention SC in his account of *S. aucuparia*. [= Y; < S. aucuparia – C, G, K, Z; < Pyrus aucuparia (Linnaeus) Gaertner – F, WV]

Spiraea Linnaeus 1753 (Spiraea, Meadowsweet, Hardhack)

A genus of about 80-120 species, shrubs, of north temperate areas (especially Asia). Many species and hybrids are cultivated, and additional taxa to those treated below may be encountered as persistent or escaped. References: Lis in FNA (in press); Robertson (1974)=Z; Rehder (1940); Uttal (1974); Kalkman in Kubitzki (2004).
ROSACEAE

1 Inflorescence a simple umbel; flowers white; [section Chamaedryon]; [alien].

2 Flowers 10-15 mm in diameter.

3 Leaves 2-7 cm long, coarsely serrate and sometimes also slightly 3-lobed; inflorescences with > 6 flowers; S. cantoniensis

4 Flowers 6-10 mm in diameter.

5 Leaf blades linear to lanceolate, 2.5-4 cm × 0.3-1 cm, < 4· as long as wide; flowers 6-8 mm in diameter; S. thunbergii

6 Leaf blades ovate to oblique, 3.5-5 cm × 2-3 cm, < 2· as long as wide; flowers 7-10 mm in diameter; S. vanhouttei

1 Inflorescence a compound corymb or panicle; flowers white, pink, or red; [native or alien].

5 Inflorescence a corymb, flat-topped or rounded, broader than long; [section Calopula]

6 Leaves rounded, obtuse, or acute at the apex; petal white (rarely pink); [native].

7 Leaves 1-4 (-5) cm long, finely serrulate, not lobed; inflorescences with 3-6 flowers; S. prunifolia

8 Leaves pubescent on the veins beneath; flowers usually pink (rarely white); shrub to 15 dm tall; S. virginiana

3 Inflorescence a panicle, longer than broad; [section Spiraea].

9 Lower leaf surface densely tomentose with white, tawny, or rustyomentum which obscures the surface.

10 Follicles glabrous; [alien, rare] S. ×bumbalda

10 Follicles pubescent; [native, common in boggy woodlands] S. ×tomentosa

11 Lower leaf surface glabrous or with a few scattered hairs that do not obscure the surface.

12 Leaves lanceolate to oblong-lanceolate, widest at or below the middle; flowers pink; [alien, rarely escaped or persisting] S. salicifolia

11 Leaves oblanceolate to oblong, widest above or at the middle; flowers white (rarely slightly pink); [native, of bogs, stream-banks, swampy areas, or moist to dry rocky areas].

13 Leaves 3-5 (-8)× as long as wide, finely and sharply toothed; inflorescence, hypanthium, and sepals pubescent; sepals usually obtuse; twigs yellow-brown to brown; S. alba

12 Leaves 2-3× as long as wide, coarsely and bluntly toothed; inflorescence, hypanthium, and sepals usually glabrous or nearly so; sepals usually acute; twigs red-brown to purple-brown; S. latifolia

Spiraea alba Du Roi, Narrowleaf Meadowweet, Pipestem. Mt (NC, VA, WV), Pd (DE, VA): bogs, boggy streambanks, seepages; uncommon (rare in DE and NC). June-September; August-October. QC west to AB, south to NC, IN, and MO. There is considerable disagreement over whether S. alba and S. latifolia represent two species with some introgression in areas of overlap, two varieties, or a variable or clinal species. [= F, FNA, G, S, W, WV, Z; = S. alba var. alba – RAB, C, GW, K]

* Spiraea ×bumbalda Burven [S. albiflora × japonica]. Pd (VA): cultivated, escaped or persisting; rare, native of cultivation, both parents from Asia. [= FNA, K]

* Spiraea cantoniensis Loureiro. Cp (AL, GA, LA, NC): roadsides; rare, native of Asia. S. cantoniensis has been collected twice on Fort Bragg, NC, by Phil Crutchfield (specimen at Fort Bragg) (Soirie, pers. comm.). Also reported for other scattered states in N. America (AR, AL, LA, NY) and Kentucky (FNA 1999, FNA). [= FNA, K]

Spiraea corymbosa Rafinesque, Dwarf Spiraea, Rock Spiraea. Mt (NC, VA, WV), Pd (NC, VA), (GA?): rocky forests and woodlands, granitic domes, dry slopes of Piedmont monadnocks, rocky slopes in partial sun; common (rare in NC and WV). June-August; Southern and Central Appalachian endemic: SC PA and MD south through w. VA, e. WV, to nw. NC, and perhaps also to e. TN (?), to n. AL (?), apparently fairly common only in w. VA. The species is limited to only a few counties each of NC and WV (Franklin 2004, Straubhaug & Core 1978), and is not listed for TN in Chester, Wofford, & Kral (1997). Although Mohr (1901) listed the species for AL, it is not listed as a part of the state's woody flora by Clark (1971). S. corymbosa is related to S. lucida (Deanes ex Greene [= S. betulifolia var. lucida (Deanes ex Greene) C.L. Hitchcock] of the Rocky Mountains, S. betulifolia [= S. betulifolia var. betulifolia] of ne. Asia (Japan, e. Siberia, ne. China, Sakhalin, and the Kurile Islands, and S. aemiliana Schneider [= S. betulifolia var. aemiliana (Schneider) Koidz.]. The group is often treated as 4 varieties or subspecies of S. betulifolia, but the morphological differences and strongly disjunct distribution seem to warrant treatment as a relictual complex of related species. See Uttal (1974, Greene 1992), and others listed in Robertson (1974) for additional discussion and a range of conclusions. [= F, FNA, S, WV; < S. betulifolia – RAB; = S. betulifolia Pallas var. corymbosa (Rafinesque) Maximowicz – C, G, K, W, Z; = S. betulifolia ssp. corymbosa (Rafinesque) Taylor & MacBryde]


Spiraea latifolia (Aiton) Burkhart, Broadleaf Meadowsweet. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE, VA): bogs, seeps, and rock outcrops (glades) over amphibolite, greenstone, olivine, and granite; uncommon (rare in DE, GA, and NC, rare in Piedmont and Coastal Plain). June-September; August-October. NL (Newfoundland) west to MI, south to e. VA and w. NC. [= FNA, G, S, W, WV, Z; = S. alba var. latifolia (Aiton) Dippel – RAB, C, GW, K; = S. latifolia var. latifolia – F]

* Spiraea prunifolia Siebold & Zuccarini, Bridal-wreath Spiraea. Mt (VA, WV), Pd (DE, VA), Cp (AL, MS, LA, NC, VA): cultivated, escaped or persisting; uncommon (rare in AL, DE, LA, MS, and WV), native of China, Korea, and Taiwan. [= C, FNA, G, K]
**Spiraea salicifolia** Linnaeus, Willowleaf Spiraea. Mt (GA, NC, VA), Pd (VA), Cp (MS, VA): cultivated, escaped or persisting; rare, native of Eurasia. [= C, FNA, K]

**Spiraea thunbergii** Siebold ex Blume. Mt (GA), Cp (AL, LA, MS, NC): roadsides; rare, native of Asia. *S. thunbergii* has been collected from roadside at Fort Bragg, NC, by Phil Crutchfield (specimen at Fort Bragg) (Sorrie, pers. comm.). Also GA, MS, and MD (FNA). [= C, FNA, K]


**Spiraea triloba** Linnaeus var. triloba, Asian Meadowsweet, Three-lobed Spiraea. Disturbed areas; native of c. Asia. Reported by Will Cook from Wake County, NC (Cook, pers. comm. 2011). [ ] (not yet keyed)

**Spiraea ×vanhouttei** (C. Briot) Carrière [S. cantoniensis × trilobata], Bridal-wreath Spiraea. Pd (NC), Mt (WV); cultivated, escaped or persisting; rare, introduced from cultivation, the two parents both from Asia. [= FNA, K, Z; = C. vanhouttei – C, G]


150. **ELAEAGNACEAE** A.L. de Jussieu 1789 (Oleaster Family) [in ROSALES]

A family of 3 genera and 30-50 species, shrubs, small trees, and lianas, of temperate Eurasia and North America, and tropical Asia and Australia. References: Bartish & Swenson in Kubitzki (2004).

_Elaeagnus_ Linnaeus 1753 (Silverberry, Oleaster, Russian-olive)


1 Flowering in the fall (October-November) and fruiting in the spring (March-April); leaves evergreen; branches usually spiny....... *E. pungens*

2 Fruit reddish-brown or pinkish, lepidote with silver and brown scales; leaves with a mixture of silver and bronze scales beneath. .......................... *E. angustifolia*

3 Fruit 10-15 mm long, bright red; fruiting pedicel 15-25 mm long; hypanthium tube about as long as the separate calyx lobes..............

3 Fruit 6-8 mm long, silvery red; fruiting pedicel 8-12 mm long; hypanthium tube about 2× as long as the separate calyx lobes..............


*Elaeagnus pungens* Thunberg, Thorny-olive, Autumn Silverberry. Forests and woodlands in suburban areas, spread by birds; native of Japan. October-November; March-April. [= RAB, K]

*Elaeagnus umbellata* Thunberg var. parvifolia (Royle) Schneider, Autumn-olive, Spring Silverberry. Forests and woodlands, spread by birds; native of Japan and China. April-May; August-September. This species has rapidly become a noxious weed shrub, still unfortunately sometimes promoted for "wildlife plantings." The rapidity of its increase may be judged by its treatment in Strausbaugh & Core (1978) as not definitely naturalized in WV; Harmon, Ford-Werntz, & Grafton (2006) map it for every county of WV. [= K; < *E. umbellata* – RAB, C, F, G, W, WV; < *E. umbellatus* – S, orthographic variant]

151. **RHAMNACEAE** A.L. de Jussieu 1789 (Buckthorn Family) [in ROSALES]

A family of about 50-52 genera and 900-925 species, mostly trees, shrubs, and lianas, cosmopolitan in distribution. References: Nesom in FNA (in prep.); Brizicky (1964a)=Z; Richardson et al. (2000a, 2000b); Medan & Schirarend in Kubitzki (2004).
1 Plant a woody vine.
2 Leaf margins entire; tendrils absent; [widespread in our area]; [tribe Rhamnaceae]..............................................................................................Berchemia
2 Leaf margins serrate to crenate; tendrils present; [of ne. FL southwards]; [tribe Gouaniae].................................................................Gouania
1 Plant a shrub or small tree.
3 Leaves with 3 prominent veins from near the base.
4 Plants not spiny; fruit dry, capsular; [native]; [tribal placement uncertain]...............................................................Ceanothus
4 Plants armed with stipular spines; fruit pulpy; [alien, cultivated and escaped]; [tribe Pallireae]......................................................Ziziphus
3 Leaves with prominently pinnate venation, the lowermost lateral veins no more prominent than others.
5 Leaves opposite, 2-4 cm long; [of shell middens and shell hammocks in the outer Coastal Plain of NC and SC]; [tribe Rhamnaceae]......
.............................................................................................................................Sageretia
5 Leaves alternate (or opposite in Frangula and some Rhamnus), 3-15 cm long; [of various habitats in the Piedmont and Mountains (rarely Coastal Plain) of VA, NC, and SC]
6 Inflorescence repeatedly branched dichotomously; peduncles fleshy and reddish in fruit; nectariferous disc pubescent; [tribe Pallireae] ..............................................................Frangula
6 Inflorescence not repeatedly branched dichotomously; peduncles not fleshy; nectariferous disc glabrous; [tribe Rhamnaceae].
7 Winter buds naked, pubescent; flowers perfect, sepals, stamens, and petals 5; style undivided; leaves with 8-10 lateral veins on either side of the midvein........................................................................................................................................RHAMNUS
7 Winter buds with bad scales; flowers functionally unisexual, sepals and stamens 4 or 5 (the stamens rudimentary in the pistillate flowers), petals 9 or 4 (never 5); style divided 1/3 to 2/3 its length into 2, 4 or 5 segments; leaves with (2-) 3-9 lateral veins on either side of the midvein........................................................................................................................................RHAMNUS

Berchemia Necker 1825 (Supplejack)


Identification notes: The young stems are shining and reddish; older stems can reach 10 cm in diameter, with bark medium gray and smooth (though often marred by sap wells drilled by Yellow-bellied Sapsuckers). The smooth bark and neatly pinnately-veined leaves are distinctive.

Berchemia scandens (Hill) K. Koch, Supplejack, American Rattan. Cp (FL, GA, NC, SC, VA), Pd (GA, NC), Mt (GA): swamp forests, bottomlands, streambanks, in mesic to even xeric uplands over calcareous rock or sediment; common (rare in Piedmont). April-May; August-October. Se. VA south to s. FL, west to TX, north in the interior to nc. TN, w. TN, s. IL, and s. MO. Berchemia climbs high into the crowns of swamp trees. [= C, F, FNA, G, GW, K, RAB, S, WH, Z]

Ceanothus Linnaeus 1753 (Redroot, New Jersey Tea)


Ceanothus americanus Linnaeus var. americanus, Common New Jersey Tea. woodland borders, dry woodlands, glady openings, dry ridge forests and woodlands (pine or oak) in the Mountains. May-June; June-July. ME west to s. MB, south to FL Panhandle and TX. [= C, F, G, X, Y, Z; < C. americanus – FNA, K, RAB, W, WH; = C. americanus – S]

Ceanothus americanus Linnaeus var. intermedius (Pursh) Torrey & A. Gray, Southern New Jersey Tea. Sandhills, dry sandy woodlands and forests, rocky openings around granitic or quartzitic rocks in the Piedmont. May-June; June-July. NJ (or possibly MA) south to c. peninsular FL, west to LA, mostly on the Coastal Plain, but disjunct inland to sandy soils around outcrops of siliceous rocks. The recognition of infraspecific taxa in the variable C. americanus is uncertain; var. intermedius may either represent ecological forms, or the variation may be too clinal to make taxonomic recognition rewarding. However, material from our area (and beyond) sorts relatively easily, with some intermediates from the Piedmont; varietal status seems provisionally appropriate. [= C, F, G, X, Y, Z; < C. americanus – FNA, K, RAB, W, WH; = C. intermedius Pursh – S]

Ceanothus herbaceus Rafinesque, Prairie Redroot. Flood-scoured rocky riverbanks. April-May. Primarily midwestern: MI west to MT, south to nw. IN, AR, TX, and Mexico; disjunct eastward in QC, NH, VT, NY, DC, and n. VA (?- Arlington County). Rafinesque described C. herbaceus from "near the falls of the Potomack, between the rocks." The holotype not extant, Coile (1988) chose a neotype, collected by Sheldon in 1881 from "Arlington County, Virginia, Chain Bridge, rocky river bottoms, Potomac River." However, Bartgis, Fleming, & Wiegand (1997) indicate that C. herbaceus in the Washington, D.C.
area can only be ascribed with certainty to DC. [= FNA, K, X, Y, Z; = C. ovatus Desfontaines – F, S, misapplied; = C. pubescens (Torrey & A. Gray ex S. Watson) Rydberg ex Small – S]

*Ceanothus microphyllus* Michaux. Sandhills. E. GA south to c. peninsular FL, west to s. AL, approaching to within a few kilometers of SC (in Screven and Chatham counties, GA), and should be sought in se. SC (except that its outlandish appearance makes it difficult to overlook!). *C. ×serpyllifolius* Nuttall (pro sp.) is apparently a hybrid of *C. americanus* var. *intermedius* and *C. microphyllus* (Coile 1988); it is known from scattered sites in FL and GA. [= FNA, K, S, X, Y, Z]

Frangula P. Miller 1754 (Buckthorn)

A genus of ca. 50 species, shrubs and small trees, of the northern hemisphere. The distinctions between *Frangula* and *Rhamnus* are many and meaningful; their separation at the generic level seems warranted based on morphological and molecular analyses (Richardson et al. 2000a; Bolmgren & Oxelman 2004). References: Nesom in FNA (in prep.); Brizicky (1964a)=Z; Medan & Schirarend in Kubitzki (2004).

1 Leaves entire; leaves ca. 2× as long as wide ................................................................................................................................................... *F. alnus*
1 Leaves serrulate; leaves ca. 3× as long as wide ................................................................................................................................... *F. caroliniana*

*Frangula alnus* P. Miller, European Alder-Buckthorn, Glossy Buckthorn. Forested areas, other disturbed areas; native of Europe. This species is a seriously invasive weed in ne. United States, south to (at least) NJ, s. PA (Rhoads & Klein 1993), KY, and se. TN (Marion County) (Chester, Woford, & Kral 1997, Kral 1981), and w. NC (where recently found in a forested area along the Blue Ridge Parkway). [= FNA, K; = *Rhamnus frangula* Linnaeus – C, F, G]

*Frangula caroliniana* (Walter) A. Gray, Carolina Buckthorn. Dry to moist barrens, woodlands, and forests, Coastal Plain limestone bluffs and shell middens, especially over mafic or calcareous rocks. May-June. Sw. VA west to s. OH and s. MO, south to c. peninsular FL and TX. [= K; = *Rhamnus caroliniana* Walter – FNA, RAB, S, W, WH; > *Rhamnus caroliniana* Walter var. caroliniana – C, F, G, Z]

Gouania Jacquin 1763 (Chewstick)

A genus of ca. 50 species, shrubs, of tropical America. References: Nesom in FNA (in prep.).


Hovenia Thunberg 1781 (Raisin-tree)


Rhamnus Linnaeus 1753 (Buckthorn)

A genus of ca. 150 species, trees and shrubs, of the northern hemisphere. The recognition of *Frangula* as separate from *Rhamnus* is supported by molecular phylogeny (Bolmgren & Oxelman 2004). References: Nesom in FNA (in prep.); Brizicky (1964a)=Z; Bolmgren & Oxelman (2004); Medan & Schirarend in Kubitzki (2004). [also see *Frangula*]

1 Leaves mostly opposite or subopposite (or some alternate), mostly with (2-) 3-6 lateral veins on either side of the midrib; plant a large shrub or small tree, to 10 m tall; fruit with 4 stones; [aliens, mostly of moist (but not boggy) soils].
2 Leaves mostly 1-2× as long as wide, with (2-) 3 (-4) lateral veins on either side of the midrib; style divided ½ its length into 4 segments....
   ........................................................................................................................................................................................................... *R. cathartica*
2 Leaves mostly 2-3× as long as wide, with 4-6 lateral veins on either side of the midrib; style divided ½ its length into 2 segments ........
   ............................................................................................................................................................................................................ *R. davurica*
Rhamnaceae

1 Leaves alternate, mostly with (4-)6-9 lateral veins on either side of the midrib; plant a shrub to 2 m tall; fruit with 2-3 stones; [natives of various, calcareous habitats].

3 Sepals and stamens 5; petals 0; fruit with 3 stones; [of mafic or calcareous peaty wetlands and seeps] .......... R. alnifolia

3 Sepals and stamens 4; petals 4; fruit with 2 stones; [of dry to moist calcareous woodlands and thickets].

4 Young leaves and young branches glabrous or with scattered hairs; mature leaves glabrous below .......... R. lanceolata var. glabrata

4 Young leaves and young branches pubescent; mature leaves soft pubescent below ........................................... R. lanceolata var. lanceolata


* Rhamnus cathartica Linnaeus, Common Buckthorn. Disturbed areas; native of Eurasia. April-June. Reported for VA by Harvill et al. (1991), but the report is actually based on specimens of R. davurica (Virginia Botanical Associates 2005); now bonafide specimens have been found in Giles and Wythe counties (T.F. Wieboldt, pers. comm. 2009). [= C, F, FNA, G, K, Z]

Rhamnus cathartica

* Rhamnus davurica Pallas, Dahurian Buckthorn. Suburban woodlands, rarely naturalized; native of e. Asia. April-June. Also reported from suburban areas near Louisville, KY, and Knoxville, TN (D. Estes, pers. comm.). [> Rhamnus davurica ssp. davurica – FNA, K; = R. citrifolia (Weston) W. Hess & Steam – C]

Rhamnus davurica Pursh var. glabrata Gleason, Western Lance-leaved Buckthorn. Dry habitats over calcareous rocks. April-May. Var. glabrata Gleason ranges from OH west to SD, south to w. WA (Ludwig 1999), KY, c. TN, AR, and KS. [= C, F, G, Z; = R. lanceolata ssp. glabrata (Gleason) Kartesz & Gandhi – FNA, K; < R. lanceolata – S, W]


Sageretia Bronn 1827 (Small-flowered Buckthorn)


Identification notes: S. minutiflora can appear superficially a bit like Ilex vomitoria, with which it typically grows; it can be distinguished from Ilex vomitoria by its opposite leaves.

Sageretia minutiflora (Michaux) C. Mohr, Small-flowered Buckthorn. Shell middens and shell hammocks, dry calcareous hammocks and maritime forests. August-September; October-November. Se. NC south to s. FL, west to s. MS. S. minutiflora is apparently most closely related to S. elegans (Kunth) Bronn, which ranges from s. Mexico south to s. South America. [= FNA, K, RAB, S, WH, Y, Z]

Ziziphus P. Miller 1754 (Jujube)

A genus of 85-100 species, shrubs and trees, of tropical and warm temperate areas. References: Nesom in FNA (in prep.); Brizicky (1964a)=Z; Medan & Schirarend in Kubitzki (2004).

* Ziziphus zizyphus (Linnaeus) Karsten, Chinese Jujube, Common Jujube, Chinese Date. Disturbed areas; native of Eurasia. Reported from ec. GA (Jones & Coile 1988). Cultivated at least as far north as NC. As of 2010, Z. jujuba is proposed for conservation over the nearly tautonymic Z. zizyphus. [= K, WH; = Zizyphus zizyphus (Linnaeus) Karsten – S, orthographic variant; = Z jujuba P. Miller – FNA, Z]
### 152. ULMACEAE de Mirbel 1815 (Elm Family) [in ROSALES]

As here circumscribed (excluding Celtis and relatives), a family of 6-7 genera and about 35 species, of temperate, subtropical, and boreal Northern Hemisphere, rarely extending into the Southern Hemisphere. Zavada & Kim (1996) discuss compelling reasons to recognize the Celtis from the Ulmaceae. The distinctiveness of the Celtidaceae from the Cannabaceae and Moraceae is more questionable. References: Sherman-Broyles, Barker, & Schulz in FNA (1997); Zavada & Kim (1996); Todzia in Kubitzki, Rohwer, & Bittrich (1993). [also see CANNABACEAE]

1. Leaves strongly 3-veined from the base, the venation otherwise pinnate; fruit a drupe with thin flesh..............[Celtis – see CANNABACEAE]
2. Leaf venation pinnate throughout, the venation strictly pinnate; fruit dry, a samara (flat and winged) or nutlike (with numerous fleshy protuberances).
3. Fruit nutlike (with numerous fleshy protuberances); primary lateral veins mostly forking before reaching the margin; [small trees of swamp forests of the Coastal Plain from se. NC and SC southward]..........................Planera
4. Fruit a samara (flat and winged); primary lateral veins mostly parallel and unforked to the leaf margin; [small to large trees, widespread in our area]....................................................................................Ulmus

#### Planera J.F. Gmelin 1791 (Planer-tree, Water-elm)


**Planera aquatica** (Walter) J.F. Gmelin, Planer-tree, Water-elm. River swamps where flooded (often to depths of 1-2 m) in the winter. Se. NC (limited to the Waccamaw and Lumber rivers) south to n. FL, west to e. TX, and north in the Mississippi Embayment to w. TN, w. KY, s. IL, and se. MO. [= RAB, C, F, FNA, G, GW, K, S]

**Ulmus** Linnaeus 1753 (Elm)

A genus of about 25-30 species, trees (rarely shrubs), of temperate and boreal regions of the Northern Hemisphere (most diverse in c. and n. Asia). References: Sherman-Broyles in FNA (1997); Wiegreffe, Sylsma, & Guries (1994); Kurz & Godfrey (1962)=Z; Todzia in Kubitzki, Rohwer, & Bittrich (1993). Key adapted in part from FNA.

1. Leaves mostly < 7 cm long, the base symmetrical to somewhat oblique.
2. Samaras ciliate-margined; twigs often cork-winged; upper surfaces of leaves glabrous to scabrous; [native trees, sometimes weedy].
3. Leaf apex acute; flowers appearing in the late winter to late spring; calyx lobes 5; upper surfaces of leaves glabrous; [widespread in our area; [subgenus Oreoptelea, section Chaetoptelea].................................U. alata
4. Leaf apex obtuse; flowers appearing in the late spring to fall; calyx lobes 6-9; upper surfaces of leaves harshly scabrous; [of w. TN, w. MS westward; also disjunct in FL; [subgenus Oreoptelea, section Trichoptelea]..........................U. crassifolia
5. Samaras with glabrous margins; twigs never cork-winged; upper surfaces of leaves glabrous; [introduced trees, planted and sometimes naturalized or persistent]; [subgenus Ulmus, section Microptelea].
6. Flowers appearing in the late summer to fall; leaf base generally oblique; leaves 1.5-2.5 cm wide, 5 or more of the lateral veins forked per side..........................................................U. parvifolia
7. Flowers appearing in the late winter to late spring; leaf base generally symmetrical; leaves 2-3.5 cm wide, 3 or fewer of the lateral veins forked per side..........................................................U. pumila
8. Leaf bases strongly oblique; larger leaves 10-15 cm long; primary leaf teeth acuminate, often curved inward; [tree widespread in our area].................................................................U. rubra
9. Leaf bases moderately oblique (rarely nearly symmetrical); larger leaves 7-10 cm long; primary leaf teeth acute, not curved; [tree restricted to moist calcareous sites in the Coastal Plain of se. NC southward].................................U. americana var. americana
10. Leaf undersurfaces glabrous or slightly to moderately scabrous on stump sprouts or seedlings; leaf undersurface glabrous to tomentose, with or without tufts of hairs in the vein axes; flowers and fruits pedicellate (on pedicels 5-20 mm long), pendulous, in fascicles or racemes.
11. Leaf bases obliquely truncate; larger leaves 10-15 cm long; primary leaf teeth acuminate, often curved inward; [tree widespread in our area]..........................................................U. americana var. floridana
12. Leaf bases obliquely truncate; larger leaves 7-10 cm long; primary leaf teeth acute, not curved; [tree restricted to moist calcareous sites in the Coastal Plain of se. NC southward].................................U. americana var. americana
13. Leaf undersurfaces glabrous or slightly pubescent, lacking prominent tufts of hairs in the vein axes (differing from the general pubescence of the surface); branches often developing corky wings; inflorescence a raceme or racemose cyme; [trees of calcareous areas in the western portion of our area]; [subgenus Oreoptelea, section Trichoptelea].

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1. Leaf blades mostly > 7 cm long, the base generally symmetrical (rarely nearly symmetrical).
2. Leaf apex obtuse; flowers appearing in the late spring to fall; calyx lobes 6-9; upper surfaces of leaves glabrous to scabrous; [widespread in our area; [subgenus Ulmus, section Microptelea].
3. Flowers appearing in the late winter to late spring; leaf base generally symmetrical; leaves 2-3.5 cm wide, 3 or fewer of the lateral veins forked per side..........................................................U. pumila
4. Flowers appearing in the late summer to fall; leaf base generally oblique; leaves 1.5-2.5 cm wide, 5 or more of the lateral veins forked per side..........................................................U. parvifolia
5. Leaf undersurface slightly to very strongly scabrous; leaf undersurface tomentose or villos, with tufts of hairs in the vein axes; flowers and fruits sessile or subsessile (on pedicels 0-2 mm long), not pendulous, in dense fascicles; [subgenus Ulmus, section Ulmus].
6. Leaves with ciliate margins; samara pubescent on the body with reddish hairs; bud scales red, the margins red-tomentose; [native tree].
7. Leaves without ciliate margins; samara glabrous except along the margin of the notched apex or on the central vein of the wing; bud scales brown, margins pale-ciliate; [introduced tree, planted and sometimes naturalized or persistent].
8. Leaf base oblique but not overlapping the petiole; branchlets not corky; samara glabrous except on the central vein of the wing.................................................................U. glabra
9. Leaf base oblique, the lower side overlapping the petiole; branchlets not corky; samara glabrous except along the margin of the notched apex..........................................................U. procera
10. Leaf undersurface glabrous (or slightly to moderately scabrous on stump sprouts or seedlings); leaf undersurface glabrous to tomentose, with or without tufts of hairs in the vein axes; flowers and fruits pedicellate (on pedicels 5-20 mm long), pendulous, in fascicles or racemes.
11. Leaf bases obliquely truncate; larger leaves 10-15 cm long; primary leaf teeth acuminate, often curved inward; [tree widespread in our area]..........................................................U. rubra
12. Leaf bases strongly oblique; larger leaves 10-15 cm long; primary leaf teeth acuminate, often curved inward; [tree widespread in our area].................................................................U. americana var. americana
13. Leaf bases moderately oblique (rarely nearly symmetrical); larger leaves 7-10 cm long; primary leaf teeth acute, not curved; [tree restricted to moist calcareous sites in the Coastal Plain of se. NC southward].................................U. americana var. floridana
14. Leaf undersurfaces glabrous or slightly pubescent, lacking prominent tufts of hairs in the vein axes (differing from the general pubescence of the surface); branches often developing corky wings; inflorescence a raceme or racemose cyme; [trees of calcareous areas in the western portion of our area]; [subgenus Oreoptelea, section Trichoptelea].
ULMACEAE

10 Leaves 7-8 (-14) cm long, lanceolate to ovate, the undersurface with yellowish-gold pubescence; buds and young twigs glabrous; calyx lobes 5-6; seeds thickened ............................................................ *U. serotina*

10 Leaves 9-11 (-16) cm long, obovate, the undersurface with whitish pubescence; buds and young twigs pubescent; calyx lobes 7-8; seeds inflated ........................................................................................................................................... *U. thomasii*

*Ulmus alata* Michaux, Winged Elm. Rock outcrops, dry and mesic forests and woodlands, bottomlands, old fields, disturbed areas. February-March; March-April. N. VA west to MO, south to c. peninsular FL and c. TX. [= RAB, C, F, FNA, G, GW, K, S, W, WH, Z]

*Ulmus americana* Linnaeus var. *americanus*, American Elm, White Elm. Swamps, bottomland forests, moist slopes, especially on relatively or strongly nutrient-rich substrates. February-March; March-April. NS, NB, and QC west to se. SK, south to n. FL and c. TX. An ascomycetous fungus, *Ceratocystis ulmi*, is the cause of the Dutch Elm disease. In our area, the effects of the disease appear to have been mild or nonexistent, especially in natural areas. [= Z; < *U. americana* – RAB, C, F, FNA, G, GW, K, W, WV; = *U. americana* – S]


*Ulmus crassifolia* Nuttall, Cedar Elm. Bottomlands, mesic forests. W. TN, s. MO, and OK south to c. TN, nw. GA, AL, and MS. [= FNA, K, S, Z]

*Ulmus parvifolia* Jacquin, Chinese Elm, Lacebark Elm. Disturbed areas; native of China and Japan. August-October; September-November. [= FNA, K]

*Ulmus procer* Salisbury, English Elm, English Cork Elm. Disturbed areas; native of Europe. [= C, FNA, K; *U. minor* P. Miller, misapplied]

*Ulmus pumila* Linnaeus, Siberian Elm, Dwarf Elm. Disturbed areas; native of Asia. [= C, F, FNA, K]

*Ulmus rubra* Muhlenberg, Slippery Elm, Red Elm. Moist to fairly dry calcareous forests, rich bottomlands, rich cove forests in the low Mountains. February-March; March-April. ME, QC, and ON west to MN and ND, south to Panhandle FL and c. TX. [= RAB, C, FNA, G, K, W, WV, Z; = *U. fulva* Michaux – S]

*Ulmus serotina* Sargent, September Elm. Mesic limestone forests. KY, s. IL, and e. OK south to c. TN, nw. GA, AL, and MS. It was collected on the French Broad River by Rugel in 1842, and has been attributed to NC by Mohr. [= C, FNA, F, G, K, S]

*Ulmus thomasii* Sargent, Cork Elm, Rock Elm. Rocky or rich slopes, especially over limestone. April. QC to MN and NE, south to NJ, MD, PA, WV, KY, TN, AR, and KS. [= C, FNA, K; = *U. thomasi* – F, G, WV, orthographic variant]

CANNABACEAE

As circumscribed to include the Celtidaceae, a family of 14 genera and about 120 species, trees, shrubs, woody vines, herbs, and herbaceous vines, of cosmopolitan distribution. Zavada & Kim (1996) discuss compelling reasons to recognize the Celtidaceae as a family distinct from the Ulmaceae. The distinctiveness of the Celtidaceae from the Cannabaceae and Moraceae is more questionable; and Sytsma et al. (2002) conclude that Celtidaceae should be considered a part of Cannabaceae. References: Small in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Sherman-Broyles, Barker, & Schulz in FNA (1997); Zavada & Kim (1996); Todzia in Kubitzki, Rohwer, & Bittrich (1993); Sytsma et al. (2002).

1 Tree or shrub; leaves simple and unlobed .......................................................................................................................................................... *Celtis*

1 Herb or vine; leaves either compound or lobed.

2 Erect herb; leaves with 3-7 leaflets .......................................................................................................................................................... *Cannabis*

2 Climbing or sprawling vine; leaves simple, with 1-9 lobes ....................................................................................................................................... *Humulus*
Cannabis Linnaeus 1753 (Hemp, Marijuana)

A genus of 1-3 species, herbs, originally native to c. Asia. *Cannabis* was formerly widely cultivated nearly worldwide for the fiber hemp; it is now better known as the source of the drug marijuana. References: Small in FNA (1997); Hillig & Mahlberg (2004); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

* *Cannabis sativa* Linnaeus, Hemp, Marijuana. Disturbed areas and clandestinely cultivated plots; native of Asia. June-October. Though perhaps not truly naturalized or persistent, *Cannabis* is treated here since clandestine cultivated plots are encountered by the field biologist, especially in fairly remote areas in the mountainous parts of our area. [= F, FNA, G, WH, WV; > *C. sativa* Linnaeus ssp. *sativa* – C, K]

**Celtis** Linnaeus 1753 (Hackberry)


1 Branches armed with short spines.......................................................................................................................................................... *C. iguanae*
1 Branches unarmed.
2 Leaves thick, very glossy above; bark remaining smoothish, lacking protuberances; [rare alien] ......................................................... *C. sinensis*
2 Leaves thin, dull or glossy above (glossy normally only in sun leaves, especially of *C. laevigata*); bark developing wartlike corky protuberances on larger individuals; [collectively common natives]
3 Leaf blades mostly > 2× as long as wide, the tip attenuate and long-acute to long-acuminate, the base cuneate to rounded; leaf margins entire or with a few teeth on each margin; [large trees, mostly of floodplains, but also in upland situations over calcareous substrates such as limestone, dolostone, and shell middens]............. *C. laevigata*
3 Leaf blades mostly < 2× as long as wide, the tip obtuse to short-acuminate, the base slightly to strongly cordate at least on one side; leaf margins entire or with a few teeth on each margin (the plant then a shrub or small tree of rocky places) or distinctly serrate with 10-35 teeth on each margin; leaves scabrous above, at least toward the tip; [shrubs to medium trees, of floodplains, moist slopes, and dry rocky woodlands, barrens, and glades].
4 Leaves 5-12 cm long, toothed well below the middle; fruit 7-14 mm long, ellipsoid or subglobose, dark orange, purple, or black, on a pedicel 7-25 mm long; [small to medium trees of dry to moist habitats] ................................................................. *C. occidentalis*
4 Leaves 2-8 cm long, toothed only near the tip if at all; fruit 5-9 mm long, subglobose or essentially spherical, orange, red, or brown, on a pedicel 3-13 mm long; [shrubs or small twisted trees of dry, rocky habitats] ......................................................... *C. tenuifolia*

**Celtis iguanae** (Jacquin) Sargent, Iguana Hackberry. Shell-middens and calcareous coastal sites. AL, sw. peninsular FL, West Indies, American tropics. [= KH; = *Momisia iguanae* (Jacquin) Rose & Standley – S]

**Celtis laevigata** Willdenow, Southern Hackberry, Sugarbark. Bottomland forests, especially on natural levees, upland calcareous forests and woodlands, shell middens. April-May; August-October. MD, WV, IN, IL, MO and KS south to s. FL and TX. [= RAB, C, FNA, G, GW, W; > *C. laevigata* var. *laevigata* – F; > *C. laevigata* var. *smallii* (Beadle) Sargent – F; = *C. laevigata* var. *laevigata* – K; > *C. mississippiensis* Rose – S; > *C. smallii* Beadle – S]

**Celtis occidentalis** Linnaeus, Northern Hackberry. Xeric to mesic glades, outcrops, barrens, woodlands, and bottomland forests, usually over calcareous substrate. April-May; August-October. NH, QC, MB, and MT south to Panhandle FL, TX, and NM. [= C, FNA, G, K, S, W, WV; > *C. occidentalis* var. *occidentalis* – RAB; > *C. occidentalis* var. *canina* (Rafinesque) Sargent – F; > *C. occidentalis* var. *occidentalis* – F; > *C. occidentalis* var. *pumila* (Pursh) A. Gray – F; < *C. occidentalis* – WH]

* *Celtis sinensis* Willdenow, Chinese Hackberry. Suburban woodlands; native of China, Korea, and Japan. Found naturalizing in Guilford County, NC (W. Cook, pers. comm., 2010). Not yet keyed

**Celtis tenuifolia** Nuttall, Dwarf Hackberry, Georgia Hackberry. Xeric to mesic glades, outcrops, barrens, woodlands, often over calcareous substrate. April-May; August-October. NJ, PA, IN, IL, and KS south to Panhandle FL and TX. [= C, FNA, G, K, W, WV; > *C. occidentalis* var. *georgiana* (Small) Ahles – RAB; > *C. tenuifolia* var. *georgiana* (Small) Fernald & Schubert – F; > *C. tenuifolia* var. *tenuifolia* – F; = *C. georgiana* Small – S; < *C. occidentalis* – WH]

Humulus Linnaeus 1753 (Hops)

A genus of 2 species, herbaceous vines, of temperate regions of the Northern Hemisphere. References: Small (1978)=Z; Small in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993). Key adapted from Z.
CANNABACEAE

1. Veins on lower surface of leaves armed with rigid, spinulose hairs; bracts of pistillate flowers spinulose-ciliate; most leaves 5-9 lobed .............. H. japonicus
2. Veins on lower surface of leaves more or less pubescent with lax, weak hairs, but lacking rigid, spinulose hairs; bracts of pistillate flowers smooth-margined; most leaves 1-3 lobed.

Humulus lupulus Linnaeus

- Humulus lupulus Linnaeus var. lupuloides E. Small, Northeastern Hops. Pd (VA), Mt (VA, WV), Cp (NC, VA): disturbed areas, particularly in rich, alluvial soils; uncommon (rare in NC and WV, rare in VA Coastal Plain). July-August; September-October. NS and NL (Newfoundland) south to VA and NC, west to NE, MT, and AB. It is not clear whether its occurrence in NC is native or native of further north. The 3 varieties (two native and one introduced) in our area are subtly different, the differences apparently sometimes further obscured by introgressive hybridization. [= C, FNA, K, Z; < H. lupulus – RAB, F, G, S, W, WV]

- Humulus lupulus Linnaeus var. lupulus, Brewer's Hops, European Hops. Pd (VA), Mt (WV): disturbed areas; rare, native of Europe. July-August; September-October. The European var. lupulus is (of course) one of the key ingredients of beer. [= C, FNA, K, Z; < H. lupulus – RAB, F, G, S, W, WV]

- Humulus lupulus Linnaeus var. pubescens E. Small, Midwestern Hops. Mt (GA, NC, VA), Pd (NC, VA), Cp (VA): disturbed areas, particularly in rich, alluvial soils; rare. July-August; September-October. NY and PA south to NC and ne. GA and west to MN, NE, KA, and AR. It is not clear whether the few occurrences east of the Blue Ridge (including those in NC and VA) are native or adventive from further west. [= C, FNA, K, Z; < H. lupulus – RAB, F, G, S, W]

Humulus japonicus

MORACEAE Lindley 1847 (Mulberry Family) [in ROSALES]

A family of about 38 genera and 1100 species, trees, shrubs, vines, and herbs, of tropical, subtropical, and (few) warm temperate areas. References: Wunderlin in FNA (1997); Rohwer & Berg in Kubitzki, Rohwer, & Bittrich (1993).

1. Herb, 0.3-1.0 m tall; stem without latex; [tribe Moreae]................................................................. Fatoua

Broussonetia L'Héritier ex Ventenat 1799 (Paper Mulberry)


**Cudrania** Trécul 1847 (Cudrania)


* **Cudrania tricuspidata** (Carrière) Bureau ex Lavallée, Cudrania. Pd (NC), Cp (GA): escaped and naturalized from plantings; rare, native of China and Korea, where cultivated as a food for silkworms. July. Naturalized in Orange County, NC, in McIntosh Co. GA (Jones & Coile 1988), and perhaps elsewhere in our area, where recommended as a hedge plant since at least 1940 (Rehder 1940). [= FNA, K; = *Maclura tricuspidata* Carrière]

**Fatoua** Gaudichaud-Beaupré 1830 (Crabweed)


* **Fatoua villosa** (Thunberg) Nakai, Crabweed, Mulberry-weed, Foolish-weed. Pd (GA, NC, SC, VA), Cp (GA, SC), Mt (NC): disturbed areas, vegetable and flower gardens; rare, native of Asia (apparently s. Asian islands). July–November. As reported by Massey (1975) and Vincent (2004), *Fatoua* was first reported in the United States (Louisiana) in the early 1960's. As of 2004, its distribution in North America had spread to include 28 states and the District of Columbia, including most states except the Great Plains and Rocky Mountains had spread (Vincent 2004, Sundell et al. 1999, Miller & Wood 2003. Since all early collections seem to be in and around greenhouses and nurseries, it is likely that it has been introduced in horticultural material, perhaps repeatedly (Kral 1981b). *Fatoua* appears to have become a fairly aggressive weed in eastern North America. It can be expected to continue to spread, and has the potential to become noxious. It has alternate, ovate leaves with cordate bases, borne on long petioles (about as long as the leaf blade), the inflorescences are dense cymes borne on peduncles in the axils of leaves. Pubescence of the stem and foliage is uncinulate, giving the plant a "tacky" feel. An excellent illustration appears in Correll & Correll (1982). [= FNA, K, Y, Z]

**Ficus** Linnaeus 1753 (Fig)


1 Leaves lobed, 7–30 cm long; [shrub to small tree]............................................................................................................ *F. carica*
1 Leaves unlobed, 1–5 cm long; [vine, climbing appressed to walls]....................................................................................... *F. pumila*

* **Ficus carica** Linnaeus, Edible Fig, Garden Fig. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): grown for its fruits, persistent from plantings, persisting and naturalizing particularly on barrier islands, where it sometimes forms thickets on dunes, or otherwise in the outer Coastal Plain, where proximity to the ocean ameliorates cold winter temperatures; rare, native of w. Asia. May–August; July–October. This is the common cultivated fig, grown for its fruit in the Mid-east for millenia. [= RAB, F, FNA, K, S, WH; = *Toxylon pomiferum* Rafinesque ex Sargent – S]

* **Ficus pumila** Linnaeus, Climbing Fig. Cp (AL, FL, GA, LA, SC): walls, disturbed urban areas; rare, native of s. Asia. Locally common in Charleston, Savannah, Pensacola, Mobile, New Orleans, and other old seaports, where grown on walls as an ornamental and certainly persisting. [= FNA, K, WH]

**Maclura** Nuttall 1818 (Osage-orange)

A monotypic genus (or sometimes broadened to include *Cudrania* and other genera), a tree, of sc. North America. References: Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

* **Maclura pomifera** (Rafinesque) C.K. Schneider, Osage-orange, Bow-wood, Bois-d'arc, Hedge-apple. Fields, hedgerows, forests; common (uncommon in DE Coastal Plain, rare in FL), naturalized from extensive planting in the eighteenth and nineteenth centuries, native of TX, OK, AR, and L.A. April–May; October. The large fruits are unmistakable: yellowish-green, grapefruit-sized, and wrinkled, reminiscent of a giant, spherical mulberry fruit. The wood is extremely heavy, fine-grained, a bright yellow-orange when fresh, but darkening with age, famous for making bows and also used in cabinetry. [= RAB, C, F, FNA, G, K, W, WH, WV; = *Toxylon pomiferum* Rafinesque ex Sargent – S]

1 Upper leaf surface glossy, glabrous or slightly scabrous; lower leaf surface glabrous, or slightly pubescent on the veins and in the vein axils only; ripe fruits black, purple, red, pink, or white............................................................................................................ M. alba


* Morus nigra Linnaeus, Black Mulberry. Reported. [add to synonymy; add to key; add to Access]

Morus rubra Linnaeus, Red Mulberry. Bottomland forests, mesic slopes, disturbed areas, suburban woodlands. April-May; May-June. MA, VT, NY, MI, WI, and se. SD south to s. FL and w. TX, and into Mexico. The fruits are very variable in quality from tree to tree. M. rubra is the only member of the Moraceae native to our area. M. murrayana D.E Saar & S.J. Galla has recently been described as distinct from M. rubra and occurring widely in eastern North America (KY, TN, MO, IL, IN, MS, LA, VA, NC, and AL) (Galla et al. 2009). It is alleged to differ from M. rubra by its leaves to 38 cm long (vs. to 15 cm long), the outer three leaves on branchlets almost always > 15 cm long (vs. < 15 cm long), leaves with caudate apex (vs. acute to acuminate apex), lateral veins curving before reaching margins, only the tiniest veins ending in a tooth (vs. lower outer three leaves on branchlets almost always > 15 cm long), leaves with caudate apex (vs. acute to acuminate apex), mature fruit to 4 cm long and 1.5 cm wide but often thinner, with much size variation on a single individual (vs. mature fruit to 3 cm long). All the alleged characters appear to be highly variable and correlated with vigor. [= RAB, C, F, G, GW, K, S, W, WV; > M. rubra var. rubra – K; > M. rubra – Z; > M. murrayana D.E. Saar & S.J. Galla – Z]

155. URTICACEAE A.L. de Jussieu 1789 (Nettle Family) [in ROSALES]

A family of about 45 genera and 1000 species, herbs, shrubs, vines, and trees, of cosmopolitan distribution in tropical, subtropical, and temperate regions. References: Boufford in FNA (1997); Friis in Kubitzki, Rohwer, & Bittrich (1993); Miller (1971a).

1 Leaves alternate.

2 Flowers in axillary spikes; woody herb to 4 m tall; [tribe Boehmerieae]............................................................................................................................................................................................................................................................................ Boehmeria nivea

Boehmeria Jacquin 1760 (False-nettle)


1 Leaves opposite; monoecious herb to 1.5 m tall; [subgenus Duretia].................................................................................................................................................................................................................................................................................................................. B. cylindrica

URTICACEAE

* **Boehmeria nivea** (Linnaeus) Gaudichaud-Beaupré, Ramie. Disturbed suburban areas, waste ground; native of Asia. This plant is cultivated for the fiber of its stems, which is extracted and used for fabric in a manner reminiscent of linen (which is made from *Linum usitatissimum*). Reported for Lowndes County, GA (Carter, Baker, & Morris 2009). [= RAB, FNA, K; = Ramium niveum (Linnaeus) Small – S]

**Laportea** Gaudichaud-Beaupré 1830 (Wood-nettle)


**Laportea canadensis** (Linnaeus) Weddell, Wood-nettle. Moist, nutrient-rich forests, especially abundant in cove forests in the Mountains and bottomlands in the Piedmont. Late June-August; late July-October. NS and se. MB south to Panhandle FL and OK. By mid-summer, *Laportea* often becomes the aspect dominant in rich, moist cove forests of the mountains (especially those with extensive seepage), visually replacing the diverse spring flora. The stinging hairs can penetrate pants made of lightweight or loosely woven fabrics. [= RAB, C, F, FNA, G, GW, K, W, WV; ? *Urticastrum divaricatum* (Linnaeus) Kunze – S]

**Parietaria** Linnaeus 1753 (Pellitory)


1 Leaves softly pubescent; [alien weed]; [subgenus *Parietaria*]. .............................................................. *P. judaica*

1 Leaves glabrescent; [native, sometimes weedy in calcareous or coastal areas]; [subgenus *Freirea*].

2 Main lateral veins diverging from the midvein above the usually narrowly cuneate leaf base; larger leaves 2-5× as long as wide ...........

2 Main lateral veins diverging from the midvein at the usually truncate, rounded, or broadly cuneate leaf base; larger leaves 1-2× as long as wide.

3 Achene with a flanged stipe, the minute apiculate tip located symmetrically at the pole of the achene, the achene 0.8-1.0 mm long...........

3 Achene without a flanged stipe, the minute apiculate tip located asymmetrically, the achene usually 1.2 (-1.4) mm long..........

Parietaria floridana Nuttall, Florida Pellitory. Coastal shores, sometimes weedy in calcareous situations. March-frost; April-frost. DE south to FL and west to TX, on the outer Coastal Plain. This species has smaller leaves than *P. praetermissa*. [= FNA, GW, K, WH, Z; = *P. nummularia* Small – C, F, S]

* **Parietaria judaica** Linnaeus, Pellitory-of-the-wall. Disturbed urban areas; native of Europe. [= FNA, K, WH; ? *P. diffusa* Mertens & Koch]

* **Parietaria officinalis** Linnaeus, Pellitory. Reported as introduced in Mobile County, AL (Kartesz 2010). {investigate} [= K2] [not keyed; add to synonymy]

**Parietaria pensylvanica** Muhlenberg ex Willdenow, Pennsylvania Pellitory, Rock Pellitory. In circumneutral soils, such as in thin soils at the bases of calcareous or subcalcareous cliffs or on calcareous shale barrens, rich floodplain soils. April-October; May-October. ME west to BC, south to e. NC, w. NC, AL, Panhandle FL, TX, NV, and Mexico. Two varieties are sometimes delimited, var. *pensylvanica* eastern and northern and var. *obtusa* (Rydberg ex Small) Shinners southwestern. [= C, FNA, G, GW, K, K2, RAB, S, W, WH; > *P. pensylvanica* – F, WV (sensa stricto)]

**Parietaria praetermissa** Hinton, Coastal Pellitory. Shell middens, coastal hammocks. March-frost; April-frost. E. NC south to s. FL and west to w. LA. [= FNA, GW, K, WH, Z; = *P. floridana* Nuttall – RAB, C, F, S, misapplied]
Pilea Lindley 1821 (Clearweed)


1 Leaves 0.5-1.0 (-1.8) cm long ............................................................................................................................................................ P. microphylla
1 Leaves 4-10 cm long.
2 Achene 1-1.5× as long as broad, tuberculate, dark brown or black, the margins slightly paler .......................................................... P. fontana
2 Achene 1.5-2× as long as broad, smooth, green or light brown, with slightly raised dark to black lines and motlings. .......... P. pumila

Pilea fontana (Lunell) Rydberg, Blackfruit Clearweed, Lesser Clearweed. Swamp forests, freshwater marshes, calcareous wetlands. August-September; September-November. E. Canada west to MN and ND, south to FL, IN, and NE. Only reliably distinguishable from P. pumila using fruits, P. fontana is, however, somewhat less shiny and transparent-translucent. [= RAB, C, F, FNA, G, GW, K, S, WH; < Adicea pumila (Linnaeus) Rafinesque – S]

* Pilea herniarioides (Swartz) Lindley, Caribbean Clearweed. Reported for Mobile County, AL and scattered sites in the FL peninsula (Karens 2010). [= K2] (not keyed; add to synonymy)

Pilea pumila (Linnaeus) A. Gray, Greenfruit Clearweed, Coolwort, Richweed. Swamp forests, bottomlands, freshwater marshes. August-September; September-November. QC west to MN, south to FL, LA, and OK. [= RAB, C, FNA, G, GW, W, WH, WV; > P. pumila var. pumila – F, K; > P. pumila var. deamii (Lunell) Fernald – F, K; < Adicea pumila (Linnaeus) Rafinesque – S (including in concept P. fontana)]

Urtica Linnaeus 1753 (Stinging Nettle)


1 Tap-rooted annual; stipules 1-3 mm long, spreading or deflexed; inflorescences usually shorter than the subtending leaf petiole, each panicle consisting of a mixture of pistillate and staminate flowers.
2 Flower clusters subglobose; mature achenes ovate, 1-1.5 mm long, < 1 mm wide; leaf teeth generally blunt, the sides of the tooth convex ................................. U. chamaedryoides
2 Flower clusters elongate; mature achenes triangular, 1.5-2.5 mm long, 1-1.5 mm wide; leaf teeth generally sharp, the sides of the tooth straight .............................................................................................................................................. U. urens
1 Rhizomatous perennial; stipules 5-15 mm long, erect; inflorescences usually surpassing the subtending leaf petiole, each panicle of either pistillate or staminate flowers.
3 Plants dioecious (male and female flowers always on separate plants); stems usually weak, sprawling, branching; stems strongly hislipid with stinging hairs; leaf blades strongly hispid with stinging hairs on both surfaces; leaf teeth commonly 5-6 mm long .................. U. dioica
3 Plants mostly monoecious (with male and female flowers in separate inflorescences on the same plant), rarely an entire plant male or female; stems upright, erect, less branched; stems glabrous to puberulent or strigose, lacking (or nearly so) stinging hairs; leaf blades glabrous or glabrescent above (lacking stinging hairs), glabrous to puberulent below (with some stinging hairs); leaf teeth commonly 2-3.5 mm long ............................................................................................................................................................................. U. gracilis

Urtica chamaedryoides Pursh, Dwarf Stinging Nettle. Rich moist soil, usually on floodplains. November-May; May-July, WV, KY, se. MO and OK south to FL, TX, and Mexico; very rare east of the Blue Ridge. Notable locations in our area include...
URTICACEAE

Stevens Creek (McCormick County, SC), Congaree Swamp (Richland County, SC), and various sites on very rich levees of the Roanoke River (NC). Gaddy & Rayner (1980) report the common winter flowering of this species in our area. [= RAB, C, F, FNA, G, K, S, WH, Z]


* Urtica gracilis Aiton, American Stinging Nettle. Bottomland forests and edges, particularly over limestone. May-July; July-September. NL (Laborador and NS west to AK, south to sw. VA, w. NC (?), s. OH, s. IL, s. MO, n. TX, s. NM, and se. AZ. The native stinging nettle of e. and c. North America is best treated as specifically distinct from U. dioica of Europe. Woodland (1982) and Woodland, Bassett, Crompton, & Forget (1982) showed that U. gracilis differs from U. dioica in a variety of morphologic characters (see key), chromosome number (2n = 26 for U. gracilis, 2n = 52 for U. dioica), breeding system (monoeary vs. dioecious), and distribution (North American vs. Eurasian); furthermore, the two taxa could not be crossed. Woodland (1982) chose subspecific status, apparently to emphasize the close relationship of the two (and a third taxa in w. North America). The combination of morphological distinctiveness, allopatry, major differences in species biology, and incompatability seem adequate to warrant separation as species, however. Until herbaria can be checked, it is uncertain whether U. gracilis occurs in NC. F (as U. procera), G (as U. dioica var. procera and S include NC in the range; Woodland (1982), however, showed the range as extending only south to VA. [= S, WV; < U. dioica – RAB, W; = U. dioica Linnaeus var. procera (Muhlenberg ex Willdenow) Weddell – C, G; > U. gracilis Aiton – F; > U. procera Muhlenberg – F; = U. dioica Linnaeus ssp. gracilis (Aiton) Selander – FNA, K, Z]


1 Leaves elliptic to oblanceolate, mostly < 15 cm long, the apices acute to obtuse; twigs puberulent; spine-covered husk of fruit splitting into 2 sections, enclosing 1 nut; nut circular in cross-section, 7-19 mm in diameter; pistillate dichasia of 1 flower; leaves with stellate trichomes, some of them usually > 12 cm long .......................................................................................................................................................... Quercus

1 Fruits partially enclosed in a scaly cup; leaves lobed, toothed, crenate, or entire .................................................................................................................................................................................................................................................. Castanea

2 Nuts rounded or flattened on one or two sides; bur with long, straight spines; winter buds < 1 cm long; leaves elliptic or oblanceolate, some of them usually > 12 cm long .......................................................................................................................................................................................................................... Fagus

2 Undersurface of leaves densely covered with bulbous-based trichomes when young, essentially glabrous in age; leaves mostly > 15 cm long, generally long-acuminate; twigs glabrous; trees single-trunked; spines of fruit husk weak, easily bent ......................................................... C. dentata

2 Undersurface of leaves persistently and densely tomentose beneath; leaves mostly < 15 cm long, generally short-acuminate; twigs puberulent; trees multi-trunked from base; spines of fruit husk stiff; nut ................................................................. C. mollissima

1 Leaves elliptic, oblongate or lanceolate, 8-30 cm long, the apices acuminate, sometimes only shortly so; spine-covered husk of fruit splitting into 4 sections, enclosing (2-) 3 (-5) nuts; nut flattened on at least one side, 18-25 mm in diameter; pistillate dichasia of 3 flowers; leaves usually without stellate trichomes; twigs puberulent or glabrous.

2 Undersurface of leaves densely covered with bulbous-based trichomes when young, essentially glabrous in age; leaves mostly > 15 cm long, generally long-acuminate; twigs glabrous; trees single-trunked; spines of fruit husk weak, easily bent ......................................................... C. dentata

2 Undersurface of leaves persistently and densely tomentose beneath; leaves mostly < 15 cm long, generally short-acuminate; twigs puberulent; trees multi-trunked from base; spines of fruit husk stiff; nut ................................................................. C. mollissima

1 Leaves elliptic to oblongate, mostly < 15 cm long, the apices acute to obtuse; twigs puberulent; spine-covered husk of fruit splitting into 2 sections, enclosing 1 nut; nut circular in cross-section, 7-19 mm in diameter; pistillata dichasia of 1 flower; leaves with stellate trichomes, with few bulbous-based trichomes when young, puberulent, pilose, tomentulose, or tomentose in age (usually rather densely so).

3 Longest spines of the fruit husk usually > 10 mm long; young twigs glabrous; petiole 8-10 (-15) mm long; [plants of n. AL and westward]..

3 Longest spines of the fruit husk usually < 10 mm long; young twigs puberulent; petiole 3-7 (-10) mm long; [plants widespread in our area].

Castanea P. Miller 1754 (Chesnut, Chinquapin)

A genus of 8-10 species, trees and shrubs, of temperate regions of the Northern Hemisphere. References: Nixon in FNA (1997); Govaerts & Frodin (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Elias (1971a).

A family of about 8 genera and 620-1050 species, trees and shrubs, mostly of the Northern Hemisphere, but extending into se. Asia and Australia. References: Nixon in FNA (1997); Govaerts & Frodin (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Elias (1971a).

1 Fruits partially enclosed in a scaly cup; leaves lobed, toothed, crenate, or entire .................................................................................................................................................................................................................................................. Quercus

1 Fruits enclosed in a spiny or prickly bur; leaves toothed.

2 Nuts sharply triangular; bur with short, recurved prickles; winter buds 1.5-2.5 cm long; leaves ovate, 6-12 cm long .......................................................................................................................................................................................................................... Fagus

2 Nuts rounded or flattened on one or two sides; bur with long, straight spines; winter buds < 1 cm long; leaves elliptic or oblanceolate, some of them usually > 12 cm long .......................................................................................................................................................................................................................... Castanea

Castanea dentata (Marshall) Borkhausen, American Chestnut. Mesic and xeric forests. June-July; September-October. S. ME, s. ON, MI, c. IN, s. IL, south to c. NC, c. GA, Panhandle FL, and sc. MS. Formerly one of the most important, largest, and
most abundant forest trees in the Mountains of our area, *C. dentata* was severely affected by chestnut blight, *Cryphonectria parasitica* (Murrill) Barr, introduced at New York City in 1904 on nursery stock of *C. mollissima*. Blight spread steadily southward, reaching our area in the 1920's and 1930's. *C. dentata* remains rather abundant, but now occurs only as stump sprouts and small trees, usually reinfected by blight persisting on oaks and killed at about the size of first fruit production. The accidental introduction of chestnut blight and the subsequent profound alteration of the role of chestnut is one of the most tragic ecological disasters to have affected our area. *Castanea × neglecta* Dode (pro sp.) [C. dentata × *pumila*], occurs in our area; "the leaves of the hybrid resemble those of *C. dentata* in size and shape but have the vestiture and stellate trichomes of *C. pumila*" (Johnson 1988).  [= RAB, C, F, FNA, G, K, S, W, WH, Z]

\* *Castanea mollissima* Blume, Chinese Chestnut. Forests; native of China. June; September. This species is relatively resistant to chestnut blight and has been planted widely as an ornamental and nut tree; it sometimes naturalizes and appears nearly native. Reported for NC (Macon County) by Pittillo & Brown (1988).  [= C, FNA, K, WH]

*Castanea ozarkensis* W.W. Ashe, Ozark Chinquapin. Dry forests. May-July; September-October. S. MO, e. OK, and w. AR; disjunct in c. AL, where now apparently extirpated by blight. *C. ozarkensis* is related to *C. pumila*, though showing some relation as well to *C. dentata*. *C. ozarkensis* is more susceptible to blight than *C. pumila*.  [= FNA, S, = C. pumila P. Miller var. ozarkensis (W.W. Ashe) G.E. Tucker – K, Z]


\* *Castanea sativa* P. Miller, Spanish Chestnut. Reported as naturalized in KY, AL, PA, and elsewhere in e. North America (Clark et al. 2005).  [= K] {not yet keyed; synonymy incomplete}

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**Fagus** Linnaeus 1753 (Beech)


1 Leaves denticulate; cupule prickles 1-2.5 (-4) mm long, slightly to strongly recurved; cupule valves generally ovate, the apex obtuse, reddish in color; leaves with fairly dense white acicular trichomes on the lower leaf surface at maturity; leaf base sometimes clearly cordate; [plants of the Coastal Plain, Piedmont, and low to moderate elevations (mostly below 1050 m or 3500 feet) in the Mountains]

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**F. grandifolia** var. *caroliniana*

1 Leaves sharply serrate; cupule prickles (3-) 4-10 mm long, projecting forward; cupule valves generally narrowly triangular, the apex acute, grayish-yellow in color; leaves usually lacking white acicular trichomes on the lower surface at maturity, instead with yellowish glandular hairs (acicular trichomes often present on the veins); leaf base not clearly cordate; [plants of moderate to high elevations (mostly above 1050 m or 3500 feet) in the Mountains]

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**F. grandifolia** var. *grandifolia*

*Fagus grandifolia* Ehrhart var. *caroliniana* (Loudon) Fernald & Rehder, White Beech, American Beech. Moist forests, from near sea level to low elevations in the Mountains, mostly below 1050 meters (3500 feet). March-May; September-October. Se. MA, OH, IN, s. IL, s. MI (?), and MO south to Panhandle FL and c. TX. Several subspecies, varieties, or phases of *Fagus grandifolia* have been described, and their taxonomic recognition is controversial. The most recent monograph, Shen (1992), recognizes three subspecies, one of which is limited to Mexico, the other two as treated here but at the subspecific level. I have here chosen to recognize 2 intergradient varieties in our area. A third variety, var. *mexicana* (Martínez) Little, of the mountains of México, is apparently most closely related to var. *grandifolia*. Cooper & Mercer (1977) studied variation in NC, concluding that two genetic races or varieties were present, the montane var. *grandifolia* and the Piedmont and Coastal Plain var. *caroliniana*, but that patterns of variation were complicated. Hardin & Johnson (1985) and Hardin (1992, 1985) note that variation is "more-or-less" clinal, variation within populations is great, and they do not favor recognition of infraspecific taxa. Depending on one's tolerance or intolerance for intergradational varieties, one may choose to recognize one or two taxa in our area.  [= C, F, G, Y; < *F. grandifolia* – RAB, FNA, K, S, W, WV, Z; < *F. grandifolia* ssp. *grandifolia* – Vj; = *F. grandifolia* ssp. *caroliniana* (Loudon) Camp ex Shen – X, nomen nudum; = *F. ferruginea* Aiton]

**Fagus grandifolia** Ehrhart var. *grandifolia*, Gray Beech, Red Beech, American Beech. Moderate to high elevation forests, especially on high elevation ridges, gaps, and open slopes, often forming clonal dwarfed thickets in the most exposed situations. April-May; September-October. NS, NB, and s. QC west to s. ON and n. MI, south to VA, w. NC, n. GA, e. TN, and n. OH.

"Red beech" is alleged to differ from "gray beech" in having the involucral segments not covering the nutlets at maturity. Hardin
Our oaks are divided into two well-marked sections; other sections occur outside our area. Red oaks (section *Lobatae*, sometimes treated as subgenus *Erythrobalanus*) are characterized by acorns maturing in two years (in one year in *Q. elliottii*), styles elongate, aborptive ovules are at the top of the seed, leaves and leaf lobes bristle-tipped, inner surface of the acorn shell velvety-pubescent, and acorns rooting in spring. White oaks (section *Quercus*, sometimes treated as subgenus *Quercus*) are characterized by acorns maturing in a single year, styles short or absent, aborptive ovules at the base of the seed, leaves and leaf lobes not bristle-tipped, inner surface of the acorn shell smooth, and acorns rooting in autumn. Twenty of our *Quercus* species are in this group: *Q. alba*, *Q. australis*, *Q. bicolor*, *Q. boytontii*, *Q. chapmani*, *Q. geminata*, *Q. lyrata*, *Q. macrocarpa*, *Q. margarettiae*, *Q. michauxii*, *Q. minima*, *Q. montana*, *Q. muehlenbergii*, *Q. oglethorpii*, *Q. prinoides*, *Q. robur*, *Q. similis*, *Q. sinuata* var. *simulata*, *Q. stellata*, and *Q. virginiana*. Hybrids within each section are frequent and diverse; hybrids do not naturally occur between the two sections. The live oaks of the southeastern Coastal Plain and Central America are subsections *Fagineae*; other white oaks are subsection *Quercus*. References: Nixon in FNA (1997) (overall treatment); Jensen in FNA (1997) (red oaks); Nixon & Muller in FNA (1997) (white oaks); Godfrey (1988); Stein, Binion, & Acciavatti (2003); Cronquist (1991); Duncan & Duncan (1988); Hunt (1990–Z; Hunt (1994); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

**Identification notes:** Many oak species are well-adapted to ecological situations in which fires frequently burn the ground layer. Fire-maintained communities of the Piedmont and Mountains typically have oaks such as *Q. stellata*, *Q. marilandica var. marilandica*, *Q. illicifolia*, and *Q. prinoides*. The two latter species are normally shrubby, and have become rarer because of fire suppression (they require fire to prevent larger trees from outcompeting them). In contrast, *Q. stellata* and *Q. marilandica var. marilandica* become larger and more frequent in fire-suppressed conditions.

Fifteen oak species in our area are typical of upland Coastal Plain communities with at least occasional fire: *Q. arkansana*, *Q. chapmani*, *Q. geminata*, *Q. hemisphaerica*, *Q. incana*, *Q. laevis*, *Q. margarettiae*, *Q. marilandica var. marilandica*, *Q. minima*, *Q. myrtifolia*, *Q. stellata*, and less typically *Q. falcata*, *Q. nigra*, *Q. velutina*, and *Q. virginiana*. Fire suppression of Coastal Plain communities, especially of sandhills, leads to an unnatural increase in the stature and abundance of oaks present. In frequent fire conditions, most oaks will persist as short, shrubby fire sprouts. Additional suggestions of how to recognize fire sprouts of these species are given below. In general, leaves of fire sprouts are larger and more deeply lobed than normal leaves. In species of the red oak group, the bristle tips are larger and more pronounced. Increased size in leaves is particularly noticeable when an area previously long fire-suppressed is burned (the large underground root system and nutritional resources of a small tree destroyed by fire being devoted to a few very vigorous sprouts). Fire sprouts are often in sunny conditions, which tend to make oak leaves more deeply lobed and more coriaceous than shaded leaves.

White oaks with lobed leaves:

**Quercus** Linnaeus 1753 (Oak)

A genus of about 350–530 species, trees and shrubs, of temperate, subtropical, and rarely tropical regions of the Northern Hemisphere. Oaks are the predominant tree of our area, with a variety of species dominating much of the landscape in nearly every ecological situation. Only in a few specialized (and usually in some sense edaphically extreme) communities are oaks generally entirely absent: deepest Coastal Plain swamps, some Coastal Plain depression ponds, wettest pine savannas, pocosins, spruce-fir forests, highest elevation northern hardwood forests, and mountain bogs.

& Johnson (1985), Hardin (1985), and Shen (1992) point out that var. *mexicana* (Martínez) Little, of the mountains of México, is more closely related to our montane variety or to the lower elevation variety or phase. [= C, F, G, Y; < *F. grandifolia* – RAB, FNA, K, S, W, WV, Z; < *F. grandifolia* ssp. *grandifolia* – V; = *F. grandifolia* ssp. *grandifolia* – X] *Fagus sylvatica* Linnaeus, European Beech, Copper Beech, of subgenus *Fagus*, section *Fagus*, is sometimes cultivated, but is not known to escape in our area. It has only 5-10 (-12) lateral veins, as opposed to (12-) 15-18 (-20) in *F. grandifolia*. [not keyed] [= V; ? *F. sylvatica* ssp. *sylvatica* – X] [not keyed]
**FAGACEAE**

*Q. elliottii* – Strongly clonal via a stoloniferous "runner", never tree-like. Leaves never lobed, even on fire sprouts, though fire sprout leaves can be larger (to 15 cm long and 5 cm wide). Very difficult to tell from fire sprouts or seedlings of *Q. incana*, best separated by leaf pubescence (white in *Q. elliottii*, gray in *Q. incana*), margin (slightly revolute in *Q. elliottii*, flat in *Q. incana*), leaf vernation (planate in *Q. incana*, rolled in *Q. elliottii*), and acorn maturation (1 year in *Q. elliottii*, with acorns often on small plants, 2 years in *Q. incana*, with small plants rarely producing acorns).  

*Q. hemisphaerica* – Not clonal. Leaves of vigorous shoots and fire sprouts often shallowly lobed, the lobing usually fairly neat and regular, triangular-ascending, and with bristle tips.

**Live oaks:**

*Q. geminata* – Sometimes clonal. Leaves, even of sprouts, not normally with lobes or teeth.

*Q. virginiana* – Sometimes clonal. Leaves of vigorous summer shoots (but apparently not spring shoots) often coarsely toothed, very similar to similar leaves of *Q. hemisphaerica*, but lacking bristle tips (instead the translucent margin with a darker, thickened callus at the tip of the tooth).

*Q. minima* – Always clonal. Leaves often with lobes or teeth.

Some oaks with ambiguous leaves are keyed in both Key A and Key D or in both Key B and Key C. The leaves of juvenile (seedling or sapling) branches, fire-sprout shoots, or other vigorous shoots (resulting from similar stimuli such as insect damage) are often much different than typical leaves and are not accounted for in these keys (see discussion at end of generic treatment). Hybrids are frequently encountered; they, too, are not keyed here, but can usually be identified (with difficulty) by their intermediate morphology and by parental context. Trichome types are useful in making and confirming identifications of oaks, since certain types are restricted to various groups of species. Hand lenses of 10× or 20× can be useful, but a dissecting scope with 20× to 40× dissecting microscope is far preferable. See Hardin (1992, 1976, 1979), and Thomson & Mohlenbrock.

1. Most of the leaves on a relatively mature tree entire and unlobed (some species frequently with some leaves on a tree, especially those on young or vigorous growth, that are toothed or shallowly lobed, the teeth or lobes generally and irregular in size or location); [primarily either "laurel oaks" of section Lobatae or "live oaks" of section Quercus].

Key A – Leaves (most of them) entire and unlobed (Laurel Oaks and Live Oaks)

2. Venation of the leaves neatly and evenly pinnate, 3-17 (or more) main lateral veins on each side distinctly parallel to each other, each ending in a tooth or shallow, crenate lobe extending <¼ of the way to the midrib; ["chestnut oaks" of sections Quercus and Cerris]..........

   Key B

3. Apices of the leaves or teeth obtuse (rarely acute), lacking bristle tips; ["white oaks" of section Quercus].

   Key C

4. Apices of the leaves or teeth acuminate (rarely acute), and with bristle tips; ["red oaks" of section Lobatae].

   Key D

1. Most of the leaves on a relatively mature tree entire and unlobed (Laurel Oaks and Live Oaks)

2. Venation of the leaves neatly and evenly pinnate, 3-17 (or more) main lateral veins on each side distinctly parallel to each other, each ending in a tooth or shallow, crenate lobe extending <¼ of the way to the midrib; ["chestnut oaks" of sections Quercus and Cerris]..........

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3. Apices of the leaves or teeth obtuse (rarely acute), lacking bristle tips; ["white oaks" of section Quercus].

   Key C

4. Apices of the leaves or teeth acuminate (rarely acute), and with bristle tips; ["red oaks" of section Lobatae].

   Key D

1. Leaves broadly obovate or spatulate, 1-2.5 (-3)× as long as wide.

2. Leaves 2-10 (-15) cm long, with rounded, subcordate, truncate, or oblique bases; lower leaf surfaces thinly to densely pubescent with tawny to orange glandlike hairs; [section Lobatae].

   Q. marilandica var. marilandica

2. Leaves 2-10 (-15) cm long, mostly with cuneate or rounded bases (in some species sometimes subcordate, truncate, or oblique); lower leaf surfaces glabrous, glabrescent, or pubescent, but the pubescence not orange and glandlike.

   Q. chapmanii

3. Twigs of the current year densely and finely hairy, obscuring the surface; [scrubby trees of sandhills from se. SC southward]; [section Quercus].

   Q. sinuata var. sinuata

3. Twigs of the year glabrous or sparsely pubescent; [shrub, shrubby small trees, or large trees of various habitats].

4. Leaves grayish beneath; [section Quercus].

   Q. inopina

4. Leaves bright green or orange-scurfy beneath; [section Lobatae].

   Q. myrsinifolia

5. Leaf blade strongly convex; lower leaf surface orange-scurfy; [of sandhills and scrub from n. FL southward]...............

6. Leaves evergreen, (including the pedicel) usually <4 cm long (sometimes to 9 cm long) and <2 cm wide (to 6 cm wide); lower leaf surface usually entirely glabrous at maturity (rarely with pubescence in the vein axes); leaf blades rarely lobed; [shrub to scrubby tree of sandhills in se. SC and southward].

   Q. arkansana

6. Leaves deciduous, (including the pedicel) usually >5.5 cm long (rarely smaller) and usually 3-5 cm wide; lower leaf surface usually with tufts of hairs in the main vein axes beneath; leaf blades often lobed.

7. Leaves with broadly cuneate to rounded leaf bases, the blades 5-15 cm long; lower leaf surfaces generally pubescent across the surface, and also with tufts in the axis; [of sw. GA westward].............

   Q. nigra

7. Leaves with cuneate bases, the blades 5-10 (-15) cm long; lower leaf surfaces glabrous, except for tufts of hairs in the vein axes; [widespread in our area]..........

   Q. phellos

8. Leaves (at maturity) glabrous or at most sparsely pubescent on the surface below, though often with tufts of hairs in the main vein axes.

9. Twigs of the year densely and finely hairy, obscuring the surface; [at maturity] sparsely pubescent beneath; [scrubby trees of sandhills from se. SC southward]; [section Quercus].

   Q. chapmanii

9. Twigs of the year glabrous or sparsely pubescent; leaves (at maturity) bright green and glabrous beneath, though often with tufts of hairs in the main vein axes; [medium to large trees, more widespread, mostly of moist habitats, except Q. hemisphaerica]; [section Lobatae].

10. Leaves predominantly lanceolate, mostly 6-12 cm long and 0.7-2 cm wide, most of them 5-8× as long as wide, the apex acute; mature leaves with tufts of hairs in the vein axes below, and sometimes also some pubescence on the blade surface near the midrib; blades never with lobes or teeth; leaves deciduous in autumn; young leaves bronze red, emerging tightly rolled lengthwise and appearing linear; [trees of bottomlands and upland depression swamps, mesic uplands, and also weedy and frequent in disturbed successional habitats]..........

   Q. phellos
10 Leaves predominantly oblongate, obovate, or rhombic, mostly 2.5-10 cm long and 1.5-4 cm wide, most of them 2-5× as long as wide, the apex acute, obtuse, or rounded; mature leaves with or without tufts of hairs in the vein axils below, lacking pubescence on the blade surface; blades sometimes with 1-5 lateral lobes or teeth; leaves persisting until spring, or tardily and irregularly deciduous in winter; young leaves red, yellow, or green, not emerging tightly rolled lengthwise; [trees primarily either of swamp forests, maritime forests, or sandhills, not typically weedy].

11 Mature leaves entirely glabrous below; leaves mostly with acute apices and bristle tips (rarely a few rounded), mostly 2.5-8 cm long and 1-2 (-3) cm wide, the upper surface shiny, the vein network not readily visible when backlit; leaves evergreen (persisting until spring); petiole 0.5-2 mm long; leaves of vigorous growth often with dentate lobes; [trees of dry sandy habitats, such as sandhills and maritime forests]..........................................................................................................................Q. hemisphaerica

11 Mature leaves with tufts of stellate trichomes in the vein axils; leaves mostly with rounded apices (rarely a few acute and then bristle-tipped), mostly 5-10 cm long and (1.8-) 2-4 cm wide, the upper surface dull, the vein network readily visible when backlit; leaves tardily deciduous; petiole 2-6 mm long; leaves of vigorous growth rarely lobed, and then not dentate; [trees of most habitats, such as floodplain forests]..........................................................................................................................Q. laurifolia

8 Leaves (at maturity) persistently and densely pubescent on the surface below, the pubescence in some species so dense and tight as to be difficult to perceive without at least 10× magnification.

12 Leaves bristle-tipped (sometimes the bristle fallen or broken off, but leaving a truncate scar), deciduous in autumn; multi-armed trichomes of the rosulate or multiradiate types, many of the arms ascending or erect (never with the stellate or fused-stellate trichomes characteristic of the live oaks); acorns maturing in 2 years (immature acorns present through the winter on fruiting trees); [section Lobatae]..........................................................................................................................Q. imbricaria

13 Leaves (including petiole) mostly 10-17 cm long, 3.5-7 cm wide; lower leaf surface (at maturity) sparsely to moderately densely pubescent with soft hairs; leaves lustrous dark-green above; [trees of the Mountains, Piedmont, and rarely Coastal Plain]..........................

13 Leaves (including petiole) mostly 4-11 cm long, 0.5-3.0 cm wide; lower leaf surface densely covered with soft hairs; leaves lustrous dark-green or bluish-green above; [stoloniferous shrubs and small to medium trees of the Coastal Plain].

14 Leaves 0.5-1.5 cm wide, mostly 4-8× as long as wide, lustrous dark-green above; acorns 8-12 mm long; petioles 1-3 mm long; [plant a stoloniferous shrub, to 1 m tall (or to 2 m in fire-suppressed pinelands)] ........................................Q. elliottii

14 Leaves 1.5-3.0 cm wide, mostly 2-4× as long as wide, dull bluish-green above; acorns 10-15 mm long; petioles 4-15 mm long; [plant a small to medium tree]..........................................................................................................................Q. incana

12 Leaves not bristle-tipped, evergreen (overwintering, falling with the expansion of new leaves in the spring) or deciduous (in Q. oglethorpensis); multi-armed trichomes of the fused-stellate and stellate types, the arms parallel to the leaf surface, radiating from a well-developed disc that appears as a white eye or dot at 20-40× magnification (or rosulate or multiradiate in Q. oglethorpensis); acorns maturing in 1 year (immature acorns not present through the winter, unless aborted); [section Quercus].

15 Leaves deciduous in autumn; bark gray, resembling Q. alba; [trees of bottomlands and upland clay flats of GA and SC]..........................

15 Leaves evergreen (overwintering, falling with the expansion of new leaves in the spring); bark (on the tree species) brownish, deeply furrowed; [trees and stoloniferous shrubs of sandy habitats of the Coastal Plain of GA, NC, SC, and VA].

16 Plant a stoloniferous shrub, to 1 m tall (or to 2 m in fire-suppressed pinelands) and producing acorns at that size............Q. virginiana

16 Plant a small to large tree, not producing acorns until >2m tall.

17 Leaf blades with the margins strongly revolute, and also the sides of the blades generally rolled downward and obscuring part of the lower surface, the leaf appearing boatlike (the depth of the "boat" often approaching the width of the leaf); midvein and major lateral veins impressed on the upper surface and raised on the lower surface (the lower surface therefore appearing rugose); buds dark brown; cup scales gray-tipped; pubescence of the lower surface stellate, both appressed and erect, the individual stellae readily visible at 20× magnification (sometimes at 10× magnification); acorns (1-) 2 (-6) per stalk; [typically a small tree of dry sands] ..........................................................................................................................Q. geminata

17 Leaf blades flat, or the margins slightly to strongly revolute, the sides of the blade sometimes rolled downward, usually not obscuring part of the lower surface, the leaf not boatlike (the leaf much wider than deep); midvein and major lateral veins not impressed (or very slightly so) on the upper surface and only very slightly, if at all, raised on the lower surface (the lower surface therefore not appearing notably rugose); buds red-brown; cup scales red-tipped; stellate-appearing clusters of the lower surface stellate, all of it tightly appressed, the individual stellae readily visible only at 30× magnification (sometimes barely distinguishable at 20× magnification); acorns 1-2 per stalk; [typically a salt-pruned shrub to large tree of dunes, estuarine shorelines, and southward of upland flats and slopes]........Q. virginiana

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Key B – Leaves with even crenations or teeth (Chestnut Oaks)
Key C – Leaves with lobes not bristle-tipped (White Oaks)

1 Lower surfaces of mature leaves glabrous.
2 Leaf lobes with acute apices; sinuses often both broad and "flat-bottomed" (with portions parallel to the midrib); acorn cup covering 2/3 to 3/4 of acorn ................................................................. Q. lyrata
3 Leaf lobes with obtuse apices; sinuses narrow (often notch-like), narrowly to broadly rounded or triangular (lacking portions parallel to the midrib); acorn cup covering 1/4 to 1/2 of acorn.
4 Leaves mostly 4-10 (-17) cm long, 2-5 (-9) cm wide, with 1-5 shallow lobes or undulations, extending 1/8 to 1/2 of the way to the midrib; acorn cup flat at the base, covering < 1/4 of the acorn .............................................. Q. sinuata var. sinuata
5 Leaves mostly 7-20 cm long, 3-10 cm wide, with 3-11 lobes, extending 1/4 to 5/6 of the way to the midrib (if the lobing < 1/5 of the way to the midrib, then the acorn cup rounded at the base and covering 1/4 to 1/2 of the acorn).
6 Leaf base deeply cordate; [native] .................................................................................. Q. alba
7 Leaf base cuneate; [alien, sometimes planted and persistent] ................................................................. Q. robur
8 Leaves mostly 7-11 lobes (the sinuses usually deep, those of the larger leaves usually about 2/3 to 5/6 of the way to the midrib), 10-20 cm long, 5-10 cm wide; terminal bud rounded or globose; basal scales of acorn cup thickened, the thickening giving the cup a knobby texture ........................................................................................................ Q. stellata
9 Leaves mostly relatively deeply lobed throughout the length of the leaf, the total number of lobes 3-13; acorns sessile or borne on peduncles up to 1 cm long; acorn cup covering 1/3 to 3/4 of acorn, the upper scales with acute, long-acuminate to, long-awned apices.
10 Upper scales of the acorn cups thin and acute; acorn cup covering 1/2 to 3/4 of the acorn; [swamps in the Coastal Plain and lower Piedmont of GA, NC, SC, and VA] ................................................................. Q. lyrata
11 Upper scales of the acorn cups long-attenuate into nearly terete awns; acorn cup covering 1/3 to 1/2 of the acorn; [Mountains of VA] .......................................................................................... Q. macrocarpa var. macrocarpa
12 Lower surfaces of mature leaves gray, green, pale green, or yellowish, glabrescent or densely pubescent, the hairs few-branched and erect; leaves mostly relatively deeply and obtusely lobed, rarely shallowly lobed (if so, the lobes 3-7), the sinuses extending 1/2 to 4/5 of the way to the midrib, the total number of lobes 3-7; acorns sessile or nearly so.
9 Leaf lobes with acute apices; acorn cup covering 2/3 to 3/4 of acorn ................................................................. Q. lyrata
10 Leaf lobes with obtuse to rounded apices; acorn cup covering 1/3 to 1/2 of acorn.
11 Woody twigs of the season glabrous or with scattered, deciduous 2-forked hairs; petioles of mature leaves 3-10 (-15) mm long; leaf blades (2.5-)4-8 (-13.5) cm long, irregularly and often rather shallowly 3-5 (-7) lobed, the overall form of the leaf only rarely cruciform; largest lateral lobes usually at the midpoint of the blade (or even below it), the lobes usually not sublobed, tapering from base to tip; [kERIC sandy sites in the Coastal Plain from sc. VA southward] ................................................................. Q. margarettae
12 Woody twigs of the season densely and persistently stellate-pubescent, especially toward the tip of the twig; petioles of mature leaves 15-20 mm long (Q. stellata) or 3-10 (-15) mm long (Q. boytonii and Q. similis); leaf blades (5-)7.5-15 (-20) cm long, usually 5-lobed, the overall form of the leaf typically cruciform (Q. stellata) or not (Q. boytonii and Q. similis); largest lateral lobes of the leaves usually above the midpoint of the blade, these lobes often sublobed or squarish in shape, usually wider near their tips than at their bases (Q. stellata) or not sublobed, tapering from base to tip (Q. boytonii and Q. similis); [collectively widespread in our area].
11 Leaves usually cruciform, the largest lateral lobes often sublobed or squarish in shape, usually wider near their tips than at their bases, and borne at right angles to the midrib; [usually of dry to dry-mesic upland situations, widespread in our area]................................. Q. stellata
12 Leaves not cruciform, the largest lateral lobes usually not sublobed, tapering from base to tip, and borne at ascending angles relative to the midrib; [of temporarily flooded calcareous swamps of the Coastal Plain, from SC (NC?) southward in our area (Q. similis) or localized on sandstone in ne. AL (Q. boytonii)].
13 Rhizomatous shrubs to small trees, generally < 2 m tall; [of sandstone outcrops in ne. AL] ................................................................. Q. boytonii
14 Single-trunked large trees, [usually of temporarily flooded calcareous swamps of the Coastal Plain, from SC (NC?) southward in our area] ................................................................. Q. similis

Key D – Leaves with lobes or teeth bristle-tipped (Red Oaks)

1 Leaves shallowly 3-lobed near the broad apex (some leaves of sprout or juvenile shoots may be more lobed).
2 Leaf blades 5-15 cm long; lower leaf surfaces glabrous, except for tufts of hairs in the vein axils (or pubescent across the surface in Q. arkansana).
### FAGACEAE

**Q. acutissima** Carruthers, Sawtooth Oak. Commonly cultivated as a suburban street tree and also widely planted in "wildlife food plots", rarely naturalizing; native of Japan. This species has been a popular recommendation for "wildlife plantings" in the recent past, and entire stands can be encountered in relatively remote areas, planted by federal and state land management agencies; why "wildlife" species in our area need more oak trees is somewhat mystifying! See Whittomore (2004) for additional information. Spreading from plantings in Knoxville, TN (D. Estes, pers. comm. 2007). [= K; ? Q. acutissima ssp. acutissima]

**Q. alba** Linnaeus, White Oak. Mesic to xeric forests. April; September-November (of the same year). ME west to MN, south to Panhandle FL and e. TX. Historically, one of the most valuable timber trees of eastern North America. **Q. alba** is

<table>
<thead>
<tr>
<th>Character</th>
<th>Value 1</th>
<th>Value 2</th>
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<tbody>
<tr>
<td>Leaves</td>
<td>shallowly to deeply 5-12-lobed (some of the leaves of <strong>Q. georgiana</strong> only 3-lobed), the lobes primarily lateral.</td>
<td></td>
</tr>
<tr>
<td>Mature leaves</td>
<td>pubescent beneath on the surface with stellate hairs.</td>
<td></td>
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<tr>
<td>Acorns</td>
<td>12-20 mm long, in a cup 15-25 mm across and 10-12 mm deep; mature leaves loosely and finely pubescent (the stellate hairs conspicuous and readily distinguishable at 10x magnification), often becoming nearly or entirely glabrous by late in the year (except for tufts of hairs in the vein axils); terminal bud 4-angled, 7-10 mm long, densely gray-tomentose.</td>
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<tr>
<td>Acorns</td>
<td>10-15 mm long, in a cup 12-14 mm across and 4-5 mm deep; mature leaves densely and finely pubescent (the stellate hairs minute and scarcely distinguishable at 10x magnification), the pubescence permanent; terminal bud only obscurely angled (if at all), 5-8 mm long, brown-puberulent.</td>
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<tr>
<td>Mature leaves</td>
<td>glabrous beneath on the surface, with tufts of hairs in the main vein axils, sometimes sloughing off by late in the year (except for tufts of hairs in the vein axils); terminal bud 4-angled, 7-10 mm long, densely gray-tomentose.</td>
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<tr>
<td>Mature leaves</td>
<td>mostly 7-12 cm long, 5-11 cm wide (averaging about 9 cm long and 8 cm wide), with 5-7 lobes; acorns (8-) 10-13 (-15) mm long; acorn cup nearly flat at base, covering about 1/4 of the acorn.</td>
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<tr>
<td>Mature leaves</td>
<td>10-13 mm long; acorn cup nearly flat at base, covering about 1/4 of the acorn; leaf sinuses extending about 1/3 of the way to the midrib; bark of mature trees medium gray; [of the Mountains, mostly at 1000 m and above]</td>
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<tr>
<td>Mature leaves</td>
<td>mostly 10-20 cm long, 8-15 cm wide (averaging about 12-15 cm long and 10-12 cm wide), with (5-) 7-11 lobes; acorns (12-) 15-25 (-37) mm long; acorn cup nearly flat, turbinate, or rounded, covering 1/2-1/3 of the acorn.</td>
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<tr>
<td>Mature leaves</td>
<td>15-26 mm long, with or without 1-3 concentric grooves near the tip; upper surface of leaves bright green.</td>
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probably the most abundant native plant in our area, and in eastern North America, based on biomass, leaf area, and ubiquity. Hardin (1975) discusses introgression between *Q. alba* and many other species of *Quercus* subgenus *Quercus*. [= RAB, C, F, FNA, G, K, W, WH, WV; < *Q. alba* – S (also see *Q. austrina*)]

**Quercus arkansas** Sargent, Arkansas Oak. Dry bluffs. Sw. and wc. GA and Panhandle FL west in a fragmented distribution to sw. AR and e. TX. [= FNA, K, S, WH; > *Q. caput-rivuli* W.W. Ashe]

**Quercus austrina** Small, Bluff Oak. River bluffs, mesic hammocks, dry hammocks, natural levees of brownwater rivers, over mafic rocks, on shell or calcareous sediments. April; October (of the same year). Essentially a Southeastern Coastal Plain endemic, ranging from sc. NC south to n. FL and west to MS, nowhere common. [= RAB, FNA, K, WH; < *Q. alba* – S (apparently)]

**Quercus bicolor** Willdenow, Swamp White Oak. Upland depression swamp forests over mafic rocks such as gabbro or diabase, bottomland swamps with calcareous sediments. April, September (of the same year). Widespread in ne. North America, south to NC, SC (Nelson 1993), TN, n. AL, and MO. [= RAB, C, F, FNA, G, GW, K. S, W]

**Quercus boytonii** Beadle, Boynton Oak. Dry forests. Ne. AL and (possibly) TX. [= FNA, K, S; = *Q. stellata* Wangenheim var. boytonii (Beadle) Sargent]

**Quercus chapmanii** Sargent, Chapman Oak. Dry pinelands, sandhills, scrub. February-March; September-November (of the same year). A Southeastern Coastal Plain endemic: se. SC south to s. FL, west to sw. AL. [= RAB, FNA, K, S, WH]

**Quercus coccinea** Muenchhausen, Scarlet Oak. Xeric upland forests. April; September-November (of the second year). Centered in the Appalachians, from s. ME south to c. AL, but ranging west to MS, ne. AR, s. IL, and s. MI. [= RAB, C, F, FNA, G, S, W, WV; > *Q. coccinea* var. coccinea – K; > *Q. coccinea* var. tuberculata Sargent – K]

**Quercus elliotii** Wilbur, Running Oak. Pine flatwoods, especially on loamy soils in the Middle Coastal Plain. March-April; September (of the first year). A Southeastern Coastal Plain endemic: se. NC south to s. FL and west to s. MS. Wilbur (2002b) and Wilbur & Ho (2008) discuss the reasons for rejecting the traditional use of *Q. pumila* for this species; Walter's diagnosis states that *Q. pumila* has leaves that are glabrous and glaucous below, ruling out application to this species. [= WH; = *Q. pumila* Walter – RAB, FNA, K, S, Z, apparently misapplied]

**Quercus falcata** Michaux, Spanish Oak, Southern Red Oak. Upland forests, usually xeric. April; September-November (of the second year). Widespread in se. North America, north to e. OK, s. MO, s. IL, s. IN, s. OH, WV, se. PA, NJ, and reported (apparently without specimen documentation) from Long Island, NY. "*Q. triloba* Michaux", the form with the leaves only shallowly trilobed at the apex, causes much confusion. Though even medium-sized trees sometimes have leaves only of this form (rather than the typical form, deeply 5-7-lobed, the terminal lobe long-attenuate and falcate), it has no taxonomic merit. [= C, FNA, K, W, WH, WV; = *Q. falcata* var. falcata – RAB, G, GW; > *Q. falcata* var. falcata – F; > *Q. falcata* var. triloba (Michaux) Nuttall – F; = *Q. rubra* – S, misapplied; ? *Q. digitata* Sudworth; > *Q. triloba* Michaux]

**Quercus geminata** Small, Sand Live Oak. Xeric sandhills (northwards restricted to areas very near the coast). April; September-November (of the same year). A Southeastern Coastal Plain endemic: se. NC south to s. FL, and west to s. MS. The alleged occurrence of *Q. geminata* as far north as se. VA is apparently based on ambiguous specimens that probably are only *Q. virginiana* (the so-called var. maritima). A careful study of the genetics, morphology, and ecology of *Q. geminata* and *Q. virginiana* supports their recognition as separate species (Cavender-Bares & Pahlich 2009). *Q. geminata* flowers about 2-3 weeks later than *Q. virginiana* when growing in close proximity. [= C, FNA, GW, K, S, WH; < *Q. virginiana* – RAB; ? *Q. virginiana* var. maritima (Michaux) Sargent – F, misapplied]

**Quercus georgiana** M.A. Curtis, Georgia Oak. Dry slopes and bluffs, mainly over granite. April; September-October (of the second year). W. SC south and west through GA to c. AL. [= RAB, FNA, K, S]

**Quercus hemisphaerica** Bartram ex Willdenow, Sand Laurel Oak, Darlington Oak. Sandhills and other dry, sandy soils, an abundant component of maritime forests with *Q. virginiana*, and widely planted as a street tree in most parts of our region. March-April; September-November (of the second year). Essentially a Southeastern Coastal Plain endemic: se. VA south to s. FL and west to s. TX, north uncommonly in the interior to nc. AL., n. MS, and s. AR. Often confused with *Q. laurifolia* (see the key for distinctions). *Q. hemisphaerica* is the semi-evergreen laurel oak planted widely as a street tree in southern cities, often
intermixed with the strictly deciduous *Q. phellos*. [= C, F, FNA, Z; < *Q. laurifolia* – RAB, WH; = *Q. laurifolia* – S, misapplied; > *Q. hemisphaerica* var. *hemisphaerica* – K; > *Q. hemisphaerica* var. *maritima* (Michaux) Muller – K]

**Quercus ilicifolia** Wangenheim, Bear Oak, Scrub Oak. Xeric soils in ridges in the Mountains and monadnocks in the upper Piedmont, other dry sites. Late April-June; August (of the second year). Primarily Appalachian: s. ME south to w. VA, w. NC, and e. KY. In NC this scrubby oak is rare and probably declining because of fire suppression (Barden 1985), though recent ice storms have opened the tree canopy at several of its NC sites. The occurrence of *Q. ilicifolia* in KY was confirmed at the Devil's Teatable, Floyd County (Clark et al. 1997). [= RAB, C, F, FNA, G, K, S, W, WV]

**Quercus falcata** Michaux, Small) Sargent – F

**Quercus geminata**

**Quercus georgiana**

**Quercus hemisphaerica**

**Quercus ilicifolia**

**Quercus imbricaria** Michaux, Shingle Oak. Rich soils of upper floodplains of rivers and creeks, often at the base of the slope into the upland, also on upland ridges, in forests over diabase in the Piedmont of VA and n. NC. May; October (of the second year). Primarily midwestern, ranging from NJ, PA, n. OH, s. MI, n. IL, and c. IA, south to e. VA, nc. and w. NC, sc. TN, n. AL, and n. AR. [= RAB, C, F, FNA, G, K, S, W, WV, Z]

**Quercus incana** Bartram, Bluejack Oak. Sandhills, primarily in somewhat loamier textured, submesic soils, inland from the Coastal Plain on coarse sandy alluvium or upland ridges over quartzite or other acidic rocks. April; September-November (of the second year). Primarily a species of the Southeastern Coastal Plain, but rarely extending inland into the Piedmont (especially on coarse sandy alluvium): se. VA south to c. peninsular FL and west to e. TX, sw. AR, and se. OK. This oak is recognizable even at a distance by its bluish color. [= RAB, F, FNA, K, Z; = *Q. cinerea* Michaux – C, G, S; ? *Q. humilis* Walter]

**Quercus inopina** W.W. Ashe, Florida Scrub Oak. Scrub, sandhills. FL peninsula, north to St. Johns County. [= FNA, K, WH] [add to synonymy]

**Quercus laevis** Walter, Turkey Oak. Sandhills, primarily in very xeric soils of deep sandy deposits (Carolina bay rims, old beach dunes, early Cenozoic deposits of the Sandhills Province), or inland from the Coastal Plain on dry ridges and slopes over quartzite or other acidic rock types. April; September-October (of the second year). Essentially a Southeastern Coastal Plain endemic: se. VA south to s. FL and west to e. LA. The leaves turn an intense orange-red in the autumn (November). [= RAB, C, F, FNA, G, K, S, WH, Z; = *Q. catesbaei* Michaux]

**Quercus laurifolia** Michaux, Laurel Oak. Mesic to seasonally flooded soils of floodplains, also (rarely) mesic slopes and swamps in maritime forests. March-April; September-November (of the second year). A Southeastern Coastal Plain endemic: se. VA south to s. FL and west to e. TX and s. AR. Sometimes confused with *Q. hemisphaerica*, but (in addition to the key characters above) *Q. laurifolia* has blunter leaf tips, flowers about 2 weeks earlier, and generally occupies much moister habitats. [= C, F, FNA, G, GW, K, Z; < *Q. laurifolia* – RAB, WH (also see *Q. hemisphaerica*); = *Q. obtusa* (Wildenow) Ashe – S]

**Quercus lyrata** Walter, Overcup Oak. Seasonally rather deeply and frequently flooded soils of floodplains of the Coastal Plain, less commonly in seasonally flooded swamps in Triassic basins in the lower Piedmont, and rarely in upland depression swamps of the Piedmont (developed over clays weathered from mafic rocks) and Coastal Plain. March-April; September-October (of the same year). Primarily a species of the Southeastern Coastal Plain: DE south to Panhandle FL, west to e. TX and se. OK, north in the inland to w. TN, s. IN, s. IL, and se. MO. Of our oaks, *Q. lyrata* tolerates the wettest habitats, both in terms of depth and duration of flooding. [= RAB, C, F, FNA, G, GW, K, S, WH]

**Quercus macrocarpa** Michaux var. *macrocarpa*, Bur Oak, Mossycup Oak. Rich bottomland forests. NB and QC west to s. MB, south to nw. VA, KY, TN, LA, and TX. Variation in this species needs additional study; *Q. macrocarpa* in our area is the typic variety or subspecies if other taxa are recognized. [= K; < *Q. macrocarpa* – C, F, FNA, G, GW, S, WH]

**Quercus margarettae** Ashe ex Small, Sand Post Oak. Sandhills, typically in slightly loamy or clayey soils, not usual in the deepest and most xeric sands. April; September-November (of the same year). Primarily a species of the Southeastern Coastal Plain: se. VA south to FL and west to TX and se. OK. As stated by Fernald (1950), this oak was "chivalrously named [by W.W. Ashe] in 1903 for Margaret Henry Wilcox, who two years later became Mrs. Ashe." There has been controversy, however, over the spelling of the specific epithet; apparently it should be corrected to the genetive "ae" (K. Gandhi, pers. comm. 2007). [= Q. margarettae – RAB, C, FNA, G, S, WH; = *Q. margarettae* Ashe ex Small – K, orthographic variant; = *Q. stellata* var. *margarettae* (Ashe ex Small) Sargent – F]
**Quercus marilandica** Muenchhausen var. *marilandica*, Blackjack Oak. Upland forests and woodlands, usually on periodically droughty soils, as over shrink-swell clays, sandstones, deep sands, and sands with clay lenses. April; September-November (of the second year). NY (Long Island), NJ, se. PA, w. VA, s. OH, s. IN, c. IL, s. IA, and se. NE south to s. GA, Panhandle FL, and sc. TX (west to the Prairie border). There are historical accounts of the existence of prairies or barrens in the vicinity of Charlotte in the late eighteenth century, known as the "the blackjack lands." These areas were described as open and prairie-like, until the early nineteenth century, when they became dominated by dense forests of blackjack oak. The previously open condition was almost certainly maintained by fire, perhaps set by the Waxhaw Indians. Blackjack oak has long been considered an indicator of poor soil, as in Guthrie (1820), who states in his discussion of NC, "the Black Jack land is generally poor, though it has sometimes a black appearance, it is wet and loose, and is avoided by farmers, unproductive." Var. *marilandica* is the widespread taxon; var. *ashei* Sudworth [= *Q. neoashei* Bush] is worthy of recognition at the varietal level at least, and occurs from s. MO and s. KS south to c. AR, e. TX, and sc. TX, especially on the Edwards Plateau (Hunt 1990). [= FNA, K, Z; < *Q. marilandica* – RAB, C, F, G, S, W, WH, WV]

**Quercus michauxii** Nuttall, Basket Oak, Swamp Chestnut Oak. Bottomland forests, especially in fertile soils of upper terraces where flooded only infrequently and for short periods, upland depression ponds. April; September-October (of the same year). NJ south to n. peninsular FL and west to e. TX and se. OK, north in the interior to s. IL and s. IN. See discussion under *Q. montana* about the application of the name *Q. prinus* Linnaeus. [= RAB, C, F, G, GW, K, W, WH; = *Q. prinus* Linnaeus – S, name rejected (possibly misapplied, and a source of confusion)]

**Quercus minima** (Sargent) Small, Dwarf Live Oak. Pine flatwoods, coastal fringe sandhills. April; September-November (of the same year). A Southeastern Coastal Plain endemic: se. NC (New Hanover County) south to s. FL, west to s. MS. [= FNA, K, S, WH]

**Quercus montana** Wildenow, Rock Chestnut Oak. Xeric forests of ridges, slopes. April; September-November (of the same year). Primarily Appalachian but broadly distributed in e. North America: s. ME, NY, MI, s. UN, s. IL, and se. MO (Smith & Parker 2005) south to c. GA, c. AL, ne. MS (and LA?). The proper application of the Linnaean *"Q. prinus"* is controversial and unclear, having been debated and variously applied for well over a century. The name "*Q. prinus*" has nomenclatural priority over either "*Q. montana*" or "*Q. michauxii*", but it is not clear which species was intended; Whittemore & Nixon (2005) proposed its formal rejection and the proposal was formally and unanimously accepted (Brummitt 2007). [= FNA, S, W; = *Q. prinus* Linnaeus – RAB, C, F, G, K, WV, name rejected (probably misapplied, and a source of confusion)]

**Quercus muehlenbergii** Engelmann, Yellow Oak, Chinquapin Oak. Slopes and bluffs, on soils derived from calcareous or mafic rocks. April; October-November (of the same year). S. New England and ON west to WI, se. MN, and IA, south to nw. FL, TX, and n. Mexico. The similar *Q. montana* sometimes has a few leaves with somewhat sharply lobed leaves, but these are minutely mucronate and lack the well-developed callus of *Q. muehlenbergii*. Additionally, *Q. muehlenbergii* has a flaky, light gray bark, very different from the dark gray, deeply furrowed bark of *Q. montana*. [= RAB, C, F, K, WH, WV; = *Q. muehlenbergii* – FNA, S, W, orthographic variant; = *Q. prinoides* Wildenow var. *acuminata* (Michaux) Gleason – G]

**Quercus myrtifolia** Wildenow, Myrtle Oak. Dry pinelands. February-March; September (of the second year). A Southeastern Coastal Plain endemic: sc. SC south to s. FL, west to se. MS. [= FNA, F, S, WH, Z]

**Quercus nigra** Linnaeus, Water Oak, Paddle Oak. Bottomland forests, especially on levees or second terraces where flooded infrequently and for short periods, less commonly on mesic slopes. April; September-November (of the second year). Primarily a species of the Southeastern Coastal Plain: s. NJ south to s. FL and west to e. TX and se. OK, north in the interior to se. TN, c. TN, w. and sc. KY (Clark et al. 2005), se. MO, and e. OK. Seedlings and fire sprouts of this species are highly variable; see discussion at end of generic treatment. [= RAB, C, FNA, G, GW, K, S, W, WH, Z; > *Q. nigra* var. *nigra* – F; > *Q. nigra* var. *heterophylla* (Aiton) Ashe – F; = *Q. aquatica* Walter]

**Quercus oglethorpensis** Duncan, Oglethorpe Oak. Bottomland forests, upland oak flats over clays (Iredell and Enon soils). April; September-October (of the same year). Widely scattered from w. SC, to adjacent c. GA, nw. AL (Sorrie pers. comm. 2002), MS, and LA. [= RAB, FNA, GW, K]

**Quercus pagoda** Rafinesque, Cherrybark Oak, Swamp Spanish Oak. Bottomland forests, especially on second terraces, also mesic upland sites. April; September-November (of the second year). A Southeastern Coastal Plain endemic: e. and c. VA south to nw. FL and west to se. TX and north in the interior to e. TN, s. IL, and s. IN. [= C, FNA, K, S, WH; = *Q. falcata* var. *pagodifolia* Elliott – RAB, F, G, GW]
though there has been much debate about its taxonomic status, with opinions ranging from full species to mere form \(Q. acerifolia\) is an endemic of Magazine Mountain in n. AR and scattered sites in OK; it is best treated as a distinct species, varieties should be recognized within \(Q. stellata\) \(Q. similis\) Bonpland, Common Chinquapin Oak. Rarely cultivated in our area; sometimes persisting or escaping in ne. United States, south at least to s. FL. Moist to fairly dry forests of slopes, coves, and ravines, below 1000 meters elevation. April; September-November (of the same year). MA and s. MI south to n. peninsular FL and TX. A number of varieties have been recognized in \(Q. similis\) and var. \(Q. similis\).  

**Quercus palustris** Muenchhausen, Pin Oak. Swamps and bottomlands, especially the broader swamps developed in the sedimentary rocks of Triassic basins of the lower Piedmont, isolated upland sag ponds, also widely planted as a street tree in towns and cities. March-April; October-November (of the second year). MA and NY west to se. IA and e. KS, south to e. NC, nw. GA, sc. TN, n. AR, and e. OK. \(=\) RAB, C, F, FNA, G, GW, K, S, W, WV

**Quercus phellos** Linnaeus, Willow Oak. Bottomland forests, especially on natural levees and second terraces, also in upland depression swamps developed on clay soils, weedy and successional on slopes and upland sites following disturbance, and widely planted as a street tree in towns and cities. March-April; September-November (of the second year). Primarily a species of the Southeastern Coastal plain: NY (Long Island), s. NJ, and se. PA south to s. GA and Panhandle FL, west to e. TX and se. OK, north in the interior to e. TN, s. KY, w. KY, s. IL, and se. MO, and e. OK. \(=\) RAB, C, F, FNA, G, GW, K, S, W, Z

**Quercus prinoides** Willdenow, Dwarf Chinquapin Oak. Xeric uplands, especially on clay soils derived from mafic rocks, and probably in sites which naturally burned rather frequently. April; August-September (of the same year). MA and s. MI south to NC, OK, and TX. Fire suppression in the Piedmont swamps where this rare oak occurs has nearly or entirely extinguished it from much of our area. \(=\) RAB, C, FNA, K, S, W; \(>\) Q. prinoides var. prinoides \(-\) F; \(>\) Q. prinoides var. rufescens Rehder \(-\) F; \(=\) Q. prinoides var. prinoides \(-\) G

\* **Quercus rubra** Linnaeus, English Oak. Rarely cultivated in our area; sometimes persisting or escaping in ne. United States, south at least to s. PA (Rhoads & Klein 1993; Rhoads & Block 2007). \(=\) FNA, K \[rejected; not mapped\]

**Quercus rubra** Linnaeus var. ambiguus (A. Gray) Fernald, Gray Oak. Forests on ridges, slopes, and coves, mostly at over 1000 meters elevation. May; September-October (of the second year). Fairly widespread in ne. North America south to PA, and in the Appalachians to w. NC, nw. SC, and n. GA. This and var. \(Q. rubra\) tend to intergrade and their distinction as even varieties may not be warranted. For discussion of the two varieties, see McDougal & Parks (1984) and Jensen (1977). \(=\) K; \(=\) Q. rubra var. borealis (Michaux f.) Farwell \(-\) RAB, F, FNA, WV; \(<\) Q. rubra \(-\) C, W; \(=\) Q. borealis Michaux f. var. borealis \(-\) G; \(=\) Q. borealis \(-\) S

**Quercus rubra** Linnaeus var. rubra, Red Oak. Moist to fairly dry forests of slopes, coves, and ravines, below 1000 meters elevation. April; August-September (of the second year). Widespread in e. North America, south to e. VA, GA, AL, MS, AR, and OK. \(=\) RAB, F, FNA, K, WV; \(<\) Q. rubra \(-\) C, W; \(=\) Q. borealis Michaux f. var. maxima (Marshall) Ashe \(-\) G; \(=\) Q. maxima (Marshall) Ashe \(-\) S

**Quercus shumardii** Buckley, Shumard Oak. Moist and fertile soils of bottomlands and lower slopes, also in xeric sites over calcareous rocks (such as limestone). April; September-October (of the second year). Sc. PA, OH, s. MI, IN, s. IL, MO, and e. KS south to n. peninsular FL and TX. A number of varieties have been recognized in \(Q. shumardii\), and the morphological and habitat variation needs additional study. Var. \(Q. schneckii\) (Britton) Sargent is apparently more midwestern, but should be looked for in our area, especially on dry limestone slopes, its preferred habitat. It is allegedly distinguished by the acorn cups rounded to turbinate below (vs. flattened and saucer-shaped in var. \(shumardii\)). Hess & Stoytontoff (1998) tentatively concluded that no varieties should be recognized within \(Q. shumardii\). \(Q. acerifolia\) E.J. Palmer) Stoytontoff & W.J. Hess \(Q. shumardii\) var. \(acerriforma\) Palmer is an endemic of Magazine Mountain in n. AR and scattered sites in OK, it is best treated as a distinct species, though there has been much debate about its taxonomic status, with opinions ranging from full species to mere form (Smith 1988, Stoytontoff & Hess 1990, Johnson 1992, Johnson 1994, Hess & Stoytontoff 1998). \(=\) RAB, C, S, W, WH; \(>\) Q. shumardii var. shumardii \(-\) F, FNA, G, K, WV; \(>\) Q. shumardii var. schneckii (Britton) Sargent \(-\) F, FNA, G, K, WV

**Quercus similis** Ashe, Swamp Post Oak, Delta Oak. Calcareous stream flats. SC south to GA, west to e. TX. \(Q. similis\) resembles \(Q. stellata\), differing in its less definitely cross-shaped leaves and its distinctly wetland habitat. \(=\) FNA, K; \(=\) Q. stellata Wangenheim var. paludosa Sargent; \(=\) Q. ashei Sterrett

**Quercus sinuata** Walter var. sinuata, Bastard Oak. Alluvial and slope forests. April-May; September-November (of the same year). Se. SC south to FL Panhandle, west to TX. \(=\) FNA, K; \(>\) Q. durandii Buckley \(-\) RAB, S; \(<\) Q. sinuata \(-\) WH

**Quercus stellata** Wangenheim, Post Oak. Upland forests and woodlands, especially in clay or rocky soils and in fire communities. April; September-November (of the same year). Se. MA, s. NY, s. PA, s. OH, s. IN, s. IA, and e. KS south to n. peninsular FL and TX. In KS, OK, and TX, post oak is one of the trees that forms the Prairie boundary. There is no question of the distinctness of \(Q. margarettae\) from \(Q. stellata\). See \(Q. similis\). \(=\) RAB, C, FNA, G, K, S, WH, WV; \(=\) Q. stellata var. stellata \(-\) F; \(=\) Q. villosa Walter
**FAGACEAE**

*Quercus texana* Buckley, Nuttall Oak, Texas Red Oak. Floodplain swamps and bottomlands. AL, TN, w. KY (Clark et al. 2005), west to e. TX. [= FNA, K; = *Q. nuttallii* E.J. Palmer – F, GW; = *Q. shumardii* Buckley var. texana (Buckley) W.W. Ashe] [not yet keyed]

*Quercus velutina* Lamarck, Black Oak. Upland forests and woodlands, especially in fairly xeric and sandy soils. April; September-October (of the second year). ME west to MN and NE, south to Panhandle FL and TX. [= RAB, C, F, FNA, G, K, S, W, WH, WV]

*Quercus virginiana* P. Miller, Live Oak. Locally common to abundant in maritime forests and maritime scrub on barrier islands, more rarely inland (though regularly on the mainland from s. NC south, and extending substantially inland from s. SC south), sometimes in dry, fire-maintained habitats more usually occupied by *Q. geminata*, also planted (especially in the outer Coastal Plain). April; September-November (of the same year). A Southeastern Coastal Plain endemic: s. VA south to s. FL islands, more rarely inland (though regularly on the mainland from s. NC south, and extending substantially inland from s. SC south), sometimes in dry, fire-maintained habitats, also in xeric and fire-maintained habitats on monadnocks in the upper Piedmont and in dry, sandy sites in the lower Piedmont and fall-line sandhills. April; August-September. NB, ON and MN, south to sc. and w. NC, w. SC, ne. GA, nc. TN, and IL. [= C, FNA, GW, K, S; = *Q. virginiana* var. virginiana – F; = *Q. sempervirens* Walter]

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1 Leaves oblong or linear-lanceolate, pinnatifid, stipulate; fruit in a bristly involucre formed by 8 bractlets ..........................................

2 Fruit flattened, not waxy, partially enclosed in 2 wing-like bractlets; terminal buds lacking; aments inserted on old wood mainly below the leaves; [in our area, common and in the Coastal Plain, Mountains, and Piedmont] ..................................................

3 Fruit spherical, densely waxy, exposed (the 4-6 bractlets small and inconspicuous); terminal buds present; aments inserted on old wood mainly below the leaves; [in our area, very rare and restricted to bogs in the Mountains] ..................................................

4 Fruit in a bristly involucre formed by 8 bractlets ..........................................

5 Leaves mostly obovate or oblanceolate, entir e or toothed (especially apically), estipulate; fruit either exposed and densely waxy (*Myrica*), or partially enclosed in 2 wing-like bractlets (*Myrica*).

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**Myrica** L'Heritier ex Aiton 1789 (Bayberry Family) [in FAGALES]


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1 Fresh leaves odorless when crushed; staminate flowers with 6-10 stamens (or as few as 3 in distal flowers); leaves usually entire; [of s. GA south and west]; [subgenus *Cerothamnus*, series *Faya*] ..........................................................................................................................

2 Fruit flattened, not waxy, partially enclosed in 2 wing-like bractlets; terminal buds lacking; aments inserted on the summit of the branchlets of the preceding year; [in our area, very rare and restricted to bogs in the Mountains] ..................................................

3 Fruit spherical, densely waxy, exposed (the 4-6 bractlets small and inconspicuous); terminal buds present; aments inserted on old wood mainly below the leaves; [in our area, common and in the Coastal Plain, Mountains, and Piedmont] ..................................................

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**Comptonia** L'Heritier ex Aiton 1789 (Sweet-fern)


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*Comptonia peregrina* (Linnæus) J.M. Coulter, Sweet-fern. In the mountains on xeric ridges at low to medium elevations, usually in fire-maintained habitats, also in xeric and fire-maintained habitats on monadnocks in the upper Piedmont and in dry, sandy sites in the lower Piedmont and fall-line sandhills. April; August-September. NB, ON and MN, south to sc. and w. NC, w. SC, ne. GA, nc. TN, and IL. [= RAB, C, FNA, K, S, W, WV; > *Comptonia peregrina* var. *asplenifolia* (Linnæus) Fernald – F, Y; > *Comptonia peregrina* var. *peregrina* – F, Y; > *Myrica asplenifolia* Linnaeus var. *asplenifolia* – G; > *Myrica asplenifolia* var. *tomentosa* (Chevallier) Gleason – G]

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**Morella** Loureiro 1790 (Bayberry, Wax-myrtle, Candleberry)

Wilbur (1994) makes a compelling case for the recognition of three genera among eastern North American Myricaceae, and for application of the name *Myrica* to *Myrica gale*. The typification of the genus *Myrica* with *Myrica gale* Linnaeus has been confirmed (Brummitt 1999); thus, the familiar southeastern species placed by many authors in *Myrica* must take another name. Wilbur (1994) prefers to treat our species as subgenus *Cerothamnus* (Tidestrom) Wilbur of genus *Morella* Loureiro; subgenus *Morella* is restricted to e. Asia, the Philippines, and Malaysia, and differs in a number of ways from subgenus *Cerothamnus*, including its fleshy and succulent, rather than waxy and hard, berries. Small maintained *Cerothamnus* at the generic level. Wilbur's inclusion of *Cerothamnus* in *Morella* may well be warranted (and is followed here), but I disagree with his provisional decision to include the taxon treated below as *Morella pumila* in *Morella cerifera*, and the taxon treated below as *Morella pensylvanica* in *Morella caroliniensis*, though their appropriate rank may be questioned. References: Bornstein in FNA (1997); Wilbur (1994)=Z; Wilbur (2002a); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

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1 Leaves mostly obovate or oblanceolate, entir e or toothed (especially apically), estipulate; fruit either exposed and densely waxy (*Myrica*), or partially enclosed in 2 wing-like bractlets (*Myrica*).

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**FAGACEAE**

*Quercus texana* Buckley, Nuttall Oak, Texas Red Oak. Floodplain swamps and bottomlands. AL, TN, w. KY (Clark et al. 2005), west to e. TX. [= FNA, K; = *Q. nuttallii* E.J. Palmer – F, GW; = *Q. shumardii* Buckley var. texana (Buckley) W.W. Ashe] [not yet keyed]
Morella caroliniensis (P. Miller) Small, Pocosin Bayberry, Evergreen Bayberry. Pocosins, wet savannas and pine flatwoods, sandhill seepage bogs, and wet or sandy peatlands. April; August-October. Primarily limited to the Southeastern Coastal Plain, from NJ south to FL and west to TX and AR. [= K; = Myrica heterophylla Rafinesque – RAB, FNA, W, Y; > Myrica heterophylla var. heterophylla – F; > Myrica heterophylla var. curtissii (Chevalier) Fernald – F; < Myrica pensylvanica – G; < Cerothamnus carolinensis – S (also see Morella pensylvanica); < Morella caroliniensis (P. Miller) Small – Z (also see Morella pensylvanica)]

Morella cerifera (Linnaeus) Small, Common Wax-myrtle, Southern Bayberry. Interdune swales (where often dominant), pocosins, brackish marshes, or wet to moist habitats, now also widely planted (including in the Piedmont) as an ornamental or landscaping shrub and preistent or naturalizing in suburban woodlands. April; August-October. Widespread in the Coastal Plain of Southeastern United States: NJ south to FL and west to TX. Our most common Morella, and also the largest, sometimes becoming a small tree, to at least 10 m tall and 20 cm DBH. See Morella pumila for a discussion of the controversial taxonomy of Morella cerifera and Morella pensylvanica. [= Myrica cerifera Linnaeus var. cerifera – RAB, Y; < Myrica cerifera – C, FNA, GW (also see C. pumilus); = Myrica cerifera – F, G; = Cerothamnus ceriferus (Linnaeus) Small – S; < Morella cerifera (Linnaeus) Small – K, Z (also see Morella pumila)]

Morella inodora (Bartram) Small, Odorless Bayberry. Acid wetlands, especially in wooded, acid, streamhead "bogs" and bayheads, often associated with Magnolia virginiana, Persea palustris, Cyrilla racemiflora, Cliftonia monophylla, and Woodwardia areolata. A Southeastern Coastal Plain endemic: se. GA west to s. MS. [= K, Z; = Myrica inodora Bartram – FNA, GW, Y; = Cerothamnus inodorus (Bartram) Small – S]

Morella pensylvanica (Mirbel) Kartesz, Northern Bayberry. Dunes, sometimes even on the foredune and stoloniferously colonizing the upper beach, more typically behind the foredune on secondary dunes and sandy flats, often growing intermixed with Morella cerifera, but able to occupy drier sites higher on the dunes, from VA north, also ranging inland in sandy situations. April; August-October. This species reaches its southern limit at Avon (Kinnakeet), Dare County, NC. On interdune flats, it often grows intermixed with Morella cerifera, but is readily distinguished (even at a distance) by its stoloniferous growth (appearing as dome-shaped clones 3-20 m in diameter), stouter twigs, and tardily deciduous leaves. The twigs of this species are noticeably stouter than those of Morella cerifera; measured at 10 cm from the twig tips, they are (2-) 3.5 mm in diameter, those of Morella cerifera ca. 1.5-2.5 mm. [= K; = Myrica pensylvanica Loiseleur – RAB, C, FNA, GW, Y; = Myrica pensylvanica – G (also see Morella heterophylla); < Cerothamnus carolinensis – S (also see Morella pensylvanica); < Morella caroliniensis (P. Miller) Small – Z; = Cerothamnus pensylvanicus (Mirbel) Moldenke]

Morella pumila (Michaux) Small, Dwarf Bayberry, Dwarf Wax-myrtle. Savannas, pine flatlands, relatively moist to extremely dry sites in sandhills (under Quercus laevis and Q. geminata). April; August-October. A Southeastern Coastal Plain endemic: se. VA south to FL and west to LA (or TX). Some authors dismiss the distinction between this taxon and Morella cerifera as merely environmental, others treat the two as distinct at the varietal or specific level. In our area at least, they appear to be genetically distinct. They often occur in close proximity (though their typical habitats differ, they can be seen side by side in wet spodosolic pine savannas, sometimes also intermixed with Morella caroliniensis), and maintain their distinctiveness. There are some observations that there is a phenologic difference, with Morella pumila peak flowering 3 weeks later than Morella cerifera (J. Townsend, pers. comm. 2002). Though the issue remains unresolved, the stoloniferous growth of Morella pumila is not merely a fire response; I here maintain the two as distinct, pending further research. [= Myrica cerifera Linnaeus var. pumila Michaux – RAB, Y; < Myrica cerifera – C, FNA, GW; = Myrica pumilla Rafinesque – F, G; = Cerothamnus pumilus (Michaux) Small – S; < Morella cerifera (Linnaeus) Small – K, Z]

*Myrica gale* Linnaeus, Sweet Gale. Peaty bogs. April; August-September. A circumboreal species, south in North America to NJ, PA, MI, MN, and OR, disjunct from PA and s. NJ to Henderson County, NC, where considered extirpated at one time, as a result of the destruction of the famous East Flat Rock Bog. This shrub has been relocated at a single site, where it is abundant in a small area (less than 0.25 hectare). [= C, FNA, GW, K, S, W, Y; = *Gale palustris* Chevalier – RAB; > *Myrica gale* var. *gale* – F]

159. JUGLANDACEAE A. Richard ex Kunth 1824 (Walnut Family) [in FAGALES]

A family of about 8 genera and 60 species, trees and shrubs, mostly temperate. References: Stone in FNA (1997); Manos & Stone (2001); Elias (1972); Stone in Kubitzki, Rohwer, & Bittrich (1993).

1 Nuts 6-7 mm long, with 2 wings; leaves even-pinnate, the rachis usually winged

2 Fruit with husk dehiscent into 4 valves; pith of twigs continuous; leaves with (3-) 5-17 (-19) leaflets, the largest usually the terminal or final 2 lateral; nut with shell smooth, ridged, or irregularly wrinkled (but not deeply furrowed); terminal buds with imbricate (overlapping) or valvate scales; [tribe *Juglandae*, subtribe *Caryinae*] ....................................................... *Pterocarya*

2 Nuts > 15 mm long, unwinged; leaves odd-pinnate, the rachis unwinged.

2 Fruit with husk indehiscent; pith of twigs chambered (not always developing until autumn of the first year's growth); leaves with (7-) 11-19 (-23) leaflets, the largest usually about halfway up the leaf; nut with shell deeply furrowed in a complex corrugated pattern; terminal buds with valvate; [tribe *Juglandae*, subtribe *Juglandinae*] ....................................................... *Juglans*

*Juglans* Nuttall (Hickory)
(by A.S. Weakley & R.K. Peet)

A genus of about 18 species, trees, of e. North America (south into s. Mexico), and e. Asia. *Carya* in our area is separated into two sections, section *Apocarya* (*C. aquatica*, *C. cordiformis*, *C. illinoinensis*) and section *Carya* (*C. carolinensis–septentrionalis*, *C. glabra*, *C. laciniosa*, *C. myristicifolium*, *C. ovalis*, *C. ovata*, *C. pallida*, *C. tomentosa*). The southeastern United States is the center of diversity of *Carya*. Our four-state area includes 11 of 13 North American species (including the naturalized *C. illinoinensis* and lacking only a more southern species, *C. floridana* Sargent of peninsular FL, and a south-central species, *C. texana* Buckley, of sc. United States), and 11 of 18 species worldwide. Section *Rhamphocarya* includes a single Asian species. The remaining 4 species in the genus are all in section *Apocarya*: *C. palmeri* Manning of Mexico and 3 Asian species. *C. cordiformis*, *C. aquatica*, *C. illinoinensis*, *C. myristicifolium*, *C. laciniosa*, *C. ovata*, and *C. carolinensis–septentrionalis* are diploids, with *n* = 16. *C. pallida*, *C. glabra*, *C. ovalis*, and *C. tomentosa* are tetraploids with *n* = 32 (Stone 1961). As suggested by Stone, Adrouny, & Flake (1969), it seems possible that reticulate evolution involving extant or extinct diploid species is responsible for some of the difficulties in the *C. glabra-ovalis* complex. Many hybrids have been described, but some are questionable. Additionally, Hardin & Stone (1984) state that "most of these hybrids are localized and have not led to introgressive populations, or at least none that have been recognized". Ecologically, *Carya* is one of the more diverse and ubiquitous genera of trees in our area, surpassed in number of species, abundance, and ecological amplitude only by *Quercus* and *Pinus*. This has led to a long tradition of describing large parts of our area (in particular the Piedmont) as being characterized by "oak-hickory" or "oak-pine-hickory" forests (e.g. Küchler 1964; Grelle 1988; Schaffale & Weakley 1990; Sargent & Van Lear 1993). Ware (1992) and others have recently questioned this tradition, pointing out that *Carya* only rarely dominates or codominates, primarily in specialized circumstances (such as in soils with greater cation concentrations, derived from mafic rocks). The association of many (but certainly not all) species of hickories with soils with high base status was noted in print as early as 1820 in an account of the landscape of North Carolina. "The sandy pine barrens, and all the lands on which pine is the exclusive growth, are unfriendly to agriculture; but where the pine is intermixed with oak and hickory, the soil is good. Some of our strongest lands have tall pine, mixed not only with hickory and oak, but also with walnut and cherry, and such trees that indicate the best soil. Where hickory prevails, the land is strong" (Guthrie 1820). References: Stone in FNA (1997); Hardin (1992); Hardin & Stone (1984); Elias (1972); Stone, Adrouny, & Flake (1969); Stone (1961); Mohlenbrock (1986); Sargent (1918); Manning (1950); Hardin (1952); Little (1969); Harrar & Harrar (1962); Stone in Kubitzki, Rohwer, & Bittrich (1993). Key based in part on an unpublished manuscript prepared by Stone & Hardin for the Flora of the Southeastern United States.

**Identification notes:** Surface vestiture of leaves and bud scales is useful in distinguishing species of *Carya*. Some use of these characters can be made with a 10× or 20× hand lens; better still is a dissecting microscope. It is important to understand the different trichome types mentioned in the key (terminology follows Hardin 1990 and Hardin & Stone 1984). Short acicular trichomes are simple, unicellular trichomes tapered to a pointed tip, 0.10-0.35 mm long and with rough walls. Long acicular trichomes ("solitary" of Hardin & Stone 1984) are similar to short acicular, but are much larger, 0.45-1.6 mm long, and have smooth walls. Fasciculate trichomes are multicellular and have 2-8 straight or curled rays radiating from a clustered base. Multiradiate trichomes are similar to fasciculate, but have 8-17 rays, the inner (and usually more upright) rays attached basally above the outer (and usually more spreading) rays. Capitate glandular trichomes are unicellular or multicellular, and are distinguished by their bulbous or expanded tip; they are usually 0.02-0.1 mm long. Peltate scales are flat or dome-shaped shields or disks, slightly to strongly glandular, (sometimes regularly or irregularly lobed) and can be either sessile or stalked (they are often referred to as scales,
resin dots, peltate glands, or lepidote scales). On the lower surfaces of leaflets, peltate scales are of two types: large peltate scales are 0.08-0.3 mm in diameter and are round, with smooth or slightly irregular margins, while small peltate scales are 0.025-0.12 mm in diameter and are either round, irregularly lobed or regularly 2- or 4-lobed.

1 Terminal buds elongate, flattened in cross-section, with 4-6 valvate scales; leaves with 7-13 (-19) leaflets, these symmetrical to strongly falcate; fruit sutures narrowly winged.

2 Leaves with 7-9 (-11) leaflets, these symmetrical to slightly falcate; fasciculate trichomes with 2-4 rays; terminal bud 9-19 mm long, bright orangy yellow to dull orange-tan; [common and widely distributed tree in our area, typically in floodplain and slope forests] ..............

2 Leaves with (7-) 9-19 leaflets, these slightly to strongly falcate; trichomes with 2-8 rays; terminal bud 11 mm long, brown to rusty-brown.

3 Leaves with (7-) 9-11 (-13) leaflets, the lower surfaces pubescent at least along the midrib and in the main vein axis; bark shaggy; lateral petiololes 0-2 mm long; nut flattened and angled in cross-section; kernel bitter; [native, of swamp forests, primarily in the Coastal Plain] ................................................................. C. cordiformis

3 Leaves with (7-) 11-19 leaflets, the lower surfaces nearly glabrous; bark scaly, with small exfoliating plates; lateral petiololes 0-7 mm long; nut round in cross-section; kernel sweet; [introduced, frequently cultivated, long persistent, and occasionally naturalized] ............... C. aquatica

............................................................................................................................. .......................................................

4 Bark tight (the ridges typically forming an interlocking diamond pattern), scaly, or shaggy (when shaggy, the separated segments normally much < 1 meter long); leaves with (3-) 5-9 (-11) leaflets; serrations of the leaflets densely (or only moderately) ciliate when young, most densely so just below the tooth apex, the hairs sloughing with age but leaving a subapical tuft of white trichomes on at least some teeth; fallen foliage turning black.

5 Twigs slender, hardened first-year growth 1-3 mm in diameter; terminal bud 6-15 mm long, glabrous to sparsely puberulent (except for ciliate fringe on the scales), reddish-brown (usually turning black on drying); lower surface of leaflets nearly glabrous, except for tufts of trichomes in the main vein axis, and only slightly lepidote with a few, scattered scales, the large peltate scales yellow and round, the small peltate scales brown, 2- and 4-lobed; terminal leaflet 2-5 (-6) cm wide ... C. carolinae-septentrionalis

5 Twigs stout, terminal buds 8-20 mm long; leaves with (5-) 7-9 (-11) leaflets; lower surface of leaflets moderately to densely hisurate with a mixture of acicular (single), fascicled (2-8 rays), and multiradiate (8-many rays) hairs; small peltate scales of the lower surface of leaflets all round; fruit husk 4-13 mm thick; nuts slightly to strongly 4-angled toward the apex.

6 Bark shaggy; petiole hirtellous; leaflet apex acuminate; lower surface of leaflets hisurate with acicular (single), 2-6-rayed fascicled, and occasional multiradiate hairs; fruit pubescent, lacking pubulate bumps; fruit 4-7 cm long; nut 3-6 cm long; [rare in our area] ................................................................. C. laciniosa

6 Bark tight; petiole hisulate; leaflet apex acute; lower surface of leaflets densely hisurate with acicular (single) and abundant 2-8-rayed fascicled and multiradiate hairs; fruit husk glabrous, with pubulate bumps; fruit 3.5-5 cm long; nut 2.5-3.5 cm long; [common in our area] ................................................................. C. tomentosa

6 Twigs slender; terminal buds 3-15 mm long; leaves with (3-) 5-7 (-9) leaflets; lower surface of leaflets mostly glabrous, except for along the midrib and primary veins, and sometimes hisurate on the surface with acicular (single) and infrequent fascicled (2-8 rays) hairs (lacking multiradiate trichomes); small peltate scales of the lower surface of leaflets of various types, 4-lobed and/or irregular scales often more frequent than round scales; fruit husk 2-5 mm thick; nuts not 4-angled toward the apex.

8 Terminal bud 5-15 mm long, predominantly pubescent (also sparsely lepidote); leaves with (3-) 5-7 (-9) leaflets; lower surface of small peltate scales slightly to densely lepidote with irregular and round peltate scales (4-lobed peltate scales uncommon).

9 Fruit husk indehiscent at maturity or tardily splitting to base  along 1 suture; leaves with (3-) 5 (-7) leaflets, glabrous to pubescent beneath; petiole usually green; fruits ellipsoidal, pyriform, or subglobose; bark tight; ................................................................. C. glabra

9 Fruit husk splitting to base at maturity along 2-4 sutures; leaves with (5-) 7 leaflets, pubescent beneath; petiole reddish; fruits typically ellipsoidal; bark tight or often scaly or somewhat shaggy. ................................................................. C. ovata

8 Terminal bud 4-10 mm long, predominantly lepidote (also pubescent); leaves with (5-) 7 (-9) leaflets; lower surface of spring leaflets densely lepidote with 4-lobed, irregular, and round peltate scales, giving the undersurface a reflective, silvery-tan, rusty-brown, or bronze sheen.

10 Lepidote scales initially silver, soon turning bronze, and giving the buds, young twigs, and undersurface of the leaves a metallic bronze sheen; fruit 2-3 cm long; [of calcareous swamps, bottomlands and slopes of the Coastal Plain of sc. NC southwards] ...........

............................................................................................................................. .......................................................

10 Lepidote scales silvery-tan or rusty-brown, giving the buds, young twigs, and undersurface of the leaves a dull or slightly shiny tan or rusty-brown color; fruit 3-5 cm long; [usually of upland and acidic forests and woodlands, collectively widespread in our area].

11 Undersurface of the leaflets with dense, silvery-tan large peltate scales, and fewer and less conspicuous fewer small peltate scales (thus the leaves appearing overall silvery-tan); petiole and rachis hisurate with fasciculate trichomes, and also with concentrations of hairs near the leaflet insertions; [widespread in our area, of upland and acidic forests and woodlands] ................................. C. myristicifloris

11 Undersurface of the leaflets with dense, rusty-brown small peltate scales, and fewer and less conspicuous sivery-tan large peltate scales (thus the leaves appearing overall rusty-brown); petiole and rachis with few fasciculate hairs (but densely scaly), and lacking concentrations of hairs near the leaflet insertions; [of the sc. United States, east to MS, w. KY, w. TN, and perhaps AL and GA, of upland or lowland, acidic or calcareous forests and woodlands] .............................................. C. texana
Hicoria glabra (P. Miller) Britton, Bitternut Hickory. Forests and woodlands, especially in rich, moist alluvial or slope forests. April; October. ME and s. QC west to MN and NE, south to Panhandle FL and e. TX. [= RAB, C, F, FNA, G, GW, K, W, WH; = Hicoria cordiformis (Wangenheim) Britton – S]

Carya glabra (P. Miller) Sweet, Pignut Hickory. In a wide variety of forests and woodlands. April-May; October. S. NH west to s. MI, se. IA, and se. KS, south to c. peninsular FL and e. TX. The C. glabra-C. ovalis portion of this treatment is tentative; in our area, this group has been variously treated as consisting of between 1 and 10 (or more) taxa. Here we recognize two species (C. glabra and C. ovalis) and no varieties, but further study of variation in this group is needed. Var. megacarpa in particular seems to show correlation of morphological traits and geographic distribution, with larger fruits (2.5-5 cm long vs. 1.5-3 cm long), thicker husks (ca. 3.5 mm thick vs. ca. 2 mm thick), large terminal leaflets (often to 20-25 cm long, vs. 10-17 cm long), and a primarily southern Coastal Plain distribution. glabrous. [= RAB, C, G, K, WH; > C. glabra var. glabra – F; > C. glabra var. megacarpa (Sargent) Sargent – F; > C. ovalis (Wangenheim) Sargent var. hirsuta (Ashe) Sargent – F; < C. glabra – FNA; > Hicoria glabra (P. Miller) Britton var. glabra – S; > Hicoria glabra – S; = Hicoria glabra var. glabra – W]

* Carya illinoensis (Wangenheim) K. Koch, Pecan. Bottomlands, eastwards persistent around dwellings and in pecan orchards, escaped to suburban woodlands, rural forest edges and floodplains, commonly cultivated. April-May; October. Native to the sc. United States, now more widespread in the se. United States as a result of cultivation. The spelling of the specific epithet has been a source of controversy. [= C, FNA, K, WH; = C. illinoensis – RAB, F, G, GW, orthographic variant; > Hicoria pecan (Marshall) Britton – S; > Hicoria texana LeConte – S]

Carya laciniosa (Michaux f.) Elliott, Nutmeg Hickory. Nonriverine swamps over calcareous substrates, including calcareous clays and coquina limestone ("marl"), oak flatwoods. April; October. Se. NC south to GA, and from wc. AL west to e. TX and se. OK, disjunct in Mexico (Nuevo Léon and Tamaulipas). The bronze sheen of the leaflets of this species is diagnostic. First reported for NC by Leonard (1971b). [= FNA, K; = C. myristicaefolia – RAB, GW, orthographic variant; = Hicoria myristicaefolia (Michaux f.) Sargent – S]

Carya myristicaefolia (Michaux f.) Elliott, Nutmeg Hickory. Nonriverine swamps over calcareous substrates, including calcareous clays and coquina limestone ("marl"), oak flatwoods. April; October. Se. NC south to GA, and from wc. AL west to e. TX and se. OK, disjunct in Mexico (Nuevo Léon and Tamaulipas). The bronze sheen of the leaflets of this species is diagnostic. First reported for NC by Leonard (1971b). [= FNA, K; = C. myristicaefolia – RAB, GW, orthographic variant; = Hicoria myristicaefolia (Michaux f.) Sargent – S]


Carya pecan (Marshall) Britton – S; > Hicoria texana LeConte – S]
**JUGLANDACEAE**

*Carya texana* Buckley, Black Hickory. Dry slopes and ridges, especially calcareous. April-May; October. Reported to occur as far east as KY, TN, and MS (FNA). Jones (2005) states that w. KY material of *C. pallida* is transitional to *C. texana.* [= FNA, K; > *C. texana* var. *arkansana* (Sargent) Little – C; > *C. texana* var. *texana* – F; > *C. buckleyi* Durand var. *arkansana* (Sargent) Sargent – G; = *Hicora texana* LeConte, misapplied – S]

*Carya tomentosa* (Lamarck ex Poiret) Nuttall, Mockernut Hickory, White Hickory. Forests and woodlands. April-May; October. MA west to IN and IA, south to n. peninsular FL and TX. One of the most common forest trees of much of our area. There has been confusion and controversy for several centuries over the specific epithet. The oldest basionym available is *Juglans alba* Linnaeus, which apparently included disparate elements, including this taxon and *C. ovata.* Following a more circumscribed typification by Crantz in 1766, the epithet "*alba*" should have been applied to this taxon, but continued to be applied in various ways. Rehder (1945) proposed that *C. alba* should be considered a *nomen ambiguum*, but agreed that it applied correctly to what has often been called *C. tomentosa*. He argued that the use of *C. alba* should be rejected "in order to avoid confusion and ambiguity." In 2008, Ward & Wiersema (2008) formally proposed rejection of *Juglans alba* (the basionym of *Carya alba*), and the Committee has recommended its rejection unanimously (Brummitt 2010). For further discussion see Rehder (1945), Howard & Staples (1983), Wunderlin, Hansen, & Hall (1985), and Brummitt (2010). [= C, F, FNA, G, RAB, W; = *Hicoria alba* (Linnaeus) Britton – S]

*Juglans* Linnaeus (Walnut)

A genus of about 21 species, trees and shrubs, of Mediterranean Europe to e. Asia, and North America to Andean South America. Stanford, Harden, & Parks (2000) present a molecular phylogeny and a discussion of biogeography; our two species are distantly related within the genus, with *J. nigra* most closely related to sw. North American *J. microcarpa* and *J. major,* and *J. cinerea* most closely related to several e. Asian species. References: Whittemore & Stone in FNA (1997); Stanford, Harden, & Parks (2000); Stone in Kubitzki, Rohwer, & Bittrich (1993); Stanford (1998).

1. Lower surface of the leaflets densely hirsute with 4-8-rayed fascicled hairs; fruit ellipsoid, densely pubescent with reddish-brown glandular hairs; leaf scars with a velvety ridge along the upper margin; leaves with (7-) 11-17 leaflets; pith dark brown; terminal buds 12-18 mm long; bark of mature trees pale; [section *Trachycaryon*] ................................................................. *J. cinerea*

1. Lower surface of the leaflets hirsute with single and 2-rayed fascicled hairs; fruit spherical or nearly so, lepidote with peltate scales and occasional glandular hairs; leaf scars without a velvety ridge along the upper margin; leaves with (9-) 15-19 (-23) leaflets; pith light brown; terminal buds 8-10 mm long; bark of mature trees dark; [section *Rhysocaryon*] ................................................................. *J. nigra*

*Juglans cinerea* Linnaeus, Butternut, White Walnut. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (VA): moist, nutrient-rich forests; uncommon. April-May; October. NB east to MN, south to n. GA and AR. This tree, formerly common, is afflicted with butternut canker disease, which now threatens its continued existence. [= RAB, C, F, FNA, G, K, W, WV; = *Wallia cinerea* (Linnaeus) Alefeld – S]

*Juglans nigra* Linnaeus, Black Walnut. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (VA): moist, nutrient-rich forests of floodplains and slopes, calcareous hammocks; common (uncommon in the Coastal Plain of NC and SC, rare in FL). April; October. MA west to MN, south to Panhandle FL and TX. The dark brown wood is famous for cabinetry and other uses; it is one of the most prized of North American hardwoods. The nuts, though difficult to crack, are prized for their intense flavor. The husk is used as a dye. Country people dehusk the nuts by putting them in dirt or gravel driveways where the passage of car tires removes the husk but does not crack the nut. [= RAB, C, F, FNA, G, K, W, WH, WV; = *Wallia nigra* (Linnaeus) Alefeld – S]

*Pterocarya* Kunth (Wingnut)

A genus of 6 species, trees, of e. and sw. Asia.

*Pterocarya stenoptera* C. de Candolle, Japanese Wingnut. Cp (LA): uncommonly cultivated, rarely naturalized or persistent; rare, native of e. Asia (China, Japan, and Korea). April-May; August-September. Naturalized in e. LA. [= K]
A family of 4 genera and about 100 species, trees and shrubs, of Malesia, Australia, and Melanesia. References: Johnson & Wilson in Kubitzki, Rohwer, & Bittrich (1993); Rogers (1982c).

**Casuarina** Linnaeus 1759 (Casuarina, Beefwood, She-oak)

A genus of about 17 species, trees, tropical to warm temperate in s. Asia, Australia, and Polynesia. References: Johnson & Wilson in Kubitzki, Rohwer, & Bittrich (1993); Rogers (1982c)=Z.

1. Leaves (teeth in whorls at each node) 6-8 per node; longitudinal ridges of branchlets sharply angular; plant monoecious; branchlet segments 5-8 (-13) mm long, 0.5-0.7 (-1) mm in diameter

1. Leaves 10-14 (-17) per node; longitudinal ridges of branchlets flattened or rounded; plant dioecious; branchlet segments 8-20 mm long, 0.9-1.2 mm in diameter


1. Fruit narrowly winged; winter buds sessile, covered by multiple, imbricate, unequal scales; [subgenus *Alnobetula]*

1. Fruit broadly winged; winter buds sessile, covered by multiple, imbricate, unequal scales; [subgenus *Alnobetula*]... *A. viridis* var. *crispa*

1. Fruit narrowly winged; winter buds stalked, covered by 2-3 equal scales.

1. Fruit broadly winged; winter buds sessile, covered by multiple, imbricate, unequal scales; [subgenus *Alnobetula*]... *A. viridis* var. *crispa*

**162. BETULACEAE** S.F. Gray 1821 (Birch Family) [in FAGALES]

A family of 6 genera and about 150 species, primarily of arctic to cold temperate regions of the Northern Hemisphere, but extending through Central America to n. South America. The two subfamilies recognized here are sometimes elevated to family status, as by Govaerts & Frodin (1998). References: Furlow in FNA (1997); Furlow (1990)=Z; Hardin (1971)=Y; Govaerts & Frodin (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

1. Scales of the pistillate catkins persistent; leafy involucre absent; fruit a small winged nut; [subfamily *Betuloideae*].

2. Pistillate scales deciduous with or soon after the fruits; plant a tree, > 10 m tall at maturity...

1. Scales of the pistillate catkins caducous; leafy involucre present, conspicuous; fruit an unwinged nut; [subfamily *Coryloideae*].

3. Nut spherical, 1-1.5 cm in diameter, closely enveloped by the involucre...

3. Nut ovoid, 0.4-0.6 cm long, loosely or not at all enveloped by the involucre.

4. Infructescence bracts inflated, loosely enclosing the nut; bark brown, shaggy; trunk not fluted; buds not 4-angled...

4. Infructescence bracts flat, 1-3 lobed, not enclosing the nut; bark gray, smooth; trunk moderately to strongly fluted; buds 4-angled...

*Alnus* P. Miller 1754 (Alder)


1. Fruit broadly winged; winter buds sessile, covered by multiple, imbricate, unequal scales; [subgenus *Alnobetula*]... *A. viridis* var. *crispa*

1. Fruit narrowly winged; winter buds stalked, covered by 2-3 equal scales.

2. Pistillate catkins mostly 1-1.5 (-2) cm long, subsessile and often clustered together closely; typical leaves with 8-14 principal veins on each side of the midrib; [subgenus *Alnus*].

3. Fruiting catkins drooping; leaves broadest at or below the middle, pale green to glaucous beneath, doubly serrate, the teeth of various sizes, usually some of them coarse; bark dark reddish-brown, shiny, with prominent light-colored lenticels...

3. Fruiting catkins erect; leaves broadest at or above the middle, green beneath, finely serrate, the teeth approximately equal in size; bark light gray or brown, with inconspicuous lenticels...

2. Pistillate catkins mostly 1.5-3 cm long, evidently pedunculate and therefore spaced; typical leaves with 5-8 principal veins on each side of the midrib.

4. Flowering spring; plant a tree; leaves broadly rounded to slightly notched at the tip; [alien, rarely planted and possibly persistent in our area]; [subgenus *Alnus*]...

*Alnobetula* Sieber ex Sprengel, Gray She-oak, Suckering Australian-pine, Scaly-bark Beefwood. Disturbed beaches and yards; native of Australia.
4 Flowering late summer or autumn; plant a shrub; leaves obtuse to short-acuminate at the tip; [native of e. MD, DE, and GA]; [subgenus Cleftropsis].
5 Strobili (14-) 14.5-19 (-24) mm long, <1.3× as long as wide; large shrub or tree 5.5-9.5 m tall, with a narrow crown; [of nw. GA]...  

* Alnus glutinosa (Linnaeus) Gaertner, Black Alder, European Alder. Disturbed areas, suburban woodlands; native of Europe. Sometimes cultivated, especially northward, and naturalized at least as far south as s. PA (Rhoads & Klein 1993); it has also been reported for Morgan County, TN (Chester, Wofford, & Kral 1997). [= FNA, C, F, G, K; = Alnus alnus (Linnaeus) Britton]


**Alnus maritima** (Marshall) Muhlenberg ex Nuttall ex Fernald spp. georgiensis Schrader & Graves, Georgia Alder. Standing water of Ridge-and-Valley spring run. Endemic to a single site in Bartow County, GA. It is one of three subspecies of A. maritima, each endemic to a small area – ssp. maritima of the Delmarva Peninsula of MD and DE, ssp. georgiensis Schrader & Graves of nw. GA, and ssp. oklahomensis Schrader & Graves of sc. OK. The closest relatives of A. maritima are in Asia. [= X; < A. maritima – FNA, K]


**Alnus viridis** (Villars) Lamarcq & De Candolle var. crispa (Aiton) House, Green Alder, Mountain Alder. Grassy balds, shrub balds, spruce-fir forests, and rock outcrops at high elevations (1600-1900m) in the Roan Mountain Massif, Mitchell and Avery counties, NC and Carter County, locally common. May-June; July. Ssp. crispa has variously been considered a variately, subspecifically, and specifically distinct from typic A. viridis. A. viridis is here treated as a circumpolar complex of 4 subspecies. Ssp. viridis occurs in montane portions of Europe. Ssp. simuta (Regel) A. Löve & D. Löve occurs in w. Canada and south in the montane west to nw. United States. Ssp. fruticosa (Ruprecht) Nyman ranges from n. CA north to coastal AK, and in ne. Asia. Ssp. crispa is generally far northern, ranging across n. Canada, south to MA and c. NY, and disjunct at a few localities in PA and at Roan Mountain on the NC-TN border, where it forms an extensive population. [= C; = A. viridis (Villars) Lamarcq & De Candolle ssp. crispa (Aiton) Turrill – FNA, K, Z; = A. crispa (Aiton) Parsh – RAB, G, W, Y; > A. crispa var. crispa – F; < A. alnobetula (Ehrhart) K. Koch – S; = Alnus michelliana M.A. Curtis ex Gray]

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**Betula** Linnaeus 1753 (Birch)


1 Leaf blades suborbicular, the apex rounded; [section Costatae]. ................................................................................................................................. B. lenta var. uber
2 Leaf blades ovate or triangular, the apex acute to acuminate.
3 Bark yellowish-gray, yellowish, pink, reddish-brown, or dark brown; samara rounded or slightly retuse at its apex, the wings making up 1/2 or less of the width; fruiting peduncles sessile (peduncled in B. nigra); [section Costatae].
4 Inner bark of the twigs bitter, not aromatic; leaves cuneate at the base. ................................................................................................................................. B. nigra
5 Park of stems 5-30 cm in diameter (on larger trees look up for branches) yellow or yellowish-gray, exfoliating in papery shreds (bark of larger trunks becoming platey, the plates not prominently marked horizontally by old lenticels); scales of fruiting catkins 6-13 mm long, pubescent and marginally ciliate; twigs and buds slightly hairy ................................................................................................................................. B. alleghaniensis
6 Bark of stems 5-30 cm in diameter (on larger trees look up for branches) reddish-brown or dark brown, tight (bark of larger trunks becoming platey, the plates prominently marked horizontally by old lenticels); scales of fruiting catkins 5-7 mm long, glabrous; twigs and buds glabrous................................................................................................................................. B. lenta var. lenta
Betula alleghaniensis Britton, Yellow Birch. Forests at medium to high elevations, rarely at low elevations. April-May; June-August. NL (Newfoundland) west to se. MB, south to DE, PA, OH, n. IN, WI, MN, and IA, and in the mountains south to w. NC, n. GA, and e. TN. [= C, FNA, S, W, WV, Y, Z; = B. lutea Michaux f. – RAB; > B. lutea var. lutea – F, G; > B. lutea var. macrolepis Fernald – F, G; > B. alleghaniensis var. alleghaniensis – K; > B. alleghaniensis var. macrolepis (Fernald) Brayshaw – K]
Betula cordifolia Regel, Mountain Paper Birch. High elevation forests, primarily on talus of avalanche chutes, in the Black Mountains, Yancey County, NC, and on talus slopes and adjacent forests at high elevations, especially on quartzite on the western flank of the Blue Ridge, and on sandstone talus in the Ridge and Valley in VA. May-August; July-September. NL (Newfoundland) and e. QC south to the mountains of NY; disjunct in n. MN, w. VA, w. NC, and e. TN (Chester, Wofford, & Kral 1997). The question of the appropriate treatment of B. cordifolia and B. papyrifera is difficult (and still controversial). [= FNA, G, S, Y, Z; = B. papyrifera Marshall var. cordifolia (Regel) Fernald – RAB, C, F, K, W]

Betula lenta Linnaeus var. lenta, Sputt Birch, Cherry Birch, Black Birch, "Mahogany." Forests at low to high elevations; common (uncommon in Piedmont). March-April; June-July. S. ME west to OH, south to GA and n. AL. This species is generally restricted elevationally in Newfoundland to medium elevations and lower, but in VA it reaches higher elevations, where it can be as common as B. alleghaniensis. Once the primary source of methyl salicylate (wintergreen flavoring), used in medicines and confections; it is now produced synthetically. [= B. lenta – RAB, F, FNA, G, K, S, W, WV, Z; < B. lenta – C, Y (also including B. uber)]

Betula lenta Linnaeus var. uber Ashe, Virginia Roundleaf Birch. Mountain forests (endemic to Smyth County, VA). May-June; July-August. B. lenta var. uber is related very closely to B. lenta var. lenta, and is apparently endemic to Smyth County, VA. In addition to the characters in the key, it differs from B. lenta var. lenta in having the leaves 2-6 cm long (vs. 7-15 cm long), with 4-6 pairs of lateral veins (vs. 8-12 pairs). See Mazzeo (1974), Ogle & Mazzeo (1976), Hayden & Hayden (1984), and McAllister & Ashburner (2004) for additional information on this birch and its history. It does not breed "true" and should perhaps be considered a form of B. lenta. [= B. lenta Linnaeus – C, Y; = Betula uber (Ashe) Fernald – F, FNA, K, W, Z; = B. lenta ssp. uber (Ashe) E. Murray; = B. lenta forma uber (Ashe) McAllister & Ashburner]


Betula papyrifera Marshall, Paper Birch, Canoe Birch. Dry soils. NL (Newfoundland), NL (Labrador) and AK, south to NJ, WV, OH, IN, IL, IA, NE, CO, and BC; it has sometimes been attributed to the Mountains of VA, but apparently these reports are based on B. cordifolia. [= FNA, G, WV, Y, Z; = B. papyrifera var. papyrifera – C, F, K, W]

* Betula pendula Roth, European Weeping Birch, European White Birch. Persistent and escaping from plantings; native of Europe. Reported for Watagua County, NC by Poindexter (pers. comm.). [= C, F, FNA, K]

Betula populifolia Marshy, Gray Birch, White Birch. Woods, thickets, in VA native in old fields and young forests in the Big Meadows area on greesone (Madison & Page counties, VA), disturbed areas. May-June; June-July. NS to s. QC, south to s. NJ and MD, more or less disjunct in n. VA, s. ON, n. OH, and n. IN. [= RAB, C, F, FNA, G, K, W, Y, Z]

* Betula pubescens Ehrhart ssp. pubescens, European White Birch, Downy Birch. Disturbed areas; native of Europe. Also reported as an introduction in e. GA (Jones & Coile 1988) and at scattered sites throughout PA (Rhoads & Klein 1993). [= FNA, K; = B. alba Linnaeus – C, F, G, an ambiguous name]
BETULACEAE

Carpinus Linnaeus 1753 (Hornbeam, Ironwood, Muscle-tree, Water-beech, Blue-beech)

A genus of about 26 species, trees, in temperate regions of the Northern Hemisphere, extending southward to se. Asia and Central America. The smooth gray bark gives Carpinus the names “Water-beech” and “Blue-beech”, the fluted, sinewy appearance of the trunk the name “Muscle-tree”, and the very hard, heavy wood the name “Ironwood.” References: Furlow (1990)=Z; Hardin (1971)=Y; Furlow (1987a); Furlow (1987b)=X; Furlow in FNA (1997); Govaerts & Frodin (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves narrowly ovate to oblong-ovate, 3.8-8.5 cm long, 1.4-5 cm wide, the apex acute, secondary teeth small and blunt, the lower leaf surface lacking conspicuous dark glands; bracts of the infructescence with rounded to subacute tips and few, blunt teeth; [primarily of the Coastal Plain and lower Piedmont] .................................................................................. C. caroliniana var. caroliniana

1 Leaves ovate to elliptic, 5.8-12.5 cm long, 2.5-6.0 cm wide, usually abruptly narrowed to the tip (sometimes gradually tapered to a long, acuminate apex), the secondary teeth often almost as long as the primary teeth, sharp-tipped, the lower leaf surface with conspicuous dark-brown glands; bracts of the infructescence mostly sharp-tipped and bearing several sharp teeth; [primarily of the Mountains and Piedmont] ...

..........................................................C. caroliniana var. virginiana

Carpinus caroliniana Walter var. caroliniana, Coastal American Hornbeam. Streambanks, riverbanks, bottomland forests, lower slopes, maritime forests. March-April; September-October. S. NJ, e. MD, and e. VA south to e. peninsular FL, west to e. TX, and north in the inland to s. MO and s. IL. The validity of 2 taxa was established by Furlow (1987a, 1987b) largely through statistical methods. The two taxa have some morphologic and phytogeographic coherence, but intergradation appears to be extensive, and individual specimens (in the herbarium) or trees (in the field) may not be readily identifiable to variety. [= C, F = C. caroliniana ssp. caroliniana – FNA, K, X, Z; < C. caroliniana – RAB, G, GW, S, WH, Y]


Corylus Linnaeus 1753 (Hazelnut, Filbert)

A genus of about 15-18 species, shrubs and trees, of temperate regions of the Northern Hemisphere. Eurasian species of this genus, C. avellana Linnaeus and C. maxima P. Miller, are the sources of commercial filberts or hazelnuts. They are sometimes cultivated in North America, especially in the Pacific Northwest. Our wild species are also excellent eating, but wild animals, especially squirrels, usually harvest them before they are ripe. References: Furlow in FNA (1997); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993); Whitcher & Wen (2001); Forest & Bruneau (2000); Govaerts & Frodin (1998).

1 Mature involucre 1.5-3 cm long, the lobes flattened and laciniate; young twigs and petioles stipitate-glandular; [section Corylus, subsection Corylus] .................................................................................................................................................. C. americana

1 Mature involucre 4-7 cm long, extended into a tubular beak; young twigs and petioles villous, glandless; [section Corylus, subsection Siphonochlamys] ........................................................................................................................................ C. cornuta var. cornuta

Corylus americana Walter, American Hazelnut, American Filbert. Rocky woodlands, mesic to rich forests and thickets. February-March; September-October. ME west to SK, south to GA, LA, and OK. [= RAB, C, FNA, K, S, W, Y, Z; < C. americana var. americana – F, G; > C. americana var. indesectens Palmer & Steyermark – F, G]

Corylus cornuta Marshall var. cornuta, Beaked Hazelnut. Dry rocky woodlands, thickets, high elevation forests and openings, seepage swamps. February-April; August-October. The species ranges from NL (Newfoundland) west to BC, south to NJ, n. GA, e. TN (Chester, Wofford, & Kral 1997), OH, MO, CO, and CA. Var. cornuta occupies most of that range; var. californica (A. de Candolle) Sharp [ssp. californica (A. de Candolle) E. Murray], a small tree, is far western and grades into var. cornuta. [= K, Z; < C. cornuta – RAB, C, F, G, S, W, Y; = C. cornuta ssp. cornuta – FNA]

Ostrya Scopoli 1760 (Hop-hornbeam, Ironwood)

Ostrya virginiana (P. Miller) K. Koch, American Hop-hornbeam, Ironwood. Mesic to dry forests, often rocky, especially over basic rocks, reaching high elevations. April-May; August-October. NS west to MB, south to c. peninsular FL, Panhandle FL, and TX. One of our heaviest and hardest woods. [= RAB, C, FNA, G, S, W, WV, Y, Z; > O. virginiana var. lassia Fernald – F; > O. virginiana var. virginiana – F; = O. virginiana var. virginiana – K]

167. CUCURBITACEAE Durande 1782 (Gourd Family) [in CUCURBITALES]

A family of about 97-120 genera and 800-1000 species, of tropical and subtropical areas, with a few extending to temperate areas. Schaefer & Renner in Kubitzki (2011); Nesom (2011b); Nesom in FNA (in prep.).

1. Ovaries and fruits muricate, tuberculate, or echinate; fruits 1-25 cm long at maturity.
2. Plants climbing; tendrils present; leaves with whitish-crisped margins; [section Bryoniae]................................. 2. Ecballium
3. Ovaries and fruits smooth or pubescent, but not prickly; fruits 1-70 cm long at maturity.

1. Momordica Linnaeus 1753 (Balsam-apple, Bitter Melon)


1. Bract of the male flowers toothed; bract of male flowers attached at the apex of the peduncle; fruit 2.5-4 (-7) cm long.............. M. balsamina
2. Bract of the male flowers entire; bract of male flowers attached near or below the midpoint of the peduncle; fruit 7-25 cm long.......................... M. charantia ssp. charantia

Momordica balsamina Linnaeus, Balsam-apple, Bitter Melon. Disturbed areas; native of Africa. May-September. [= FNA, K2, WH]


2. Ecballium A. Richard 1824 (Squirtin Cucumber)

3. **Luffa** P. Miller 1754 (Luffa)


1. Fruits clavate, strongly 10-angled; petals pale yellow; leaves shallowly lobed ........................................ L. acutangula var. acutangula
1. Fruits cylindric, not angled; petals deep yellow; leaves deeply lobed .......................................................... L. aegyptiaca

* **Luffa acutangula** (Linnaeus) Roxburgh var. acutangula, Angled Luffa, Ridged Gourd, Sponge Gourd. Gardens, fields, trash heaps; cultivated in home gardens, sometimes volunteering from seed the following year; native of s. Asia. Var. amara (Roxburgh) Clarke is also native of s. Asia. [= FNA; < L. acutangula – K]

* **Luffa aegyptiaca** P. Miller, Smooth Luffa, Sponge Gourd, Vegetable Sponge. Gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year; native of s. Asia. [= FNA, K; ? L. cylindrica (Linnaeus) M. Roemer – S]

4. **Echinocystis** Torrey & A. Gray 1840 (Wild-cucumber)


5. **Sicyos** Linnaeus 1753 (Bur-cucumber)

A genus of about 75 species, annual or perennial vines, of Australia, Pacific Islands, tropical America. References: Nesom (2011a) = Z; Schaefer & Renner in Kubitzki (2011).


6. **Cucumis** Linnaeus 1753 (Canteloupe, Muskmelon, Cucumber)


1. Fruits with spine-bearing tubercles (aculeae); [West Indian gherkin]; [subgenus *Cucumis*; section *Aculeatosi*].
2. Aculei 1–2 mm long; leaves deeply 3–5-palmately lobed .......................................................... C. anguria var. anguria
2. Aculei 4–10 (15) mm long; leaves slightly to deeply 3–5-palmately lobed.......................................................... C. anguria var. longaculeatus
1. Fruits smooth, reticulate, or hairy, lacking aculeae; [subgenus *Cucumis*; section *Cucumis*].
3. Leaf blade lobe broadly triangular; corolla tube of female flower 3.5–6.5 mm long; corolla tube of male flower 3.4–4.9 mm long; [cucumber] .......................................................... C. sativus
3. Leaf blade central lobe elliptic, oblong or ovate; corolla tube of female 0.8–2.8 mm long; corolla tube of male flower 0.8–2.0 mm long.
4. Fused portion of hypanthium or youngest fruits with appressed hairs; stem abundantly beset with retrorse prickles; fruit diameter 2.5–5 cm .......................................................... C. melo var. texanus
4. Fused portion of hypanthium or youngest fruits with spreading hairs; stems smooth or nearly so; fruit diameter > 10 cm.
5. Fruits with smooth or wrinkled rind; ripe fruits with white or green flesh, lacking musky odor ...................................... C. melo var. inodorus
5. Fruits with netted, warty, or scaly rind; ripe fruits with orange (rarely green) flesh, with aromatic flavor and musky odor. .......................................................... C. melo var. melo
**Cucumis anguria** Linnaeus var. anguria, Bur Gherkin. Disturbed areas; native of Africa. [= FNA, K2; < *C. anguria* – S, V]

**Cucumis anguria** Linnaeus var. *longaculeatus* J.H. Kirkbride, West Indian Gherkin. Disturbed areas; native of the Africa. Reported for GA (Jones & Coile 1988), FL (Wunderlin & Hansen 2003, as *C. anguria*), and AL (Diamond & Woods 2009, as *C. anguria*). [= K, Z; < *C. anguria* – S, V, WH]

**Cucumis anguria** Linnaeus var. *longaculeatus* J.H. Kirkbride, West Indian Gherkin. Disturbed areas; native of the Africa. Reported for GA (Jones & Coile 1988), FL (Wunderlin & Hansen 2003, as *C. anguria*), and AL (Diamond & Woods 2009, as *C. anguria*). [= K, Z; < *C. anguria* – S, V, WH]


**Cucumis melo** Linnaeus var. melo, Canteloupe, Muskmelon. Gardens, fields, trash heaps, commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year; native of w. Africa. [= FNA, Y; < *Cucumis melo* Linnaeus – RAB, F, G, K, S, V, WV; = *C. melo* var. *canalipes* Naudin – U, X; < *C. melo* ssp. *melo* – Z]

**Cucumis melo** Linnaeus var. texanus Naudin, Gulf Coast Melon. Fields, roadsides, other disturbed areas; apparently evolved into a distinct variety in the southeastern United States from Asian stock introduced at an unknown time and by unknown means. Panhandle FL south to peninsular FL, west through s. MS, s. TX, and Mexico. Decker-Walters et al. (2002) show that var. *texanus* is morphologically and molecularly distinct from the most closely related varieties, the Asian var. *chito* (C. Morren) Naudin and var. *dudaim* (Linnaeus) Naudin; they postulate that var. *texanus* was likely introduced from Asia in pre-Columbian times. [= FNA, Y; < *Cucumis melo* Linnaeus – RAB, F, G, K, S, V; = *C. melo* ssp. agrestis (Naudin) Pangalo var. *texanus* – FNA; < *C. melo* var. *chito* – U, X; < *C. melo* ssp. agrestis (Naudin) Pangalo – Z]

**Cucumis sativus** Linnaeus, Cucumber. Gardens, fields, trash heaps, commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year; native of s. Asia. [= F, FNA, G, K, V, Z]

### 7. Melothria Linnaeus 1753 (Melonette)

A genus of about 12 species, vines, of the New World. References: Nesom in FNA (in prep.).

**Melothria pendula** Linnaeus, Melonette, Creeping Cucumber, Mouse Melon. Bottomland forests, moist roadsides and disturbed areas, marshes. June-November. DC, MD, and VA west to IN, south to FL and TX. [= C, F, FNA, G, GW, RAB, W; > *M. pendula* – S; > *M. pendula* var. *pendula* – K; > *M. pendula* var. *aspera* Cogniaux – K, S; > *M. pendula* var. *crassifolia* (Small) Cogniaux – K; > *M. microcarpa* Shuttleworth – S; > *M. nashii* Small – S]

### 8. Citrullus Schrader 1836 (Watermelon)


### 9. Coccinia Wight & Arnott 1834 (Ivy Gourd)

A genus of ca. 30 species, herbaceous vines, of sub-Saharan Africa. References: Nesom in FNA [in prep.]

**Coccinia grandis** (Linnaeus) Voigt, Ivy Gourd. Disturbed areas, escaped from cultivation; native of sub-Saharan Africas. May-November. [= K, WH]

### 10. Lagenaria Seringe 1825 (Bottle Gourd)

A genus of 6 species, Old World tropical, centered in Africa. References: Nesom in FNA (in prep.).

**Lagenaria siceraria** (Molina) Standley ssp. *siceraria*, Bottle Gourd, Calabash Gourd. Gardens, fields, trash heaps, commonly cultivated in home gardens and commercially, rare as a volunteer from seed the following year; native of Africa. One of the oldest cultivated plants. [= FNA; < *L. siceraria* – K, WH; < *L. vulgaris* Seringe – RAB, F; < *L. leucantha* Rusby – G; < *Cucurbita lagenaria* Linnaeus – S]
11. Cayaponia Silva Manso 1836

A genus of about 45 species, of tropical, subtropical and warm-temperate America.

*Cayaponia quinqueloba* (Rafinesque) Shinners. Swamp forests, river banks. June-November. E. SC south to GA, west to e. TX, north in the interior to w. TN. [= FNA, K; = *C. boykinii* (Torrey & A. Gray) Cogniaux – RAB, S; > *C. quinqueloba* GW; > *C. grandifolia* (Torrey & A. Gray) Small – GW]

12. *Cucurbita* Linnaeus 1753 (Squash, Zucchini, Pumpkin, Gourd, Vegetable Marrow)

A genus of 14-22 annual or perennial vines, of the New World. References: Nesom in FNA (in prep.); Nesom (2011b)=Z.

1 Leaf blades distinctly longer than broad, triangular, usually unlobed; [coyote melon]..........................................................................................*C. foetidissima*

2 Leaf blades as wide or wider than long, deeply to shallowly lobed.

3 Fruiting peduncles relatively soft and cork-thickened, terete and not strongly ribbed, expanding gradually along their length ..................*C. maxima*

2 Stems and leaves variously pubescent, the hairs generally not pustulate-based.

3 Fruiting peduncles hardened and woody, 5-ribbed, abruptly and widely expanded at point of fruit attachment..........................*C. moschata*

4 Wild plants; fruit almost always bitter, solid ivory or green-and-white striped, usually not yellow or orange; rind smooth.

5 Fruit usually solid ivory, sometimes green-and-white striped; germination within 1-4 days .......................*C. melopepo* var. *ozarkana*

5 Fruit usually green-and-white striped, sometimes maturing yellow; germination within 3-7 days ......................*C. melopepo* var. *texana*

6 [scallop, pattypan, acorn, crookneck, and straightneck squashes, most ornamental gourds]...............................*C. melopepo* var. *melopepo*

6 [cucozelle, jack-o’-lantern pumpkins, vegetable marrows, zucchini, some ornamental gourds].................................................*C. pepo*


*Cucurbita maxima* Duchesne, Hubbard Squash, Pumpkin. Gardens, fields, trash heaps, commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year; native of tropical America. [= F, K]

*Cucurbita melopepo* Linnaeus var. *melopepo*, Crookneck Squash, Straightneck Squash, Scallop Squash, Pattypan Squash, Acorn Squash, Ornamental Gourd. Gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, rarely volunteering from seed the following year; native of tropical America. May-October. [= *C. melopepo* ssp. *texana* (Scheele) Nesom var. *melopepo* – Z]


*Cucurbita moschata* Duchesne, Butternut Squash. Gardens, fields, trash heaps, commonly cultivated in home gardens and commercially, rarely volunteering from seed the following year; native of tropical America. May-October. [= F, K, WH; = *Pepo moschata* (Duchesne) Britton – S]

*Cucurbita pepo* Linnaeus, Pumpkin, Zucchini, Ornamental Gourd, Vegetable Marrow. Gardens, fields, trash heaps; commonly cultivated in home gardens and commercially, sometimes volunteering from seed the following year; native of tropical America. May-October. [= Z; < *C. pepo* – F, RAB, WV; = *C. pepo* var. *pepo* – K; < *Pepo pepo* (Linnaeus) Britton ex Small – S]
**CUCURBITACEAE**

A family of 2 genera and about 900-1500 species, herbs and shrubs, of tropical and subtropical (rarely warm temperate) regions. References: de Wilde in Kubitzki (2011).

*Begonia* Linnaeus (Begonia)

A genus of about 900-1500 (or more) species, herbs and shrubs, of tropical and subtropical (rarely warm temperate) regions. References: de Wilde in Kubitzki (2011).

* Begonia cucullata* Willdenow, Wax Begonia, Club Begonia. Disturbed places; native of South America. Escaped or persistent in e. GA (Jones and Coile 1988) and AL (Woods & Diamond 2006), south to Panhandle FL and ne. FL (Wunderlin & Hansen 2004). [= K, WH]

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**172. PARNASSIACEAE** Gray 1821 (Grass-of-Parnassus Family) [in CELASTRALES]

A family of 2 genera and about 16 species, herbs, of largely north temperate and arctic areas. Numerous anomalous features separate *Parnassia* from the Saxifragaceae; affinities with the Droseraceae, Clusiaceae, Celastraceae, and other families have been historically suggested. It is now clear that its affinities lie with Celastraceae, but APG III’s (2009) inclusion of it in Celastraceae seems premature; it is here retained as separate. Considering the uncertainties of its relationships, *Parnassia* is best treated as a family, the Parnassiaceae, as suggested by numerous workers as early as 1821, and increasingly accepted in recent decades. The very distant relationship of *Parnassia* to the Saxifragaceae (sensu stricto) has been strongly reaffirmed by molecular analyses (Morgan & Soltis 1993, Soltis et al. 2000, Savolainen et al. 2000). References: Simmons in Kubitzki (2004). [including LEPUROPETALACEAE]

1 Plants diminutive, rosettes < 3 cm across; winter annual .................................................................................................................. Lepuropetalon
1 Plants larger, rosettes over 8 cm across; perennial from rhizomes ............................................................................................................. Parnassia

**Lepuropetalon** Elliott 1817 (Lepuropetalon)

A monotypic genus, of se. North America, Mexico, c. Chile, and Uruguay. Sometimes treated as part of a broad and polymorphic Saxifragaceae, *Lepuropetalon* has often been associated with *Parnassia* in the Parnassiaceae. Morgan & Soltis (1993) suggest a close relationship of Lepuropetalon and Parnassia, as well as the "distant relationship between both genera and the Saxifragoideae." The affinities of Lepuropetalon with Parnassia remain uncertain, however, as emphasized by Gastony & Soltis (1977) in their analysis of chromosomes and partially reiterated by Morgan & Soltis (1993). Lepuropetalon is here treated in the Parnassiaceae, as supported by molecular analyses (Soltis et al. 2000, Savolainen et al. 2000); treatment in a monotypic Lepuropetalaceae is perhaps equally warranted. References: Ward & Gholson (1987); Spongberg (1972); Gastony & Soltis (1977); Wilbur (1988b); Simmons in Kubitzki (2004).

*Lepuropetalon spathulatum* Elliott, Lepuropetalon. In moist open areas, such as seepage on granitic flatrocks, ditches, seasonally wet depressions. February-April. Se. NC and SC south to GA and FL Panhandle (Kunzer et al. 2009), west to e. TX and Mexico; also in Chile and Uruguay. As indicated by Ward & Gholson (1987), Lepuropetalon is more common than collections would indicate; the rosettes are 0.5-2 (-3) cm across, the greenish flowers are 2-3 mm across. It has been considered "the smallest terrestrial angiosperm" (Morgan & Soltis 1993). Its apparently greater abundance in the western portion of its range, where largely found by a few botanists "who have made determined efforts to establish its range" (Ward & Gholson), and in habitats such as granitic flatrocks, which have overall received close scrutiny, may be more a reflection of its diminutive size and early season of occurrence than of its real distribution and abundance. The recent increase in collections, mostly in disturbed or human-maintained habitats, also suggests a possible increase in abundance (and range?) from its original state. It should be more vigorously sought in our area. The presence of lines of red glandular dots on the leaves and sepals is a helpful diagnostic character. [= RAB, GW, K, S]

**Parnassia** Linnaeus 1753 (Grass-of-Parnassus, Parnassia)**
**PARNASSIACEAE**

A genus of 15-70 species, herbs, primarily of arctic and north temperate areas. Our species (especially *P. caroliniana*) are among the most southerly of the genus in distribution. *Parnassia* (all species) are among the most beautiful of our native plants. From a distance the white flowers are attractive but not extraordinary; when observed closely, though, the delicate tracery of the green veins on the waxy white petals is astonishing. References: Gastony & Soltis (1977); Spongberg (1972); GW; Simmons in Kubitzki (2004).

**Identification notes:** Note that the five staminodia are (in our species) deeply three-lobed to the base, thus appearing as 15.

1 Leaf blades reniform, as wide or wider than long, the base strongly cordate; staminodia shorter than the stamens [note that the stamens elongate after the staminodia; thus at a certain early stage the stamens of *P. asarifolia* may be shorter than the staminodia; check several flowers] .................................................................................................................. *P. asarifolia*

2 Staminodia longer than the stamens; [of VA, WV, MO, OK southward].......................................................................................................................... *P. glauca*

3 Main parallel veins of each petal 5-9 (counted at a point halfway between the base and the apex and ignoring short laterals), often strongly dilated toward the apex of the petal; outer- or basal-most main vein branching pseudo-dichotomously several times; rhizome horizontal, long-creeping, the leaves scattered or loosely clustered, tending to form clonal patches to several m in diameter; ovary white; [of Coastal Plain pinelands] ........................................................................................................................................... *P. caroliniana*

4 Staminodia shorter than the stamens; [of NJ, PA, and OH northward] ........................................................................................................................................ *P. glauca* or shorter than the stamens (P. glauca) ........................................................................................................................................... *P. grandifolia*

**Parnassia asarifolia** Ventenat, Kidney-leaved Grass-of-Parnassus, Appalachian Grass-of-Parnassus, Brook Parnassia. Bogs, sphagnous seeps, brookbanks, generally in more acidic habitats than *P. grandifolia*, up to elevations over 1800 m. (July-) August-October. VA, e. WV, sw. AR south to GA and e. TX, primarily in the Appalachian and Ozarkian highlands. [= RAB, C, F, G, GW, K, S, W, WV]

**Parnassia caroliniana** Michaux, Carolina Grass-of-Parnassus, Savanna Parnassia, Eyebright. Wet longleaf pine, pond pine, or pond cypress savannas (especially but not strictly where shallowly underlain by coquina limestone), sandhill seepage bogs. September-November (-December). Se. and sc. NC south through SC; disjunct in the Panhandle of FL, the distribution (at least now) fragmented and disjunctive. In NC, locally common in three small areas, centered around Maple Hill (Pender and Onslow counties), Old Dock (Columbus and Brunswick counties), and the Green Swamp (Brunswick County). Following Michaux's discovery of the species it was apparently not reported again in the Carolinas until found by H.A. Rankin near Hallsboro. His comments, quoted in Alexander (1934) are interesting. "What if our savannas are sometimes steaming, it is the condition necessary for the development for many wonderful plants which find here their most congenial surroundings. But Grass-of-Parnassus does not star the meadows during the steaming season, instead, by local tradition, the 'Eyebright,' its local name, times its first flowers to come just two weeks before frost ... As a matter of fact, I saw the first flowers this year on October 12th and our first frost came the morning of the 25th. Its chosen habitat is the wet savannas and hundreds of acres may be seen liberally dotted with its white stars, but it finds its best development in the lower places, and here it often almost covers the ground. Today, November 1st, it is in its prime and is the most conspicuous flower on many acres and in one little depression less than two feet in diameter I counted seventy-two flowers and buds." With the extensive destruction of our wet savannas (by conversion to pine tree farms, agriculture, and developed areas) and fire suppression, very few such places now remain. [= RAB, GW, K, S, WH]

**Parnassia glauca** Rafinesque, American Grass-of-Parnassus, Fen Grass-of-Parnassus. Fens. NL (Newfoundland), QC, and SK south to NJ (Ocean County), s. PA (Rhoads & Klein 1993), OH, IN, IA, and SD. [= C, F, G, K]

**Parnassia grandifolia** A.P. de Candolle, Bigleaf Grass-of-Parnassus, Limeeep Parnassia. Fens, gravelly seepages, pineland seepage bogs and ecotomes, primarily or solely over calcareous, mafic, or ultramafic rocks, in the outer Coastal Plain in seepage over marl on nearly vertical river bluffs on the Cape Fear River (NC) and in pineland seepage bogs. September-October. VA, WV, s. MO, and OK south to n. GA, Panhandle FL, s. MS (Sorrie & Leonard 1999), AR, and e. TX, primarily in the Appalachian and Ozarkian highlands. The discovery of populations of this species in Brunswick and Columbus counties, NC, was remarkable. In the Panhandle of FL and the West Gulf Coastal Plain of LA and TX it also occurs in wet savannas and pitcherplant bogs (MacRoberts, MacRoberts, & Jackson 2004), in FL sometimes in close proximity to *P. caroliniana; Parnassia* in Coastal Plain savannas should not necessarily be assumed to be *P. caroliniana.* [= RAB, C, F, G, GW, K, S, W, WH, WV]

![Image of Parnassia species](image_url)

**172b. CELASTRACEAE** R. Brown 1814 (Bittersweet Family) [in CELASTRALES]
A family of ca. 98 genera and ca. 1200 species, trees, shrubs, lianas, perennial and annual herbs, nearly cosmopolitan, especially in the tropics and subtropics. References: Brizicky (1964); Simmons in Kubitzki (2004).

1 Leaves spiny-toothed, coriaceous; [rare waif in our area]........................................................................................................................ Crossoptetalum

2 Leaves entire; twining woody vines .................................................................................................................................................. Celastrus

2 Leaves opposite; upright to trailing shrubs or climbing woody vines.

3 Leaves widely spaced, averaging < 1 pair per cm of stem; leaves 2.5-12 cm long, (0.5-) 1-6 cm wide; [shrubs to small trees, mostly > 0.4 m tall, collectively in many habitats].................................................................................................................. Euonymus

3 Leaves closely spaced, 2-4 pairs per cm of stem; leaves 1.1-2.5 cm long, 0.2-0.6 cm wide; [shrub < 0.4 m tall, native to calcareous rock outcrops, rarely naturalized elsewhere] ........................................................................................................... Paxistima

**Celastrus** Linnaeus 1753 (Bittersweet)

A genus of ca. 30 species, scandent shrubs, primarily in e. Asia, Malaysia, Oceania, Madagascar, and Central and South America. The one species native to e. North America is related to e. Asian species. The grammatical gender of the genus has been conserved as masculine (Brummitt 2005). References: Duncan (1969)=Z ; Leicht-Young et al. (2007); Simmons in Kubitzki (2004).

1 Flowers in 2-3-flowered axillary cymes; mature leaves mostly obovate, averaging 1.2-1.4 (-1.7)× as long as wide; expanding leaves folded (conduplicate); capsule yellow (contrasting with the seeds); pollen white................................................................. C. orbiculatus

1 Flowers in 6-many-flowered terminal panicles; mature leaves mostly ovate-lanceolate to elliptic, averaging (1.8-) 2.0-2.6× as long as wide; expanding leaves rolled (involute); capsule orange (similar to color to the seeds); pollen yellow ...................................................... C. scandens

* Celastrus orbiculatus *Thunberg, Oriental Bittersweet. Thickets, roadsides, forests; native of Asia. May; August-September. *C. orbiculatus*, though attractive, is becoming a noxious weed in our area. The first reports of its occurrence in our area appear to be in the 1960’s; it is now much more common than its native relative, *C. scandens*. [= RAB, C, F, W, Z; = C. orbiculata – G, K, orthographic variant]*

**Celastrus scandens** Linnaeus, American Bittersweet. Mesic forests. May-June; August-September. QC west to MB and WY, south to w. SC, n. GA, AL, LA, and TX. [= RAB, C, F, G, K, S, W, Z]

**Crossoptetalum** P. Browne 1756 (Christmas-berry)

A genus of about 26 species, trees and shrubs, of the West Indies and tropical America. References: Simmons in Kubitzki (2004).

* Crossoptetalum ilicifolium * (Poiret) Kuntze, Holly-leaf Rhacoma, Christmas-berry. Disturbed, acid, peaty soil; native of subtropical FL. Presumably introduced via cattle at an agricultural experiment station near Wenona, Washington County, NC (Hayes 1946). The species has probably not persisted in our area. [= K, WH; = Rhacoma ilicifolia (Poiret) Trelease – S]

**Euonymus** Linnaeus 1753 (Spindle-tree, Euonymus, Strawberry-bush)

A genus of ca. 129 species, of temperate and tropical areas, trees, shrubs, and lianas. The genus name was variously spelled "Euonymus" and "Eunonymus" by Linnaeus. The spelling *Euonymus* has been nomenclaturally "conserved." The genus is now considered to be grammatically masculine, and specific epithets therefore end in "-us." References: Ma & Funston (2008)= Y; Voss (1985)=Z; Simmons in Kubitzki (2004).

1 Leaf undersurface with mostly erect hairs to ca. 0.2 mm long; petioles 8-20 mm long; flowers 4-merous; [native]; [section Euonymus]................................. E. atropurpureus var. atropurpureus

1 Leaf undersurface glabrous (or with some hairs on the midrib); petioles 1-33 mm long; flowers 4- or 5-merous; [introduced or native].

2 Leaves evergreen; flowers 4-merous; [introduced species, rarely naturalized]; [section Illicifoli].

3 Leaves 2-5.5 cm long, 2-3.5 cm wide; capsule 5-6 mm in diameter............................................................................................ E. fortunei

3 Leaves (3-) 5-10 (-12) cm long, (2-) 3-5 (-5.5) cm long; capsule 6-9 (-12) mm in diameter .................................................................................. E. japonicus

2 Leaves deciduous; flowers 4- or 5-merous; [introduced or native].

4 Petioles 5-33 mm long; flowers 4-merous; [introduced, rarely naturalized]; [section Euonymus].

5 Leaf apex acute to short-acuminate; larger leaves 8-11 per cm.................................................................................. E. europeus

5 Leaf apex long-acuminate; larger leaves with teeth 6-8 per cm .................................................................................. E. maackii

4 Petioles 1-5 mm long; flowers 4- or 5-merous; [native and introduced].

6 Twigs and branches with 2-4 corky wings; flowers 4-merous; capsules smooth; [introduced, rarely naturalized]; [section Melanocarya].................................................................................................................. E. alatus

6 Twigs and small branches lacking corky wings, terete (or nearly so); flowers 5-merous; capsules muricate; [native species]; [section Echinococcus].

7 Primary stems erect, to 20 dm tall; upper leaves widest at or below the middle; petioles mostly 1-3 mm long; [widespread in our area]................................................................. E. americanus

Euonymus americana Linnaeus, Strawberry-bush, Heart's-a-bustin'- (with-love). Mesic to submesic forests. May-June; September-October. Se. NY west to s. OH and se. MO, south to n. peninsular FL and TX. A variety, var. angustifolia (Pursh) A. Wood, with narrowly lanceolate to linear leaves, has been named and occurs in our area; it is of uncertain status (Brizicky 1964). [= RAB, C, F, G, S, W, WH, WV; = Euonymus americana – K]  

Euonymus atropurpureus Jacquin var. atropurpureus, American Wahoo, Burning Bush. Bottomland forests, riverbanks, mostly on rich alluvial sediments, or on slopes over mafic or calcareous rocks. May; October. NY west to ND, south to Panhandle FL and TX. Var. cheathumii Lundell is endemic to TX. [= E. atropurpurea var. atropurpurea – K; > Euonymus atropurpureus – RAB, C, F, G, S, W, WH, WV; < Euonymus atropurpurea – Z]  

* Euonymus europaeus* Linnaeus, European Spindle-tree. Suburban woodlands, uncommonly cultivated, rarely naturalized; native of Europe. [= C, F, G; = Euonymus europaea – K, Z]  


* Euonymus japonicus* Thunberg, Japanese Spindle-tree. Disturbed areas, especially on barrier islands; native of Japan. Widely planted on barrier islands and in other maritime situations because of its resistance to salt damage (Brown 1959). [= C, Y; = E. japonica – K]  

* Euonymus maackii* Ruprecht, Winterberry. Cultivated, rarely naturalized; native of n. China. [= WH, Y; > Euonymus bungeanum Maximowicz – K; > E. hamiltonianus Wallich var. hamiltonianus – K2]  

* Euonymus obovatus* Nuttall, Running Strawberry-bush. Cove forests, northern hardwood forests, other mesic forests, especially in boulderfields, where sometimes quite abundant locally. May-June; September-October. W. NY west to s. MI, south to sw. NC, ne. GA, TN, and MO. [= RAB, C, F, G, S, W; = Euonymus obovata – K, Z]  

Paxistima Rafinesque 1838 (Mountain-lover)  

A genus of 2 species, rhizomatous shrubs, of temperate North America. The only other species in the genus is *P. myrsinites* (Pursh) Rafinesque of the Western Cordillera; its two subspecies are ssp. *myrsinites*, ranging from BC and AB south to AZ and NM, and ssp. *mexicana* Navarro & Blackwell of mountainous Mexico (Coahuila, Nuevo León, and Tamaulipas). For discussion of the long confusion and controversy over the appropriate spelling of the genus, see Navarro & Blackwell (1990) and Uttal (1986). The first validly published spelling of the name was “Paxistima,” and this spelling should be retained. References: Navarro & Blackwell (1990) in Z-Simmons in Kubitzki (2004).  

Paxistima canbyi A. Gray, Cliff-green, Canby’s Mountain-lover, Ratstripper. On calcareous bluffs and cliffs (generally near the top of the cliffs or bluffs, rarely far below the crest), mostly on limestone and dolostone, but rarely on greenstone or shale; in NC naturalized at the site of a plant nursery and possibly also native (see discussion below). April-May; September. The species is a Central Appalachian endemic: sc. PA (Bedford County) (Rhoads & Klein 1993), e. WV, w. VA, s. OH, e KY, ne. TN, and w. NC (wherequestionably native). The only collection definitely known from NC is that from an old nursery site (Hardin 1963). Navarro & Blackwell (1990) note that "the presence of *P. canbyi* in North Carolina was, however, noticed as long ago as 1883 by Chapman, and *P. canbyi* is likely native to North Carolina." Small (1933) reports it from "n. NC." Casting doubt on its native status in NC is the species' habitat: limestone ravines and bluffs, a very rare habitat in NC. [= RAB, C, K, W, Z; = Paxistima canbyi – F, WV (the name not validly published); = Pachystima canbyi – G, S (the name not validly published)]
175. OXALIDACEAE R. Brown 1818 (Wood-sorrel Family) [in OXALIDALES]

A family of 5-6 genera and 600-775 species, herbs, shrubs, vines, and small trees, nearly cosmopolitan (especially temperate). References: Cocucci in Kubitzki (2004).

Oxalis Linnaeus 1753 (Wood-sorrel, Oxalis)


2 Leaflets obdeltoid.
3 Leaflets green; plants with bulbs and bulblets .................................................................................................................. O. intermedia
4 Leaflets purple; plants with scale-clad rhizomes .................................................................................................................. O. triangularis

5 Plants arising from slender, herbaceous, stoloniform rhizomes at intervals producing white, horizontal, fusiform tubers or tuberlike thickenings; leaflets with upper shoulders flattened, margins green; flowers produced mostly within the level of the leaves; petals 12-18 mm long, throat strongly red-lined within ................................................................. O. illinoensis
6 Plants arising from slender, herbaceous, stoloniform rhizomes at intervals producing white, horizontal, fusiform tubers or tuberlike thickenings; leaflets with upper shoulders flattened, margins green; flowers produced mostly within the level of the leaves; petals 12-18 mm long, throat strongly red-lined within ................................................................. O. illinoensis

7 Stems pilose to villous to nearly glabrous, rarely strigose and then only on peduncles or pedicels.
8 Petals 10-20 mm long, red-lined in the throat.
9 Corolla throats strongly red-lined within; petals 14-20 mm long; flowers 1 or (2-3) 3-8 in umbelliform cymes above the level of the leaves; stems densely and pilose with stiffly spreading non-septate hairs; stoloniform rhizomes lignescent and numerous on an individual plant .................................................................................................................................................. O. priceae
10 Plants arising from slender, lignescent, stoloniform rhizomes without tubers; leaflets with upper shoulders usually rounded, margins often with a narrow purple margin; flowers produced above the level of the leaves; petals 10-14 mm long, throat yellow very faintly or weakly red-lined within .................................................................................................................................................. O. grandis

11 Stems erect, usually arising singly from the base, rarely decumbent, nor very rarely rooting at the nodes, from a short, thin, often herbaceous to slightly lignescent rhizome etc.; seeds all brown or with white transverse ridges; stipules absent or so reduced to be barely evident.
12 Stems 5-7 (-15) in regular (rarely irregular) cymes; capsules villous to sparsely puberulent, not villous .................................................................................................................................................. O. floribunda

* Oxalis articulata Savigny in Lamarck. Roadside, old gardens; native of South America. [= V; > O. rubra St. Hilaire – RAB, K, Q, WH; ? Ionoxalis martiana (Zuccarine) Small – S, misapplied; > O. articulata Savigny ssp. rubra (St. Hilaire) Lourteig]

* Oxalis corniculata Linnaeus. Creeping Lady’s-sorrel. Gardens, fields, disturbed areas, sometimes more natural areas including pinelands, dunes; probably native of New World tropics, but possibly including the deeper South. February–December. Now nearly worldwide in distribution, probably native of the New World tropics and subtropics. [= RAB, C, F, K, Q, WV, Y; = O.

Oxalis dillenii Jacquin. Southern Yellow Wood-sorrel. Roadsides, pastures, lawns, a wide variety of other habitats. February-May (-October). NS west to SK, south to FL, TX, NM; introduced elsewhere. [= C, K; > O. dillenii – RAB, > O. floridana var. floridana – RAB; > O. floridana Salisbury var. filipes (Small) Ahles – RAB; > O. stricta Linnaeus – G, WV, misapplied; > O. dillenii ssp. dillenii – Q, W, Y, Z; > Xanthoxalis brittoniae (Small) Small – S]


Oxalis illinoensis Schwedegmann, Illinois Wood-sorrel. Dry to dry-mesic forests and bluffs, often but not necessarily calcareous. S. IN and s. IL south through KY to c. TN. [= K]

* Oxalis intermedia A. Richard. West Indiana Wood-sorrel. Moist disturbed areas; native of West Indies. April-September. [= V; < O. latifolia Kunth – WH]


Oxalis texana (Small) Fedde. Reported for GA (GANHP, Kartesz 1999); not in GA (Ward 2004). Rejected for our area. [= O. priceae Small ssp. texana (Small) Eiten – K, Q, Y] {not keyed or mapped}

* Oxalis triangularis A. St.-Hilaire. Disturbed areas; native of Brazil and Argentina. April-May. [= V; < Oxalis triangularis A. St.-Hilaire ssp. papilionacea (Hoffmannsseg ex Zuccarini) Loureiro – WH]


181. Rhizophoraceae R. Brown 1814 (Red Mangrove Family) [in MALPIGHIACEAE]

A family of about 15 genera and 120 species, of tropical areas of the Old and New World.

Rhizophora Linnaeus (Red Mangrove)
A genus of 8-9 species, trees and shrubs, of tropical shores.

**Rhizophora mangle** Linnaeus, Red Mangrove. Cp (FL, GA, NC, SC): beaches; rare. Well-established from n. FL southwards into the West Indies and beyond in tropical America. The distinctive floating seedlings of *Rhizophora* occasionally wash up as jetsam on beaches of GA, NC, and SC, particularly following hurricanes. Photographic evidence has been supplied from Bear Island, Onslow County, NC, 11 June 1996 (Dave Owen, pers. comm. and photograph). These propagules may sprout and grow for some time, forming a young sapling with leaves, but do not survive because of frost. *Rhizophora* is not currently truly an established part of the flora north of FL,” but is repeatedly introduced naturally. [= GW, K, S, WH]

### 184. EUPHORBIACEAE A.L. de Jussieu 1789 (Spurge Family) [in MALPIGHIALES]

A family of about 313-322 genera and 8100-9000 species, trees, shrubs, vines, and herbs, nearly cosmopolitan in distribution, as defined broadly. Molecular systematics suggests that various units traditionally included in the Euphorbiaceae should be segregated (Solits et al. 2000, Chase et al. 2002). In our flora, this includes *Phyllanthus* (in Phyllanthaceae). References: Webster (1967), Webster (1994); Govaerts, Frodin, & Radcliffe-Smith (2000). [also see PHYLANTHACEAE]

1 Shrub or tree (woody).

2 Leaves entire.

3 Leaf blades 2-5× as long as wide; petioles 0.2-1.0 cm long; plant a native shrub; [subfamily *Euphorbioideae*] ................................................. *Ditrysinia*

3 Leaf blades 1-1.5× as long as wide; petioles 2-6 cm long; plant an alien tree; [subfamily *Acalyphoideae*] .......................................................... *Triotica*

2 Leaves crenate, serrate, or palmately lobed.

4 Leaves elliptic or lanceolate, with crenate or serrate margins.

5 Petiole lacking glands; [subfamily *Acalyphoideae*] ................................................................. *Sapum*

5 Petiole with 2 glands at summit; [subfamily *Euphorbioideae*] .......................................................... *Stillingia*

4 Leaves ovate or orbicular in outline, palmately lobed.

6 Inflorescence an panicle; petals absent; [subfamily *Acalyphoideae*] .......................................................... *Ricinus*

6 Inflorescence a dichasium; petals present; [subfamily *Crotonoideae*] .................................................. *Vernicia*

1 Herb.

7 Leaves palmately or ternately lobed or divided.

8 Leaves peltate; calyx green or purple; plant glabrous; stamens 100-1000; [subfamily *Acalyphoideae*] .......................................................... *Ricinus*

8 Leaves cordate at base; calyx petaloid, white; plant glabrous or ith conspicuous stinging trichomes; stamens 8-10; [subfamily *Crotonoideae*].

9 Plant with stinging trichomes; stamens connate ................................................................. *Cnidoscolus*

9 Plant lacking stinging trichomes; stamens separate ............................................................... *Manihot*

7 Leaves generally not lobed, entire or serrate (rarely pinnately lobed in *Euphorbia*).

10 Plant with copious white latex; flowers enclosed in a cyathium; [subfamily *Euphorbioideae*] .......................................................... *Euphorbia*

10 Plant without white latex (the sap clear, or slightly milky in *Stillingia*); flowers not enclosed in a cyathium.

11 Pubescence of stellate trichomes and/or scales; [subfamily *Crotonoideae*] .................................................. *Croton*

11 Pubescence of simple trichomes, or glabrous.

12 Flowers in terminal spikes; stout perennial with several to many stems arising from a subterranean crown [subfamily *Euphorbioideae*]. ................................................................. [see *Phyllanthus – PHYLLANTHACEAE*]

12 Flowers strictly axillary or both axillary and terminal, in small clusters, racemes, or spikes; finer perennial or annual, not typically with > 1 stem arising from a subterranean crown.

13 Ovules and seeds 2 per locule (the capsule thus 6-seeded); flowers in small axillary clusters of 2-4 ..........................................................

13 Ovules and seeds 1 per locule (the capsule thus 3-seeded, or fewer by abortion); flowers in axillary spikes or in racemes borne in leaf axils or opposite the leaves; [subfamily *Acalyphoideae*].

14 Pistillate flowers lacking a leafy bract; plant with stinging trichomes; styles undivided .......................................................... *Tragia*

14 Pistillate flowers subtended by a conspicuous leafy bract; plant lacking stinging trichomes; styles laciniate

15 Leaves alternate; carpels 3 (sometimes fewer by abortion) .......................................................... *Acalypha*

15 Leaves opposite; carpels 2 ...........................................................................................................

**Acalypha** Linnaeus 1753 (Copperleaf, Three-seeded Mercury)
A genus of about 430-462 species, shrubs, herbs, and trees, of primarily tropical and subtropical regions (rarely warm temperate). References: Levin in FNA (in prep.); Levin (1999b)=Z; Levin (1999a); Govaerts, Frodin, & Radcliffe-Smith (2000)=Y. Key based in part on Levin in FNA.

1 Bracts of pistillate flowers with linear tips or lobes longer than the broad basal portion; pistillate flowers all or chiefly in terminal spikes, the staminate flowers in axillary clusters (except sometimes in A. arvensis).
2 Pistillate inflorescences with the bracts densely crowded, completely hiding the inflorescence axis; bracts of pistillate flowers with lobes consisting of deltate bases bearing long linear tips, long-hirsute with non-glandular hairs to 2 mm long ......................................................A. arvensis
3 Leaves cordate at base; fruit tuberculate, but not pubescent .............................................................A. ostryifolia
4 Leaves rounded to widely cuneate at base; fruit pubescent with pubescence-based trichomes ......................................................A. setosa

Bracts of the pistillate flowers with deltate or lanceolate tips or lobes; pistillate and staminate flowers all in axillary inflorescences, the staminate flowers above and pistillate flowers below in each inflorescence.

4 Bracts subtending the pistillate flowers (5-) 7-9 (-11) lobed, usually stipitate-glandular; petiole 0.5-1.5× as long as the leaf blade; stems with only short, incurved trichomes.
5 Fruit 2-seeded; seeds 2.4-3.2 mm long ..............................................................................................................A. deamii
5 Fruit 3-seeded; seeds 1.2-2.0 mm long .............................................................................................................A. rhomboidea

4 Bracts subtending the pistillate flowers 9-15 (-16) lobed, stipitate-glandular or merely pubescent; petiole 0.2-0.5× as long as the leaf blade; stems with short incurved trichomes, with or without longer, straight, spreading trichomes as well.
6 Bracts subtending the pistillate flowers usually stipitate-glandular, the bract lobes ovate to deltoid, the longest < 2 mm long .................A. gracilens
6 Bracts subtending the pistillate flowers usually non-stipitate, pointed hairs, the bract lobes linear to oblanceolate, the longest usually > 3 mm long broadly ......................................................A. virginica

* Acalypha arvensis Poeppig & Endlicher. Disturbed ground; native of West Indies, Mexico, and Central America. [= FNA, K, WH]

Acalypha deamii (Weatherby) Ahles, Big-seeded Copperleaf, Two-seeded Copperleaf. Pd (VA), Mt (VA), Cp (VA): alluvial forests, especially on sandy beaches; un cultivated. W. PA (Rhoads & Klein 1993), s. OH, and s. IN south to w. TN (Chester, Wofford, & Kral 1997) and AR; apparently disjunct in c. VA (where now known from 23 counties, mainly in the Piedmont), but probably now overlooked elsewhere. This plant is up to a meter tall and occurs in moist bottomland forests. [= C, FNA, K, Z; = A. rhomboidea var. deamii (Weatherby) Weatherby – F; G; = A. virginica Linnaeus var. deamii Weatherby – Y]

Acalypha gracilens A. Gray, Shortstalk Copperleaf. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): woodlands, disturbed ground; common (uncommon in WV). Late June-November. ME west to WI, south to FL and TX. The related A. monococca (Engelmann ex A. Gray) Lill. W. Miller & Gandhi is of broadly Ozarkian distribution and warrants specific status (Levin 1999a, 1999b). Var. fraseri is generally more southern and is considered to differ in having more elongate staminate spikes, to 3-4 cm long (vs. 0.5-1.5 cm long). It may have merit, but was not recognized by Levin (1999a, 1999b). [= RAB, FNA, K, S, W, Z; > A. gracilens var. gracilens – C, F, G; > A. gracilens var. fraseri (Müller of Aargau) Weatherby – C, F, G; = A. virginica Linnaeus var. gracilens (A. Gray) Müller of Aargau – Y; = A. gracilens ssp. gracilens]

Acalypha ostryifolia Riddell ex J.M. Coulter, Rough-pod Copperleaf. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (FL, GA, SC): disturbed ground; uncommon (rare in WV). Late June-November. NJ west to IN and NE, south to FL, TX, Mexico, and the West Indies. [= FNA, K, W, Y; = A. ostryifolia – RAB, C, F, G, s, orthographic variant]


Cnidoscolus Pohl 1827 (Spurge-nettle)

**Croton Linnaeus 1753 (Croton, Doveweed, Rushfoil)**

A genus of about 1250 species, herbs, shrubs, and (rarely) trees, of nearly cosmopolitan distribution. Webster (1992, 1993) considers the 2 species traditionally treated as *Crotonopsis* to be closely related to sections within *Croton*, such as section *Gynamblosis*; his reasoning has been supported by molecular phylogenetic studies and all recent floristic treatments and is followed here. References: van Ee & Berry in FNA (in prep.); van Ee, Riina, & Berry (in press); Webster (1992)=Z; Webster (1993)=Y; Govaerts, Frodin, & Radcliffe-Smith (2000).

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1 Evergreen shrub, (1-)2-3 m tall; pistillate flowers with petals; [section *Alabamenses*]................. *C. alabamensis* var. *alabamensis*

1 Herbaceous or suffrutescent, 0.1-1.2 m tall; pistillate flowers lacking petals.

2 Leaves with coarsely serrate margins; 1-2 glands present near the junction of the petiole and the leaf blade; [section *Geiseleria*]..............

2 Leaves with entire margins; glands absent at the junction of the petiole and the leaf blade.

3 Leaves sessile or with short petioles (to 3.2 mm long), the petiole < 1/5 the length of the leaf blade; fruit 1-locular, indehiscent; seed 1 per fruit, 2.2-5.5 mm long; [section *Crotonopsis*].

4 Branches monopodial; stellate hairs of the upper leaf surface with arms to 0.3 mm long, not overlapping the arms of the nearby stellae...

4 Branches dichotomous and trichotomous; stellate hairs of the upper leaf surface with arms to 1.0 mm long, overlapping the arms of nearby stellae...

5 Stem leaves mostly 2× or more as long as wide; lobes of the calyx of the pistillate flowers 5-9 (-12); [section *Pilophyton*].

6 Leaves (the larger) 4-15 cm long, 1.5-6 cm wide (generally 2-3× as long as wide), lanceolate to elliptic, cordate at the base; hairs of 2 colors, the shorter gray, the longer tan; lobes of the calyx of the pistillate flowers (6-) 7-9 (-12); [alien, of disturbed habitats]..

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55 mm long.

6 Leaves (the larger) 2.5-6 cm long, 0.7-1.5 cm wide (generally 3-6× as long as wide), linear to linear-lanceolate, cuneate at the base; hairs of 1 color, all gray; lobes of the calyx of the pistillate flowers 5-6; [native, of Coastal Plain pondshores]............. *C. elliottii*

5 Stem leaves mostly < 2× as long as wide, 1-8 cm long, broadly cuneate to rounded at the base (a few rarely subcordate); lobes of the calyx of the pistillate flowers 5.

7 Styles 3, each 4-lobed, the style branches thus 12; capsule erect, 5-7 mm long; seeds 4.5-5.0 mm long; lower leaf surface silvery; plant an annual or perennial; [of coastal dunes]; [section *Drepanodium*]...

....................................................................................... *C. punctatus*

7 Styles 2 or 3, each 2-lobed, the style branches thus 4 or 6; capsule pendulous, 3-6 mm long; seeds 2.5-4.0 mm long; lower leaf surface white to silvery; plant an annual; [of limestone outcrops, fields, or weedy situations].

8 Fruit 2-locular; seeds 1 per fruit; styles 2, each 2-lobed; [of limestone outcrops or weedy situations]; [section *Gynamblossis*].....

....................................................................................... *C. monanthogynus*

8 Fruit 3-locular; seeds 3 per fruit; styles 3, each 2-lobed or 4-lobed; [of fields or weedy situations]; [section *Velamea*]........

....................................................................................... *C. lindeheimerianus* var. *lindeheimerianus*.

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**Croton alabamensis** E.A. Smith ex Chapman var. *alabamensis*, Alabama Croton. Dry to mesic limestone glades, woodlands, and wooded ravines. Endemic to scattered populations in c. AL; alleged populations in sc. TN (Chester, Wofford, & Kral 1997) are apparently based on mislabeled specimens (Wurdack 2006). *C. alabamensis* var. *texensis* S. Ginzbarg is endemic to c. TX (Ginzberg 1992; Aplet et al. 1994), where it occurs in canyons in the Edwards Plateau. The species is most closely related to species of the West Indies, Central America, and South America; its distribution is obviously relictual. [= K; < *Croton alabamensis* – S]

* Croton bonplandianus Baillon. Cp (VA): chrome ore piles; rare. Reported for chrome ore piles at Newport News, VA and Canton, MD (Reed 1964). [= K] (not keyed; not mapped; rejected)


**Croton elliotii** Chapman, Pondshore Croton, Elliott's Croton. Cp (FL, GA, SC): shores and exposed drawdown zones of clay-based Carolina bays and limesink ponds (dolines); rare (GA Special Concern, SC Rare). Se. SC south to Panhandle FL, west to se. AL. [= K, S, WH]

* Croton glandulosus Linnaeus var. *septentrionalis* Müller of Aargau, Doveweed, Tooth-leaved Croton, Sand Croton. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, roadsides, disturbed areas; common (uncommon in DE and WV). May-October. *C. glandulosus* is widespread in tropical and subtropical America; var. *septentrionalis* is the northernmost variety, but its pre-Columbian range is obscure because of its weedy nature. [= RAB, C, F, G, K, S, W; < Croton glandulosus var. *glandulosus* – WH; < Croton glandulosus – WV]

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**Croton stimulosus** (Michaux) Engelmann & A. Gray, Spurge-nettle, Tread-softly, Finger-rot, Bull-nettle. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC, SC): sandhills, dry sandy woodlands, other dry sandy soils; common (rare in Piedmont and Mountains). Late March-August; May-September. Se. VA south to s. FL, west to e. LA, mostly on the Coastal Plain, but further inland southward. Beset with stinging thistles. Allied to *C. urens* of Mexico, Central America, and n. South America, and sometimes treated as a variety of it. [= RAB, C, F, G, K, W, WH, Y; = Bivonea stimulosa (Michaux) Rafinesque – S = *C. urens* (Linnaeus) Arthur var. *stimulosus* (Michaux) Govaerts – Z]
Croton lindheimerianus  Scheele var. lindheimerianus, Lindheimer's Croton. Pd (NC): fields and other disturbed soils; rare, adventive from further west. June-October. [= K;  < Croton lindheimerianus – RAB]

Croton michauxii Webster, Sand Rushfoil, Michaux's Croton. Cp (FL, GA, SC, VA?): sandhills, disturbed sandy soils; common (uncommon in GA, rare north of GA). June-October. SC south to s. FL, west to TX, north in the interior to MO, IL, and IA. Fernald (1950) alleges that this species extends as far north as VA, but the documentation is unknown to me. [= K, WH, Z; = Crotonopsis linearis Michaux – RAB, C, F, G, S]

Croton monanthogynus Michaux, Prairie-tea, One-seed Croton. Mt (GA, NC, VA, WV), Pd (GA, SC, VA*), Cp (GA, VA?): limestone outcrops, blackland prairies, disturbed dry soil; rare. June-October. Sw. VA, OH, IN, IA, NE, and CO, south to nw. GA, FL, TX, and Mexico; adventive as a weed at scattered locations east of the Blue Ridge. [= RAB, C, F, G, K, S, W, WV]

Croton punctatus Jacquin, Silverleaf Croton, Beach-tea, Gulf Croton. Cp (FL, GA, NC, SC): beach dunes, coastal grasslands, usually with Uniola paniculata and/ or Spartina patens; common. Late May-November. NC (Dare County) south to s. FL, west to TX, and south into Central and South America. [= K; = RAB, K, S, WH]


Croton argyranthemus Michaux, Silver Croton, Sandhill Croton, Healing Croton. Cp (FL, GA): sandhills; common. C. GA and s. AL south to c. peninsular FL; w. LA and sw. OK south through e. and c. TX to Nuevo León and Tamaulipas. [= K1, K2, S, WH]  {not ye t keyed}

Croton lindheimeri (Engelmann & A. Gray) Müller of Aargau – K; = Croton capitatus Michaux var. lindheimeri (Engelmann & A. Gray) Müller of Aargau – K; = C. engelmannii Ferguson – S}  {not yet keyed}

* Croton texensis (Klotzsch) Müller of Aargau var. texensis, Texas Croton. Cp (DE): disturbed areas; rare, native of c. North America. [= K]  {not yet keyed; add to synonymy

**Dirysinia** Rafinesque 1825 (Sebastian-bush)

A monotypic genus, a shrub, of the Southeastern United States Coastal Plain. Perhaps as close to Gymnanthes as to Sebastiania. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

Dirysinia fruticosa (W. Bartram) Govaerts & Frodin, Sebastian-bush. Swamp forests, other wet to moist, mostly shaded, habitats. May-June; July-October. Se. NC south to c. peninsular FL, west to e. TX. [= Z = Sebastiania fruticosa (W. Bartram) Fernald – GW, K, WH; = Sebastiania ligustrina (Michaux) Müller of Aargau – RAB; = Sebastiania ligustrina – S (orthographic error)]

* Euphorbia* Linnaeus 1753 (Spurge)


1 Leaves strictly opposite, oblique or inequilateral at base; branches often prostrate .......................................................... **Key A (subgenus Chamaesyce)**

1 Leaves alternate or opposite, not oblique or asymmetrical at base; branches usually erect.

2 Bracteal leaves lobed or toothed (rarely linear), usually marked with red or white at the base or purple-spotted; glands of the cyathia usually 1 (rarely more), bilabiate, lacking petaloid appendages ............................................................................................................ **Key B (subgenus Poinsettia)**

2 Bracteal leaves entire, not marked with red (white-margined in E. marginata); glands of the cyathia 4-5, not bilabiate, with or without petaloid appendages.

3 Glands of the cyathia 5 (or 7-10 on the central cyathium in *E. pubentissima*), with petaloid appendages 0.1-5.0 mm long (measured along a radius), these white, maroon, red, pink, or green; stipules present, glandlike, often minute ....... **Key C (subgenus Tithymalopsis)**

3 Glands of the cyathia 4 (except 5 in *E. purpurea*), oval, reniform, or crescent-shaped, lacking petaloid appendages (the glands themselves yellowish or green); stipules absent or vestigial ................................................................. **Key D (subgenus Eula)**

**Key A – subgenus Chamaesyce**

1 Young stems and leaves glabrous; leaves **either** entire or serrulate, at least at the apex (use 10× magnification).

2 Leaves serrulate, at least at the apex (use 10× magnification); seeds with 2-4 transverse ridges.

3 Seeds 1.0-1.3 mm long, with 3-4 transverse ridges ................................................................. **E. glyptosperma**

3 Seeds 0.8-1.0 mm long, with 2-3 (-4) transverse ridges ........................................................................... **E. hyssopifolia**

2 Leaves absolutely entire; seeds smooth.

4 Stipules united into a triangular scale-like structure (this often lobed or fringed), thus appearing as 2 stipules at each node ....... **E. serpens**

**Key B – subgenus Poinsettia**

1 Leaves serrulate or serrate; stamens rarely 3, often more than 8.
Key B – subgenus Poinsettia

1 Principal stem leaves opposite, dentate, neither lobed nor linear; plant pubescent .................................................. E. dentata
1 Principal stem leaves alternate, either lobed or linear; plant usually glabrous
2 Cyathial gland 2-lipped, the opening elongate; bracteal leaves red or green at base; seeds not angular ...................... E. cyathophora
2 Cyathial gland with a circular opening; bracteal leaves purple-spotted or green; seeds angular .................................. E. heterophylla

Key C – subgenus Tithymalopsis

1 Upper stem leaves and bracteal leaves with white margins, ovate, the apex acute; [alien, cultivated and rarely persisting or a waif]; [section Petaloma] .......................................................... E. marginata
1 Upper stem leaves and bracteal leaves entirely green, obovate, elliptic, narrowly elliptic, or oblanceolate, the apex rounded or obtuse; [native]; [section Tithymalopsis].
2 Petaloid appendages (0.5-) 1.0-4.4 mm long (measured along a radius), about as long as wide or longer, white; stems (1.5-) 3-9 (-11) dm tall, erect; leaves not ciliate-margined.
3 Nodes below the umbel (25-) 35-60 (-115); cyathia (5-) 6.5-8.0 (-11.0) mm wide (across the appendages); stems (1-) 3-10 from a crown, each (1.2-) 2.5-5 (-7) mm in diameter at the base; plants flowering March-July; [c. MD, VA, and c. and sw. TN, south to Panhandle FL and s. MS, west to e. TX]. .............................................. E. corollata
3 Nodes below the inflorescence (6-) 15-26 (-41); cyathia (3.5-) 4.0-5.5 (-6.5) mm wide (across the appendages); stems usually 1-2 (-3) from a crown, each (0.8-) 1.5-2.8 (-3.5) mm in diameter at the base; plants (1.5-) 3-5 (-6.5) dm tall; leaves usually reflexed (E. pubentissima) or usually ascending (E. discoidalis), thin, petiolate or subpetiolate; plants flowering March-July; [c. MD, VA, and c. and sw. TN, south to Panhandle FL and s. MS]. ................................................................................... E. discoidalis
4 Leaves 1.9-7.2 cm long, 0.1-0.5 cm wide, averaging >10x as long as wide; primary inflorescence rays usually 3; [e. and c. GA (or e. SC?)] south and west to Panhandle FL and e. TX] .......................................................... E. pubentissima
4 Petaloid appendages 0.05-0.6 mm long (measured along a radius), shorter than wide; green, red, white, or pink; stems (0.8-) 1.5-4.5 (-6) dm tall, erect, ascending or decumbent; leaves ciliate-margined (E. mercurialina and E. curtisii) or not.
5 Leaf margins ciliate; cyathia 3.5-5.9 mm wide (across the appendages), green; leaves not fleshy, 1.7-2.2 (-3)x as long as wide, not especially variable; [of mesic forests with rich soils]. ............................................................................................................ E. mercurialina
5 Leaf margins not ciliate (except some margin hairs in E. curtisii); cyathia 2.0-3.4 mm wide (across the appendages), green or maroon; leaves slightly to strongly fleshy, 0.7-20x as long as wide, often very variable in shape, even on the same plant; [of more or less xeric sandhill woodlands with acidic, sandy soils].
6 Stems usually 10-18 per crown, decumbent to weakly ascending; leaves opposite (scales on the lower stem sometimes alternate), fleshy, blue-green with a narrow, thickened, red-hyaline margin; branching dichotomous from the base of the plant (the branches typically equal, though sometimes unequal). .......................................................... E. ipecauanhiae
**Key D – subgenus Esula**

1. Principal stem leaves finely serrulate (especially toward the apex); [subgenus Esula, section Thymalmus]... \[E. helioscopa\]
2. Ovary and capsule smooth................................................................. \[E. obtusata\]
3. Ovary and capsule verrucose-roughened.
4. Principall stem leaves entire.
5. Stem leaves alternate (or mostly so); seeds 1-3 mm long; [subgenus Esula, section Esula]... \[E. spatulata\]
6. Stem leaves 1-3 cm long, 1-3 mm wide............................................ \[E. cyprissias\]
7. Stem leaves 3-8 cm long, 4-8 mm wide.............................................. \[E. esula\]
8. Seeds pitted only on one face, the inner face furrowed.................. \[E. peplus\]
9. Seeds pitted on both the inner and outer faces.
10. Seeds finely pitted with numerous, evenly distributed, circular pits; bracteal leaves broader than long; glands of the cyathia crescent-shaped, the horns elongate, and caudate........................ \[E. commutata\]

**Euphorbia bombensis** Jacquin, Southern Seaside Spurge, Dixie Sandmatt. Cp (FL, GA, NC, SC, VA): open sands of dunes, dune blowouts and overwashes, often growing with perennial grasses such as *Uniola paniculata*, but preferring open sands with little competition, sometimes mixed with the more common *E. polygonifolia*; common (uncommon in GA, NC, and SC, rare in VA). June-October. E. VA south to s. FL along the Atlantic, from s. FL to TX and Mexico along the Gulf of Mexico, and south into n. South America. Johnson (1992) describes the habitat of this species with that of the closely similar *E. polygonifolia*; *E. bombensis* prefers areas behind the foredune, while *E. polygonifolia* prefers the pioneer situation on the upper beach and foredune front. [=Q = Chamaesyce bombensis (Jacquin) Dugand – K, WH, Z; = Euphorbia ammannioides Kunth – RAB, C, F, G; > Chamaesyce ingaalisii Small – S]

**Euphorbia commutata** Engelmann ex A. Gray, Woodland Spurge, Tinted Spurge. Mt (GA, NC, VA, WV), Pd (GA, NC, SC, VA), Cp (FL, GA, VA): rich forests and rock outcrops, over calcareous or mafic rocks; uncommon (rare in Coastal Plain, rare in NC). March-July. PA west to s. ON and MN, south to FL and TX. The southern var. *ectera* J.B.S. Norton may be worthy of recognition; we probably have both it and the typical var. *commutata* in our area. Var. *ectera* (ranging north to VA, KY, and MO) has all the cauleine leaves oblanceolate and with petioles 5-12 mm long; var. *commutata* has leaves varying from oblanceolate to obovate, the upper leaves usually broad and sessile. [= RAB, F, K, Q, W, WH, WV; > Eu. commutata var. *commutata* – C, G; > Eu. commutata var. *ectera* J.B.S. Norton – C, G; = Galarhoeus commutatus (Engelmann) Small – S]

**Euphorbia cordifolia** Elliott, Heartleaf Sandmat. Cp (FL, GA, NC, SC): open sands of very dry sandhills; uncommon (rare north of FL). July-October. Se. NC south to s. FL and west to s. TX. [= RAB, Q; = Chamaesyce cordifolia (Elliott) Small – K, S, WH, Z]

**Euphorbia corollata** Linnaeus, Eastern Flowering Spurge. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, VA), Cp (DE, VA): woodlands and forests; uncommon. June-September. NH and MA west to s. ON, MI, WI, MN, and NE, south to se.VA, c. NC, n. GA, s. AL, and e. TX. Huft (1979) considered *Eu. marilandica* a sporadic growth form of *Eu. corollata*. [= K, WV, Y, Z; = Eu. corollata var. *corollata* – RAB; > Eu. corollata var. *corollata* – C, F; > Eu. marilandica Greene – C, F, G; > Eu. corollata – G, W (also see Eu. pubentissima); = Thymalopsis corollata (Linnaeus) Klootsz – S; < Eu. corollata var. *corollata* – Q (also see Eu. discoidalis)]


Euphorbia cyathophora Murray, Unnamed Leaf, Fire-on-the-mountain. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): disturbed habitats, dunes; common (uncommon in GA, NC, SC, and VA). June-October. E. VA, KS, and CA south into the New World tropics, the original range obscure. [= C, K, Q; > Eu. heterophylla Linnaeus var. heterophylla – RAB, F, misapplied; > Eu. heterophylla var. graminifolia Engelmann – RAB, F; = Eu. heterophylla – G; > Poinsettsia cyathophora (Murray) Klotzsch & Garcke – S; > Poinsettsia heterophylla – S, misapplied]


* Euphorbia discoidalis * Chapman, Summer Spurge. Cp (FL, GA): sandhills; uncommon. E. and c. GA (or e. SC?) south and west to Panhandle FL and e. TX. [Park 1998] includes in synonymy *Eu. corollata var. angustifolia* Elliott, which has a stated type locality in e. SC. [= K, WH, Y; > Tithymalopsis discoidalis (Chapman) Small – S; < Eu. corollata var. corollata – Q]

* Euphorbia esula * Linnaeus var. esula, Wolf's-milk, Leafy Spurge Mt (WV), Pd (VA): disturbed areas; rare, native of Eurasia. May-September. [= K; < Eu. esula – C, F, G, WV; = Eu. esula ssp. esula – Q; > Tithymalus esula (Linnaeus) Scopoli]

* Euphorbia esculenta * (Small) Coker, Maroon Sandhills Spurge, Coastal Sand Spurge. Cp (FL, GA, NC, SC, VA): sandhills; uncommon. March-June. Sc. NC south to e. South Carolina and e. Panhandle FL; disjunct in se. VA (Sussex County) (Belden et al. 2004). The leaves are extremely variable in size and shape, from linear to rotund. Park (1998) recognizes *Eu. esculenta* and *Eu. gracilis* as distinct from one another, differing in the involucre (purple in *Eu. esculenta* and green in *Eu. gracilis*) and the appendages (rudimentary and purple in *Eu. esculenta* and semicircular and white in *Eu. gracilis*). [= K, Q, WH, Z; > Eu. gracilis Cronquist – RAB; > Tithymalopsis esculenta Small – S; > Tithymalus gracilis (Boissier) Small – S; > Eu. esculenta – Y; > Eu. gracilis – Y]

* Euphorbia falcata * Linnaeus. Mt (VA, WV), Pd (VA): disturbed areas; rare, native of Europe. [= C, F, G, K, QW; > Eu. falcata ssp. falcata – Q]

* Euphorbia helioscopia * Linnaeus, Wattweed. Pd (GA, NC, SC, VA), Mt (VA), Cp (DE, VA): cultivated ground; rare, native of Europe. Late March-June. [= RAB, C, F, G, K; = Galarhoeus helioscopia (Linnaeus) Haworth – S; > Eu. helioscopia sp. helioscopia – Q]

* Euphorbia heterophylla * Linnaeus, Fiddler’s Spurge, Mexican Fireplant. Cp (FL, GA): disturbed areas; uncommon. All year. [= K, Q; > Poinsettsia heterophylla (Linnaeus) Klotzsch & Garcke ex Klotzsch – S; > Poinsettsia geniculata Ortega – S; = Poinsettsia heterophylla (Linnaeus) Klotzsch & Garcke ex Klotzsch – S, WH]

* Euphorbia hirta * Linnaeus, Pillpod Sandmat. Cp (FL, GA, NC, SC), Pd (GA, SC, VA): fields, disturbed ground, waste areas, in and around greenhouses; rare, perhaps only adventive in the northern part of our area. (January-) June-October (-December). E. NC, c. SC, south to s. FL, west to TX, and south into Central and South America. Reported for Goldsboro, NC and Abbeville, Abbeville County, SC (C.N. Horn, pers.comm. 2008). [= RAB, C, G, Q; = Chamaesyce hirta (Linnaeus) Millsbaugh – K, S, WH, Z]

* Euphorbia himmistrata * Engelmann, Spreading Sandmat. Cp (FL, VA*), Mt (VA*, WV*), Pd (GA*, VA*): floodplain forests, exposed river shores, rocky riverside gravel bars, disturbed areas; uncommon (rare in FL, GA, and WV, rare in VA Mountains and Coastal Plain), some of the easternmost occurrences apparently adventive from further west. ON and MN south to Panhandle FL and TX; scattered eastwards, apparently as an adventive. [= C, F, G, Q, WV; = Chamaesyce himmistrata (Engelmann) Small – GW, K, S, WH, Z]

* Euphorbia hyssopifolia * Linnaeus, Hyssopleaf Sandmat. Cp (FL, GA, SC): disturbed ground; common. May-October. Sc. south to s. FL, west to LA; also in w. TX, s. NM, and n. Mexico, and south to s. South America. Its status in our area has been muddied by confusion with *E. mutans*. [= Q; = Chamaesyce hyssopifolia (Linnaeus) Small – GW, K, WH, Z]

* Euphorbia ipecacuanhae * Linnaeus, Carolina Ipecac. Sandhills. February-May (and later, especially in response to fire). CT (formerly), NY (Long Island), NJ, and se. PA (Roads & Klein 1993) south to ec. GA, on the Coastal Plain. The leaves are extremely variable in size and shape, from linear to rotund. Huft (1979) considered *Eu. arundelana* Bartlett (reported from MD, SC, and GA) a sporadic form of *Eu. ipecacuanhae*. Park (1998) suggested that *Eu. ipecacuanhae* is actually a member of *Chamaesyce* (treated by Park as a subgenus), rather than of *Euphorbia*. [= RAB, C, G, K, QZ; > Eu. ipecacuanhae – F; > Eu. arundelana Bartlett – F; = Tithymalus ipecacuanhae (Linnaeus) Small – S]

* Euphorbia latyris * Linnaeus, Caper Spurge, Myrtle Spurge, Mole Plant. Mt (NC, SC, VA, WV), Pd (VA), Cp (VA): roadsides, disturbed areas; uncommon (rare in NC and SC, rare in VA Piedmont, rare in VA Coastal Plain), native of Europe. June-August. [= RAB, F, K, Q, WV; = Eu. latyris – C, G, an orthographic variant; = Galarhoeus latyris – S]


* Euphorbia mercurialina * Michaux, Cumberland Spurge, Mercury Spurge. Mt (GA), Pd (GA*, NC, SC, VA*): rich moist forests over mafic or calcareous rocks; rare. May-June. S. KY south through e. TN to nw. GA and n. AL; disjunct in sc. NC, where found in 1992, and in nc. SC. Apparently introduced in VA. [= C, F, G, K, Q, W, Y, Z; > Tithymalopsis mercurialina (Michaux) Small – S]

EUPHORBIACEAE  

544
**EUPHORBIACEAE**

_Euphorbia nutans_ Lagasca y Segura, Eyebane. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, gardens, waste places, disturbed ground; common. May-October. NH west to MI and ND, south to Panhandle FL and TX; introduced in widespread places worldwide. [= C, Q, W = Chamaesyce nutans (Lagasca y Segura) Small – GW, K, WH, Z; = Euphorbia maculata Linnaeus – RAB, F, WV, misapplied; = Euphorbia preslii Guss. – G; = Chamaesyce hyssopifolia (Linnaeus) Small – S, in part, misapplied]


_Euphorbia polygonifolia_ Linnaeus, Northern Seaside Spurge, Northern Sandmat. Cp (DE, FL, GA, NC, SC, VA): open sands of dunes, upper beach, dune blowouts and overwashes, sometimes growing with perennial grasses such as Uniola paniculata, but preferring open sands with little competition. Introduction with the less common _E. bombensis_; common (rare in FL). May-October. NS to ne. FL along the Atlantic Ocean; disjunct to the Great Lakes. See _E. bombensis_ for discussion of the habitats of these related species. [= RAB, C, F, G, Q; = Chamaesyce polygonifolia (Linnaeus) Small – K, S, WH, Z]

* Euphorbia prostrata_ Aiton, Prostrate Sandmat. Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA), Mt (NC, SC, VA, WV): crevices of pavement or sidewalks, disturbed places; rare, probably native of tropical America and only naturalized in our area. January-December. [= C, Q; = Chamaesyce prostrata (Aiton) Small – K, WH; = Euphorbia chamaesyce Linnaeus – RAB, F, G, misapplied]


_Euphorbia purpurea_ (Rafinesque) Fernald, Glade Spurge, Darlington Spurge, Purple Spurge. Mt (NC, VA, WV), Pd (DE), Cp (DE): rich moist forests in bottomlands or on slopes, in rich soil around rock outcrops, in swamps or seeps, especially over calcareous rocks (such as dolomite) or mafic clays (such as amphibolite); rare. May-September. NJ, PA, and OH south to w. NC. [= RAB, C, F, G, K, K, Q, WV; = Galarhoeus darlingtonii (A. Gray) Small – S]


_Euphorbia spathulata_ Lamarck, Prairie Spurge, Warty Spurge. Mt (NC?, VA), Cp* (FL*): rocky woodslands, disturbed areas; rare. May-June. MN and WA south to w. VA, AL, LA, TX, and Mexico. [= C, W, WH; ? Eu. dictyosperma Fischer & Meyer – F, G; < Eu. spathulata – K, Q (also see Eu. obtusata?); = Galarhoeus arkansanae (Engelmann & A. Gray) Small ex Rydberg – S]


* Euphorbia davidii_ Subils, David's Spurge. Mt (NC), Pd (NC): disturbed areas; rare, native of {}. Introduced in se. TN (Chester, Wofford, & Kral 1997). [= K, Q; ? Eu. dentata var. gracillima Millspaugh] [not yet keyed]

_Euphorbia exigua_ Linnaeus, Dwarf Spurge. Mt (WV): disturbed areas; rare, native of {}. In PA and WV (Kartesz 1999). [= K, WV; ? Eu. exigua ssp. exigua – Q] [not yet keyed]


_Euphorbia glyptosperma_ Engelmann, Ridge-seed Spurge. East to se. TN (Chester, Wofford, & Kral 1997). In VA, WV, LA (Q). [= C, F, G, Q; = Chamaesyce glyptosperma (Engelmann) Small – K]

* Euphorbia graminea_ Jacquin. Landscaped areas, other disturbed areas. Native of tropical America. Naturalized in FL Panhandle, FL peninsula. [= Agaloma graminea (Jacquin) D.B. Ward] [not yet keyed; not mapped]

* Euphorbia hexagona_ Nuttall ex Sprengel, Six-angle Spurge. Pd (DE): disturbed areas; rare, native of c. North America. [= K] [not yet keyed; add to synonymy]

_Euphorbia hypericifolia_ Linnaeus, reported for SC (Kartesz 1999), FL, GA, LA (Q). [Investigate] [= Q; = Chamaesyce hypericifolia (Linnaeus) Millsap – K, S] [not yet keyed]

_Euphorbia inunudata_ Torrey ex Chapman var. inunudata, Flatwood Spurge. Wet pine flatwoods, savannas, seepage slopes. Ne. FL and se. GA (Bridges & Orzell 2002); Panhandle FL west to s. MS. Var. garrettii Bridges & Orzell is endemic to e. and s. FL peninsula. [= WH, X; < Eu. inunudata – K, Q; < Galarhoeus inunudatus (Torrey ex Chapman) Small – S] [not yet keyed]

_Euphorbia ophthalmica_ Persoon. GA and PA (Kartesz 1999), widespread in FL (WH), but not in North America (Q). [= Q; = Chamaesyce ophthalmica (Persoon) Burch – K; = Chamaesyce gemella (Lagasca y Segura) Small] [not yet keyed]

_Euphorbia serpyllifolia_ Persoon var. serpyllifolia. Cp (FL): disturbed areas; rare, native of the Great Plains. Also in GA, PA, and DE (Kartesz 1999). In NC, GA, SC (Q) [investigate] [= Q; = Chamaesyce serpyllifolia (Persoon) Small ssp. serpyllifolia – K; < Chamaesyce serpyllifolia – WH] [not yet keyed]

_Euphorbia telephioides_ Chapman. Cp (FL): pine flatwoods; rare. Endemic to FL Panhandle (Bay, Franklin, and Gulf counties). [= K, WH; = Galarhoeus telephioides (Chapman) Small – S] [not yet keyed; add to synonymy]

_Euphorbia tetrapora_ Engelmann. GA and AL west to TX. [= K, Q] [not yet keyed]
EUPHORBIAEAE

546

Manihot P. Miller 1754 (Cassava)

A genus of about 100 species, trees, shrubs, and herbs, of tropical and subtropical America. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

1 Leaf segments 5-7, with entire margins; calyx of male flowers < 10 mm long; fruit wing-angled.......................... M. esculenta
1 Leaf segments 9-13, with undulate lobes towards the tip; calyx of male flowers 12-15 mm long; fruit not winged .................... M. grahamii

* Manihot esculenta Crantz, Manioc, Tapioca. Disturbed areas; native of tropical America. Naturalized on the Gulf Coast, as in AL and s. FL. [= K, WH, Z; = Jatropha manihot Linnaeus – S]

* Manihot grahamii Hooker, Hardy Tapioca, Graham's Cassava. Suburban forests, vacant lots, other disturbed areas, uncommonly grown as an ornamental, rarely naturalizing; native of tropical America. Introduced in sw. GA (Jones & Coile 1988; Carter, Baker, & Morris 2009), FL Panhandle, peninsular FL, west to LA. [= K, WH, Z]

Mercurialis Linnaeus 1753 (Mercury)

A genus of about 8 species, herbs, of the Old World. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

* Mercurialis annua Linnaeus, Annual Mercury, Boys-and-girls. Disturbed areas, waif on ballast; native of Mediterranean Europe. This species has been reported as a rare "ballast weed" from Charleston, SC and Mobile, AL (Wiggins 1932); some of the occurrences presumably represent non-persistent waifs. [= C, F, G, K, S, Z] [not yet keyed]

Ricinus Linnaeus 1753 (Castor-bean)

A monotypic genus, a shrub or tree, native to Africa and w. Asia, now pantropical. References: Govaerts, Frodin, & Radcliffe-Smith (2000)=Z.

* Ricinus communis Linnaeus, Castor-bean, Castor-oil Plant, Palma Christi. Waste places, gardens; native of the tropics, probably Africa. July-October. The seeds are dangerously poisonous, formerly the source of an oil used as a purgative and machine lubricant. In FL and further south in the tropics, R. communis is a small to medium tree. [= RAB, C, F, G, K, S, WH, Z]

Sapium P. Browne (Milktree)

A genus of 21 species, trees and shrubs, of the Neotropics. The most recent monographers of Sapium and related genera (Kruijt 1996; Esser 2002) separate Triadica from Sapium sensu stricto. This conclusion is corroborated by molecular phylogenetic analysis (Wurdack, Hoffmann, & Chase 2005). References: Kruijt (1996)=Z; Govaerts, Frodin, & Radcliffe-Smith (2000)=Y. [also see Triadica]


Stillingia Garden ex Linnaeus 1767 (Queen's-delight)
EUPHORBIACEAE


1 Stems woody, single; leaves < 1 cm wide; [of pineland ponds and other aquatic habitats] .................................................. Stillingia aquatica
1 Stems herbaceous, several from a crown; leaves > 1 cm wide; [of dry habitats] ................................................................. Stillingia sylvatica

Stillingia aquatica Chapman, Corkwood, Water Toothleaf. Ponds in pine flatwoods. May-September. Se. SC south to s. FL, west to sw. AL. [= RAB, K, S, WH, Z]

Stillingia sylvatica Garden ex Linnaeus ssp. sylvatica. Queen's-delight. Sandhills, dryish coastal plain woodlands. May-July; June-September. Se. VA south to s. FL, west to TX and NM, north in the interior to KS. Ssp. tenuis (Small) D.J. Rogers is in s. FL. [= K, Z; < S. sylvatica – RAB, C, G, WH; > S. sylvatica var. sylvatica – F; > S. sylvatica – S; > S. pathulata (Müller of Aargau) Small – S]

Tragia Linnaeus 1753 (Noseburn)

A genus of about 100-170 species, of tropical to warm temperate regions of the Old and New Worlds. References: Miller & Webster (1967) = Z; Govaerts, Frodin, & Radcliffe-Smith (2000) = Y.

1 Plant vining and trailing; larger leaf blades on a plant > 5 cm wide and > 8 cm long, deeply cordate at the base .................................. Tragia cordata
1 Plant not vining, erect; larger leaf blades on a plant < 3.5 cm wide and < 8 cm long, cuneate, rounded, truncate, or shallowly cordate at the base.

2 Leaf base cuneate at base; leaf blade 3-20× as long as wide .................................................................................................................. Tragia urens
2 Leaf base cordate, subcordate, truncate, or broadly rounded at base; leaf blade 1-3× as long as wide.

3 Petioles 1-4 mm long; leaves rounded to acute at the tip; stamens 2 (-3) ........................................................................................ Tragia smallii
3 Petioles 3-17 mm long; leaves acute to acuminate at the tip; stamens 3 .................................................................................... Tragia urticifolia

Tragia cordata Michaux, Heartleaf Noseburn. Rocky calcareous woodlands, calcareous prairies. C. KY, s. IN to s. MO, south through c. TN, rarely to e. TN (Meigs County, in the Ridge and Valley Province) (Chester, Wofford, & Kral 1997), n. AL (Jackson Co.) (D. Spaulding pers. comm.) to sc. and sw. GA, Panhandle FL, and e. TX. [= C, K, WH, Z; = T. macrocarpa Willdenow – S]

Tragia smallii Shinners, Gulf Coast Noseburn. Sandhills. Sw. GA south to c. peninsular FL, west to e. TX. Reports of T. betonicaefolia from GA are based on misapplication of that name to material representing T. smallii. [= K, WH, Z; = T. betonicaefolia Nuttall – S, misapplied; = T. betonicaefolia Nuttall, misapplied]

Tragia urens Linnaeus, Southeastern Noseburn, Wavyleaf Noseburn. Sandhills, sandy woodlands, other woodlands. May-October. Se. VA south to s. FL and west to TX, mostly on the Coastal Plain, but ranging into the mountains southward. [= RAB, C, F, G, K, S, W, WH, Z; = T. linearifolia Elliott – S]

Tragia urticifolia Michaux, Nettleleaf Noseburn. Dry woodlands and rock outcrops, particularly over mafic or calcareous rocks. May-October. Sc. VA west to MO, KS, and CO, south to c. peninsular FL, Panhandle FL, and AZ. [= RAB, F, G, K, W, WH; = T. urticaefolia – S, orthographic variant]

Triadica Loureiro 1790 (Chinese Tallow-tree)

A genus of 1-3 species, native to tropical and subtropical Asia. The most recent monographers of Sapium and related genera (Kruijt 1996; Esser 2002) place our naturalized species in the genus Triadica, native to Asia; Sapium (excluding Triadica) is a genus of 21 species restricted to the neotropics. This conclusion is corroborated by molecular phylogenetic analysis (Wurdack, Hoffmann, & Chase 2005). References: Kruijt (1996) = Z; Esser (2002) = Y; Govaerts, Frodin, & Radcliffe-Smith (2000) = X.

* Triadica sebifera (Linnaeus) Small, Chinese Tallow-tree, Popcorn Tree. Marsh edges, shell deposits, disturbed areas; native of c. Asia. May-June; August-November. With Euphorbia and Cnidoscolus, one of our few Euphorbiaceous genera with milky sap. Triadica sebifera has become locally common from Colleton County, SC southward through the tidewater area of GA, and promises to become a serious weed tree (as it is in parts of LA, TX, and FL). [= K, S, X, Y, Z; = Sapium sebiferum (Linnaeus) Roxburgh – RAB, GW, WH]

Vernicia Loureiro 1790 (Tung-oil Tree)
EUPHORBIACEAE


* Vernicia fordii (Hemsley) Airy-Shaw, Tung-oil Tree, Tung Tree. Planted for the oil and for ornament, rarely naturalizing; native of central and western China. Naturalized on the Gulf Coastal Plain from former plantations; planted and showing a tendency to naturalize in the Coastal Plain of NC (Mount Olive, Wayne Co.). [= K, Z; = Aleurites fordii Hemsley – WH]

189. PHYLLANTHACEAE Martinov 1820 (Leaf-flower Family) [in MALPIGHIACEAE]

A family of about 60 genera and 1800 species, trees, shrubs, and herbs, mainly tropical. References: Webster (1994); Chase et al. (2002).

1 Woody shrub; stamens 5-6 ........................................................................................................................................................................Phyllanthopsis

1 Annual herb; stamens 3 ............................................................................................................................................................................Phyllanthus

Phyllanthopsis (Scheele) Vorontsova & Petra Hoffman 2008 (Maidenbush)


Phyllanthopsis phyllanthoides (Nuttall) Vorontsova & Petra Hoffman, Maidenbush. Barrens, including river-scour barrens, on limestone or other calcareous rock. C. MO, AR, and OK, south to c. TX; disjunct in c. AL and ec. TN. [= Leptopus phyllanthoides (Nuttall) G.L. Webster – K; = Andrachne phyllanthoides (Nuttall) Coulter – F, G]

Phyllanthus Linnaeus 1753 (Leaf-flower)


1 Plant with “normal” arrangement of branches and leaves (leaves uniformly distributed on the stem and branches, alternate and either distichous or spirally arranged, the ultimate branches not deciduous, flowers produced on ultimate and penultimate orders of branches); [subgenus Isocladus].

2 Leaves arranged distichously; stipules typically auriculate; [section Loxopodium].

3 Stems terete; filaments free; seeds 0.8-1.0 mm long; [widespread in our area]..............................P. caroliniensis ssp. caroliniensis

3 Stems flattened and winged; filaments connate; seeds 1.3-1.5 mm long; [of e. LA westward]..............................P. evanescens

4 Plant herbaceous, with a single or few stems; seeds 1.7-1.8 mm long; calyx lobes 2.8-3.5 mm long (when in fruit); [endemic to FL Gulf Coast].................................................................P. liebmannianus ssp. platylepis

4 Plant suffruticose, with many stems clustered from the plant base; seeds 1.1-1.5 mm long; calyx lobes 1.5-2.5 mm long (when in fruit); [of e. LA westward] .................................................................P. polygonoides

1 Plant with “phyllanthoid” arrangement of branches, leaves, and flowers (leaves lacking on the main stem, the penultimate order of branches with scales arranged spirally, the ultimate order of branches deciduous, bearing normal leaves alternately and distichously, flowers produced only on the ultimate, deciduous branches).

5 Stamens 5, filaments free; fruiting pedicels capillary, 3-7 mm long; seeds densely papillose; [subgenus Kiepertelia] triplete P. tenellus

5 Stamens 3, filaments connate into a column 0.1-0.15 mm long; fruiting pedicels thicker and often also shorter; seeds variously ribbed or striate; [subgenus Phyllanthus]
6 Fruit pedicels 0.5 mm long; seeds with 12-15 transverse ridges and sometimes 1-3 pits; male flowers borne towards the tip of the branchlets. Female flowers towards the base; [section *Urinaria*] ............................................................... *P. urinaria* ssp. *urinaria*

6 Fruit pedicels > 0.5 mm long; seeds longitudinally ribbed or striate; female flowers borne towards the tip of the branchlets, male flowers towards the base; [section *Phyllanthus*] ...............................................................

7 Cymules bisexual (each with 1 female and 1 male flower); calyces of male flowers 4 (-5) ....................................................... *P. abnormis* var. *abnormis*

7 Cymules unisexual; calyces lobes usually 6. .......................................................................................................................... *P. fraternus*

**Phyllanthus abnormis** Baill. var. *abnormis*, Drummond’s Leaf-flower. Cp (FL): dunes; uncommon. All year. Ne. FL south to s. peninsular FL; TX south into Mexico. Another variety occurs along the Rio Grande River in TX. [= FNA, K, X, Y; > *P. garberi* Small – S; < *P. abnormis* – WH]

* Phyllanthus amarus Schumacher, Gale-of-wind, Carry-me-seed. Reported by RAB for NC and SC; misidentified and actually represents *P. tenellus* (Webster 1970). [rejected; not keyed or mapped]

*? Phyllanthus caroliniensis* Walter ssp. *caroliniensis*, Carolina Leaf-flower. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): roadsides, moist woodlands, forests, and fields, often in seasonally wet, muddy places; common (rare in VA and WV Mountains). July-November. PA and IL south to c. peninsular FL and TX, and south to Argentina and Paraguay, the original range not clear, likely introduced in part of the area. Ssp. *saxicola* (Small) G.L. Webster (sometimes treated as a species) is restricted to s. FL, the Bahamas, and Greater Antilles. [= FNA, K, X, Y; < *P. caroliniensis* – RAB, F, G, W, WV; = *P. carolinianus* var. *carolinianus* – C; < *P. carolinianus* – GW, orthographic correction; = *P. carolinianus* – S]

**Phyllanthus evansescens** Brandegee. LA (St. Charles Parish) west to TX. March-November. [= FNA; > *Phyllanthus pudens*]

L.C. Wheeler – K, X, Y]

* Phyllanthus fraternus* G.L. Webster. Disturbed areas. S. FL, MS, LA. Introduced in SC (Kartesz 1999). [investigate] [= FNA, K, WH, X, Y]

**Phyllanthus liebmannianus** Müller of Aargau ssp. *platylepis* (Small) G.L. Webster. Cp (FL): wet hammocks; rare. Late March-late June. Endemic to the “Big Bend” area of the FL Gulf Coast (Dixie, Levy, and Taylor counties). Apparently closely related to *P. liebmannianus* ssp. *liebmannianus* of the western Gulf Coast (Tamaulipas south to Yucatan and Belize). [= FNA, K, WH, X, Y; = *Phyllanthus platylepis* Small – S]

**Phyllanthus niruri** Linnaeus. Reports of *P. niruri* Linnaeus from NC and SC (Ahles, Bell, & Radford 1958) have proved to be *P. tenellus* (Webster 1970). [rejected; not keyed or mapped]

**Phyllanthus pentaphyllus** Wright, Fivepetal Leaf-flower. Unlikely to be correctly labeled from Darlington County, SC (as also indicated by RAB), is here excluded.

**Phyllanthus polygonoides** Nuttall ex Sprengel. Grasslands, calcareous glades. April-October. E. LA west to NM, south into Mexico. [= FNA, K, X, Y]

* Phyllanthus tenellus* Roxburgh, Mascarene Island Leaf-flower. Cp (DE, FL, GA, NC, SC), Pd (GA, NC): disturbed areas, in and around greenhouses; uncommon (rare north of FL), native of the Mascarene Islands. This species appeared in FL in the 1920’s, s. GA in the 1940’s, SC in the 1950’s, NC in the 1960’s, and TN in the 1970’s (Kral 1981). Reported from a single collection from VA, as a “contaminant in a container plant” (Virginia Botanical Associates 2007). [= FNA, GW, K, WH, Y; ? *P. amarus* – RAB, misapplied (misidentified); > *P. tenellus* var. *tenellus* – X]


190. ELATINACEAE Dumortier 1829 (Waterwort Family) [in MALPIGHIACEAE]


**Elatine** Linnaeus 1753 (Waterwort)


1 Seeds mostly straight, the areoles elliptic, the rounded ends not dovetailing into adjacent rows, the longitudinal ridges thus appearing straight and distinct; seeds basal-axile, extending lengthwise through the capsule, not overlapping; leaves 1-5 mm long; flowers mostly 2-merous; ............................................................... **E. minima**

1 Seeds mostly curved, the areoles 6-sided, the angular ends dovetailing into the adjacent rows, the longitudinal ridges thus appearing broken or irregular; seeds axile, attached along an elevated placenta at different levels, therefore overlapping; leaves 1-15 mm long; flowers mostly 3-merous.

2 Leaves obovate to broadly spatulate, rounded at the tip, 3-8 mm long, the larger 1.5-5 mm wide; seeds with 20-30 pits in each row...........  ............................................................................................................................... **E. americana**

2 Leaves linear-lanceolate to narrowly spatulate, emarginate to truncate to rounded at the tip, 1-15 mm long, the larger 0.5-3 mm wide; seeds with 9-25 pits in each row.

3 Leaves 1.5-4 mm long, 0.7-1.8 mm wide; seeds with 9-15 pits per row ............................................................... **E. brachysperma**

3 Leaves 2.8-15 mm long, 0.5-3 mm wide; seeds with 16-25 pits per row ............................................................... **E. rubella**

**Elatine americana** (Pursh) Arnott, American Waterwort. Cp (DE, VA), Mt (NC, SC): tidal flats, lakes; rare. July-October. Widespread in ne. United States, s. to NC and MO. The only known site for this species in NC is an artificial lake; it is uncertain
whether it should be considered native or introduced. [= F, K, S; < E. triandra Schkuhr – RAB, W; = E. triandra var. americana (Parsh) Fassett – C, GW]

**Elatine brachysperma** A. Gray, Shortseed Waterwort. Pd (GA): {habitat not known}; rare. It has been reported for nc. GA (Jones & Coile 1988). [= F, K; = E. triandra Schkuhr var. brachysperma (A. Gray) Fassett – C, G]

**Elatine minima** (Nuttall) Fischer & C.A. Meyer, Tiny Waterwort. Cp (DE, VA), Pd (NC, SC): tidal flats, lakes, mud flats; rare. July-October. First found in NC in 1990. *E. minima* is widespread in ne. United States, south to VA, NC, and SC (Horn, pers. comm. 2004). The only known site for this species in NC is the spillway of an artificial lake (Lake Butner, Granville County); it is uncertain whether it should be considered native or exotic in NC. It may have been introduced by waterfowl or humans. [= C, F, G, K]

**Elatine rubella** Rydberg, Red Waterwort. Pd (SC): ponds; rare. This species occurs in AL (Fayette County) as well as north of our area (Haynes 1998). Hill & Horn (1997) reported *E. triandra* for SC, but the specimen is *E. rubella* Rydberg (Horn, pers. comm. 2004). [= K; = E. triandra Schkuhr – F, misapplied; = E. triandra var. triandra – C, G, misapplied]

196. **CHRYSOBALANACEAE** R. Brown 1818 (Coco-plum Family) [in MALPIGHIALES]

A family of about 18 genera and 530 species, trees, shrubs, and vines of tropical and subtropical areas, especially tropical America. References: Prance & Sothers (2003); Prance (1970).

**Licania** Aublet (Gopher-apple)


**Licania michauxii** Prance, Gopher-apple, Ground-oak. Cp (GA, SC): sandhills, dry sandy pinelands; common (uncommon in GA, rare in SC). May-June; September-October. Se. SC south to s. FL, west to LA, becoming abundant and ubiquitous in dry sandy habitats in the southern part of its range. *L. michauxii* is one of 49 species of subgenus *Moquilea*, section *Moquilea*, which is distributed from se. North America through Central America and the West Indies to South America; our species may be most closely related to *L. retifolia* Blake, a small tree of sw. Mexico and El Salvador (Prance 1970; Prance & Sothers 2003). A rare upright shrub form (to over 15 dm tall) has been found in Brevard County, FL, suggesting that *L. michauxii* evolved from a taller and more upright ancestor (Horn & Taylor 1999).

199. **PASSIFLORACEAE** A.L. de Jussieu ex Kunth 1817 (Passionflower Family) [in MALPIGHIALES]

A family of about 27 genera and 935 species, vines, shrubs, trees, and herbs, of tropical and warm temperate regions, especially America and Asia. Here circumscribed to include Turneraeae, following Angiosperm Phylogeny Group (2009). References: Feuillet & MacDougal in Kubitzki, Bayer, & Stevens (2007); Arbo in Kubitzki, Bayer, & Stevens (2007).

**Passiflora** Linnaeus 1753 (Passionflower)


**Identification notes**: *Passiflora* flowers are structurally striking. There are 5 sepals and either 0 or 5 petals; a *corona* of numerous linear structures is present, arranged in 1-several series. The ovary, 3 styles, and 5 stamens are basally adnate and elevated on an *androgynophore*. Most species have *glands* on the leaves which function as extrafloral nectaries; these can be seen as paired glands on the leaf petiole (in all our species except *P. lutea*), and some species also have *laminar glands* on the leaf blade, near the margin.

1 Sepals 25-35 mm long, green on the outer surface, white on the inner surface; petals 30-40 mm long, lavender, violet, or mauve; berry 40-70 mm long; corona in 2-3 series, the longer 15-30 mm long; [subgenus *Passiflora*; supersection *Passiflora*] .............................. *P. incarnata*

2 Petiole lacking paired glands; leaf blade lacking laminar glands; berry 7-12 mm long; [subgenus *Decaloba*; supersection *Decaloba*].

3 Calyx, petals, and stems glabrous; [WV, OH, and OK south to AL and TX] ........................................... *P. lutea* var. glabriflora

4 Sepals 5-10 mm long; petals absent; corolla in 2 series the outer 3-7 mm long; berry 6-10 (-15) mm long; [native, of ne. FL southwards]; [subgenus *Decaloba*; supersection *Sieca*] .............................. *P. pallida*
PASSIFLORACEAE

Piriqueta Aublet 1775


Piriqueta caroliniana (Walter) Urban var. caroliniana. Cp (FL, GA, SC): longleaf pine sandhills, sandy soils of roadsides, woodland edges, and disturbed areas; uncommon. May-September. SC south to s. FL; Cuba and Hispaniola; and in Central and S. America. Arbo (1990; 1995) considers P. caroliniana as a subspecies of P. cistoides, but the morphological distinctions seem strong and the two taxa have widely overlapping distributions in the Neotropics. Maskas & Cruzan (2000) discuss variation and evolutionary taxa in this complex in the southeastern United States and the Bahamas. [<P. caroliniana – RAB; <P. cistoides (Linnaeus) Grisebach var. caroliniana (Walter) M.M. Arbo = K, WH; Z; = P. caroliniana – S] * Piriqueta cistoides (Linnaeus) Grisebach. Reported for GA (Kartesz 1999), but the documentation is untraceable. [<P. cistoides ssp. cistoides – K, Z; not keyed; rejected pending better documentation]

201. SALICACEAE de Mirbel 1815 (Willow Family) [in MALPIGHIACEAE]


Populus Linnaeus 1753 (Poplar, Aspen, Cottonwood)

Winter buds not viscid; stem 5-20. 2 Stems 12-20; scales of the catkins deeply fimbriate; petals terete; [section Leucoidea] ................................................................. P. heterophylla

1 Leaf blades (2-)3-30× as long as wide; stem 5-12; scales of the catkins dentate or with only 3-7 linear-triangular lobes; petals strongly flattened laterally (90 degrees to the plane of the leaf blade), especially near the junction with the blade; [section Populus].

Petioles flatly or deeply crenate-laterally; leaves glabrous when mature (pubescent when young in P. grandidentata); [native trees].

4 Leaf margins coarsely crenate- or undulate-toothed, with fewer than 12 (-15) teeth per side, the sinuses of the larger teeth 1.5-6 mm deep; leaves puberulent beneath when young (glabrate in age); buds gray-pubescent .............................................................................. P. grandidentata

3 Petioles either or nearly so, leaves densely pubescent (P. alba) or glabrescent (P. ×canescens); [exotic trees].

Populus Linnaeus 1753 (Poplar, Aspen, Cottonwood)
5 Leaves of vigorous shoots palmately 3-5 (-7)-lobed (and also toothed); leaves densely white-tomentose beneath when young and mature .................................................. \textit{P. alba} \\
5 Leaves of vigorous shoots merely toothed; leaves glabrescent when mature ................................................................................................. \textit{P. \textit{canescens}} \\

1 Winter buds viscid (sticky and shiny as if recently varnished); stamens (15-) 20-80. \\
6 Petiole terete or dorsally flattened (in the plane of the leaf blade), and often also channeled above; leaf blades dark green above, glaucous white beneath; leaf margin not translucent, finely serrate with teeth < 1 mm deep; [section \textit{Tacamahaca}]. \\
7 Petioles 7-10 cm long; leaves ovate, broader below the midpoint; leaf base rounded to subcordate; twigs terete or slightly angled in cross-section .................................................................................. \textit{P. balsamifera} \\
7 Petioles < 2 cm long; leaves obovate, broader past the midpoint; leaf base cuneate to rounded; twigs strongly angled in cross-section ..... .......................................................................................................................... \textit{P. simonii} \\
6 Petiole laterally flattened (90 degrees to the plane of the leaf blade), especially near the junction with the blade; leaf blades light green above, often paler beneath but not distinctly whitened; leaf margin translucent, coarsely serrate with teeth > 1 mm deep. \\
8 First-year branches reddish-brown; leaves noticeably paler beneath; flattened portion of petiole < 2× as deep as wide; early leaves with > 20 teeth per side, the largest < 2.5 mm deep; [probable intersectional hybrid of section \textit{Aegeiros} and section \textit{Tacamahaca}] .................. \textit{P. \textit{jackii}} \\
8 First-year branches yellow-orange-brown; leaves nearly the same color above and below; flattened portion of petiole > 2× as deep as wide; early leaves usually with < 20 teeth per side, the largest < 2.5 mm deep; [section \textit{Aegeiros}]. \\
9 Stigmas 3-4; stamens (30-) 40-80; [native tree, common] ............................................................................................................................. \textit{P. deltoides \textit{ssp. deltoides}} \\
9 Stigmas 2-3; stamens (15-) 20-30; [alien trees, rare out of cultivation]. \\
10 Floral disk 2-4 mm wide; stigmas 2-3; ovules and seeds 6-14 (-20) per placenta ........................................................................ \textit{P. \textit{canadensis}} \\
10 Floral disk 1-2 mm wide; stigmas 2; ovules and seeds 4-8 per placenta ......................................................................................... \textit{P. nigra} \\

* \textit{Populus balsamifera} Linnaeus, Balsam Poplar, Hackmatack, Tacamahac. Cp* (DE*, VA*), Pd* (VA*), Mt* (VA*, WV): floodplains, disturbed areas; rare. NL (Labrador) and AK south to PA, WV, OH, IN, IL, IA, SD, CO, ID, and OR; scattered further south by introduction. Ranges south to s. PA (Rhoads & Klein 1993), e. and c. KY (Clark et al. 2005), and to VA (according to Kartesz 1999). Also reported for n. GA (Jones & Coile 1988) and provisionally for SC (Kartesz 1999). Many of the attributions of this species to states in our area are based on misidentifications. [= C, FNA, G, WV; = \textit{P. balsamifera \textit{ssp. balsamifera}} – K; > \textit{P. balsamifera \textit{var. subbalsamifera}} – F; > \textit{P. balsamifera \textit{var. magnifica}} Victorian – F; > \textit{P. balsamifera \textit{var. subcordata}} Hylander; > \textit{P. balsamifera \textit{var. michauxii}} (Duffey) tenry] \\
* \textit{Populus \textit{canadensis}} Moench (pro sp.) (\textit{P. \textit{deltoides} \textit{\textit{\times} nigra}}), Hybrid Black Poplar. Pd (GA, VA), Mt (VA, WV), \{NC\}: disturbed areas; rare. Reported for a county in c. GA (Jones & Coile 1988) and for NC and VA (Kartesz 1999). [= C, FNA, K] \\
* \textit{Populus \textit{\textit{\times} jackii}} Sargent [probably \textit{P. balsamifera \textit{\times deltoides}}], Balm-of-Gilead. Mt (NC, VA, WV), Pd (VA), Cp (DE): bottomlands, riverbanks, streambanks; uncommon (rare or locally abundant in DE, NC, and VA), spread from cultivation. April. This cultivar is of uncertain origin, considered by some to be a hybrid \textit{P. balsamifera \textit{\times deltoides}}, by others to be an atypical cultivar of \textit{P. deltoides} Linnaeus. The cultivar 'gileadensis' is distinguished from the typical form by the petioles densely and stiffly pubescent (vs. petioles glabrous). \textit{P. \textit{\textit{\times} jackii}} is locally abundant along the New River in Watauga, Ashe, and Alleghany counties, NC and downstream into VA. [= C, FNA, K, Y; = \textit{P. candidans} Aiton – RAB, G, S, misapplied; > \textit{P. \textit{\textit{\times} gileadensis}} Rouleau – F, W, WV] \\
* \textit{Populus nigra} Linnaeus, Black Poplar, Lombardy Poplar. Pd (GA, VA), Cp (GA, VA): disturbed suburban areas; rare, native of s. Europe. Cultivated in many forms, including the columnar "Lombardy Poplar," short-lived and only weakly spreading to disturbed areas in the vicinity of plantings. [= C, F, FNA, G, K; > \textit{P. italicus} (Du Roi) Moench – S; > \textit{P. nigra \textit{var. italicus}} Du Roi – \textit{WV}]

* \textit{Populus tremuloides} Michaux, Quaking Aspen. Mt (NC*, VA, WV), Pd (DE*, VA): heath balds, rocky woodlands, exposed rock outcrops, clearings, floodplains; uncommon (rare in DE, and NC, and VA). April-May. NL (Labrador) west to AK,
south to NJ, VA, nw. NC (where perhaps not native), WV, MO, and (in the Rockies) to TX and Mexico. [= C, FNA, G, K, S, W, WV; > P. tremuloides var. tremuloides – F]

**Populus ×smithii** Boivin [P. grandidentata × tremuloides]. Mt (WV): {habitat}; rare. South to MD and WV. [= C, FNA, K] {not yet keyed}

**Salix Linnaeus 1753 (Willow)**

A genus of about 400 species, trees, shrubs, and subshrubs, mostly north temperate and boreal. References: Argus in FNA (2010); Argus (1986)=Z; Dorn (1995)=Y; Argus (1997); Chen et al. (2010). Key adapted from Z and FNA.

1 Leaves mostly alternate, but some opposite or subopposite; [subgenus Vetrice, section Helix].......................................................................................................................... S. purpurea
2 Leaves all alternate.
3 Bud apex short-pointed; bud scale margin free and overlapping; leaf blades 2.5-16× as long as wide; [subgenus Protitea].
4 Leaf blades (4-) 7-10- (16-) times as long as wide; leaf undersurface glaucous or not; [section Longifoliae, subgenus Longifoliae].
5 Leaves lanceolate or elliptic-lanceolate, 2-6× as long as wide; leaf margin usually absent on the upper leaf surface; pistils glabrous; stamens 3, or if 2 (S. ernicephala), the staminate floral bracts dark brown, the anthers sessile with a few leafy bracts. 
6 Leaves glaucous beneath; pistils borne on stipes averaging 2 mm long (range 1-5 mm); staminate floral bracts nectariferous, to 5 mm long.
7 Leaves tomentose beneath with a mixture of white and rusty hairs; [section Griseae, subgenus Griseae].
8 Leaf margin serrulate; leaves long-acuminate; capsules 5-7 mm long.......................................................................................................................... S. lucida
9 Leaf margin minutely and uniformly serrulate; leaves long-sericeous or glabrate beneath; leaf blade 5-13× as long as wide; petioles 3-12 mm long, tomentose or sericeous.
10 Leaf margin entire or crenate (to slightly and irregularly serrate); [subgenus Vetrice, section Cinerella].
11 Leaves glabrate (sparsely pubescent when young), not revolute .......................................................................................................................... S. discolor
12 Leaves permanently pubescent, at least on the lower surface (densely villous or tomentose when young), revolute.
13 Leaves stipulate; leaf blades (5-) avg. 7 (-13) cm long, (12-) avg. 17 (-35) mm wide; staminate aments 1-2 cm long; pistillate aments 2-3.5 cm long.................. S. humilis
14 Leaves exstipulate; leaf blades (2.5-) avg. 4 (-5) cm long, (5-) avg. 7 (-10) mm wide; stamine aments 0.5-1.1 cm long; pistillate aments 1-2 cm long...................................................................................... S. occidentalis
15 Trees or tall shrubs, to 15 m tall; decorticated wood of 1-4 year old branches smooth or with a few ridges usually < 5 mm long......................................................... S. caprea
16 Shrubs to 6 m tall; leaves lacking stomates on the upper surface; [native to our area]; [subgenus Vetrice].
17 Stipules prominent, 5-15 mm long; branches flexile; mature leaves glabrous or glabrescent beneath; stamine aments borne on short, leafy branches; [section Cordatae] ................................................................. S. ericophila var. ericophila
18 Leaf margin coarsely and irregularly serrate; leaves glabrous beneath; leaf blade 4-7 (-10)× as long as wide; petioles (7-) 10-20 mm long, glabrous; [section Salix].................................................................................................................................. S. fragilis
19 Leaf margin minutely and uniformly serrulate; leaves long-sericeous or glabrate beneath; leaf blade 5-13× as long as wide; petioles 3-12 mm long, tomentose or sericeous.
20 Leaves long-sericeous beneath; branches ascending (rarely pendulous); leaves narrowly lanceolate, with length/width ratio of 5-6:5; petioles 3-6 mm long; petioles 3-6 mm long, sericeous; flowering branches 1-1.5 cm long; [section Salix].. S. alba
21 Leaves glabrate beneath; branches normally pendulous; leaves very narrowly lanceolate, with length/width ratio of 6.5:8; petioles 7-12 mm long; petioles 7-12 mm long, tomentose; flowering branches ca. 0.3 cm long; [section Subalbae].

Salix amygdaloides Andersson, Peachleaf Willow. Mt (WV): floodplains and other wet places; rare. April-May. QC west to BC, south to PA, n. WV, w. KY, MO, TX, NM, NV, AZ, and OR. [= C, F, FNA, G, K, Z]


Salix caprea Linnaeus, Goat Willow, Great Sallow. Mt (NC, VA), Pd (DE, VA): disturbed areas; uncommon (rare in NC and VA), native of Eurasia. April. [= C, F, FNA, G, K, Z]

Salix caroliniana Michaux, Carolina Willow, Coastal Plain Willow. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, WV, NY): riverbanks, sandbars, other wet sites; common (uncommon in Piedmont and Mountains). March-April. Widespread in the Southeast. S. caroliniana has a somewhat peculiar range, with three main centers of distribution, the Coastal Plain from VA south to s. FL, the Interior Low Plateau of TN, KY, and n. AL, and the Ozark-Ouachita Highlands of AR and MO. [= RAB, C, F, FNA, G, GW, WH, WV; < S. longipes Andersson – S]


Salix discolor Muhlenberg, Pussy Willow. Mt (VA, WV), Pd (DE, NC*): calcareous wetlands, disturbed areas; rare, apparently native in DE, VA, and WV, introduced only in NC. March-April. NL (Newfoundland) and AB south to DE, w. VA, WV, KY, MO, SD, and MT. [= C, FNA, K, S, Z; > S. discolor var. discolor – F, G, WV; > S. discolor var. latifolia Andersson – F, G, WV; > S. discolor var. prinosoides (Pursh) Andersson – WV]


Salix exigua Nuttall var. sericans (Nees) Nesom, Sandbar Willow. Mt (VA, WV), Pd (VA), Cp (DE, VA): sandbars, riverbanks, creekbanks; common (rare in DE and VA). March-mid May and June-August. S. exigua occurs throughout North America except most of the Southeast, south to DE, se. VA, w. VA, e. TN, MS, LA, TX, and Mexico; var. sericans is the more western variety of the complex (Nesom 2002). [= < S. exigua – W, Z; > S. exigua ssp. interior (Rowlee) Conquist var. angustissima (Andersson) Revel & Broome – C; > S. interior Rowlee var. interior – F, G; = S. interior Rowlee – FNA, GW, K, S, WV]


Salix fragilis Linnaeus, Crack Willow, Brittle Willow. Pd (DE, VA), Mt (WV), Cp (DE): low areas; uncommon (rare in VA), native to Asia Minor, introduced to Europe and thence to here. [= C, F, G, K, S, WV, Z; = S. ×fragilis Linnaeus – FNA]

Salix humilis Marshall, Upland Willow, Prairie Willow. Mt (GA, NC, VA, WV), Pd (DE, GA, NC, VA), Cp (DE, FL, GA, NC, SC, VA): upland areas, often in open or semi-open sites, in barrens, fens, and grassy balds over mafic rocks (such as amphibolite) up to at least 1800m elevation, also in powerline rights-of-way, woodland borders, and other miscellaneous habitats; uncommon. March-May. NL (Newfoundland) and MB, south to FL and TX. [= C, G, S, WH; < S. humilis – RAB, GW (also see S. occidentalis); > S. humilis var. humilis – FNA, K, S, Z; > S. humilis var. humilis – F, WV; > S. humilis var. hypophylla Fernald – F, WV]

Salix lucida Muhlenberg, Shining Willow. Mt (VA*), WV), Pd (DE), Cp (DE): seepages, low areas; rare. May. Uncertainly indigenous to the one known VA population in Roanoke County. [= C, FNA, W, WV, Z; > S. lucida var. lucida – F, G; = S. lucida ssp. lucida – K]


Salix occidentalis Walter, Dwarf Upland Willow, Sage Willow. Mt (GA, NC, VA, WV), Pd (DE, GA, NC, VA), Cp (DE, GA, NC, SC, VA): upland areas, often over mafic (amphibolite) or ultramafic (olivine) rocks; uncommon (rare in WV). March-May. This species is less widespread than the related S. humilis, with a distribution centered in the central Appalachians. ME to
**SALICACEAE**

ND, south to GA, LA, and OK. [= C; < S. humilis – RBW, G; = S. humilis var. microphylla (Andersson) Fernald – F; W, Z; = S. tristis Aiton – G, WB; = S. humilis var. tristis (Aiton) Griggs – FNA, K]

* Salix ×pendulina Wenderoth [S. babylonica × euxina], Weeping Willow. {DC, GA, MD, NC, VA, WV}: disturbed areas; uncommon, a hybrid introduced from Europe. March-April. [= FNA, K]

* Salix pentandra Linnaeus, Bay Willow. Mt (NC, VA), Pd (NC): disturbed areas; rare (perhaps not established), native of Eurasia. April. [= C, F, FNA, G, K, Z]


* Salix ×sepulcralis Simonkai [S. alba × babylonica], Weeping Willow. {DC, KY, LA, MD, NC, VA, WV}: disturbed areas: uncommon, a hybrid introduced from Europe. March-April. [= FNA, K]


Salix bebbiana Sargent, Long-beaked Willow, Gray Willow, is widespread and rather common in PA (Rhoods & Klein 1993) and also occurs in MD (Argus 1986). [= C, FNA, K, Z; > S. bebbiana var. bebbiana – F] [subgenus Salix, section Fulvae]

Salix cordata Michaux, south to MD, PA (Kartesz 1999). {investigate} [= C, FNA, K; > S. cordata var. cordata – F] [not yet keyed]

* Salix elaeagnos Scopoli, Hoary Willow, Rosemary Willow, Diamond Willow. Reported for SC (Kartesz 1999). [= FNA, K] [subgenus Vetrix, section Canae] [not yet keyed]

* Salix matsudana Koidzumi, Corkscrew Willow. Pd (VA): disturbed areas; rare, doubtfully naturalized, native of e. Asia. Reported for VA (Fairfax and Fauquier counties). [= K] [not keyed]

* Salix petiolaris Sm. Cp (NJ). [research]

* Salix triandra Linnaeus, Almond-leaf Willow. {DC, VA}. [= FNA] [not yet keyed]

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**202. VIOLACEAE** Batsch 1802 (Violet Family) [in MALPIGHIACEAE]

A family of about 20 genera and 900 species, herbs, shrubs, and vines, cosmopolitan in distribution. References: McKinney & Russell (2002)=X.

1 Plants acaulescent, 3-10 dm tall, the leaves narrowly cuneate to a petiole 0-20 mm long, also long acuminate; petals green............. **Hybanthus**

1 Plants acaulescent or caulescent, 0-4 dm tall, if caulescent, the leaves not at the same time cuneate, short-petiolate, and acuminate; petals white, yellow, violet, or blue, the lowermost spurred........................................................................................................... **Viola**

**Hybanthus** Jacquin (Green-violet)


1 Leaves 9-17 cm long, entire (or with a few obscure teeth); capsule 15-20 mm long; seeds ca. 4 mm long; [native, of nutrient-rich forests].... .......................................................... **H. concolor**

1 Leaves 0.6-3 cm long, finely crenate; capsule 3-4 mm long; seeds ca. 1.5 mm long; [alien, of weedy areas].......................... **H. parviflorus**


* Hybanthus parviflorus* (Mutis ex Linnaeus f.) Baillon. Cp (GA): disturbed area; rare, native of South America. April. First collected in North America in New Jersey in the 19th century; and again in 1998 by Tom Govus at Fort Pulaski National Monument (Chatham County, GA). It is unclear whether this is a recent introduction or an old weed introduced via ship's ballast (Wofford et al. 2004). [= *Pombalia*]

**Viola** Linnaeus 1753 (Violet, Johnny-jump-up, Pansy)

(.contributed by B.A. Sorrie and A.S. Weakley)


**Identification notes:** *Viola* has presented numerous problems in taxonomy, distribution, and identification. Particularly troublesome are the so-called “acaulescent blue violets”, including *V. sororia*, *V. sagittata*, *V. palmata*, *V. septempetala*, etc. They may be difficult to identify due to morphological overlap, or trying to key plants without mature leaves; in some instances hybridization may be suspect. Leaf maturity is an
important feature to recognize–the earliest 1-2 leaves produced in most of these taxa are generally ovate-cordate in outline and may not display characteristic lobing, toothing, or pubescence until more mature leaves are produced, 1-2 weeks later. Specimens thus collected early in the flowering period can present the botanist with a perplexing series of plants that do not key cleanly. A second troublesome group contains the small white violents, including Viola tricolor, Viola incognita, and Viola macloskeyi. These taxa have been dealt with in various ways, but resist a wholly satisfactory treatment, due to apparent hybridization (Russell, 1954, Amer. J. Bot. 41: 679-85; Russell, 1955, Amer. Midl. Nat. 54: 481-94). However, recent reviews of these 3 species in the Southeast show that Viola tricolor and Viola macloskeyi are quite distinct, with Viola incognita less so (but this may be due to paucity of specimens from the area). A third difficult group contains Viola appalachiensis, Viola conspersa/labradorica, and Viola walteri. They have been treated recently by Ballard (1992, 1994) and McKinney & Russell (2002). Despite the problems present in the genus, the great majority of plants encountered in the field may be successfully keyed out, particularly by botanists working within an area of several counties. Violet species are usually quite faithful to one or a few plant community types, so once learned these habitats can be valuable indicators as to which species to expect. Botanists working in larger regions (state, floristic province), however, must be aware of increased morphological variation and potential hybridization. The works of McKinney & Russell and Ballard provide the most satisfactory understanding of taxa and are followed here, with exceptions based on field and herbarium studies throughout the Southeast US. All species possess brownish or reddish nectar guide striae in the corolla throat; these are ignored in the key. Hairs of the corolla throat and on leaf surfaces are important key characters; several plants should be inspected with a 10× lens before deciding the character state.

1 Plant acaulescent (producing aerial stems bearing leaves and flowers).

2 Corolla yellow, or white with a yellow center (sometimes drying lavender); stipules entire or erose ........................................................... Key A

2 Corolla wholly cream-colored, or cream with a yellow center, or blue-violet, or multicolored (blue or violet with orange or yellow); stipules fringed or deeply lobed ....................................................................................... Key B

1 Plant acaulescent (with leaf petioles and flower stalks arising separately from the base of the plant).

3 Plant producing stolons; corolla white (or blue in V. odorata) ....................................................................................... Key C

3 Plant not producing stolons; corolla blue-violet (or yellow in V. rotundifolia) ................................................................. Key D

Key A – Acaulescent Violets with yellow or white flowers

1 Corolla white with a yellow center (sometimes drying lavender); stipules long-triangular, attenuate.............................. V. canadensis var. canadensis

1 Corolla solid yellow; stipules ovate to narrowly ovate.

2 Leaf blades > 1.5× as long as broad.

3 Leaf blades narrowly ovate; base of leaf blade rounded to broadly cuneate................................................................. V. hastata

4 Leaf blade hastate; base of leaf strongly cordate................................................................. V. tripartita

5 Leaf blade narrowly ovate; base of leaf strongly cordate....................................................................................... V. tripartita

Key B – Acaulescent Violets with blue, cream, or multicolored flowers

1 Stipules foliaceous, deeply lobed (the lobes narrow, but not ciliate or fringed; leaves cuneate at base; plants annual, without thickish rootstock; [of weedy habitats].

2 Corolla pale blue with a cream center; petals 2× as long as the sepals.............................................................................. V. bicolor

2 Corolla either cream with a yellow center or multicolored; petals < 2× as long as the sepals.

3 Corolla cream with a yellow center; petals shorter than the sepals or longer by up to 2 mm ................................................. V. arvensis

4 Corolla multicolored (cream to orange with a yellow center, the upper petals at least partly dark blue); petals longer than the sepals by 2 mm or more ................................................................. V. tricolor

1 Stipules herbaceous, fringed or ciliate along the margin; leaves truncate or cordate at the base; plants perennial, with thickish rootstock; [mainly of natural habitats]; [section Viola]

4 Stems immediately becoming prostrate at time of flowering; stems persistent through winter, rooting at the nodes, and generating the following year's plants at their tips (plants thus mat-forming).

5 Leaf blades with scattered hairs near the margin only; petioles, peduncles and stems glabrous; stipules shallowly lacerate, with marginal processes < ½ as long as the stipule................................................................. V. walteri var. appalachiensis

5 Leaf blades moderately to densely puberulent over the entire surface; petioles, peduncles and stems moderately to densely puberulent; stipules deeply laciniate with marginal processes > ½ as long as the stipule ................................................................. V. walteri var. walteri

4 Stems ascending to erect at time of flowering and fruiting; stems deciduous at end of growing season, not rooting at nodes (plants thus solitary).

6 Corolla wholly cream-colored................................................................. V. striata

6 Corolla blue or blue-violet.

7 Spur of basal petal 4-6 mm long; lateral petals bearded within; corolla uniformly blue ................................................................. V. labradorica

7 Spur of basal petal 10-15 mm long; lateral petals beardless; corolla lavender, with a purple-black eyespot surrounding the throat........ V. rostrata

Key C – Acaulescent Violets with stolons and white (or rarely blue) flowers

1 Flowers generally blue (sometimes white or blue-and-white variegated); style terminating in a slender hook ca. 1 mm long; capsules hirtellous; [introduced, cultivated, rarely persistent or spreading] .............................................................................. V. odorata

1 Flowers white; style broad at the tip, in most species resembling a scoop; capsules glabrous; [native].

2 Leaf blades > 1.5× as long as broad.
VIOLACEAE

3 Leaf blades lance-ovate, broadly cuneate to subtruncate at the base ................................................................. V. primulifolia
3 Leaf blades linear to lanceolate, narrowly cuneate at the base.
4 Leaf blades lanceolate, < 8× as long as wide; plant glabrous ................................................................. V. lanceolata var. lanceolata
4 Leaf blades linear or narrowly lanceolate, > 10× as long as wide; plant glabrous to pubescent................. V. lanceolata var. vittata
2 Leaf blades < 1.5× as long as broad.
5 Leaf blades completely glabrous (petioles may be villous); [of wet, acidic seepage or swampy woods, often with Sphagnum]................. V. macloskeyi var. pallens
5 Leaf blades pubescent, at least on the upper surface of the basal lobes; [of wet to more mesic situations].
6 Lateral petals glabrous within; petals and peduncles usually reddish-tinted; leaf apex acute; basal lobes of the leaf often overlapping; pubescence of the upper leaf surface often restricted to the basal lobes; [of mesic, often nutrient-rich forests]......................... V. blanda
6 Lateral petals bearded within; petals and peduncles green; leaf apex obtuse to rounded; basal lobes of the leaf not overlapping; pubescence of the upper leaf surface usually widespread; [of mesic to wet situations]................................................................. V. incana

Key D – Acaulescent Violets without stolons, with blue-violet or yellow flowers

1 Corollas yellow; leaf blades rotund, lie nearly flat on ground ................................................................................................. V. rotundifolia
1 Corollas violet to bluish or purple, leaves various (flat on ground only in some V. villosa and V. hirsutula).
2 Leaf blades completely divided throughout, or lobed basally, or deeply toothed basally (beware that in V. pedata the earliest 1-2 leaves may be uncut and cordate, to shallowly lobed).
3 Bladeflower divided, lobed, or deeply toothed only on basal portion, or blades incised only in distal half.
4 Orange stamens conspicuously exsert and beak-like; blades incised only in distal half or only apically ......................... V. pedata var. 1
4 Stamens not visible, not exsert; blades divided, lobed, or deeply toothed only on basal portion.
5 Blade outline oblong-lanceolate to ovate-triangular, much longer than wide.
6 Petioles distinctly shorter than blades; blades densely pubescent, apex blunt, basal teeth undeveloped or with a few coarse teeth on mature leaves.
7 Mature leaves deeply lobed with 2-3 lanceolate lobes on each side; spurred petal bearded; [of small blackwater streamsides and floodplains]................................................................................................. V. sagittata var. avata
6 Petioles equal or longer than blades; blades glabrous or glabrate, apex acute; basal teeth well developed, very coarse to lobe-like................................................................................................................................. V. sagittata var. sagittata
5 Bladeline ovate to subrotund, about as wide as long.
7 Plant moderately to densely pubescent, at least on petioles and undersurface of leaves; mature leaves trilobed; [of mesic to dryish woods]......................................................................................................................................................... V. palmata
8 Mature leaves trilobed, with 1 (~2) remiform or obovate lobes on each side; spurred petal glabrous; [of small blackwater streamsides]................................................................................................. V. esculenta
7 Plant glabrous or glabrate (hairs on leaf margins or atop lobes).
8 Mature leaves deeply lobed with 2-3 lanceolate lobes on each side; spurred petal bearded; [of mesic to moist pine savannas and pocoino ecotones]................................................................................................................................. V. sagittata var. sagittata
6 Petioles equal or longer than blades; blades glabrous or glabrate, apex acute; basal teeth well developed, very coarse to lobe-like
3 Blades deeply divided throughout into linear or lanceolate segments (or with several narrow lateral segments and a broadly lanceolate central segment), blades about as broad as long, or broader.
9 Lateral petals glabrous within; orange stamens conspicuously exsert and beak-like............................................. V. pedata var. pedata
9 Lateral petals bearded; stamens not visible, not exsert.
10 Central lobe of leaf blade mostly 1-2.5× the width of the first lateral lobes.
11 Blades pubescent, divisions mostly 7-11; [midwestern, disjunct to shale barrens of western VA].............................. V. pedatifida
11 Blades glabrous or glabrate, divisions 5-11; [of limestone glades or of Coastal Plain woodlands].
12 Blade divisions 7-11; [of Coastal Plain, moist to mesic hardwoods along rivers or streams]................................. V. brittoniana
12 Blade divisions 5-9; [of inland regions, dry limestone glades or barrens]................................................................. [V. egglestonii]
10 Central lobe of leaf blade mostly 3-4× the width of the first lateral lobes.
13 All leaves homophyllous, the early ones not ovate, rotund, or cordate; blades pubescent; [of Piedmont and Mountains]......................... V. subsubulata
13 Leaves heterophyllous, the early ones ovate, rotund, or cordate, the mature ones divided; blades pubescent or glabrate; [of various distributions].
14 Blades and petioles moderately to densely pubescent; lowestmost lobe directed outward parallel to ground; [primarily of mesic hardwoods, widespread]............................................................................................................................ V. palmata
14 Blades glabrous or glabrate; lowestmost (outermost) lobe on each half of blade usually directed downward towards ground; [primarily of pine savannas on Coastal Plain]......................................................... V. septemloba
15 Most or all blades longer than broad, narrowly ovate to long-triangular, tapering to an acute apex.
16 Blades and petioles moderately to densely pubescent; leaves distinctly longer than wide; dry to xeric clearings and banks..................... V. sagittata var. avata
16 Blades and petioles glabrous or glabrate.
17 Lateral petals bearded with clavate hairs; spurred petal glabrous within; [of swamps, seepages, bogs, and sphagnum streamside].
18 All leaf teeth uniform; leaf bases cordate; [of mesic woods to moist seepages to streamside]........... V. sororia var. missouriensis
17 Lateral petals with hairs of essentially uniform width; spurred petal bearded within.
18 Basal teeth longer than others; leaf bases truncate to subcordate (ignore earliest 1-2 leaves).
19 Leaf outline broadly triangular, not much longer than wide; basal teeth of the leaf numerous, ± pectinate............ V. brittoniana
19 Leaf outline narrowly ovate-triangular, much longer than wide; basal teeth of the leaf few, very coarse................................. V. sagittata var. sagittata
15 Blades as wide as long or wider, ovate to suborbicular, apex obtuse (to acute).
20 Lateral petals bearded with clavate hairs; foliage glabrous or glabrate.
21 Petals light blue or light blue-violet, with a dark eye (also with dark veins); sepalis 8-12 mm long; no plants in population with lobed blades; [mostly Piedmont and Mountains, rare in Coastal Plain] ................................................................. \textit{V. cucullata}

22 Leaf blades moderately to densely pubescent on one surface or both, and on petioles.

23 Leaf blades equally pubescent on both surfaces.

24 Leaf blades large, apex acute, carold afoft on long petioles, deciduous; peduncles shorter than to equaling petioles ...........

25 Leaf blades densely pubescent above, sparsely so beneath and on petiole; apex blunt to rounded; in life dark veins prominent on pale upper surface of blade ................................................................................................. \textit{V. hirsutula}

26 Leaf blades glabrous or glabrate, or with hairs confined to just the basal lobes; petioles glabrous or glabrate.

27 At least some plants in population with trilobed leaves; [southern and mainly Coastal Plain, of small blackwater streamside and floodplains] ................................................................. \textit{V. esculenta}

28 Spurred petal densely bearded; leaf blades reniform; [northern, ranging south to PA and WV, of fens and swamps in alkaline soils] ................................................................................................. \textit{V. nephrophylla}

29 Spurred petal glabrous or glabrate; leaf blades ovate to widely triangular; [widespread, of mesic slopes to moist floodplains] ................................................................................................. \textit{V. sororia} var. \textit{sororia}


\textit{Viola blanda} Willdenow, Sweet White Violet. Mt (GA, MD, NC, SC, VA, WV), Pd (DE, MD, NC, VA): moist, rich forests; common (uncommon in Piedmont). NH and QC west to MN and ne. ND, south to DE, MD, w. NC, n. GA, e. TN, OH, IN, IL, and e. IA. [= F, G, S, WV; \textit{V. blanda} – RAB, C, W, X (also see \textit{V. cognicita}); \textit{V. blanda} var. \textit{blanda} – K, V]


\textit{Viola canadensis} Linnaeus var. \textit{canadensis}, Tall White Violet. Mt (GA, MD, NC, SC, VA, WV), Pd (NC, VA): rich cove forests, other rich mesic situations, such as floodplains; common. April-July. NL (Newfoundland) to ON, south to GA, AL, TN, and AR. Other varieties are more western. [= RAB, C, K, V; \textit{V. canadensis} var. \textit{rugulosa} (Greene) C.L. Hitchcock – RAB, C; \textit{V. rugulosa} Greene – RAB, C; misapplied to plants in our area; \textit{F. canadensis} – F, G, S; \textit{V. rugulosa} Greene – M, missapplied to our plants; \textit{V. canadensis} – W, X]


\textit{Viola hirsutula} Brindley. Mt (AL, GA, NC, SC, VA, WV), Pd (AL, DE, GA, NC, SC, VA), Cp (NC): bottomlands and moist slopes; common (rare in NC Coastal Plain). CT, NY, PA, OH, and s. IN, south to Panhandle FL, AL, and MS. [= RAB, F, G, K, S, W, V, WV, X; \textit{V. villosa} Walter – C]

\textit{Viola incognita} Brindley. Mt (NC, VA, WV): moist to wet forests; rare. April-June. NL (Labrador) to MN, south to DE, PA, and WI, and in the Appalachians south to w. NC. [= S, WV; < \textit{V. blanda} – RAB, C, X; \textit{V. incognita} var. \textit{incognita} – F, G; \textit{V. incognita} var. \textit{forbesii} Brindley – F, G; \textit{V. blanda} Willdenow var. \textit{palustriformis} A. Gray – K, V]

\textit{Viola labradorica} Schrank, American Dog-violet. Mt (GA, MD, NC, SC, VA, WV), Pd (DE, MD), Cp (FL, GA, VA): moist alluvial woodlands and forests, seepage slopes, marl ravines, hammocks; uncommon (rare in FL, GA, and WV). Late March-May. NL (Labrador) west to AK, south to e. VA, nw. SC, n. GA, c. AL, and OH; disjunct in sw. GA and Panhandle FL.
Ballard (1992) concluded that *V. conspersa* was not distinct from *V. labradorica*. [= K, V, X; > *V. conspersa* Reichenbach – RAB, C, F, G, GW, S, W, WV]

**Viola lanceolata** Linnaeus var. *lanceolata*. Lanceleaf Violet. Cp (AL, DE, FL, GA, MD, NC, SC, VA), Pd (DE, NC), Mt (VA, WV): wet habitats; common (uncommon in Piedmont and Mountains). March-May. NB west to MN, south to FL and e. TX. [= C, F, V; > *V. lanceolata* – RAB, W, X; > *V. lanceolata ssp. lanceolata* – GW, K; = *V. lanceolata* – G, S, WV]

**Viola lanceolata** Linnaeus var. *vittata* (Greene) Weatherby & Griscom, Strap-leaf Violet. Cp (GA, NC, SC, VA): wet pinemelasses, depressions ponds, other wetlands; common. February-May. Se. VA south to FL, west to e. TX. [= C, F, V; < *V. lanceolata* – RAB, W, X; > *V. lanceolata ssp. vittata* (Greene) Russell – GW, K; = *V. vittata* Greene – G, S]

**Viola macloskeyi** F. Lloyd var. *pallens* (banks ex A.P. de Candolle) C.L. Hitchcock, White Wild Violet. Mt (GA, NC, SC, WA), Pd (DE, NC, VA), Cp (FL, DE): brookbanks, seepages; uncommon (rare in DE). NL (Labrador) west to NT, south to GA, AL, MS, MO, SD, CO, UT, NV, and CA. Perhaps better recognized at the specific level, as *V. pallens*, which seems distinct from the narrowly distributed *V. macloskeyi*, of CA, OR and e. NV. Ballard et al. (2001) suggest that **Hispnomaulan dominensis** Urban is conspecific with *F. macloskeyi** sensu latu. [= RAB, C; > *V. pallens* (banks ex A.P. de Candolle) Brainerd – F, G, GW, S, WV; > *V. pallens* var. *pallens* – G; > *V. pallens* var. *subrepens* Roush – G; = *V. macloskeyi** ssp. pallens* (banks ex A.P. de Candolle) M.S. Baker – K, V, W; < *V. macloskeyi** F. Lloyd – X]

**Viola nephrophylla** Greene, Northern Bog Violet. Mt (WV): bogs; rare. May. NL (Newfoundland) and YT south to PA, WV, IN, IL, LA, TX, and CA. [= C, F, G, K, V, WV] [add to synonymy]

*Viola odorata* Linnaeus, Sweet Violet, English Violet. Pd (NC, VA), Mt (NC), Cp (LA), (GA): gardens, lawns, disturbed places, persistent or weakly spreading from horticultural use; rare, native of Europe. [= C, F, G, K, S, V, Z]

**Viola palmata** Linnaeus, Wood Violet. Mt (AL, GA, MD, NC, SC, VA, WV), Pd (AL, DE, GA, NC, SC, VA), Cp (FL, DE, GA, NC, SC, VA): moist forests; common (uncommon in DE). ME west to WI, south to FL, AL, MS, and LA. [= V, X; > *V. palmata ssp. palmata* – RAB, WV; > *V. palmata ssp. triloba* (Schweinitz) Gingsins ex A.P. de Candolle – RAB, WV; < *V. palmata ssp. palmata* – C; > *V. triloba* Schweinitz – triloba – F, G, K; > *V. stoneana* – F, G; > *V. palmata* – F, G, S, W, in the narrow sense; > *V. chalcosperma* Brainerd – F, S; < *V. palma ssp. palma* (Linnaeus) (pro sp.) – K; > *V. triloba* Schweinitz – S, W]

**Viola pedata** Linnaeus var. *pedata*. Bird’s-foot Violet. Mt (GA, NC, SC, WA, WV), Pd (GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): dry rocky or sandy forests, wetlands, and roadbanks; common (uncommon in GA, NC, and SC Coastal Plain; rare in DE). March-May; May-June. NH, NY, MI, WI, MN, and ND south to s. GA, AL, MS, MO, SD, CO, UT, NV, and CA. Perhaps better recognized at the specific level, as *V. pedata* (Cp (NC, SC): sandhills; uncommon. [distribution] [= *V. pedata* var. ranunculifolia (Jussieu ex Poiret) Gings ex A.P. de Candolle – F, GW, WV; > *V. pedata var. pedata* – X; > *V. pedata var. ranunculifolia* (Jussieu ex Poiret) Gings ex A.P. de Candolle – X, probably misapplied; < *V. pedata* – RAB, K, S, V;]

**Viola pedatifida** G. Don, Crowfoot Violet. Mt (VA): shale barrens; rare. April-May. ON west to AB, south to OH, IN, AR, OK, NM, and AZ; disjunct in w. VA. [= F, G, K; = *V. palmata* Linnaeus var. *pedatifida* (G. Don) Cronquist – C; = *V. pedatifida* G. Don sp. *pedatifida* – X]

**Viola pensylvanica** Michaux, Smooth Yellow Forest Violet. Mt (AL, GA, KY, MD, NC, SC, TN, VA, WV), Pd (DE, MD, NC, SC, VA), Cp (DE, NC, SC, VA): mesic forests; common (rare in DE Coastal Plain). March-May. QC west to MB south to DE, MD, w. NC, GA, AL, AR, and OK. [= WV; = *Viola pubescens* Aiton var. *scabriuscula* Schweinitz ex Torrey – K, V, X; = *F. eriocarpon* (Nuttall) Schweinitz var. *leiocarpa* Fernald & Wiegand – RAB; < *V. pubescens* – C, GW, W; > *V. pensylvanica* Michaux var. *pensylvanica* – F; > *V. pensylvanica var. leiocarpa* (Fernald & Wiegand) Fernald – F; = *F. eriocarpon* – G, S; = *V. eriocarpon* (Nuttall) Schweinitz var. *leiocarpus* Fernald & Wiegand; > *V. pubescens* Aiton var. *leiocarpus* (Fernald & Wiegand) Seymour]

**Viola primuldilfolia** Linnaeus, Primrose-leaf Violet. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): bogs, wet savannas, poeciscus, most poeciscus oils along small streams; common. March-May. NL (Newfoundland) to ON, to SE FL, and west to TX and se. OK. [= RAB, C, GW, S, V, W, WV, X; > *V. primulifolia var. primulifolia* – F, G; > *V. primulifolia var. acuta* (Bigelow) Torrey & A. Gray – F; > *V. primulifolia var. villosa* Eaton – F, G; = *V. primulifolia* Linnaeus (pro sp.) (*lanceolata × macloskeyi*) – K]

**Viola pubescens** Aiton, Hairy Yellow Forest Violet. Mt (MD, NC, TN, VA, WV), Pd (DE, MD, NC, SC, VA), Cp (DE, NC, SC, VA), Mt (VA, WV): deciduous forests; common in WV Mountains, in DE Piedmont (rare in DE Coastal Plain). March-May. ME and s. QC west to SD, south to DE, NC, TN, MO, and NE. [= G, S, WV; > *V. pubescens* var. *pubescens* – K, V, X; = *V. eriocarpon* (Nuttall) Schweinitz var. *eriocarpon* – RAB; < *V. pubescens* – C, GW, W; > *V. pubescens* var. *pubescens* – F; > *V. pubescens* var. *peckii* House – F; = *V. eriocarpon* (Nuttall) Schweinitz var. *eriocarpon*]

**Viola rostrata** Pursh, Long-spurred Violet. Mt (GA, NC, SC, VA, WV), Pd (VA): mesic forests, often under *Tsuga*; common. April-May. NH and QC west to WI, south to GA and AL. [= RAB, F, G, K, S, V, W, WV, X, Z]

**Viola rotundifolia** Michaux, Round-leaf Yellow Violet, Early Yellow Violet. Mt (GA, NC, SC, VA, WV), Pd (DE): rich coves; common (rare in DE). March-April. ME to s. ON, south to w. NC, n. GA, and e. TN. [= RAB, C, F, G, K, S, V, W, WV, X]

**Viola sagittata** Aiton var. *avata* (Nuttall) Torrey & A. Gray. Mt (NC, WV), Pd (NC), (DE, VA): dry soils, glades, prairies; uncommon. April. SS west to MN, south to n. FL, AL, LA, and OK. [= K, V, X; = *V. biflora* L. J.E. Smith – RAB, F, G, S, W, WV, Y; < *V. sagittata* Aiton – C]

**Viola sagittata** Aiton var. *sagittata*. Arrowhead Violet. Mt (WV), Pd (DE), Cp (DE), (GA, NC, SC, VA): dry to moist forests and woodlands; common in WV, uncommon in DE. April. MA west to MN, south to GA and e. TX. [= K, V, X; = *V. sagittata* – RAB, F, S, W, WV, Y; > *V. emarginata* (Nuttall) Le Conte var. *emarginata* – RAB, F, G; > *V. emarginata var. acutiloba* Brainerd – RAB, F, G; < *V. sagittata* – C; > *V. emarginata*?; < *V. emarginata* – S]

**Viola septemloba** Le Conte. Cp (FL, GA, NC, SC): sandy pinelands; rare. Late March-early May. E. NC south to s. FL, west to LA, mainly on the Coastal Plain. [= F, G, GW, K, S, W, Y; < *V. septemloba* – RAB (also see *V. esculenta*); < *V. septemloba* var. *palmata* – C; < *V. septemloba ssp. septemloba* – X]

**Viola septentrionalis** Greene. Mt (NC, TN, WV): wet woods, moist thickets; rare. NL (Newfoundland) to BC south to PA, w. NC (P. McMillan, pers. comm.), e. TN (Chester, Wofford, & Kral 1997), MI, WI, MT, and WA. [= G, K, W, WV, Y; <
**VIOLACEAE**

V. sororia – C; V; ? V. septentrionalis var. septentrionalis – F; < V. sororia var. sororia – X; = V. sororia Willdenow var. septentrionalis (Greene) XXX [comb. nov.,]

**Viola sororia** Willdenow var. missouriensis (Greene) L.E. Mc Kinney, Thinleaf Violet, LeConte’s Violet. Pd (GA, NC, SC, VA), Cp (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): swamp forests, wet bottomlands; common. March-May. ME west to se. MN, south to Panhandle FL and e. TX. Var. sororia and var. missouriensis are not yet satisfactorily understood. The extremes of these varieties (with blades distinctly longer than wide, and glabrate; var. sororia with blades wider than long or equally wide/long, and pubescent) are readily identified. However, too many specimens still cannot be readily keyed. [= X; = V. affinis Le Conte – RAB, F, G, GW, S, V, W, WV; < V. sororia – C; > V. affinis Le Conte – K; Y; > V. missouriensis Greene – K, Y]}


**Viola subsinuata** Greene. Mt (KA, KY, MD, NC, SC, TN, VA, WV), Pd (DE, GA, MD, NC, SC, VA, WV), Ip (TN): {distribution} [= V, X; < V. palmata var. palmata – C; ? V. triloba Schweinitz var. dilatata (Elliott) Brainerd – F, G, K] *


**Viola villosa** Walter, Southern Woolly Violet. Cp (FL, GA, NC, SC, PD (GA, NC, SC), Mt (GA): pocosin ecotones, other sites with moist soils; uncommon. Late February-May. MD south to n. peninsular FL, west to TX and OK. Reported for VA by Kartesz (1999), on the basis of Massey (1961); report requiring additional documentation. [= RAB, F, G, K, S, X, Y; < V. villosa – C (also see V. hisututa)]

**Viola walteri** House var. appalachiensis (L.K. Henry) L.E. Mc Kinney, Appalachian Violet. Mt (NC, WV): serpentine barrens, rich cove forests (especially old road beds through coves); uncommon (rare in NC). April-May. PA, MD, and WV south to sw. NC. See Grund & Isaac (2007) and Ballard & Wujek (1994) for discussion of the taxonomy of this species. [= X; = V. appalachiensis L.K. Henry – K, WV, Z]

**Viola walteri** House var. walteri, Walter's Violet. Mt (GA, NC, SC, VA), Pd (GA, NC, SC), Cp (GA, SC): nutrient-rich woodlands and forests, especially over mafic or calcareous rocks; uncommon (rare in Coastal Plain). March-May. W. VA west to s. OH and AR, south to n. peninsular FL and e. TX. [= X; = V. walteri – RAB, F, G, K, S, W, Z]

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A genus of about 180 species, herbs of temperate and subtropical areas. References: Robertson (1971)=Y.

**Linum** Linnaeus 1753 (Flax)

A genus of about 180 species, herbs, of temperate and subtropical areas. References: Rogers (1984)=Z; Rogers (1963)=Y.

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1. Petals blue, red, or pink; capsule 5-10 mm long; [section Linum].
2. Petals red or pink ................................................................................................................................................................. L. grandiflorum
3. Petals blue.
4. Inner sepals with minutely ciliate margins; stigmas slender, elongate; capsule 6-10 mm long .............................................. L. usitatisimum
5. Inner sepals entire; stigmas capitulate; capsule 5-7 mm long.
6. Flowers homostylos (flowers with stigmas at about the level to slightly above the anthers) .............................................. L. lewisii var. lewissii
7. Flowers heterostylos (some flowers with stigmas below the anthers, others with stigmas well above the anthers) ............. L. perenne

1. Petals yellow; capsules 1-4 mm long; [section Linopis].
2. Inner and outer sepals all very conspicuously glandular-toothed; annual; leaves with 2 brownish glands flanking the attachment to the stem; styles united basally for (0.2-) 0.5-1.2 (-1.8) mm; [section Linopis, subsection Rigidis]
3. Sepals 2.3-3.5 mm long, acute; inflorescence consisting of 1 or more elongate and racemiform branches; dried plants dark, purple-dotted ........................................................................................................ L. harperi
4. Sepals (3.1-) 3.6-5 (-7.3) mm long, acuminate; inflorescence an open panicle; dried plants pale green ........................................ L. sulcatum
5. Outer sepals entire (very rarely sparsely glandular-toothed), inner sepals entire or sparsely to conspicuously glandular-toothed; perennial; leaves without brownish glands flanking the attachment to the stem; styles free; [section Linopis, subsection Linopis].
6. Fruit as long as broad or longer, its apex acute, apiculate, or obtuse, (2-) 2.2-3.2 (-3.3) mm long; leaves mostly 1.3-4.3 mm wide.
8 Leaves (1.2-) 2.3-4.3 (-5.6) mm wide, mostly 25-50 below the inflorescence; sepal of the fruit sparsely but conspicuously ciliate; false sepal incomplete; fruit apex acute, the exposed portions purple..................\textit{L. intercursum} \\
8 Leaves (1.0-) 1.3-2.0 (-3.2) mm wide, mostly 50-120 below the inflorescence; sepal of the fruit glabrous; false sepa virtually complete; fruit apex rounded to apiculate, the exposed portions purple or yellow. \\
9 Fruit pyriform, (2.0-) 2.3-2.8 (-3.0) mm long, 1.7-2.6 mm in diameter, the apex rounded, the exposed portions purple; seeds (1.6-) 1.7-2.0 (2.1) mm long; anthers averaging 0.8 mm long ..........................................................\textit{L. floridanum var. floridanum} \\
9 Fruit ovoid, (2.8-) 3.0-3.2 (-3.3) mm long, 2.5-3.1 mm in diameter, the apex minutely apiculate, the exposed portions yellow; seeds 2.1-2.4 mm long; anthers averaging 1.2 mm long ..........................................................\textit{L. floridanum var. chrysocarpum} \\
7 Fruit broader than long, its apex depressed, flattened, or broadly rounded, (1.3-) 1.5-2.1 (-2.3) mm long; leaves mostly 1.9-9.3 mm wide. \\
10 Margins of the inner sepal with conspicuous stalked glands; mature fruits of dried specimens usually adhering to the plant...............\textit{L. medium var. texanum} \\
10 Margins of the inner sepal glandless, or with a few inconspicuous, sessile glands; mature fruits of dried specimens usually shattering and falling freely. \\
11 Inflorescence paniculate, the lower inflorescence branches not elongate, their tips not nearly reaching the tips of the upper inflorescence branches; branchlets striate-ridged; leaves mostly opposite (usually to beyond the midpoint from the base of the plant to the first inflorescence branch)..........................................................................................................................\textit{L. striatum} \\
11 Inflorescence corymbose, at (at least) the lower branches of the inflorescence elongate, their tips nearly equaling the tips of the upper inflorescence branches; branchlets terete or nearly so; leaves mostly alternate (usually the opposite leaves of the lower stem not extending beyond the midpoint from the base of the plant to the first inflorescence branch)..........................\textit{L. virginianum} \\

\textit{Linum floridanum} (Planchon) Trelease \textit{var. chrysocarpum} Rogers, Yellow-fruited Yellow Flax. Wet savannas. June-October. Se. NC south to s. FL and west to s. MS. [= K, Y, Z; < \textit{L. virginianum\textit{ var. floridanum}} Planchon – RAB; < \textit{L. floridanum} – GW, WH; < \textit{Cathartolinum floridanum} (Planchon) Small – S] \\

\textit{Linum floridanum} (Planchon) Trelease \textit{var. floridanum}, Florida Yellow Flax. Savannas, sandhill seeps. June-October. E. NC south to s. FL and west to LA, also in the West Indies, essentially limited to the Coastal Plain. [= K, Y, Z; < \textit{L. virginianum\textit{ var. floridanum}} Planchon – RAB (also see \textit{L. floridanum\textit{ var. chrysocarpum} and \textit{L. intercursum}); < \textit{L. floridanum} – C, F, G, GW, WH; < \textit{Cathartolinum floridanum} (Planchon) Small – S; > \textit{Cathartolinum macrosepalum} Small – S] \\
* \textit{Linum grandiflorum} Desfontaines, Red Flax. Disturbed areas; native of Africa. [= F, K, WH; = Adenolinum grandiflorum (Desfontaines) W. A. Weber] \\

\textit{Linum harperti} Small, Harper's Grooved Flax. Dry pinelands. This is a rare taxon of longleaf pine woodlands or savannas in w. FL, sw. GA, and c. AL. It is probably distinct from \textit{L. sulcatum} at the species level, needing additional study. [= \textit{L. sulcatum} Riddell \textit{var. harperti} (Small) Rogers – K, Y, Z; < \textit{Cathartolinum harperti} (Small) Small – S; > \textit{L. sulcatum} – WH] \\

\textit{Linum intercursum} Bicknell, Bicknell's Yellow Flax. Dry to moist places. June-October. MA south to c. TN, nw. GA, and c. AL; from MA to MD, nearly restricted to the Coastal Plain, in VA, NC, SC, GA, AL, and se. TN, however it is primarily on the Piedmont and Mountains. It also occurs disjunctively in s. IN near the Great Lakes. [= C, F, G, K, W, Y, Z; < \textit{L. virginianum\textit{ var. floridanum}} (Planchon) – RAB; = \textit{Cathartolinum intercursum} (Bicknell) Small – S] \\

\textit{Linum lewisii} Pursh \textit{var. lewisii}, Prairie Flax. Calcareous glades and barrens. A western blue-flowered species, ranging from N. west to AK, south to MI, LA, TX, NM, AZ, and CA; disjunct at Smoke Hole Caverns, WV, and several adjacent counties. [= K; < \textit{L. perenne} – C, apparently misapplied to WV material; < \textit{L. lewisii} – F; < \textit{L. perenne} Linnaeus var. \textit{lewisii} (Pursh) Eaton & J. Wright – G; < \textit{Adenolinum lewisii} (Pursh) A. & D. Löve] \\

\textit{Linum macrocarpum} C.M. Rogers, Spring Hill Flax. Pitcher plant bogs, wet savannas. FL Panhandle west through s. AL and s. MS to se. LA. [= K, WH] [not yet keyed; add synonymy] \\

\textit{Linum medium} (Planchon) Britton \textit{var. texanum} (Planchon) Fernald, Texas Yellow Flax. Dry to moist places. Var. \textit{texanum} ranges from s. ME, MI, and n. IL south to s. FL and TX, and in the West Indies. Var. \textit{medium} is limited to area around the Great Lakes. [= C, F, GW, K, W, WH, WV, Y, Z; < \textit{L. virginianum\textit{ var. medium}} Planchon – RAB; < \textit{L. medium} – G; < \textit{Cathartolinum medium} (Planchon) Small – S; = \textit{L. medium ssp. texanum} (Planchon) A. Haines] \\
* \textit{Linum perenne} Linnaeus, Perennial Flax. Disturbed areas; native of Europe. Cultivated and "rarely naturalized along road sides" in scattered locations in PA (Rhoads & Klein 1993) and reported tentatively for VA (Kartesz 1999). [= K; < \textit{L. perenne} – C (also see \textit{L. lewisii var. lewisii})] \\

**LINACEAE**

*Linum sulcatum* Riddell, Grooved Yellow Flax. Dry calcareous places in the mountains of VA (where also somewhat weedy in adjacent disturbed areas), diabase barrens in the Piedmont of NC. May-August. Primarily a species of the Great Plains of s. MB, ND, and MN south through SD, IA, WI, NE, MO, IL, KS, and MO to OK. *L. sulcatum* occurs farther east as a rare disjunct on glades or barrens over rocks such as limestone or diabase. [= RAB, C, F, G, W, WV; = Linum sulcatum Riddell var. sulcatum – K, Y, Z; = Cathartolinum sulcatum (Riddell) Small – S; = Mesynium sulcatum (Riddell) A. & D. Löve]

*Linum usitatissimum* Linnaeus, Common Flax. Disturbed places; native of Europe. This is the flax of commerce, used both for its fiber, the source of flax, and the oil expressed from its seeds (linseed oil). [= RAB, C, F, G, K, S, WH, WV, Z]


*Linum westii* C.M. Rogers, West’s Flax. Bogs, margins of flatwoods ponds. Ne. FL; Panhandle FL. [= K, WH] [not yet keyed; add synonymy]

213. **PODOSTEMACEAE** Richard ex C. Agardh 1822 (Riverweed Family) [in MALPIGHIALES]

A family of about 47-49 genera and 280 species, aquatic herbs, of tropical, subtropical, and rarely temperate regions of the New World and Old World. References: Graham & Wood (1975); Cook & Rutishauser in Kubitzki, Bayer, & Stevens (2007).

*Podostemum* Michaux 1803 (Riverweed)

A genus of about 7-17 species, reduced aquatic herbs, of tropical to temperate America. References: Graham & Wood (1975)=Z; Philbrick & Crow (1983); Cook & Rutishauser in Kubitzki, Bayer, & Stevens (2007).

**Identification notes:** *Podostemum* is a curious plant, seeming more like an alga than a vascular plant in color, texture, mode of attachment to substrate (by a fleshy disk), and irregular thalloid branching.

*Podostemum ceratophyllum* Michaux, Threadfoot, Riverweed. Attached to rocks and dams in rapidly or slowly flowing water. May-July. NS, ME, and QC south to sw. GA, s. AL, s. MS, LA (Florida parishes), AR, and w. TN; disjunct in the Ozark-Ouachita Highlands of w. AR and se. OK; Dominican Republic; Honduras. [= RAB, C, F, G, GV, K, W, WV; = Podostemon ceratophyllum - GW, orthographic variant; > Podostemon ceratophyllum – S, orthographic variant; > Podostemon abroloanoioides Nuttall – S]

214. **HYPERICACEAE** A.L. de Jussieu 1789 (St. John's-wort Family) [in MALPIGHIALES]

A family of 7-9 genera and 480-560 species, herbs, shrubs, and trees, nearly cosmopolitan. It appears from molecular analysis that recognition of the Hypericaceae may (after all) be warranted. *Hypericum* is in a clade with *Podostemum* and *Bonnetia*, sister to a clade including Clusiaceae s.s. (Savolainen et al. 2000), and unless the morphologically very different Podostemaceae is to be included in a broad Clusiaceae, Hypericaceae and Podostemaceae must be recognized. References: Adams (1973)=Z; Godfrey (1988)=Y; Wood & Adams (1976); Stevens in Kubitzki, Bayer, & Stevens (2007).

*Hypericum* Linnaeus 1753 (St. John's-wort)

A genus of 370-420 species, trees, shrubs, and herbs, primarily temperate. *Hypericum* in our area is a large, complex, and interesting genus, with a number of unresolved questions remaining. The species treated in Key B have often been treated in the segregate genus *Ascyrum*. Evidence from a variety of disciplines now suggests that they should be included in *Hypericum* (Adams & Robson 1961; Calie, Schilling, & Webb 1983; Robson 1996). References: Adams (1973)=Z; Godfrey (1988)=Y;
Key H

1. Petals pale pink; stamens fascicled, in 3 fascicles of 3 stamens each; staminodia (hypogynous glands) present, alternating with the fascicles of stamens; perianth 5-merous; "Triadenum" ........................................................................................................... Key A1 or A2

2. Leaves with an articulation at the very base, appearing as a narrow line, groove, or abrupt change of color and texture which extends across the petiole; shrub; [section Myriandra].

3. Plant an erect shrub 0.5-4 m tall, with single main stem branched above; inflorescence elongate (3-7 nodes); flowers [section Brathys] ....... Key D

4. Leaves needle-like, 0.5-1.5 (-2) mm wide, the margins essentially parallel (except for the two marginal sutures; primary branches with two ridged or winged angles running the length of the internodes, extending from the leaf midribs (but not the margins) at the base of the paired leaves; leaf surface glossy; of alfisols and ultisols of wet pine savannas, seepage bogs] ........................................................................................................................................................................................................

5. Capsules 3 (-4) locular; stamens connate at the base into 3 or 5 fascicles; leaves with black glandular dots when backlit (except in H. perfoliatum); sepals and/or petals marked with black glandular dots or lines; perennial herbs; [section Centrosperma] ...................................................................................................................................... Key E

6. Leaves ascending or appressed, 1-nerved, < 1 mm wide; inflorescence a compound raceme; annual herbs; [section Trigynobrathys] ....... Key F

7. Capsules 1-locular; stamens separate or connate at the base, not grouped into fascicles; leaves with translucent glandular dots, without black glandular dots (when backlit); sepals and petals with translucent glandular lines or dots only, not marked with black glandular dots or lines.

8. Shrubs, decumbent shrubs, or suffruticose herbs; [section Myriandra, subsections Pseudobrathydium and Suturosperma] ....... Key G

Key A1 – shrubby St. John's-worts with needle-like leaves and flowers with 5 petals and 5 sepals [section Myriandra, subsection Centrosperma]

1. Longest leaves 5-16 mm.

2. Capsules 3-6 mm long; seeds reddish-amber or brown, the alveoli not in distinct longitudinal rows, the seed lacking longitudinal ridges except for the two marginal sutures; primary branches with two ridged or winged angles running the length of the internodes, extending from the leaf midribs (but not the margins) at the base of the paired leaves; leaf surface glossy; [of alfisols and ultisols of wet pine savannas, seepage bogs] ........................................................................................................................................................................................................

2. Capsules 6-9 mm long; seeds dark red to black, the alveoli in distinct longitudinal rows, with raised ridges often evident between the rows; primary branches with six ridged or winged angles running the length of the internodes, extending from the midribs and margins at the base of the paired leaves; leaf surface dull; [of seasonally dry spodosol pine flatwoods] .......................................................... H. tenuifolium

1. Longest leaves 13-30 mm.

3. Plant a low shrub < 5 dm tall, more- or-less decumbent, forming dense clumps; inflorescence elongate (flowers at up to 5 nodes); flowers 10-12 mm diameter; [of dry to mesic soils of lower prairie and inner coastal plain of sc. VA-NC-SC-GA-AL; disjunct to rock outcrops of s GA] ........................................................................................................................................................................................................

4. Understory of most leaves easily seen on both sides of midrib, veins obvious on undersurface, leaves narrowly oblanceolate to oblongar, 1.5-5 (-7) mm wide; inflorescence elongate (3-7 nodes) ............................................................................................................. H. galioides

5. Plant short, < 1 m tall; stem < 1 cm wide at base; plant unbranched or few-branched, wand-like with narrow crown; [endemic to FL Panhandle] .......................................................... H. exile

5. Plant tall, normally > 0.8 m; stem 1-several cm wide at base; crown broader with many ascending to spreading branches.

6. Young branches, leaves, and sepals strongly glaucous; bark of upper stem and branches silvery gray and smooth; mature plant 2-4 m tall with ascending branches imparting tree-like or vase-like aspect; [restricted to shores of sinkhole ponds in Bay and Washington Counties, FL] ............................................................................................................. H. issipotheus

7. Inflorescence elongate (3-7 nodes); stem bark tight, thin, not exfoliating or exfoliating in narrow strips, not revealing buff or pale cinnamon color; if leaf undersurface is exposed it is distinctly paler than upper surface; [usually associated with flowing water (blackwater streams and impoundments)] ............................................................................................................. H. nitidum

7. Inflorescence short (1-3 nodes); stem bark corky-thickened to spongy, exfoliating in broad strips or sheets revealing buff or pale cinnamon color; if leaf undersurface is exposed it is about the same color as upper surface; [usually associated with static water (Carolina bays, impoundments, beaver ponds, borrow pits, flatwoods depressions, cypress-gum ponds)]

8. Mature plant 2-3 (-4) m tall; branches ascending and imparting a tree-like or vase-like aspect (younger plants may be bushy); youngest internodes terete; [of flatwoods depressions and cypress-gum ponds and stringers of FL Panhandle only] ...

... H. chapmanii

8. Mature plant 0.8-1.5 (-2) m tall; branches spreading and imparting a bushy or gumdrop aspect; youngest internodes with distinct winged ridge on either side; [of Carolina bays, impoundments, beaver ponds, borrow pits, widespread] .......................... H. fasciculatum
Key A2 – shrubby St. John’s-worts with needle-like leaves and flowers with 5 petals and 5 sepals
[section Myriandra, subsection Centrosperma]

1 Plants < 0.6 m tall, erect, decumbent, or matted and with ascending/erect branches.
   2 Longest leaves 5-13 mm; flowers 13-15 mm diameter.
   3 Capsules 3-6 mm long; seeds reddish-amber or brown, the alveoli not in distinct longitudinal rows, the seed lacking longitudinal ridges except for the two marginal sutures; primary branches with two ridged or winged angles running the length of the internodes, extending from the leaf midrib (but not the margins) at the base of the paired leaves; leaf surface glossy; [of alfisols and ultisols of wet pine savannas, seepage bogs] .................................................. H. brachyphyllum
   3 Capsules 6-9 mm long; seeds dark red to black, the alveoli in distinct longitudinal rows, with raised ridges often evident between the rows; primary branches with six ridged or winged angles running the length of the internodes, extending from the midrib and margins at the base of the paired leaves; leaf surface dull; [of seasonally dry spodosol pine flatwoods] .................................................. H. tenuifolium

2 Longest leaves 11-25 mm; flowers 9-17 mm diameter.
   4 Plant unbranched or few-branched, wand-like with narrow crown; [restricted to FL Panhandle flatwoods] .................. H. exile
   4 Plant densely branched, bushy with broad crown; [plants of dry mesic soils of lower piedmont and inner coastal plain of se. VA-NC-SC-GA-AL, disjunct to rock outcrops of s GA] ........................................................................................................ H. lloydii

1 Plants > 0.6 m tall, plants erect.
   5 Longest leaves (12-)15-30 mm, linear and needle-like or narrowly oblanceolate to oblinear (H. galioides), permanently tightly revolute with usually only the midrib showing on underside; flowers 13-15 mm diameter; [s GA-s FL-w LA] ............................................................................................................................ H. brachyphyllum
   5 Capsules 6-9 mm long; seeds dark red to black, the alveoli in distinct longitudinal rows, with raised ridges often evident between the rows; primary branches with six ridged or winged angles running the length of the internodes, extending from the midrib and margins at the base of the paired leaves; leaf surface dull; [of seasonally dry spodosol pine flatwoods] .................................................. H. tenuifolium

   6 Leaves narrowly oblanceolate to oblinear, 1.5-5 (-7) mm wide, margins revolute during drying but leaving considerable exposed undersurface; veins obvious on undersurface; flowers 13-15 mm diameter in elongate inflorescences of 3-7 nodes........ H. galioides
   6 Leaves linear, needle-like, 0.5-1.5 mm wide, permanently tightly revolute with usually only the midrib showing on underside, if undersurface visible there are no veins; flowers 14-26 mm diameter, inflorescences elongate or short.

   7 Plant short, < 1 m tall; stem < 1 cm wide at base; plant unbranched or few-branched, wand-like with narrow crown; [restricted to FL Panhandle].......................... H. exile
   7 Plant tall, normally > 0.8 m; stem 1-several cm wide at base; crown broader with many ascending to spreading branches; [collectively more widespread].

   8 Plant 2-4 m tall, with tree-like or vase-like aspect; [restricted to FL Panhandle].
   9 Young branches, leaves, and sepals not glaucous; bark of upper stem and branches normally not silvery gray, variously roughened; inflorescence short (1-3 nodes); [flatwoods depressions and cypress-gum ponds of FL Panhandle]..... H. chapmanii
      9 Young branches, leaves, and sepals strongly glaucous; bark of upper stem and branches silvery gray and smooth; inflorescence elongate (3-7 nodes); [restricted to shores of sinkhole ponds in Bay and Washington Counties, FL] .................. H. lissophloeus

   8 Plant to 1.5 m tall, with broad bushy or gumdrop aspect; [collectively more widespread].
   10 Inflorescence short (1-3 nodes); bark corky-thickened, exfoliating in sheets and wide strips exposing buff or pale cinnamon color; if leaf undersurface is exposed it is about the same color as upper surface; [usually in static waters of Carolina bays, impoundments, beaver ponds, borrow pits] .................................................. H. fasciculatum
      10 Inflorescence elongate (3-7 nodes); bark tight, thin (not corky thickened), not exfoliating in sheets or wide strips; if leaf undersurface is exposed it is distinctly paler than upper surface; [in moving water of blackwater streams and impoundments] .... H. nitidum

Key B – shrubby St. John’s-worts with 4 petals and 4 (rarely 2) sepals
[section Myriandra, subsection Ascyrum]

1 Styles and carpels 3 (rarely 4); leaves (5-)7-20 mm wide, rounded, subcordate, or cordate-clasping at the base; plant an erect shrub.
   2 Leaves rounded or subcordate at the base; [widely in our area] .................................................................................. H. crux-andreae
   2 Leaves cordate-clasping at the base; [of e. GA southward] .......................................................... H. tetrapetalum

1 Styles and carpels 2 (3 in H. microsepalum); leaves 1-7 mm wide, mostly cuneate (or if rounded the leaves < 8 mm long and 3 mm wide); erect or decumbent shrub.
   3 Sepals nearly equal in size; styles 3; [s. GA south to n. FL] .................................................................................. H. microsepalum
   3 Sepals markedly unequal, one opposite pair large and enclosing the capsule; styles 2; [collectively widespread].
   4 Pedicels 6-13 mm long, soon reflexed; subtending bractlets located near the last pair of leaves; decumbent shrub, to 2 dm tall ........ H. suffruticosum
   4 Pedicels 1-5 mm long, erect; subtending bractlets located midway between the base of the flower and the last pair of leaves; erect or decumbent shrub, mostly 1-15 dm tall.
   5 Erect shrub, usually with a single stem, freely branched well above ground level (or from ground level if injured, as by fire, but then the multiple branches still erect rather than decumbent), to 1 m or more tall; leaves usually variable in size and shape, widest near the middle .......................................................... H. hypericoides
   5 Decumbent, matted shrub, with several prostrate stems arising from a primary rootstock near ground level, each with numerous erect branches, rarely over 3 dm tall; leaves usually relatively uniform in size and shape, widest above the middle .......................................... H. stragulum

Key C – shrubby St. John’s-worts with broader leaves (mostly lanceolate or oblanceolate)
and flowers with 5 petals and 5 sepals

1 Leaves cordate-clasping at the base, ovate; [of s. SC southward]; [section Myriandra, subsection Brathydium] .................. H. myrtifolium
1 Leaves cuneate at the base, oblanceolate, oblong, elliptic, or narrowly elliptic; [collectively widespread]; [section Myriandra, subsection Centrosperma].
2 Leaves mostly narrowly oblanceolate, the larger 2-3 cm long, 2-5 (-7) mm wide, mostly 5-10× as long as wide; seeds 0.4-0.8 mm long, dark brown ................................................................. H. galioides
2 Leaves mostly oblong, elliptic, narrowly elliptic, or broadly oblanceolate, the larger (2-) 3-7 cm long, 5-15 mm wide, mostly 2.5-5× as long as wide; seeds 0.8-1.3 mm long, amber to medium brown.
3 Flowers solitary, terminal (or in 3-flowered terminal cymes); petals 10-20 mm long; sepals 7-15 mm long; shrubs to 1 m tall .................. H. frondosum
3 Flowers (1-) 3-many in terminal cymes; petals 5-10 mm long; sepals 1.5-8 mm long; shrubs to 3 m tall.
4 Flowers (1-) 3-7 per inflorescence; capsules (6-) 7-14 mm long; larger leaves (4-) 7-14 mm wide ..................... H. prolificum
4 Flowers 7-many per inflorescence; capsules (3-) 4-5-6 mm long; larger leaves 1-7 (-11) mm wide.
5 Leaves (1.8-) 2.8-8.3 (-11) mm wide, the widest on a plant always over 4 mm wide; [widespread].......................... H. densiflorum
5 Leaves 1.0-3.7 (-4.1) mm wide; [of the Ridge and Valley of nw. GA, c. and nw. AL, and e. TN] ......................... H. interior

**Key D** – herbaceous St. John’s-worts with leaves ascending or appressed, 1-nerved, < 1 mm wide and with a diffuse, racemose inflorescence

1 Leaves linear-subulate, (5-) 8-20 mm long; capsules 1-1.75× as long as the sepals; seeds coarsely rugose-areolate ................ H. drummondii
1 Leaves scale-like, 1-5 mm long; capsules ca. 2-3× as long as the sepals; seeds minutely and inconspicuously reticulate .......... H. gentianoides

**Key E** – herbaceous St. John’s-worts with broad leaves, 3 (-4) locular capsules, stamens connate at base into 3 or 5 fascicles, leaves with black dots as well as translucent glands (except in *H. perforatum*), and sepals and/or petals marked with black dots or lines

1 Smaller stems strongly wing-angled; seeds 1.0-1.3 mm long; leaves of the main stem (8-) 11-20 (-26) mm long, those of the lateral branches typically much smaller; leaves punctate primarily with translucent glands; [alien, usually in disturbed habitats]; [section Hypericum] ................ H. perforatum
1 Smaller stems not wing-angled; seeds 0.6-1.1 mm long; leaves of the main stem (11-) 21-48 (-64) mm long, those of the lateral branches nearly to quite as large; leaves punctate with black glands; [native, in a variety of habitats]; [section Graveolentia].
2 Petals (3.0-) 4.3-12.2 (-14.0) mm long; sepals 1.5-6 mm long, conspicuously punctate with black glands (sometimes also black-lined); capsules (2.5-) 3.0-5.4 (-6.0) mm long; [collectively widespread, occurring in the Coastal Plain, Piedmont, and Mountains of NC, SC, and VA].
3 Sepals 3-6 mm long; styles (2.5-) 5.4-7.4 (-9.0) mm long; petals (6.0-) 9.2-12.2 (-14.0) mm long; leaf apices acute ................ H. psuedomaculatum
3 Sepals 1.5-4.0 mm long; styles (1.0-) 1.4-2.4 (-3.0) mm long; petals (3.0-) 4.3-5.9 (-9.0) mm long; leaf apices obtuse to slightly retuse ........ H. punctatum
2 Petals 6-18 mm long; sepals 4-10 mm long, with or without black lines (sometimes also black-punctate); capsules (3.0-) 4.0-7.7 (-10.0) mm long; [endemic to moderate to high elevations of w. NC, sw. VA, and e. TN].
4 Styles (3.0-) 5.6-10.0 (-12.0) mm long; sepals without black lines; petals (5.0-) 11.5-16.1 (-18.0) mm long, without black lines and with round black glands only along the petal margin; longest stamens (8.0-) 10.7-16.3 (-22.0) mm long; cymes relatively few-flowered, (2-) 5-14 (-22) flowers per plant ......................................................... H. gravesent
4 Styles (1.5-) 1.9-2.9 (-5.0) mm long; sepals with black lines; petals (6.0-) 7.0-9.2 (-11.0) mm long, with black lines and round black glands scattered over the surface of the petal; longest stamens (4.0-) 6.1-8.5 (-10.0) mm long; cymes relatively many-flowered, (5-) 13-61 (124) flowers per plant ................................................................. H. mitchellianum

**Key F** – shrubby and subshrubby St. John’s-worts

1 Plant a matted, decumbent shrub, 0.5-3 (rarely to 5) dm tall; leaves 1.5-2.5× as long as wide, without axillary fascicles of leaves; flowers in simple 3-flowered cymes; [mostly of the Coastal Plain and Piedmont, very rarely in the Mountains and then at low elevations]; [section Myriandra, subsection Suturosperma].
2 Larger leaves 4-10 mm wide, 3-5× as long as wide; axillary leaf fascicles present in main leaf axils; seeds pale brown, faintly reticulate, 0.4-0.5 mm long .................. H. cistifolium
2 Larger leaves 10-30 mm wide, 1.5-3× as long as wide; axillary leaf fascicles absent; seeds dark brown, strongly reticulate, 1.5-2.5 mm long.
3 Flowers in simple 3-flowered cymes or in compound cymes with up to 8 flowers; sepals 3 mm long, oblong, obtuse apically; capsules ovoid, 8-10 mm long (excluding the styles) and 5-7 mm broad; seeds 1.8-2.0 mm long, cylindric, sometimes slightly falcate, dull brown when mature ................................................. H. apocynifolium
3 Flowers usually in many-flowered cymes terminating branches; sepals 1.5-2.0 mm long, usually triangular-acute; capsules ovoid to subglobose, 4-5 mm long (excluding the styles) and 4-5 mm broad; seeds 1.5-1.8 mm long, usually falcate-cylindric, dark purplish-brown and lustrous when mature ........................................... H. nudiflorum

**Key G** – herbaceous St. John’s-worts with broad leaves, 1-locular capsules, stamens separate or connate at base, but not grouped into fascicles, leaves with translucent dots, without black dots, sepals and petals with translucent lines or dots only, not marked with black dots or lines

1 Plant an erect suffrutescent herb, 1.5-10 dm tall; leaves 1.5-5× as long as wide, with or without axillary fascicles of leaves; flowers in compound cymes; [mostly of the Coastal Plain and Piedmont, very rarely in the Mountains and then at low elevations]; [section Myriandra, subsection Suturosperma].
2 Larger leaves 4-10 mm wide, 3-5× as long as wide; axillary leaf fascicles present in main leaf axils; seeds pale brown, faintly reticulate, 0.4-0.5 mm long .................. H. cistifolium
2 Larger leaves 10-30 mm wide, 1.5-3× as long as wide; axillary leaf fascicles absent; seeds dark brown, strongly reticulate, 1.5-2.5 mm long.
3 Flowers in simple 3-flowered cymes or in compound cymes with up to 8 flowers; sepals 3 mm long, oblong, obtuse apically; capsules ovoid, 8-10 mm long (excluding the styles) and 5-7 mm broad; seeds 1.8-2.0 mm long, cylindric, sometimes slightly falcate, dull brown when mature ................................................. H. apocynifolium
3 Flowers usually in many-flowered cymes terminating branches; sepals 1.5-2.0 mm long, usually triangular-acute; capsules ovoid to subglobose, 4-5 mm long (excluding the styles) and 4-5 mm broad; seeds 1.5-1.8 mm long, usually falcate-cylindric, dark purplish-brown and lustrous when mature ........................................... H. nudiflorum
HYPERICACEAE

1 Stems and leaves pubescent; [section Trigynobrathy] .......................................................... H. setosum
2 Stems and leaves glabrous.

1 Leaves 3-6 cm long, 4-6× as long as wide; margins revolute; [plants (in our area) of low elevations in the Coastal Plain] .......................... H. adpressum
2 Leaves 1-3 (-4) cm long, 2-3× as long as wide, the margins not revolute; [plants (in our area) of high elevations in the Mountains] .......................... H. ellipticum

2 Styles 2-4 mm long; stamens 50-80.
3 Punctate glands absent on the stem (rarely very few on the internodes of the inflorescence); punctate glands of the leaves small, round, distributed on the lower leaf surface, becoming sparse toward the base of the leaf and toward the midrib; midstem leaves mostly broadest at or beyond the middle .................................................................................. H. virgatum
4 Punctate glands frequent on the stem of leaves and stems large, oval, distributed evenly and densely on the lower leaf surface, also dense on the upper leaf surface in H. denticulatum and H. harperi (absent on upper leaf surface in H. species 1); midstem leaves usually broadest at or below the middle. .................................................................................................................................. H. radfordiorum
5 Punctate glands abundant on the stem of leaves and stems large, oval, distributed evenly and densely on the lower leaf surface, also dense on the upper leaf surface in H. denticulatum and H. harperi (absent on upper leaf surface in H. species 1); midstem leaves usually broadest at or beyond the middle. .................................................................................................................................. H. radfordiorum

6 Upper surface of the leaf with no punctate glands; inflorescence branches typically with 3-12 pairs of bracteal leaves about 1/2 as large as the foliage leaves; [of shallow soil mats on granitic domes in the Piedmont of NC] .......................... H. radfordiorum
7 Upper surface of the leaf with abundant punctate glands; inflorescence branches with at most a few pairs of very small bracts; [of Coastal Plain wetlands, very rarely disjunct inland and then in wetlands].

1 Leaves 5-20 (-24) mm long, 5-15 mm wide, 1.5-3× as long as wide, ovate to obovate to narrowly elliptic, mostly appressed to the stem, mostly shorter than the internodes; sepals 4.0-8.0 mm long, 2.0-4.0 mm wide, acute; lower stem not spongy-thickened with aerenchymatous tissue; [of moist pinelands of the Coastal Plain, very rarely disjunct inland to bog habitats in the Piedmont and Mountains] .......................... H. denticulatum
2 Leaves 10-35 (-40) mm long, 3-8 (-12) cm mm wide, 3-10× as long as wide, lanceolate to linear-lanceolate, mostly ascending to spreading, often equaling the internodes; sepals 3.0-5.0 mm long, 0.8-2.5 mm wide, acute to acuminate; lanceolate to linear-lanceolate; upper portion of stem with numerous axillary branches; lower stem usually spongy-thickened with aerenchymatous tissue; [of upland depression ponds of the Coastal Plain, growing where seasonally inundated] .......................... H. harperi

4 Styles 0.5-1.5 mm long; stamina 5-22.
5 Leaves ovate to elliptic, 3-35 mm long, 2-15 mm wide, the leaf base rounded to cordate-clasping.

1 Ultimate bracts of the inflorescence linear, differing conspicuously from the leaves; leaves paler beneath; sepals acute, about equaling the capsule; capsule 3-5 mm long .......................................................... H. boreale
2 Ultimate bracts of the inflorescence linear, differing conspicuously from the leaves; leaves paler beneath; sepals acute, about equaling the capsule; capsule 2-3.5 mm long.
3 Inflorescence branches from the upper 1-6 nodes of the stem, the further branching repeatedly monochasial; stem with apical internode well developed, usually longer than the internode below; sepals broader above the middle, more- or less imbricate; [of the Coastal Plain] .......................... H. mutilum var. latipesatum
4 Inflorescence branches from the upper 2-10 nodes of the stem, the further branching mostly dichasial; stem with apical internode shorter than the the internode below or even essentially absent; sepals broader below the middle, not imbricate (rarely broader above the middle and imbricate); [widespread] .......................... H. mutilum var. mutilum
5 Inflorescence branches from the upper 6-10 nodes of the stem, the further branching mostly dichasial; stem with apical internode shorter than the the internode below or even essentially absent; sepals broader below the middle, not imbricate (rarely broader above the middle and imbricate); [widespread] .......................... H. mutilum var. mutilum

Key H – “Triadenum”

1 Leaves narrowed to the cuneate or broadly cuneate (rarely truncate) base.
2 Lower leaves sessile; sepals 5-7 mm long, acute (to obtuse); leaves lacking translucent or dark glands or punctae; styles 0.5-1.5 mm long (best seen in fruit) .......................................................... H. tubulosum
2 Lower leaves petiolate; sepals 3-5 mm long, obtuse; leaves with translucent glands and dark punctae; styles 1.5-3 mm long (best seen in fruit) .......................................................... H. walteri

1 Leaves claspving, cordate, or subcordate at the base.
2 Sepals 2.5-5 mm long at maturity, obtuse to acute; styles 0.5-1 (-1.5) mm long (best seen in fruit) .......................................................... H. fraseri
3 Sepals 5-8 mm long at maturity, acute to acuminate; styles 1.8-3 mm long (best seen in fruit) .......................................................... H. virginicum


Hypericum ascyron Linnaeus ssp. pyramidatum (Aiton) N. Robson, American Great St.-John’s-wort. [habitat]. June-August. The species is of e. North America and c. Asia; the North American ssp. pyramidatum occurs from QC west to MN, south to s. PA (Rhoads & Klein 1993), MD (Robson 2000), and WV (Harmon, Ford-Werntz, & Grafton 2006). [= X; < H. ascyron Linnaeus – K; = H. pyramidatum Aiton – C, F, G] [not yet keyed] [section Roscyna]

Hypericum boreale (Britton) Bicknell, Dwarf St.-John’s-wort, Northern St.-John’s-wort. Sinkhole ponds in the Mountains, interdune ponds in the outer Coastal Plain, boggy places. NL (Newfoundland) and QC west to w. ON, south to VA, nw. NC (?),
OH, IN, and n. IL. Hybrids with *H. canadense* have been called *H. ×dissimulatum* Bicknell (pro sp.). [= C, F, G, K, WV; = *H. mutilum* Linnaeus ssp. boreale (Britton) J.M. Gillett – X]

**Hypericum brachyphyllum** (Spach) Steudel. Ponds and wet pinelands. Se. NC south to s. FL, west to s. MS. Material from se. NC was at one point thought to perhaps represent a new taxon. [= GW, K, WH, X, Y, Z; < *H. aspalathoides* – S]


**Hypericum canadense** Linnaeus, Canada St. John's-wort. Cp (DE, FL, GA, NC, SC, VA), Mt (NC, SC, VA, WV), Pd (DE, NC, VA); bogs, pine savannas, ditches; common (rare in NC and VA Piedmont, rare in VA Mountains, rare in FL). July-September. NL (Newfoundland) and QC west to MN, south to s. GA, ne. FL, Panhandle FL, and MS; also in Holland and Ireland, where considered by some to be native. Hybrids with *H. mutilum* and/or *H. boreale* have been called *H. ×dissimulatum* Bicknell (pro sp.). [= RAB, C, G, GW, K, S, WH, WV, X, Z; > *H. canadense* var. canadense – F; > *H. canadense* var. galiiforme Fernald – F]

**Hypericum chapmanii** W.P. Adams, Apalachicola St. John's-wort, Tree St. John's-wort. Margins of pond-cypress ponds, pond-cypress stringers, often growing with *Cyrilla parviflora* and *Nyssa ursina*. Endemic to Panhandle FL (9 counties). [= GW, K, V, WH, X, Y, Z; < *H. fasciculatum* – S; = *H. arborescens* Chapman]

**Hypericum cistifolium** Lamarck. Pine savannas, wet pine flatwoods. June-August. E. NC south to s. FL, west to e. TX. [= RAB, GW, K, WH, X, Y, Z; > *H. cistifolium* – S, in a narrower sense; > *H. opacum* Torrey & A. Gray – S]

**Hypericum crux-andreae** (Linnaeus) Crantz, St. Andrew's Cross, St. Peter's-wort. Dry forests and woodlands, pine flatwoods. June-October. NY (Long Island) and NJ south to s. FL, west to e. TX, primarily on the Coastal Plain, but scattered inland to w. NC and n. GA, also north in the interior to c. TN, s. KY, c. AR, and se. OK. [= GW, K, W, WH, X, Y; = *H. fasciculatum* Michaux ex Willdenow – F; G; = *Ascyrum stans* – S, > *Ascyrum cuneifolium* Chapman – S]

**Hypericum densiflorum** Pursh, Mountain Bushy St. John's-wort. Bogs, streambanks, dry to moist forests, rock outcrops, moist forests, pine savannas. June-September. Sw. PA south to n. GA and c. AL in and near the Mountains; NJ south to SC in the Coastal Plain; s. GA west to TX in the Coastal Plain. The related *H. lobocarpum* Gattinger is more western, extending east to TN; the basis for attribution of *H. lobocarpum* to "Blue Ridge, N.C." by Small (1933) is unknown. [= RAB, C, G, GW, K, S, WH, WV, X, Z; > *H. densiflorum* Small – S; > *H. glomeratum* Small – S]

**Hypericum denticulatum** Walter, Coppery St.-John's-wort. Savannas, wet pine flatwoods, adjacent ditches, borrow scraps, blackwater stream shores. July-September. S. NJ south to e. GA (McIntosh County) (Sorrie 1998b) on the Coastal Plain; disjunct inland in c. and w. NC, sc. TN, and in s. AL. See discussion under *H. virgatum*. [= K, Q, S; = *H. denticulatum* var. denticulatum – RAB, C, F, G, Z; < *H. denticulatum* – GW (also see *H. virgatum*); = *H. denticulatum* var. denticulatum – X]

**Hypericum dolabriforme** Ventenat, Glade St.-John's-wort. Limestone glades and barrens. In nw. GA (Jones & Coile 1988) and e. TN (Chester, Woford, & Kral 1997); this species should be sought in sw. VA. [= C, F, G, K, S, V, X, Z; ]


**Hypericum ellipticum** Hooker, Pale St.-John's-wort. Swamp forests, wet places along streams. July-August. NL (Newfoundland) and NS south to c. TN, se. AL, and in the mountains to WV, NC (?), and ne. TN (Johnson County) (Chester, Woford, & Kral 1997), and NC (?). The documentation for C's attribution of *H. ellipticum* to NC is unknown. [= C, F, G, K, V, WV, X]
**HYPERICACEAE**

Hypericum erythreae (Spach) Steudel, Georgia St.-John's-wort, Sparse-leaved St.-John's-wort, Grit St.-John's-wort. Seepage bogs, roadside ditches. Apparently nearly endemic to the Altamaha Grit region of the GA Coastal Plain, extending to Beaufort County, SC (Allison, in press). [= Q, not yet keyed]


Hypericum fasciculatum Lamarck. Pebblek St.-John's-wort. Wet pine savannas, beaver ponds, upland depression ponds. May-September. E. NC south to s. FL, west to s. MS. [= RAB, GW, K, V, WH, X, Y, Z; < *H. fasciculatum* – S (also see *H. nitidum* and *H. chapmani*)]

Hypericum dolabriforme
Hypericum drummondii
Hypericum ellipticum
Hypericum erythreae
Hypericum exile
Hypericum fasciculatum

Hypericum fraseri Spach, Fraser's Marsh St.-John's-wort. Bogs, peaty wetlands. July-August. NL (Newfoundland) and QC west to MN, south to NY, PA, w. VA, ne. TN, w. NC, OH, n. IN, and NE. Closely related to *T. virginicum* and reduced to a variety of (or included in) that species by some authors. [= *Triadenum fraseri* (Spach) Gleason – C, G, K; = Hypericum virginicum Linnaeus var. fraseri (Spach) Fernald – F, WV; < *T. virginicum* – W, Z]

Hypericum frondosum Michaux. Rock outcrops and rocky woodland. Late May-July. This species is native and widespread as far east as e. TN (Chester, Wofford, & Kral 1997), GA, and FL. [= C, F, G, K, V, WH, Y, Z; = *H. aureum* Bartram – S; = *H. splendens* Small – S]


Hypericum graveolens Buckley, Mountain St.-John's-wort. Grassy balds, grassy openings, forests, at high elevations (1200 m or more). July-August. Nw. NC and ne. TN south to sw. NC, a Southern Appalachian endemic. This and the related *H. Mitchellianum* (another narrow endemic to the Southern Appalachians) hybridize, forming local hybrid populations with intermediate characteristics (Culwell 1970). [= RAB, GW, K, S, W, X, Z]

Hypericum gymnanthum Engelmann & A. Gray, Clasping-leaf St.-John's-wort. Pine savannas, wet pine flatwoods, sinkhole ponds (Augusta and Rockingham counties, VA), other wet to moist habitats. June-September. S. NJ south to ne. FL, Panhandle FL, west to c. TX, and scattered inland in PA, WV, sc. TN, OH, IN, IL, MO, and c. KS; also disjunct in Guatemala (introduced?). [= RAB, C, F, G, GW, K, S, WH, X, Z]

Hypericum harperi R. Keller, Harper's St.-John's-wort. Clay-based Carolina bays, other upland depression ponds, with *Taxodium ascendens*. July-September. E. and c. SC south to sw. GA and e. Panhandle FL. *H. harperi* should be sought in sc. and se. NC, where it may well occur. This species has generally been considered a part of *H. denticulatum* or *H. virgatum*, but Webb (1980) makes a convincing argument for its recognition, including the ecological differentiation and absence of intermediates or hybrids when growing in proximity to *H. denticulatum*. See *H. virgatum* for additional discussion. [= Q, WH, X; < *H. denticulatum* var. acutifolium – RAB, Z; < *H. denticulatum* – GW; < *H. harperi* – K; < *H. acutifolium* – S]

Hypericum hypericoides (Linnaeus) Crantz, St. Andrew's Cross. Dry forests and woodlands. May-August. NJ, w. VA, c. KY, se. MO, and c. OK, south to s. FL and e. TX; also in the West Indies, Mexico, and Central America. [= RAB, C, GW, V, W, WH, Y, Z; > *Ascyrum hypericoides* Linnaeus var. hypericoides – F, G; > *Ascyrum hypericoides* Linnaeus var. oblongifolium (Spach) Fernald – F, G; = *H. hypericoides* ssp. hypericoides – K, X; > *Ascyrum hypericoides* Linnaeus – S; > *Ascyrum linifolium* Spach – S]


HYPERICACEAE

Hypericum lobocarpum Gattinger. Streambanks, river bottoms, pinelands. C. TN (Chester, Wofford, & Kral 1997) and MS west to s. IL, se. OK, e. TX; credited to SC by Robson (1996), based on specimens debated and dismissed by Adams (1973). Late May-September. [= C, K, S, V, X, Z; = H. densiflorum var. lobocarpum (Gattinger) Svenson – F, G; < H. densiflorum – GW] {not yet keyed}


Hypericum mitchellianum Rydberg, Blue Ridge St.-John's-wort. Grassy balds, grassy openings, forests, seepages, at moderate to high elevations (generally at 1000-1900 m or more). July-August. W. VA, e. WV, and e. TN south to sw. NC, a Southern Appalachian endemic. Robson (2006) interprets this as a hybrid of H. graveolens and H. punctatum but offers no evidence other than its general morphological intermediacy. [= RAB, C, F, G, GW, K, S, W, WH, Z; = H. mitchellianum Rydberg, pro sp. – X]

Hypericum munitum Linnaeus var. latisepalum Fernald, Southern Dwarf St.-John's-wort. Marshes and other wet habitats. June-October. Se. SC south to peninsular FL, to TX (and, according to F, north to s. NJ). Hybrids with H. canadense have been called H. ×dissimulatum Bicknell (pro sp.). [= F; < H. munitum – RAB, G, GW, K, S, W, WH, WV, Z; = H. munitum ssp. latisepalum (Fernald) N. Robson – X]

Hypericum myrtifolium Lamarck, Myrtle-leaf St.-John's-wort. Ponds. Small (1933) reports this species from SC; this distribution is now documented by a specimen from Jasper Co., SC (P. McMillan, pers. comm.). Se. SC south to s. FL, west to se. MS, a Southeastern Coastal Plain endemic. [= GW, K, S, V, WH, X, Y, Z]


Hypericum pseudomaculatum Bush. Wet, moist, or dry forests. June-September. SC south to Panhandle FL, west to TX, north in the interior to c. TN, c. IL, s. MO, and c. OK. [records east of the Ozarks need to be studied more carefully] [= RAB, C, G, K, S, X, Z; = H. punctatum Lamarr var. pseudomaculatum (Bush) Fernald – F; < H. punctatum Lamarr – WH]

**Hypericum radfordiorum** Weakly ex J.R. Allison, Radfords' St. John's-wort, Brushy Mountain St. John's-wort. Shallow circumneutral soil mats of granitic domes in the Brushy Mountains. Apparently endemic to the Brushy Mountains of Alexander and Wilkes counties, NC. This taxon, included in *H. denticulatum* var. *acutifolium* by Webb (1980), differs from typical *H. virgatum* in being profusely branched from the medial and upper nodes (rather than being little if at all branched, and then only from the uppermost nodes), in having leaves with acuminate (rather than acute to obtuse) apices, and electrophoretically (Webb 1980). Additionally, these plants have numerous bracteal leaves along the inflorescence branches (vs. few or none), the punctate glands of the foliage are large and oval, resembling those of *H. denticulatum* (vs. small and round), and the punctate glands are distributed on the lower leaf surface and stem (vs. lower leaf surface only). It may be notable that these same outcrops are phytogeographically interesting, with other disjunct and weakly differentiated races (see *Allium cuthbertii*). [=; < *H. denticulatum* (included in concept of *H. denticulatum* (= *H. denticulatum* var. *acutifolium*, *H. denticulatum* ssp. *acutifolium*) by most earlier authors]


**Hypericum stragulum** W.P. Adams & Robson, Low St. John’s-wort, Straggling St. John’s-wort. Dry rocky or sandy woodlands. May-August. MA (Nantucket Island), NY (Long Island), west to s. PA, s. IN, s. IL, c. MO, se. KS, and c. OK, south to ne. NC, c. SC, c. GA, n. AL, n. MS, n. LA, and c. TX. [= C, V, W, Z; = *H. stragulum* – RAB, misspelling; = Ascyrum hypericoides Linnaeus var. multicaule (Michaux ex Willdenow) Fernald – F, G, WV; = *H. hypericoides* (Linnaeus) Crantz ssp. multicaele (Michaux ex Willdenow) Robson – K, X]


**Hypericum tenuifolium** Pursh, Sandhill St.-John’s-wort. Pine flatwoods, pine savannas, sandhills. June-September. Se. NC south to c. peninsular FL; Panhandle FL and se. AL. Robson (1996) indicates that the older name *H. tenuifolium* Pursh has now been adequately shown to apply to this taxon. [= X; = *H. reductum* (Svenson) W.P. Adams – RAB, GW, K, V, WH, Y, Z; < *H. aspalathoides* Willdenow – S (also including *H. brachyphyllum*)]

**Hypericum tetrapetalum** Lamarck. Wet pinelands and in depressional wetlands (open or dominated by *Taxodium ascendens*). E. GA (within a few counties of se. SC), south to s. FL, west to Panhandle FL. [= GW, K, V, WH, X, Y; = Ascyrum tetrapetalum (Lamarck) Vail – S]

**Hypericum tubulosum** Walter, Southern Marsh St.-John's-wort. Bogs, peaty wetlands, drawdown sloughs along rivers, drawdown shorelines along man-made reservoirs. August-September. Se. VA south to Panhandle FL, west to LA, and north in the interior to se. and c. TN, s. IL and s. OH. [= RAB; = Triadenum tubulosum (Walter) Gleason – C, G, GW, K, WH, Z; = Hypericum tubulosum Walter var. tubulosum – F; = *T. longifolium* Small – S]

**Hypericum virgatum** Lamarck, Strict St. John’s-wort. Woodlands, rock outcrops, woodland borders. Late June-September. MD west to s. OH, s. IN, and s. IL, south to c. NC, c. SC, sw. GA, Panhandle FL, s. MS, and se. LA. Though treated by most recent authors as a variety of *H. denticulatum*, *H. virgatum* is better considered as a distinct species. Webb (1980) recognized *H. harperi* as a separate species (it had previously been considered a part of *H. virgatum*), and continued to recognize this taxon as a variety of *H. denticulatum*. However, based on the nature of the punctate glands, size of seeds, inland distribution, etc., it appears that *H. virgatum* is more distantly related to *H. denticulatum* and *H. harperi* than they are to one another; recognition at the species level is warranted for *H. virgatum*. As pointed out by Webb, *H. denticulatum* is primarily tetraploid (n = 24), while *H. virgatum* and *H. harperi* are (as far as is known) strictly diploid. Additionally, the aberrant populations from granitic outcrops in the Brushy Mountains of Alexander and Wilkes counties, NC referred by Webb (1980) to this taxon are distinct, and more closely allied to *H. denticulatum* and *H. harperi*; see *Hypericum radfordiorum* for additional discussion. [= K, Q; < *H. denticulatum*

Hypericum virginicum Linnaeus, Common Marsh St.-John's-wort. Bogs, peaty wetlands. July-September. NS west to OH and s. ON, south to s. FL and MS, mostly on the Coastal Plain but scattered inland. [= RAB; = Triadenum virginicum (Linnaeus) Rafinesque – C, G, GW, K, S, WH; = Hypericum virginicum Linnaeus – RAB; = Hypericum virginicum var. virginicum – F, WV; < T. virginicum – W, Z (also see T. fraseri)]

Hypericum walteri J.G. Gmelin, Walter’s Marsh St.-John’s-wort. Swamp forests and marshes. August-September. MD south to n. peninsular FL, west to e. TX, and north in the interior to s. MO, s. IL, and OH. [= RAB; = Triadenum walteri (J.G. Gmelin) Gleason – C, G, GW, K, W, WH; = Hypericum tubulosum Walter var. walteri (J.G. Gmelin) Lott – F, WV; = T. petiolatum (Walter) Britton – S]

215. GERANIACEAE A.L. de Jussieu 1789 (Geranium Family) [in GERANIALES]

A family of about 5-11 genera and 700-835 species, herbs and shrubs, mostly temperate. References: Albers & Van der Walt in Kubitzki, Bayer, & Stevens (2007).

1 Leaves simple, deeply lobed but not divided............................................................................................................................................. Erodium
1 Leaves pinnately cleft or compound; fertile stamens 5, staminodia 5........................................................................................................ Erodium

Erodium L’Héritier in Aiton 1789 (Stork's-bill, Filaree)


1 Leaves simple, deeply lobed but not divided............................................................................................................................................. E. texanum
1 Leaves pinnately cleft or compound; fertile stamens 5, staminodia 5........................................................................................................ E. texanum


* Erodium texanum A. Gray, Texas Stork’s-bill. Cp (SC): waste areas near wool-combing mill; rare, perhaps merely a waif, native of sc. and sw. United States. [= K]

Geranium Linnaeus 1753 (Geranium, Crane’s-bill)

A genus of about 300-430 species, herbs, mainly temperate. House plants called ‘geranium’ are members of the genus Pelargonium. References: Aedo, Aldasoro, & Navarro (1998); Yeo (1984); Albers & Van der Walt in Kubitzki, Bayer, & Stevens (2007).

1 Petals 12-18 mm long; perennial, from a stout rhizome; anthers > 2 mm long; [subgenus Geranium, section Geranium] ........... G. maculatum
1 Petals 2-13 mm long; annual or biennial, from a taproot; anthers < 1 mm long.
2 Leaves dissected, but not compound, all segments interconnected by leaf tissue; petals 2-10 mm long; [collectively common and widespread in our area].
3 Sepals blunt or acute, or terminating in a minute callus tip; [subgenus Robertium, section Batrachioidea].
4 Mericarps glabrous, reticulately ridged; stem pubescence an admixture of long eglandular hairs (1.0-1.7 mm long) and short (< 0.5 mm long) gland-tipped and eglandular hairs; stamens (all 10) fertile (note that anthers may fall readily) ....................................................... G. molle
GERANIACEAE

4 Mericarps appressed pubescent, not ridged; stem pubescence of short (< 0.3 mm long), gland-tipped and eglandular hairs; stamens partly sterile (the inner 5 fertile, the outer 5 lacking anthers). ...................................................... G. pusillum

3 Sepals awned or subulate, the subulate awn 0.7-3 mm long.

5 Mature pedicels < 1.5× as long as the calyx.

6 Mericarps with spreading hairs about 0.5 mm long, these often gland-tipped; [subgenus Geranium, section Dissecta] .............................................................................................................. G. dissectum

6 Mericarps with long appressed hairs about 1 mm long, these not gland-tipped; [subgenus Geranium, section Geranium].

7 Inflorescence diffusely corymbiform (because of long upper internodes), mostly 4-12-flowered; pubescence of stem mostly < 0.5 mm long ........................................................................................................ G. carolinianum var. carolinianum

7 Inflorescence a compact corymb (because of notably short upper internodes), mostly 5-25-flowered; pubescence of stem mostly > 0.75 mm long ........................................................................................................ G. carolinianum var. confertiflorum

5 Mature pedicels > 2× as long as the calyx; [subgenus Geranium, section Geranium].

8 Pedicels spreading pubescent, the hairs not glandular; mature stylar beak 0.5-1.5 mm long

9 Peduncles bearing a single flower; seed reticulate .......................................................... [G. sibiricum]

9 Peduncles mostly with 2 flowers; seed nearly smooth to very finely reticulate .......................................................... G. thunbergii

8 Pedicels either retrorse-striose or glandular-villosus; mature stylar beak 3-5 mm long.

10 Pedicels glandular-villosus .............................................................................................................. G. bicknellii

10 Pedicels retrorse-striose .............................................................................................................. G. columbinum

Geranium bicknellii Britton, Northern Cranebill, Bicknell’s Crane’s-bill. Mt (WV): open woods and clearings; uncommon. July-September. NL (Newfoundland) and AK south to PA, WV, c. TN, IN, IL, MO, CO, UT, and CA. [= C, G, K, W; > G. bicknellii var. bicknellii – F]


Geranium carolinianum Linnaeus var. confertiflorum Fernald, Northern Carolina Crane’s-bill. Mt (NC, VA), Pd (VA), {DE}: fields, roadsides, lawns, gardens, disturbed areas; common. March-June (and sometimes later). ME and MN, south to DE and MO, and in the mountains to w. NC and e. TN. [= C, F, G; < G. carolinianum – RAB, S, W; < G. carolinianum var. carolinianum – K]


* Geranium robertianum Linnaeus, Herb Robert. Mt (VA, WV), Pd (DE): rocky woodlands, especially over calcareous rocks; uncommon (rare in VA and WV). June-October. Circumpolar, ranging south in North America to w. VA, nc. TN (Chester, Wofford, & Kral 1997), OH, IN, and IL. Considered by C and G to be introduced in North America, but apparently native. [= C, F, G, K, W, WV]


* Geranium ibericum Cavanilles, Iberian Crane’s-bill. Mt (NC): rare, spread from horticultural use, native of Europe. Recently found in Great Smoky Mountains National Park, in both NC and TN (K. Langdon, pers. comm.). [= K; ? G. nepalense – C] {not yet keyed}

* Geranium sanguineum Linnaeus, Blood-red Crane’s-bill. Mt (NC): roadbank, rare, probably persistent or spread from cultivation. [= C, F, G, K] {not yet keyed; add to synonymy}

* Geranium sibiricum Linnaeus, native to Asia, is naturalized south to s. PA (Rhydas & Klein 1993) and is likely to occur in at least the northern part of our area. [= C, F, K]

219. LYTHRACEAE J. St.-Hilaire 1805 (Loosestrife Family) [in MYRTALES]

A family of about 27-35 genera and about 600 species, herbs, shrubs, and trees, primarily tropical (a few warm temperate). References: Graham (1975) = Z; Graham in Kubitzki, Bayer, & Stevens (2007). Keys adapted, in large part, from Z. [including PUNICACEAE and TRAPACEAE]
**LYTHRACEAE**

1 Plant woody or suffrutescent, a shrub or a small tree 1-10 m tall; petals present, showy, 8-20 mm long.
2 Aquatic shrubs with arching suffrutescent or woody stems; leaves opposite or whorled; [native] .............................................. Decodon
3 Terrestrial shrubs or small trees with erect woody stems; leaves alternate to subopposite; [aliens cultivated and sometimes persistent].
4 Flowers in many-flowered terminal or axillary panicles; fruit a loculicidal capsule ................................................................. Lagerstroemia
5 Flowers solitary or several in terminal or axillary clusters; fruit a leathery berry (pomegranate) ................................................... [Punica]
6 Plant not woody, an herb 0.1-1.2 m tall; petals absent or present, inappositive or showy, 1-10 mm long.
7 Fruit with 2-4 prominent spines; leaves coarsely toothed ............................................................... Trapa
8 Fruit not spinose; leaves entire.
9 Stems pubescent.
10 Floral tube (hypanthium) swollen obliquely at its base; capsule dehiscing longitudinally along the upper surface .................. Cuphea
11 Floral tube (hypanthium) symmetrical; capsule dehiscing sepctically at the apex ............................................................... Lythrum
12 Floral tube cylindric to turbinate, about 2× as long as wide ............................................................... Lythrum
13 Floral tube campanulate to globose, about 1× long as wide.
14 Flowers or fruits (1-) 3-10 in the leaf axils (at least some axils with 2 or more flowers or fruits on a given plant) ........... Ammannia
15 Flowers or fruits solitary in the leaf axils (never > 1 per axil).
16 Capsule indehiscent; petals 0; sepals 4, broadly triangular, lacking intersepalary appendages; seeds spatulate or oblanceolate, about 1 mm long, minutely granular on one face and smooth on the other ............................................................... Didiplis
17 Capsule dehiscing septicidally; petals 4; sepals 4 (-6), triangular, with intersepalary appendages of size about equal to the calyx lobes; seeds hemispheric, about 0.3 mm long, the surface very finely reticulate ................................................... Rotala

**Ammannia** Linnaeus 1753 (Toothcup)


1 Style exerted (when in fruit), filiform, 1.5-3.0 mm long (equal to or longer than the ovary); calyx lobes triangular, with acute apices; petals 4 .............................................. W, WH, Y, Z
2 West to TX (mostly on the Coastal Plain), and also in the West Indies, Yucatan, Central America, and South America. All plants south to TX and Mexico. [= GW, K2, Y, Z] {not yet keyed}

2 Style included (when in fruit), thick, 0.5-1.0 mm long (much shorter than the ovary); calyx lobes obtuse, often with the apices mucronate; petals 0, 1, or 4, pale pink to white, to 1 mm long and 1 mm wide. .............................................. A. latifolia
1 Style exerted (when in fruit), filiform, 1.5-3.0 mm long (equal to or longer than the ovary); calyx lobes triangular, with acute apices; petals 4 (-5), deep rose-purple or pale lavender, ca. 2 mm long and 2 mm wide.
2 Inflorescence usually a short- or long-pedunculate cyme (sometimes reduced); flowers usually > 3 per axil; petals deep rose-purple; fruits 3.5-5 mm in diameter ............................................................... A. coccinea
3 Flowers solitary or several in terminal or axillary clusters; fruit a leathery berry (pomegranate) ...................................................[Punica]
4 Fruit not spinose; leaves entire.
5 Leaves whorled (at least in part); pedicels > 10 mm long; [flatwoods of FL Panhandle] ........................................................... C. aspera
1 Leaves opposite (none whorled); pedicels < 3 mm long; [collectively widespread].

2 Floral tube green, 4.5-6 mm long, glabrous inside; stamens much shorter than the floral tube; petioles to 8 mm long, often very short....................

........................................................................................................................................................................................................

C. carthagenensis

2 Floral tube purple-green, 6-10 mm long, villous inside; stamens equal to or exceeding the the floral tube; petioles to 20 mm long................

........................................................................................................................................................................................................

C. viscosissima

Cuphea aspera Chapman, Apalachicola Waxweed. Flatwoods. Endemic to the FL Panhandle (Franklin, Gulf, and Calhoun counties). [= K, WH, Z; = Parsonsia lythroides Small – S]

* Cuphea carthagenensis (Jacquin) J.F. Macbride, Colombian Waxweed. Marshes, ditches, floodplain forests, wet hammocks, other wet places; native of South America. June-September. [= GW, K, WH, Z; = C. carthagenensis – RAB (a misspelling); = Parsonsia balsamona (Chamisso & Schlechtendahl) Standley – S]

* Cuphea procumbens Gómez Ortega is reported for NC by Small (1933). Graham (1975) considers this Mexican species to be represented in se. United States only by "garden escapes that do not persist." [= K, Z; = Parsonsia procumbens (Gómez Ortega) Heller – S] {not keyed; not mapped}

Cuphea viscosissima Jacquin. Dry or wet places. July-October. NH west to IA and KS, south to e. GA, LA, and e. OK. [= RAB, C, GW, K, W, WV, Z; = C. petiolata (Linnaeus) Koehne – F; G; = Parsonsia petiolata (Linnaeus) Rusby – S]

Decodon J.F. Gmelin 1791 (Water-oleander, Water-willow)


Decodon verticillatus (Linnaeus) Elliott, Water-oleander, Water-willow, Swamp Loosestrife, Peatweed. Natural lakes, limesink ponds, peatlands, peaty swamps, not known in the Piedmont or Mountains of NC or SC, but scattered in the Ridge and Valley of VA. July-September. NS, ON, and MN south to e. peninsular FL and e. TX. The lower stems are spongy in texture. [= RAB, GW, K, S, WH, WV, Z; > D. verticillatus var. verticillatus – C, F, G; > D. verticillatus var. laevigatus Torrey & Gray – C, F, G]

Didiplis Rafinesque 1833 (Water-purslane)


Lagerstroemia Linnaeus 1759 (Crape-myrtle)


Lythrum Linnaeus 1753 (Loosestrife)


1 Flowers numerous in terminal spike-like thyrses; stamens usually 12; leaves opposite or whorled.................................................. L. salicaria

1 Flowers solitary or paired in axils; stamens usually (4-) 6; leaves opposite or alternate.---------------------------L. salicaria

2 Annual; flowers present in nodes more-or-less throughout the plant; flowers homostylyous, all alike, the stamens always included ..........

........................................................................................................................................................................................................... L. hyssopifolia
LYTHRACEAE

2 Perennial by basal stoloniferous outshoots; flowers present only at upper nodes; flowers heterostyloous (either with an exerted style and included stamens, or vice versa).

3 Leaves opposite throughout, mostly shorter than to as long as the internodes, 1-4 mm wide......................L. lineare

3 Leaves opposite below, alternate above, mostly longer than the internodes, 2-14 mm wide.

4 Floral tube 3-4 mm long; petals 2-3 mm long; calyx appendages about the same length as the calyx lobes; branch leaves abruptly and definitely reduced in size relative to the stem leaves, and widely spaced; [of sw. GA southward]..........................L. curtissii

4 Floral tube 5-6 mm long; petals 5-6 mm long; calyx appendages about 2× as long as the calyx lobes; branch leaves gradually reduced relative to the stem leaves, dense and overlapping; [collectively widespread in our area].

5 Leaves ovate to lanceolate, widest at a point 1/6 to 1/2 of the way from the base to the apex, the base rounded to subcordate; stems mostly slender, to 8 dm tall; bracteoles mostly at the base of the pedicel ......................................................L. alatum

5 Leaves lanceolate to linear-lanceolate, widest at a point 1/3 to 2/3 of the way from the base to the apex, the base cuneate, often narrowly so; stems stout, to 13 dm tall; bracteoles mostly on the upper pedicel, immediately below the floral tube ..............................................L. lanceolatum


Lythrum curtissii Fernald, Curtiss's Loosestrife. Calcareous swamps, seepage areas. June-early September. Sw. GA south to Panhandle FL, and disjunct in ne. FL; the report from Emanuel County, GA (Jones & Coile 1988) is in error. [= GW, K, S, WH, Z]

Lythrum hyssopifolia Linnaeus, Annual Loosestrife. Salt marshes, other wet soils; probably only adventive from Eurasia, but sometimes interpreted as native from ME to NJ. June-September. [= C, G, K]

Lythrum lanceolatum Elliott, Southern Winged Loosestrife. Moist to wet places. May-September. Se. VA, se. NC, SC, GA, AL, MS, n. AR, and OK south to s. FL, s. TX, and in the West Indies. Although Graham (1975) argues that L. lanceolatum should be reduced to a variety of L. alatum, her evidence can also be interpreted as warranting specific status. [= RAB, F, S; = L. alatum Pursh var. lanceolatum (Elliott) Torrey & A. Gray ex Rothrock – C, G, GW, K, WH, Z; = L. alatum ssp. lanceolatum (Elliott) A. Haines – Y]


Punica Linnaeus 1753 (Pomegranate)


* Punica granatum Linnaeus, Pomegranate. Suburban areas, cultivated and at least persistent; native of Mediterranean Europe. Reported as cultivated on Hatteras Island (Dare County, NC) (Brown 1959). This species has been cultivated in the Old World at least since the 3rd millennium B.C. [= K, S]

Rotala Linnaeus 1771 (Toothcup)

A genus of about 44 species, wetland herbs, of temperate to tropical areas, closely related to Didiplis. References: Graham (1975)=Z; Graham in Kubitzki, Bayer, & Stevens (2007).

1 Leaves linear to oblanceolate, > 3× as long as wide..........................................................R. ramosior

1 Leaves broadly elliptical to orbicular, < 1.5× as long as wide...........................................R. rotundifolia

Rotala ramosior (Linnaeus) Koehne, Toothcup. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): marshes, ditches, exposed drawdown muds and silts; common (uncommon in VA Mountains). June-October. VT, NY, ON, MI, WI, MN, SD, MT, and BC, south to s. FL, TX, AZ, CA, and south through Mexico to Central America and , South
LYTHRACEAE

Flowers (3-)4(-7)-merous, the petals yellow, pink, or white (or absent); fruits lacking uncinate trichomes; leaves alternate (rarely opposite). *Rotala rotundifolia* (Buchanan-Hamilton) Koehne, Dwarf Rotala, Roundleaf Toothcup. Disturbed wet areas, perhaps just a waif; native of Asia. March-August. [= K2, WH]

*Trapa* Linnaeus 1753 (European Water-chestnut)

A genus of 1 highly polymorphic or up to 45 more narrowly defined species, annual aquatic herbs, native of the Old World. Often placed in a monogenic family, Trapaceae, but *Trapa* is deeply embedded phylogenetically in Lythraceae (Graham, Diazgranados, & Barber 2011). References: Angiosperm Phylogeny Group (2003, 2009); Graham in Kubitzki, Bayer, & Stevens (2007).


220. ONAGRACEAE A.L. de Jussieu 1789 (Evening-primrose Family) [in MYRTALES]

A family of about 18 genera and 655 species, herbs, shrubs, and rarely trees, cosmopolitan (especially of temperate and subtropical America). References: Wagner, Hoch, & Raven (2007); Munz (1965)=X; Crisci et al. (1990).

1 Flowers 2-merous, the petals white; fruits with uncinate trichomes; leaves opposite, decussate, borne spreading at right angles to the stem, mostly ovate, on petioles mostly 0.5-8 cm long; [subfamily *Onagroideae*; tribe *Circeae*] .......................................................................................................................... 2. **Circeae**

   1 Flowers (3-)4 (-7)-merous, the petals yellow, pink, or white (or absent); fruits lacking uncinate trichomes; leaves alternate (rarely opposite), not decussate, usually ascending or appressed (rarely spreading at right angles to the stem), mostly lanceolate, mostly sessile or subsessile. 2 Fruit indehiscent; seeds 1-6 per capsule, 1.5-3.5 mm long; [subfamily *Onagroideae*; tribe *Onagreae*] ............................................................................... 5. **Oenothera**

   1 Leaves opposite; plants creeping (rooting at the nodes); [section *Dantia*] ................................................................................................................................. Key A

   1 Leaves alternate; plants erect or ascending (not rooting at the nodes), or creeping (rooting at the nodes)

   2 Stamens 8-14; sepals 4-7; petals 4-7; [of various habits, including annual and perennial herbs and shrubs, variously erect, ascending, creeping, or forming floating mats] ........................................................................ Key B

   2 Stamens 4; sepals 4; petals 0-4; [perennial herbs, with erect ascending flowering stems] ........................................................................................................... Key C

   3 Seeds not comose (gravity-dispersed); petals yellow or absent (rarely white or pink).

   4 Calyx tube not extended beyond the summit of the ovary; sepals persistent on the capsule (rarely deciduous); stamens 4, 8, or 10-14; petals yellow or absent; [primarily of wetlands]; [subfamily *Ludwigioideae*] ........................................................................................................ 1. **Ludwigia**

   5 Calyx tube extended beyond the summit of the ovary; sepals deciduous; stamens 8; petals yellow (rarely pink or white); [primarily of uplands]; [subfamily *Onagroideae*; tribe *Onagreae*] ........................................................................................................ 5. **Oenothera**

I. **Ludwigia** Linnaeus 1753 (Seedbox, Water-primrose, Water-purslane)


**Identification notes:** Many natural hybrids are known, not necessarily in our area. Hybrids are generally recognizable from their intermediate morphology and usual association with their two parents. However some hybrids resemble one parent much more than the other, and some hybrids are found in populations independent (and even disjunct) from one or both parents. Allopolyploidy may have had a major role in the evolution of this genus, especially section *Microcarpium*, which has a majority of polyploid species.

1 Leaves opposite; plants creeping (rooting at the nodes); [section *Dantia*] ................................................................................................................................. Key A

1 Leaves alternate; plants erect or ascending (not rooting at the nodes), or creeping (rooting at the nodes)

2 Stamens 8-14; sepals 4-7; petals 4-7; [of various habits, including annual and perennial herbs and shrubs, variously erect, ascending, creeping, or forming floating mats] ........................................................................ Key B

2 Stamens 4; sepals 4; petals 0-4; [perennial herbs, with erect ascending flowering stems] ........................................................................................................... Key C
Key A – Ludwigia with opposite leaves

1 Pedicels of flowers and fruits 5-35 mm long.
2 Petals 7-11 mm long; pedicels of capsules 15-35 mm long, longer than the leaves .............................................................. L. arcuata
3 Petals 4-5 mm long; pedicels of capsules 5-16 mm long, shorter than to equaling the leaves ...................................................... L. brevipes

Key B – Ludwigia with alternate leaves, 8-14 stamens, 4-7 sepals, and 4-7 petals

1 Pedicels of flowers and fruits 0-3 mm long.
2 Sepals 5 (-7); stamens 10 (-14); seeds in 1 vertical series in each locule, loosely embraced or embedded in endocarp tissue.
3 Sepals 4; stamens 8; seeds in 2-several vertical series in each locule, free of endocarp tissue.
4 Petals 0; floral tubes and capsules with 4 longitudinal dark green bands; bractlets (borne at or near base of floral tube) absent or present, if present then 0-1 mm long .............................................................. L. palustris
5 Petals 4; floral tubes and capsules lacking green banding; bractlets (borne at or near base of floral tube) present, 2-4 mm long ........ L. repens

Key C – Ludwigia with alternate leaves, 4 stamens, 4 sepals, and 0-4 petals

1 Pedicels 2-15 mm long; capsules subglobose to spheric or cubic, about as long as wide, box-like, 4-angled, dehiscence by an apical pore (later sometimes also irregularly loculicidal); petals present, 4-15 mm long, persistent or caducous; roots fascicled, fusiform, tuberous; plants lacking basal, stoloniform shoots; [section Ludwigia].
2 Leaves cuneate at base; pedicels 2-5 mm long; nectary discs at base of style flatish, inconspicuous; [widespread in our area, in a wide variety of habitats] .............................................................................................................................................. L. alternifolia
3 Leaves rounded or truncate at base; pedicels 4-15 mm long; nectary discs at base of style domed, prominent; [nearly restricted to the Coastal Plain, primarily of pinelands].
4 Styles (at least the lower portions) decumbent, creeping, or floating in mats (the flowering stems more-or-less erect in L. grandiflora and L. hexapetala); floral tube much shorter than the pedicel; seeds embedded in the woody endocarp; [section Oligoxypomum].
5 Flowering stems decumbent, floating, or creeping; stem and leaves glabrous or glabrescent; petals mostly 1-1.5 cm long; anthers 1-1.7 mm long ...................................................................................................................................................................... L. leptocarpa
6 Flowering stems more-or-less erect; stem and leaves sparsely to densely pubescent with long soft hairs; petals (1.2-) 1.6-3 cm long; anthers 2.5-3.5 mm long.
7 Sepals 5-7 mm long; lateral and marginal veins obscure on lower leaf surface; seeds reddish brown; capsules obpyramidal, tapering through most or all of their length, with a shallow longitudinal groove on each face; anthers 1.1-1.6 mm long ........ L. grandiflora ssp. grandiflora
8 Sepals 4; lateral and marginal veins parallel-sided through most of their length, not grooved; anthers 0.5-1.1 mm long .............................................................. L. macrocarpon

5 Petals 0; floral tubes and capsules with 4 longitudinal dark green bands; bractlets (borne at or near base of floral tube) absent or present, if present then 0-1 mm long .............................................................................................................................................. L. hexapetala

6 Sepals 2.3-4 mm long, acuminate, the surfaces densely and minutely papillose, the papillae 0.02-0.05 mm long and appressed; capsules 5-8.5 (-10) mm long, 2-4 (-5) mm in diameter; pedicels 0-0.4 mm long; seed surface cells elongate parallel to the seed length (as seen at 20× or more); anthers 1.1-1.6 mm long ...................................................................................................................................................... L. linearis var. linearis
Ludwigia alata

Elliott, Winged Seedbox.  Cp (GA, NC, SC, VA):  interdune ponds, freshwater to slightly brackish (oligohaline) marshes; rare.  June-September.  Se.  VA south to s.  FL, west to se.  LA; disjunct in Jamaica.  This species is a hexaploid (n = 24).  One third of the genome of L.  alata is apparently derived from L.  microcarpa or its ancestor (Peng 1988).  [= RAB, C, F, G, K, U, Z; > L.  alata – GW (also see L.  lanceolata); > L.  alata – S; > L.  simulata Small – S]

Ludwigia alternifolia


Ludwigia brevipes (B.H.  Long ex Britton, A.  Braun, & Small) Elliott, Long Beach Seedbox.  Coastal Plain Water-primrose.  Cp (GA, SC, VA):  ponds, lakes, sluggish waters of ditches or swamps; rare.  May-September.  Se.  SC south to FL, west to TX; disjunct in MO, Guatemala, and in

Ludwigia brinkworthii (Michaux) Greuter & Burdet ssp.  brinkworthii, Showy Water-primrose.  Cp (GA, SC):  ponds, lakes, sluggish waters of ditches or swamps; rare.  May-September.  Se.  SC south to FL, west to TX; disjunct in MO, Guatemala, and in

Ludwigia brachycarpa (E.J.  Palmer & Steyermark – C, F; > L.  brachycarpa Small – S]


**Ludwigia grandiflora** (Michaux) Greuter & Burdet ssp. *hexapetala* (Hooker & Arnott) Nesom & Kartesz, Common Water-primrose. Cp (NC, SC), Pd (GA, NC), Mt* (VA*, WV*): ponds, lakes, sluggish waters of ditches or streams; uncommon (but often locally abundant) (rare in VA and WV). May-September. NC south to FL, west to OK and TX; also in CA, Europe, South America, Mexico; also introduced further north in North America. This taxon is decaploid (n = 40). See Zardini, Gu, and Raven (1991) and Nesom & Kartesz (2000) for additional information. [= Q; < L. uruguayensis (Cambessedes) Harra – RAB, C, GW, K; < Jussiaea uruguayensis Cambessedes – F, G, WV; > Jussiaea michauxiana Fernald – F; = L. hexapetala (Hooker & Arnott) Zardini, Gu, & Raven – U, V]


**Ludwigia lanceolata** Elliott, Lanceleaf Seedbox. Cp (GA, NC, SC): interdune ponds, open wet areas; rare (NC Rare). August-September. Se. NC south to c. peninsular FL, west to Panhandle FL. This species is tetraploid (n = 16). [= RAB, K, S, U, Z; < L. alata – GW]

**Ludwigia leptocarpa** (Nuttall) Harra, Water-willow. Cp (DE*, GA, NC, SC, VA), Pd (GA, VA), Mt (GA, WV): riverbanks, marshes, and ditches; common (uncommon in VA, rare in DE). June-September. VA south to c. peninsular FL, west to e. TX, north in the interior along the Mississippi and Ohio rivers to se. MO, s. IL, and w. WV; and in tropical America. [= RAB, C, GW, K, U, W; = Jussiaea leptocarpa Nuttall – F, G, S, WV]

**Ludwigia linearis** var. *linearis*, Eastern Narrowleaf Seedbox. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC): savannas; common (uncommon in DE). June-September. Var. *linearis* ranges from s. NJ south to c. peninsular FL, west to se. LA, extending inland to the Cumberland Plateau of nc. AL and c. TN. Var. *linearis* is here interpreted to be equivalent to Peng's subglabulose morph. Peng (1989) declines to recognize infraspecific taxa in *L. linearis*, but his discussion makes clear that 2 distinctive entities are present, as characterized by orientation of seed surface cells and characters of leaves, bracteoles, pedicels, sepals, stigmas, and styles (see key). The orientation of seed surface cells, recognized as a distinctive character in other difficult species pairs (such as *L. alata* and *L. lanceolata*) is the most reliable character separating the 2 varieties. This species is diploid (n = 8). [= < L. linearis – RAB, C, F, G, GW, K, S, U, W, Z]

**Ludwigia linearis** var. *puberula* Engelmann & A. Gray, Western Narrowleaf Seedbox. Cp (GA, NC, SC), Pd (GA, SC): savannas, interdunal swales; uncommon. June-September. Var. *puberula* ranges primarily from c. AL west to c. AR, south to e. TX, with intergradational material extending as far north and east as n. FL and e. NC. Var. *puberula* is here interpreted to include Peng's intermediate morph, densely strigillose morph, and completely glabrous morph (Peng 1989). As pointed out by Peng (1989), the glabrous morph is exactly like the densely strigillose morph except for the absence of pubescence. They often grow together, have essentially the same distribution, and may differ only at a single allele. Peng's intermediate morph is heterogeneous; some likely being truly intermediate between (and possibly hybrid derivatives of) the 2 varieties here recognized, while others clearly belong to var. *puberula* (based on surface cell orientation and floral characteristics) and merely have an amount of pubescence intermediate between the densely strigillose and completely glabrous morphs. [= < L. linearis – RAB, C, F, G, GW, K, S, U, W, Z]

**Ludwigia linifolia** Poiret, Flaxleaf Seedbox. Cp (GA, NC, SC), Pd (NC): limesink ponds (dolines) and *Taxodium ascendens* savannas; rare (NC Rare). June-September. Nc. NC south to s. FL, west to s. MS; disjunct in Tabasco, Mexico. This species is diploid (n = 8). [= RAB, GW, K, S, U, Z]


**Ludwigia microcarpa** Michaux, Small-fruited Seedbox. Cp (GA, SC, NC), Pd (GA, NC), Mt (GA): in circumneutral or alkaline soils of moist places, over calcareous rock, mafic rock, shell hash, or brackish sands, such as in maritime wet grasslands, savannas and adjacent ditches over coquina limestone ("marl"), and wet clay flats over diabase, often in roadside ditches; uncommon. July-Oct. November. Ne. NC south to s. FL, west to se. TX (Brown & Marcus 1998); disjunct inland on calcareous or mafic rocks in nc. NC, n. GA, n. AL, c. TN, and sc. MO; also in the Bahamas, Cuba, and Jamaica. This species is diploid (n = 8). [= RAB, F, GW, K, S, U, W, Z]


**Ludwigia pilosa** Walter, Hairy Seedbox. Cp (GA, NC, SC, VA), Pd (NC): ditches, wet places; common (rare in VA). June-October. Se. VA south to n. FL, west to se. TX, restricted to the Coastal Plain except for disjunct occurrences inland in NC, VA, and n. AL. This species is tetraploid (n = 16). \[= K, U, W, Z; < L. pilosa – RAB, C, F, G, GW, S (also see L. ravenii)]

**Ludwigia polyacarpa** Short & Peter. Pd (VA), Mt* (WV*): [habit]; rare. June-September; July-October. MA, CT, and w. VT west to s. ON, MI, WI, MN, and c. NE, south to c. VA, KY, s. IL, s. MO, and e. KS. This species is tetraploid (n = 16). \[= C, F, G, GW, K, S, U, Z]

**Ludwigia repens** Peng, Raven's Seedbox. Cp (NC, SC, VA): savannas, swamps, marshes, wet open places; rare. June-October. Se. VA south to ne. FL (no known records for GA), restricted to the Coastal Plain. For further information, see Peng (1984, 1988, 1989). This species is tetraploid (n = 16). \[= K, U, Z; < L. pilosa – RAB, C, F, G, GW, S (included within concept of L. pilosa by most earlier authors)]

**Ludwigia sphaerocarpa** Elliott, Globe-fruited Seedbox. Cp (DE, GA, NC, SC, VA), Pd (GA), Mt (VA): ditches, pools, and streams; uncommon (rare in VA). June-September. Se. VA south to s. FL, west to TX and n. Mexico, north in the interior to TN, MO, and OK; also in CA, Bermuda, and the West Indies. Reveal et al. (2003) propose the name *L. repens* for nomenclatural conservation with a conserved type; if this proposal is not accepted, *L. natans* Elliott will become the name of this species. \[= RAB, GW, K, U; = Ludwigia natans* Elliott – F, G; = Isnardia repens – S]

**Ludwigia spathulata** Torrey & A. Gray, Southern Water-purslane. Cp (GA, SC), Pd (GA): sinkhole ponds, cypress-gum ponds, depression meadows, boggy shores; rare. June-October. SC south to Panhandle FL and s. AL. \[= RAB, GW, K, U; = Isnardia spathulata (Torrey & A. Gray) Small – S]

**Ludwigia suffruticosa** Walter, Shrubby Seedbox. Cp (GA, NC, SC): periodically to seasonally flooded portions of limesink ponds (dolines) and clay-based Carolina bays; rare north of SC (NC Rare). June-September. Se. NC south to s. peninsular FL, west to Panhandle FL and se. AL. This species is tetraploid (n = 16). \[= RAB, GW, S, W, WV; = Ludwigia natans* Elliott – F, G; = Isnardia spathulata* (Torrey & A. Gray) Small – S; the leaf teeth are quite different.\]

**Ludwigia peruviana** Linnaeus, Primrose-willow. In s. GA (Jones & Coile 1988). Reported for NC (Kartesz 1999). All or part of the Southeastern distribution is as an alien species. \{investigate\} \[= GW, K, U; = Jussiaea peruviana Linnaeus – S\]

2. *Circaea* Linnaeus 1753 (Enchanter's-nightshade)


Identification notes: Sometimes confused in vegetative condition with *Phryma*; the leaf teeth are quite different.

1 Flowers opening before elongation of the raceme axis, more or less loosely spaced, borne on spreading pedicels; plants (12-) 20-100 cm tall; 
\[= C. alpina – RAB, F, G, GW, S (also see C. alpina var. alpina – C)]

1 Flowers opening after elongation of the race me axis, therefore clustered and corymbiform at the apex of the raceme, borne on erect or spreading pedicels; plants (12-) 20-100 cm tall; 
\[= C. canadensis ssp. canadensis – C. sterill]

1 Flowers opening before elongation of the raceme axis, more or less loosely spaced, borne on spreading pedicels; plants (12-) 20-100 cm tall; 
\[= C. alpina – RAB, F, G, GW, S, W, WV; = C. alpina var. alpina – C]*

**Circaea alpina** Linnaeus ssp. *alpina*, Alpine Enchanter's-nightshade. Mt (GA?, KY, NC, VA, WV), Ip (KY): moist organic soil at high elevations (especially in spruce-fir and northern hardwood forests), rocky seepages, in spray behind waterfalls, at dripping cliff bases; uncommon (rare in KY Interior low Plateau). June-September. *C. alpina* is treated by Z as a circumboreal complex of six subspecies. Ssp. *alpina* is itself circumboreal, in North America ranging from NL (Newfoundland) and NL (Labrador), west to AK, south to MD, w. NC, e. TN, n. GA (?), KY, n. IL, MN, MT, and WA, disjunct in montane sites southward in the w. United States, such as the Black Hills of SD, and isolated montane sites in CO, AZ, and NM. Another subspecies occurs in w. North America, and four subspecies occur in humid and montane parts of Asia. \[= K, U, X, Z; < C. alpina – RAB, F, G, GW, S, W, WV; = C. alpina var. alpina – C]

**Circaea canadensis** (Linnaeus) Hill ssp. *canadensis*, Canada Enchanter's-nightshade. Mt (GA, KY, NC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, KY, NC, VA), Ip (KY): mesic, nutrient-rich forests; common (rare in SC). June-August. NS and NB west to se. MB and ND, south to e. NC, e. SC, s. GA, LA, OK, and NE. The systematics of this taxon is controversial, and the best treatment is still unclear. Most recently, Boufford (2005) has treated the complex as 2 species, *C. canadensis* and *C.
Quadrisculata, the former with 2 subspecies, ssp. canadensis of eastern North America and ssp. quadrisculata of Asia. Previously, Boufford (1983) treated the complex as a circumboreal complex of 3 subspecies of C. lutetiana, including the North American ssp. canadensis (Linnaeus) Ascherson & Magnus, the primarily Asian ssp. quadrisculata (Maximowicz) Ascherson & Magnus, and the European ssp. lutetiana. Other authors have preferred varietal status for the 3 entities, full species status, no formal status at all (C. lutetiana as a polymorphic complex), or associating the more similar pair (North American and Asian) as 2 subspecies separate from the European at specific rank. Boufford (1983) and Averett & Boufford (1985) show convincingly that separate taxonomic status for the three entities is warranted, and that ssp. canadensis is more closely related to ssp. quadrisculata. The question of the appropriate taxonomic level remains. Boufford (1983) states that "although subspp. canadensis and quadrisculata are placed in C. lutetiana, this might not ultimately prove to be the best treatment." Later, flavonoid data showed strong differences between the three taxa, stronger than the differences between many of the other species in the genus (Averett & Boufford 1985). Morphologic differences between the three taxa are fairly subtle but appear to be consistent. The complicated synonymy is perhaps an example of a too-zealous attempt to have nomenclature reflect subtleties of relationship and evolutionary divergence, our understanding of which is unclear and changeable. [=U, Y; = C. lutetiana Linnaeus ssp. canadensis (Linnaeus) Ascherson & Magnus – RAB, K; W, X, Z; = C. lutetiana var. canadensis Linnaeus – C; = C. quadrisculata (Maximowicz) Franchet & Savatier var. canadensis (Linnaeus) Harra – G, WV; > C. canadensis var. canadensis – F; > C. canadensis var. virginiana Fernald – F; = C. latifolia Hill – S; = C. quadrisculata ssp. canadensis (Linnaeus) Löve & Löve]

Circarea ×sterilis Boufford, Hybrid Enchanter’s-nightshade. Mt (NC, VA, WV): mesic, nutrient-rich forests; rare. June-August. C. ×sterilis is reported to occur frequently in the absence of one or both of its parents (Z, Skvortsov 1979), and is therefore treated separately and keyed here. It ranges from NL (Newfoundland) west to ON and MN, south to w. NC, OH, and WI. It appears to be rare in our area, but should be sought more carefully. Recognition of C. canadensis (Linnaeus) Hill as distinct from C. lutetiana renders the hybrid binomial name C. ×intermedia inappropriate for North American plants, since it is the hybrid of C. alpina ssp. alpina and the European C. lutetiana. [= U, Y; = C. ×intermedia Ehrhart (pro sp.) – RAB, C, K; W, X, Z (but misapplied as to our material if C. canadensis is accepted as a species); > C. canadensis var. canadensis – F; misapplied; > C. canadensis var. virginiana Fernald – F; = C. canadensis (Linnaeus) Hill – G, WV, misapplied]

3. Chamerion Rafinesque ex Holub 1972 (Fireweed)

A genus of 8 species (9 taxa), herbs, of arctic, boreal, and temperate Northern Hemisphere. There is increasingly strong evidence for the recognition of this group of plants as a genus separate from Epilobium. References: Wagner, Hoch, & Raven (2007)=U; Mosquin (1966)=Z; Holub (1972)=Y; Munz (1965)=X.

Chamerion platyphyllum (Daniels) Löve & Löve, Great Willow-herb, Fireweed. Mt (NC, VA, WV), Pd (DE), Cpt (DE): grassy balds, road sides, disturbed areas; uncommon (rare in DE and NC). July-September. Chamerion platyphyllum has a circumboreal distribution; it is a member of a circumboreal complex, consisting of several related taxa that differ in chromosome number, a variety of morphological characters, and distribution. The tetraploid C. platyphyllum is generally more southern, extending south in North America to NJ, montane w. NC and ne. TN, n. IN, MN, SD, AZ, NM, and CA; it may be more appropriately treated as a variety or subspecies of C. angustifolium. The diploid Chamerion angustifolium (Linnaeus) Holub is arctic and boreal, extending south in North America to NB, QC, ON, alpine WY, and BC. The hexaploid is Chamerion danielsii D. Löve. [< Epilobium angustifolium – RAB, G, GW, W, WV; = E. angustifolium var. canescens A. Wood – C; >> E. angustifolium var. angustifolium – F, X; = E. angustifolium var. platyphyllum (Daniels) Fernald – F; = Chamerion angustifolium (Linnaeus) Holub ssp. circumvagum (Mosquin) Kartesz – K, V; = Chamaenerion angustifolium (Linnaeus) Scopoli – S; < Chamerion angustifolium (Linnaeus) Holub – Y; = E. angustifolium Linnaeus ssp. circumvagum Mosquin – Z]

4. Epilobium Linnaeus 1753 (Willow-herb) [also see Chamerion]

A genus of ca. 165 species (ca. 185 species), herbs, distributed primarily in boreal and alpine latitudes and elevations. All five of the species in our area reach or approach their southern limits in eastern North America in our area. All members of the genus is ur area are placed in section Epilobium. References: Wagner, Hoch, & Raven (2007)=U; Munz (1965)=X.

1 Stigma capitate; petals 2-8 mm long........................................................................................................................................................................... E. hirsutum
1 Stigma 4-cleft; petals 10-15 mm long........................................................................................................................................................................... E. leptophyllum
2 Leaves lanceolate, distinctly broader below the middle, flat, the larger generally at least 10 mm wide, toothed.
3 Principal leaves 3-7 cm long, with obscure marginal teeth, the apices merely acute; internodes (below the inflorescence) glabrous, glabrescent, or with pubescence scattered over the surface; mature coma (attached to plump seeds) brown (pale when immature); plants often strict or sparingly branched; seeds striate (with well-developed papillae arranged conspicuously in lines) .................. E. ciliatum ssp. ciliatum
3 Principal leaves 5-15 cm long, with conspicuous and often irregular marginal teeth, the apices acuminate to attenuate; internodes (below the inflorescence) with lines of pubescence (some internodes on a given plant sometimes with scattered pubescence or glabrous); mature coma cinnamon (attached to plump seeds) brown (pale when immature); plants generally well-branched, with a bushy habit; seeds papillose (the papillae sometimes forming weak lines) ......................................................... E. coloratum
4 Pubescence spreading........................................................................................................................................................................... E. strictum
4 Pubescence appressed, the upper leaf surface finely and rather densely pubescent .................................................................................. E. leptophyllum
**Epilobium ciliatum** Rafinesque *ssp. ciliatum*, American Willow-herb. Mt (NC, VA), Pd (VA): bogs, seeps, disturbed wet places (such as margins of logging roads); common (uncommon in VA, rare in NC). June-September. NL (Newfoundland) and NL (Labrador) west to AK, south to VA, w. NC, ne. TN, IN, IA, CA, TX, Mexico, Central America; disjunct in Chile and Argentina. [= K, U; < E. ciliatum – RAB, W; = E. ciliatum var. ciliatum – C; > E. ciliatum – F, X, in a narrower sense; > E. glandulosum Lehmann var. adenocaulon (Hausknecht) Fernald – F, W; > E. adenocaulon Hausknecht var. adenocaulon – G, Z]

**Epilobium coloratum** Biehler, Bronze Willow-herb, Eastern Willow-herb. Mt (GA, KY, NC, SC, VA, WV), Pd (DE, NC, VA), Cp (DE, NC, VA), Ip (KY): seepages, moist open places; common (uncommon in KY Interior Low Plateau, rare in NC Coastal Plain). June-September. ME west to MN, south to NC, n. GA, AL, AR, and TX. There are some difficulties in distinguishing this species and *E. ciliatum* in our area. [=RAB, C, F, G, K, U, W, WV, Z]


**Epilobium leptophyllum** Rafinesque, Narrowleaf Willow-herb, American Marsh Willow-herb. Mt (NC, VA, WV): bogs, seepages, and boggy meadows; rare. July-October. NL (Newfoundland) and NT west to BC, south to w. NC, ne. TN, KS, ne. TX (Mink, Singhurst, & Holmes 2011b), and CA. [= RAB, C, F, G, K, U, W, WV, Z]

**Epilobium strictum** Muhlenberg ex Sprague, Northeastern Willow-herb, Downy Willow-herb, Soft Willow-herb. Marshes, bogs. QC west to MN, south to n. VA (?), OH, and n. IL. Reported for Arlington County, VA; the single record is regarded as questionable. [= C, F, G, K, U, Z]

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**5. Oenothera** Linnaeus 1753 (Evening-primrose)

A genus of about 124 species, herbs, of America (especially temperate regions). This treatment provisional, with further revision likely, especially in the *O. fruticosa-O. tetragona-O. pilosella* complex. References: Wagner, Hoch, & Raven (2007)=U; Dietrich, Wagner, & Raven (1997)=Z; Dietrich & Wagner (1988)=Y; Munz (1965)=X; Straley (1977)=V. Keys adapted in part from those references. [also see Calypohluus]

1 Fruit indehiscent; seeds 1-6 per capsule, 1.5-3.5 mm long; []
2 Pedicels 2-4 mm long; fruit with a stipe at maturity; clumped or matted perennials from woody rhizomes or rootstocks; [of sandy habitats of SC and GA southward].
3 Clumped perennial; petals 4-10 mm long; body of the fruit 5-10 mm long; stipe of the fruit 0.5-4.5 mm long..........................**O. filipes**
4 Mat-forming perennial; petals 7-15 mm long; body of the fruit 8-15 mm long; stipe of the fruit 2-8 mm long..........................**O. sinuosa**
2 Pedicels 0-1 mm long; fruit without a stipe; annual, winter annual, or biennial; [collectively of various habitats and more widespread in our area].
4 Sepals 2.5-3.5 mm long; petals 1.5-3 mm long..........................**O. curtiflora**
4 Sepals 2.5-12 mm long; petals 2.5-9 mm long.
5 Sepals 2.5-8 mm long; leaves 0.3-2.5 cm wide, the largest nearly always > 1 cm wide; flowers 4-merous; fruits 4-angled; [primarily of the Mountains and Piedmont of NC, SC, and VA, extending to the Coastal Plain of GA and SC]..........................**O. gaura**
1 Fruit dehiscent; seeds (10-) 50-many per capsule, 0.3-2 mm long.
6 Ovary essentially terete; fruit terete or with 4 rounded ridges; stamens equal in length (except in *O. speciosa*).
7 Flowers white or pink; flower buds nodding; [section Hartmania]..........................**O. speciosa**
7 Flowers yellow; flower buds erect; [section Oenothera]
8 Fruit linear, nearly isodiametric through its length; seeds borne ascending in the locules, rounded or fusiform, more or less regularly pitted; [section Oenothera, subsection Raimannia].
9 Petals acute to rounded at the apex.
10 Inflorescence dense, with > 2 flowers per spike opening each day; leaves gray-green..........................[O. clevelandii]
10 Inflorescence lax, 1-2 flowers per spike opening on each day; leaves green..........................**O. curtisii**
9 Petals truncate to emarginate at the apex.
11 Nonflowering portion of stems stiff, densely strigillose or sometimes also villous; leaves gray-green, densely strigillose, usually subentire to shallowly dentate (rarely lorate); [in maritime situations].
12 Sepals 2.0-3.3 cm long; petals 2.5-4.5 cm long; stigma elevated above the anthers at anthesis; capsule 2.5-5.5 cm long; rosette leaves 5-14 cm long, 1-2 cm wide ..................................................**O. drummondii** ssp. drummondii
12 Sepals 0.3-1.1 cm long; petals 0.45-1.6 cm long; stigma surrounded by the anthers at anthesis; capsule 1.5-4.5 cm long; rosette leaves 4-8 cm long, 0.7-1.0 cm wide ..................................................**O. humifusa**
11 Nonflowering portion of stem not stiff, moderately to sparsely strigillose to sometimes densely villous, and also ± glandular puberulent; leaves green, sparsely to moderately strigillose and usually villous, deeply lobed to dentate (rarely some of them subentire); [in inland disturbed situations].
13 Petals 2.5-4 cm long; style 4.7-5 cm long; stigma lobes well elevated above the anthers at anthesis .......................**O. grandis**
13 Petals 0.5-2.2 cm long; style 2-5 cm long; stigma lobes surrounded by the anthers at anthesis .......................**O. laciniata**
8 Fruit thickest near the base, tapering to the apex; seeds borne horizontally in the locules, angled-prismatic, not regularly pitted; [section Oenothera, subsection Oenothera]
14 Stigma elevated above the anthers at anthesis; petals 2.5-5.5 cm long.
15 Cauline leaves 0.4-1.0 cm wide; apex of the inflorescence curved; free sepall tips subterminal, usually spreading; capsules spreading at nearly right angles to the stem, long-attenuate toward apex, usually conspicuously arculate ..................**O. argillicola**
15 Cauline leaves 1.5-6 cm wide; apex of the inflorescence erect; free sepall tips terminal, erect; capsules erect or slightly spreading, gradually attenuate toward the apex.
ONAGRACEAE

16 Upper stem, ovary, floral tube, and sepals always conspicuously pubescent, usually with at least some red-pustulate hairs; bracts green, persistent; sepals often flushed with red, or red-striped .................................................. O. glazioviana

16 Upper stem, ovary, floral tube, and sepals often apparently glabrous without magnification; pustulate hairs absent, or if present not red (in fresh material); bracts often pale-green and deciduous; sepals yellowish green, or flushed with some red...

.......................................................... O. grandiflora

14 Stigma surrounded by or below the anthers at anthesis; petals 0.7-2.5 (-3) cm long.  
17 Plant appearing exclusively (as seen without magnification).

18 Apex of the inflorescence curved; free sepals tips subterminal in bud, erect to spreading; dry capsules usually rusty brown ....  
.......................................................... O. oakesiana

18 Apex of the inflorescence erect; free sepals tips erect in bud; dry capsules gray-green or dull green.

19 Leaves green to pale green; stems, ovary, floral tube, and sepals sparsely appressed-pubescent ................. O. biennis

19 Leaves dull green to gray-green; stems, ovary, floral tube, and sepals densely appressed-pubescent ... O. villosa ssp. villosa

17 Plant appearing either glabrous or with a mixture of long pubustulous hairs and appressed pubescence (as seen without magnification).

20 Apex of inflorescence curved; free sepals tips subterminal in bud.

21 Plant (at least the lower portions) predominantly strigillose; leaves dull green to gray-green; dry capsules rusty brown .....  
.......................................................... O. oakesiana

21 Plant predominantly erect-pubescent or appearing glabrous (as seen without magnification); leaves usually bright green; dry capsules usually dark green or black .......................................................... O. parviflora

22 Inflorescence conspicuously pubescent .......................................................... O. biennis

22 Inflorescence glabrous (or appearing so without magnification).

23 Free sepals tips terminal in bud; petals 1.4-2.5 (-3) cm long; bracts caducous, pale green; capsules dull green when dry; petals fading yellowish-white to translucent. .................................................. O. nutans

23 Free sepals tips subterminal in bud; petals 0.8-1.5 (-2) cm long; bracts persistent, green; capsules usually black or dark green when dry; petals fading pale yellow, usually opaque................................................. O. parviflora

6 Ovary 4-angled or 4-winged (at least near its tip); fruit sharply 4-angled or 4-winged; stamens of two lengths (except O. triloba and O. macrocarpa ssp. macrocarpa).

24 Leaves all basal, pinnatifid; [section Lavauxia, subsection Lavauxia] .......................................................... O. triloba

24 Leaves in part cauline, entire or toothed.

25 Petals 50-70 mm long; flowers opening in the evening; wings of the fruit 10-25 mm wide; [section Megapoterium] .......................................................... O. macrocarpa

25 Petals 3-30 mm long; flowers opening in the day; wings of the fruit <3 mm wide; [section Kneiffia] ............................ O. macrocarpa ssp. macrocarpa

26 Cauline leaves linear, < 1 mm wide; petals 1-5 (-7) mm long; floral bracts shorter than the subtended ovaries; mature fruits elliptipsoid-rhomboid, 4-6 mm long; annual; [section Kneiffia, subsection Peniophyllum] ........................................ O. linifolia

26 Cauline leaves lanceolate to ovate, > 1 mm wide; petals 5-30 mm long; floral bracts longer than the subtended ovaries; mature fruits clavate to oblong-elliptic, 8-20 mm long; perennial; [section Kneiffia, subsection Kneiffia].

27 Petals 5-10 mm long; inflorescence usually nodding .......................................................... O. perennis

27 Petals 15-30 mm long; inflorescence usually erect.

28 Plant conspicuously pilose-hirsute with hairs 1-3 mm long; free sepals tips 1-4 mm long, divergent .................. O. pilosella

28 Plant either with shorter or appressed pubescence, of glandular or nonglandular hairs; free sepals tips 0-2 (-6) mm long, divergent or not.

29 Capsules oblong, widest near the middle, usually abruptly tapered to a stipe 0.1-3 (-7) mm long; hairs of the ovary and capsule predominantly glandular (or the ovary glabrous); leaves subglabrous or sparsely pubescent, more or less dentate.

30 Petals (20-) 25-35 mm long; cauline leaves lanceolate to ovate, 2-7 cm long, 1-3 cm wide, often glaucous beneath ......  
.......................................................... O. tetragona var. fraseri

30 Petals 12-20 (-25) mm long; cauline leaves linear to lanceolate, 2-7 cm long, 0.5-1.0 (-1.5) cm wide ......................... O. tetragona var. tetratoga

29 Capsules clavate, widest above the middle, gradually tapered to a stipe 3-10 mm long; hairs of the ovary and capsule nonglandular (or with a mixture of glandular and nonglandular hairs); leaves generally pubescent, subentire.

31 Petals 15-30 mm long; stems 7-12 dm tall, freely branched, slightly pubescent; cauline leaves lanceolate, 5-12 cm long, 0.5-1.5 cm wide; [of tidal marshes, usually with spongy lower stems and adventitious roots where regularly submerged] .......................................................... O. riparia

31 Petals (8-) 15-22 mm long; stems 1-8 dm tall, less branched (unless mowed, grazed, or otherwise damaged), more pubescent; cauline leaves 2-6 (-8) cm long, 0.2-1.0 (-1.2) cm wide.

32 Capsule vestiture a mixture of glandular and nonglandular hairs.

33 Cauline leaves not velutinous, 5-10+ as long as wide................................. O. tetragona var. brevistipula

33 Cauline leaves velutinous, 2+4 as long as wide.

34 Petals 7-12 mm long; leaves lance-oblong, obtuse; [of barrens of TN, KY, and AL]................................. O. tetragona var. sharpii

34 Petals 15-20 mm long; leaves lanceolate, acute; [of the Atlantic Coastal Plain] ......................... O. tetragona var. velutina

32 Capsule vestiture strictly nonglandular.

35 Free sepals tips 1-3 mm long, cartilaginous and often arching after the sepals have reflexed; calyx strigose ............  
.......................................................... O. fruticosus var. unguaiculata

35 Free sepals tips < 1 mm long; calyx various.

36 Capsule body 6-11 mm long, the pubescence rather coarse................................. O. fruticosus var. fruticosus

36 Capsule body 3-5 mm long, the pubescence very fine.

37 Capsule body 3.5-4 mm long; strigose-pilose; [of Coastal Plain bog]................................. O. fruticosus var. microcarpa

37 Capsule body 4-5 mm long; very finely strigillose; [of Piedmont rock outcrops] ................................. O. fruticosus var. subglobosa


* Oenothera curtiflora W.L. Wagner & Hoch, Small-flowered Gaura. Cp (GA, SC, VA), Pd (GA): sandy fields, disturbed areas, and clearings; rare, native of e. and w. North America. May-July. IN and IL west to WA, south to MS, and Mexico; apparently introduced eastward to MA, TN, GA, and SC. Kartesz's (1999) adoption of *Mollis* as the name for this taxon has been rejected (Wagner & Hoch 2000, Brummitt 2001). [= U; = Gaura parviflora Dough ex Lehm – RAB, F, G, Q, S; = Gaura mollis James – K; > Gaura parviflora var. parviflora – X; > Gaura parviflora var. lachnocarpa Weatherby – X]

**Oenothera curtissii** Small. Cp (GA, SC): sandhills, sandy fields; rare. May-September. Se. SC south to n. peninsular FL, west to s. AL. Closely related to *O. rhombipetala*, which is restricted to the Great Plains, with scattered occurrences east to AR, IL, and MI. [= K, Y; < O. rhombipetala Nuttall ex Torrey & A. Gray – RAB, F, X, misapplied; = Raimannia curtissii Rose – S]

**Oenothera drummondioides** Hooker ssp. drummondioides, Drummond's Evening-primrose. Cp (NC, SC): sandy ocean beaches; rare, perhaps only introduced or adventive from the Gulf Coast. April-October. Ssp. drummondioides ranges from se. NC south to s. FL, west to s. TX, and south to Tamaulipas and Vera Cruz. Ssp. thalassiphila (Brandegee) W. Dietrich & W.L. Wagner is restricted to the southern tip of Baja California. [= Y; < O. drummondioides – RAB, K; < Raimannia drummondioides (Hooker) Rose ex Sprague & Riley – S; > O. drummondioides var. drummondioides – X]

**Oenothera filipes** (Spach) W.L. Wagner & Hoch, Threadstalk Gaura. Cp (GA, SC), Pd (GA), Mt (GA): sandy fields, disturbed areas, and clearings; common. April-July. SC west to n. TN and s. IN, south to ne. FL and e. LA. [= U; = Gaura filipes Spach RAB, C, G, K, Q, W; > Gaura filipes var. filipes – F; > Gaura filipes var. major Torrey & A. Gray – F, X; > Gaura michauxii Spach – S]


**Oenothera fruticosa** Linnaeus var. subglobosa (Small) Munz, Flatrock Sundrops. Pd (GA): granite flatrocks and domes; rare. GA to AL. [= X; < O. fruticosa – RAB, C; < O. fruticosa sp. fruticosa – H, K, V; = Kneiffia subglobosa Small – S]

**Oenothera fruticosa** Linnaeus var. unguiculata Fernald, Southern Sundrops. Cp (NC, SC, VA): sandhills, moist to wet loamy savannas; uncommon. April-August. Se. VA south to e. SC. [= F, X; < O. fruticosa – RAB, C; < O. fruticosa sp. fruticosa – H, K, V]

**Oenothera gaura** W.L. Wagner & Hoch, Biennial Gaura, Northeastern Gaura. Mt (NC, SC, VA, WV), Pd (GA, NC, VA), Cp (DE, GA, NC, SC, VA): roadsides, woodlands, streambanks, fields, disturbed areas; common (uncommon in VA Coastal Plain, rare in DE Coastal Plain). June-October. MA and NY west to WI, se. MN, and IA, south to sw. NC, c. GA (Jones & Coile 1988), sc. TN, and c. IL. [= U; = Gaura biennis Linnaeus – RAB, K, Q, S, W, WV; > Gaura biennis var. biennis – C, F, G, X]

* Oenothera glaziouvsia* Micheli in Martius, Garden Evening-primrose. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): disturbed areas; uncommon. This species apparently arose as a garden hybrid, and has been widely cultivated and naturalized nearly worldwide. [= K, Z; = O. erythrophea Borbás – X]

**Oenothera grandiflora** L'Héritier ex Aiton. Cp (GA, NC, SC), Pd (GA, NC, SC), Mt (GA, NC, SC): disturbed areas; uncommon. June-June. VT west to KY, south to c. peninsular FL and s. MS. [= F, K, X, S, Z]

* Oenothera grandis* (Britton) Smyth. Cp (NC): roadsides; rare, introduced from further west. March-July. The native range of this species is centered in KS, OK, and TX. [= K, X, Y; = O. laciniata Hill var. grandiflora (S. Watson) B.L. Robinson – RAB, F, G]


**Oenothera laciniata** Hill, Cutleaf Evening-primrose. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed areas; common. February-October. ME west to ND, south to s. FL and TX; also in CA. [= K, W, WV; > O. laciniata var. laciniata – RAB, C, F, G; = Raimannia laciniata (Hill) Rose – S; > O. laciniata sp. laciniata – X]

**Oenothera linifolia** Nuttall, Threadleaf Sundrops, Flaxleaf Sundrops. Pd (GA, NC, SC, VA*), Cp (GA, SC), Mt (GA): dry openings and fields; rare (SC Rare, VA Watch List). C. VA west to s. IL and se. KS, south to Panhandle FL and se. TX. Occurrences east of the Mississippi River may be mainly or entirely adventive. Belden et al. (2004) discuss the Virginia occurrence. [= RAB, C, F, G, K, W, V, X; = Peniophyllum linifolium (Nuttall) Pennell – S]

**Oenothera nutans** Atkinson & Bartlett. Mt (GA?, NC, SC?, VA, WV), Pd (GA?, NC, SC?): roadsides, openings, forest edges, pastures; common (rare in VA). July-October. ME west to MI, south to n. FL, s. AL, and s. MO. [= K, Z; < O. biennis – RAB, G, S, WV; > O. biennis Linnaeus var. austromontana (Munz) Cronquist – C; > O. biennis var. nutans (Atkinson & Bartlett) Wiegand – F; > O. austromontana (Munz) Raven, Dietrich, & Stubbe – H, W; > O. biennis spp. austromontana Munz – X]
Oenothera oakesiana (A. Gray). RS west to MB, south to e. NC, SC, VA, PA, n. IN, n. IL, and s. MN. [= G, K, Z; = O. parviflora Linnaeus var. oakesiana (A. Gray) Fernald – C, F; = O. parviflora ssp. parviflora var. oakesiana (A. Gray) Fernald – X]


Oenothera perennis Linnaeus, Little Sundrops. Mt (NC, SC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA); bogs, sphagnum seeps, moist fields; uncommon (rare in DE, NC, and SC; rare in VA Coastal Plain). May-August. NS west to MB, south to w. NC, nw. SC, KY, and MO. [= RAB, C, G, K, W, X, WV; > O. perennis var. perennis – F; = Kneiffia perennis (Linnaeus) Pennell – S]

Oenothera pilosella Rafinesque, Midwestern Evening-primrose. Mt (VA, WV), Pd (VA), Cp (VA); moist fields, disturbed areas; rare. NH west to ON, south to s. VA, KY, n. AL, c. MS, and c. LA. O. sessilis (Pennell) Munz, treated by Straley (1977) as O. pilosella ssp. sessilis (Pennell) Staley, is best recognized as a species; it is restricted to West Gulf Coastal Plain. [= F, G, WV, X; = O. pilosella ssp. pilosella – C, K, V; > Kneiffia pratensis Small – S; > O. pilosella var. pilosella – X; = O. pilosella Linnaeus var. hirsuta Nuttall ex Torrey & A. Gray]

Oenothera riparia Nuttall, Riverbank Evening-primrose. Cp (NC, SC, VA?); tidal marshes; rare (NC Rare). June-July. Se. VA (?) south to se. NC and e. SC. Distinct from O. fruticosa. Present in the freshwater tidal portions of the Waccamaw, Northeast Cape Fear, Black, Greater Pee Dee, and Cape Fear (?) rivers. [= O. fruticosa – RAB; < O. fruticosa ssp. fruticosa – K, V; = Kneiffia riparia (Nuttall) Small – S; > O. tetragona Roth ssp. glauca (Michaux) Manz var. riparia (Nuttall) Munz – X]

Oenothera simulans (Small) W.L. Wagner & Hoch, Southeastern Gaura. Cp (GA, NC, SC); open woodlands, sandy fields, roadsides, primarily in the outer Coastal Plain; common. May-September. E. NC (Dare County) south to s. FL, west to e. TX, endemic to the Coastal Plain. [= U; = Gaura angustifolia Michaux – RAB, K, Q, S; > Gaura angustifolia var. angustifolia – X]

* Oenothera sinuosa W.L. Wagner & Hoch, Texas Gaura. Cp (GA, SC), Pd (GA); sandy fields, disturbed areas, and clearings; uncommon, native of further west. April-June. AR and OK south to s. TX, introduced eastward to SC and FL. [= U; = Gaura sinuata Nuttall ex Seringe – RAB, K, Q, X]

* Oenothera speciosa Nuttall, White Evening-primrose, Pink-ladies. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV); roadsides and fields, also cultivated as an ornamental; common (rare in Mountains), introduced from western US. May-August. [= RAB, C, F, K, W, X; = Hartmannia speciosa (Nuttall) Small – S]

Oenothera tetragona Roth var. brevistipata (Pennell) Munz. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (VA); dry forests and woodlands, roadsides; common. May-August. SC and KY, south to GA and MS. Should perhaps be considered more closely related to O. fruticosa (where placed in synonymy by Straley), if it is determined to be valid. [= G; > O. tetragona – RAB, C; = O. fruticosa Linnaeus ssp. fruticosa – H, K, V, W; = Kneiffia brevistipata Pennell – S; = O. tetragona ssp. tetragona var. brevistipata – X]

Oenothera tetragona Roth var. fraseri (Pursh) Munz, Appalachian Sundrops. Mt (GA, NC, SC, VA, WV), Pd (NC, SC, VA), Cp (VA); dry to moist forests and woodlands, roadsides; common. May-August. NY and PA, south to nw. SC and n. GA. This is the more montane and higher elevation variant of O. tetragona. [= F, G, X; = O. tetragona – RAB, C; > O. tetragona var. hybrida (Michaux) Fernald – F, WV; > O. tetragona var. latfolia (Rydberg) Fernald – F, WV; > O. fruticosa Linnaeus ssp. glauca (Michaux) Staley – H, K, V, W; > Kneiffia glauca (Michaux) Spach – S; > Kneiffia hybrida (Michaux) Small – S; > Kneiffia latfolia Rydberg – S; = O. tetragona ssp. glauca var. glauca – X]

Oenothera tetragona Roth var. tetragona, Northern Sundrops. Mt (NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, VA); dry forests and woodlands, roadsides; common. May-August. NL (Newfoundland) west to MI, south to e. VA and MO. [= F, = O. tetragona – RAB, C; = O. tetragona var. longistipitata (Pennell) Munz – F, WV; = O. tetragona var. tetragona – G; = O. fruticosa Linnaeus ssp. glauca (Michaux) Staley – H, K, V, W; = Kneiffia tetragona (Roth) Pennell – S; = O. tetragona ssp. tetragona var. tetragona – X – X]

Oenothera tetragona Roth var. velutina (Pennell) Munz. Cp (VA); dry sandy soils. Se. NY (Long Island) south to se. VA. Should perhaps be considered more closely related to O. fruticosa (where placed in synonymy by Straley), if it is determined to be valid. [= F, G, X; > O. tetragona – RAB, C; = O. fruticosa Linnaeus ssp. fruticosa – H, K, V, W; = Kneiffia velutina Pennell – S; = O. tetragona ssp. tetragona var. velutina – X]

Oenothera triloba Nuttall, Stemless Evening-primrose. Mt (GA, VA*); limestone glades (in GA), blackbelt prairies, disturbed areas (in VA); rare, perhaps only introduced in VA, though native into eastern KY and TN (GA Watch List). [= C, F, G, H, K, X; = Lavackia triloba (Nuttall) Spach – S]

* Oenothera villosa Thunberg ssp. villosa. Mt (VA, WV), Pd (VA); disturbed areas; uncommon (rare in WV), apparently naturalized in our area from an original distribution in the Great Plains. [= K, Z; = O. strigosa (Rydberg) Mackenzie & Bush – G; = O. biennis var. canescens Torrey & A. Gray – C, F; = O. strigosa (Rydberg) Mackenzie – B; Bush & Bush ssp. canovirens (Steele) Munz – X]


Oenothera macrocarpa Nuttall ssp. macrocarpa, Wingfruit Evening-primrose, occurs as a disjunct in c. TN. [= K; = O. missouriensis Sims – F; = O. macrocarpa Nuttall – C, G; = O. missouriensis Sims ssp. missouriensis – X; = Megaperium missouriense (Sims) Spach]

Oenothera serrata Nuttall, east to w. KY. [= U; = Calylophus serrulatus (Nuttall) Raven – K] {not yet keyed, synonymy incomplete} Oenothera speciosa Roth var. sharpii Munz. Known from the Eastern Highland Rim of TN, AL, and KY. [= O. tetragona – RAB, C; = O. tetragona var. tetragona – G; = O. fruticosa Linnaeus ssp. fruticosa – H, K, V, W; = O. tetragona ssp. tetragona var. sharpii – X]

Oenothera xenogaura W.L. Wagner & Hoch. Disjunct eastward in GA (Kartesz 1999). [= U; = Gaura drummondii (Spach) Torrey & A. Gray] {not yet keyed}
222. MYRTACEAE A.L. de Jussieu 1789 (Myrtle Family) [in MYRTALES]

A family of about 100 genera and 3500 species, trees and shrubs, nearly worldwide in tropical and subtropical areas.

Melaleuca Linnaeus 1767 (Cajeput, Bottlebrush, Punktree)

A genus of ca. 300 species (if circumscribed, as here, to include Callistemon), trees and shrubs, of tropical and subtropical Australia and nearby Asia and Pacific Islands.

1 Filaments red or crimson; flowers attached to the inflorescence axis singly ................................................................. M. cirrina
1 Filaments white, greenish, or yellowish; flowers attached to the inflorescence in triads .......................................................... M. quinquenervia


223. MELASTOMATAEAE A.L. de Jussieu 1789 (Melastome Family) [in MYRTALES]

A family of about 200 genera and 4500-5000 species, trees, shrubs, vines, and herbs, of tropical, subtropical, and warm temperate areas.

Rhexia Linnaeus 1753 (Meadow-beauty)

(by Richard J. LeBlond)


Identification notes: Measurements of the hypanthium are to the base of the calyx lobes.

1 Anthers straight, ca. 2 mm long.
2 Stem internodes with at least some hairs; leaves oblong, linear, or spatulate; petals yellow ..................................................... R. lutea
2 Stem internodes glabrous; leaves ovate, suborbicular, or widely elliptic; petals lavender-rose to pink.
3 Calyx segments acuminate-aristate; floral tube nearly glabrous except along the calyx lobes; surface of seeds pebbled ........... R. petiolata
1 Anthers curvate, 5-11 mm long.
4 Stem nodes and internodes glabrous; stem and foliage blue-green ............................................................ R. alifanus
4 Stem nodes and usually also the internodes hirsute; stem and foliage green.
5 Sepal lobes aristate, the awn-tip 0.5-1.5 mm long, and also with flaring, yellowish, stiff hairs 3-5 mm long ...................... R. aristosa
5 Sepal lobes obtuse to acuminate, not aristate, the hairs shorter and not yellowish or stiff.
7 Leaves twisted at base, borne in a vertical plane; four stem faces subequal, the angles narrowly winged; mature hypanthium neck shorter than body; calyx lobes 1.5-2 mm long; anthers 4-5 mm long ......................... R. salicifolia
7 Leaves not twisted at base, borne more or less horizontally; four stem faces markedly unequal, the angle wings inconspicuous or absent; mature hypanthium neck as long as or longer than body; calyx lobes 2-4 mm long; anthers 5-10 mm long.
8 Petals lavender-rose, (1-) 1.5-2 (2.5) cm long; mature hypanthium 10-14 mm long, with glandular hairs; marginal nerves of leaf abaxial surface either absent or obscure and discontinuous; anthers 7-10 mm long ........................................... R. cubensis
8 Petals white to pink (-rose-purple), (7-) 0.9-1.4 cm long; mature hypanthium 6-10 mm long, glabrous or sparsely glandular-hairy; marginal nerves of leaf abaxial surface prominent; anthers 5-8 mm long .............................................................. R. mariana var. exalbida
6 Leaves (5-) 7-20 (35) mm wide, lanceolate, elliptic, or ovate.
9 Four stem faces at mid-stem markedly unequal, one pair of opposite faces broader, convex, darker green, the narrower pair concave or flat, pale.
10 Mature hypanthium 6-10 (-11) mm long, glandular-setose; petals 12-15 (-18) mm long, glabrous on the lower surface; anthers 5-8 mm long ................................................................................................................. R. mariana var. mariana
10 Mature hypanthium (9-)10-15 (-20) mm long, glabrous or glabrate; petals (18-) 20-25 mm long, glandular-hairy on the lower surface (best seen in bud); anthers 8-11 mm long ......................................................................................... R. nashii
9 Four stem faces at mid-stem about equal, almost flat, the angles sharp or winged.
11 Roots tuberous; stem angles at mid-stem conspicuously winged; hypanthium 7-10 mm long, the neck shorter than the body...... R. virginica
11 Roots not tuberous; stem angles sharp to narrowly winged; hypanthium 10-13 mm long, the neck as long as or longer than the body.
12 Hypanthium 7-9 (-10) mm long; petals 8-12 mm long; seeds irregularly ridged, especially along the crest [west of the Appalachians]...................................................................................................................... R. interior
12 Hypanthium (9-) 10-12 mm long; petals 10-25 mm long; seeds papillate, the papillae in concentric lines [from NJ to SC east of the Appalachians] .................................................. R. ventricosa

Alternate Key based largely on vegetative characters

1 Stem internodes glabrous.
2 Stem nodes as well as internodes glabrous, leaf margins entire or remotely low-toothed apically, glabrous ........................................ R. alifanus
3 Stem nodes hirsute, leaf margins toothed, the teeth often tipped with hairs.
4 Longest leaves 1.5 (-2) cm long, ovate or suborbicular ................................................................. R. nuttallii or R. petiolata
5 Longest leaves > 2 cm long, lanceolate, elliptic, or ovate.
6 Rhizomes present, roots not tuberiferous or spongy-thickened .............................................. R. mariana var. ventricosa
7 Rhizomes absent, roots tuberiferous or spongy-thickened.
8 Stem leaves gradually reduced upward .................................................. R. virginica
9 Stem leaves gradually lengthening from the base to mid-stem .................................................. R. aristosa
10 Rhizomes absent, roots tuberiferous or spongy-thickened.
11 Mature hypanthium 6-10 mm long, glabrous or sparsely glandular-hairy; petals white, 1.2-1.5 cm long ........ R. mariana var. exalbida
12 Hypanthium (9-) 10-12 mm long; petals 10-25 mm long; seeds papillate, the papillae in concentric lines [from NJ to SC east of the Appalachians] .................................................. R. ventricosa

Rhexia alifanus Walter, Yellow Meadow-beauty. Pine flatwoods and savannas, pocosins borders, more able to tolerate merely moist soils than other Rhexia species. May-September. A Southeastern Coastal Plain species: e. NC south to n. peninsular FL and west to se. Texas (Singhurat, Mink, & Holmes 2010). Our tallest and showiest Rhexia: the unbranched (unless injured), wandlike stems, with strongly ascending, bluish-green, generally entire leaves make this species unmistakeable. [=GW, K, RAB, S, WH, Z]

Rhexia aristosa Britton, Awned Meadow-beauty, Bristly Meadow-beauty. Clay-based Carolina bays, depression meadows, and limesink ponds (dolines). June-September. This species has a very local and disjunct range extending (strictly on the Coastal Plain) from NJ south to AL. The long yellowish bristles at the summit of the calyx/hypanthium are diagnostic. R. aristosa × virginica is known from the Coastal Plain of NJ (Snyder 1996). [= C, F, G, GW, K, RAB, S, Z]

Rhexia cubenensis Grisebach, West Indies Meadow-beauty. Limesink ponds (dolines). June-September. Se. NC south to s. FL and west to sw. MS; also in the West Indies. [=GW, K, RAB, S, WH, Z]

Rhexia interior Pennell. Moist to wet areas, ditches, prairies. S. IN, s. IL, s. MO, and se. KS south to c. AL, c. MS, n. LA, and se. OK. [=F, G; = R. mariana Linnaeus var. interior (Pennell) Kral & Bostick – GW, K, Z; < R. interior – C]

Rhexia lutea Walter, Yellow Meadow-beauty, Golden Meadow-beauty. Wet pine flatwoods and savannas, seepage slopes, and bogs. April-July (and later in response to growing-season fire). A Southeastern Coastal Plain species: e. NC south to ne. FL and Panhandle FL, and west to se. TX. The only yellow-flowered Rhexia and also our bushiest species. [=GW, K, RAB, S, WH, Z]

Rhexia mariana Linnaeus var. exalbida Michaux, White Meadow-beauty. Wet pine flatwoods and savannas, wet meadows, ditches, and wet roadsides. June-September. NC south to FL and west to MS. Merging into R. mariana var. mariana from FL westward, var. exalbida appears quite distinct in NC. The white flowers and linear leaves are diagnostic. [=RAB; ? R. lanceolata – S; < R. mariana var. mariana – GW, K, Z; < R. mariana – WH]

Rhexia mariana Linnaeus var. mariana, Maryland Meadow-beauty, Dull Meadow-beauty, Pale Meadow-beauty. Pine flatwoods, wet woods, bog margins, ditches, wet roadsides, often weedy. May-October. E. MA south to s. FL, west to TX, and north to s. IN and IL. [=G, W, RAB; < R. mariana var. mariana – F; GW, K, Z (also see R. mariana var. exalbida); > R. mariana var. leiosperma Fernald & Griscom – F; ? R. delicatula Small – S; < R. mariana – WH, WV]
Rhexia nashii Small, Hairy Meadow-beauty, Maid Marian. Wet pine flatwoods and savannas; pondshores, bogs, marshes, ditches, wet roadsides. May-October. Primarily a Southeastern Coastal Plain species: e. VA south to s. FL and west to se. LA. [= GW, K, S, WH, Z; = R. mariana var. purpurea Michaux – F, G, RAB]

Rhexia nuttallii C.W. James, Nuttall's Meadow-beauty. Pine flatwoods, bogs. Coastal Plain of se. GA west to FL Panhandle, south to s. peninsular FL. [= GW, K, WH, Z; = R. serrulata Nuttall – S]

Rhexia parviflora Chapman, Small-flowered White Meadow-beauty, Apalachicola Meadow-beauty. Limesink pond margins. Sw. GA (Mitchell County) south into Panhandle FL. [= GW, K, S, WH, Z]

Rhexia petiolata Walter, Ciliate Meadow-beauty, Short-stemmed Meadow-beauty. Wet pine flatwoods and savannas, pocosin borders, and ditches. June-September. May-October. A Southeastern Coastal Plain endemic: se. VA south to s. FL and west to se. TX. The flowers are sessile, the petals ascending. [= C, G, GW, K, RAB, WH, Z; = R. ciliosa Michaux – F, S]

Rhexia salicifolia Kral & Bostick, Willowleaf Meadow-beauty, Panhandle Meadow-beauty. Drawdown zones of Coastal Plain depression ponds and interdune swales. Sw. GA and FL Panhandle west to s. AL (Jensen 2007). [= GW, K, WH, Z]

Rhexia ventricosa Fernald & Griscom, Swollen Meadow-beauty. Pine flatwoods and savannas, clearings in cypress-hardwood swamps, ditches, wet roadsides. June-September. S. NJ south to e. SC. This taxon is closely related to R. interior Pennell, which is distributed west of the Appalachians. [= F, RAB; = R. mariana Linnaeus var. ventricosa (Fernald & Griscom) Kral & Bostick – GW, K, WH, Z; = R. interior Pennell – C]


230. STAPHYLEACEAE Martynov 1820 (Bladdernut Family) [in CROSSOSOMATALES]

A family of 2 genera and about 45-50 species, trees and shrubs, of mainly temperate Northern Hemisphere, especially e. Asia. References: Spongberg (1971)-Z; Simmons in Kubitzki, Bayer, & Stevens (2007).

Staphylea Linnaeus 1753 (Bladdernut)

A genus of 23 species, trees and shrubs, mainly of temperate Eurasia and e. North America, but extending into Central and South America. References: Simmons in Kubitzki, Bayer, & Stevens (2007).

Identification notes: The opposite, trifoliolate leaves with serrulate margins are diagnostic.

Staphylea trifolia Linnaeus, Bladdernut. Nutrient-rich bottomland forests, extending upslope over calcareous or mafic rocks. April, September-October. QC west to MN, south to sw. GA, Panhandle FL, n. AL, n. MS, and OK. [= RAB, C, F, G, GW, K, S, WH, WV, Z]

239. ANACARDIACEAE R. Brown 1818, nom. cons. (Cashew Family) [in SAPINDALES]

A family of about 70-81 genera and about 800-875 species, trees, shrubs, lianas, and rarely herbs, of tropical, subtropical, and temperate regions. Our representatives are all classed in subfamily Anacardioideae (Pell et al. 2011). References: Pell et al. in Kubitzki (2011); Barkley (1937).
<table>
<thead>
<tr>
<th></th>
<th>Leaves even-pinnate</th>
<th>Leaves odd-pinnate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Fruits both red and glabrous.</td>
<td>Fruits not simultaneously red and glabrous.</td>
</tr>
<tr>
<td>3</td>
<td>Fruits white or yellow, glabrous or puberulent (the hairs not glandular); foliage and stems containing contact poisons; inflorescences openly branched, axillary.</td>
<td>Fruits red, glandular pubescent; foliage and stems lacking contact poisons; inflorescences dense, either terminal or lateral on last year's growth.</td>
</tr>
<tr>
<td>4</td>
<td>Schinus</td>
<td>Rhus</td>
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**Cotinus** P. Miller 1754 (Smoketree)


1 Leaves elliptic, to 10 cm long; [planted tree, rarely persistent]............................................................................................................ C. coggygria
1 Leaves obovate, to 20 cm long; [native tree of calcareous habitats] ........................................................................................................... C. obovata

* **Cotinus coggygria** Scopoli, European Smoketree. Suburban areas; native of Europe and Asia. *C. coggygria* is planted as an ornamental, and is reported as naturalized in various states in ne. United States. There is little evidence of its true naturalization or persistence in our area. [= K1, K2]

* **Cotinus obovata** Rafinesque, American Smoketree. Limestone woodlands and glades. Se. TN (Cumberland Plateau) (Chester, Wofford, & Kral 1997), nw. GA, and n. AL west to OK and e. and sc. TX. A small tree of limestone woodlands and glade margins, occasionally planted as an ornamental tree. [= C. obovatus Rafinesque – K1, K2, orthographic variant; = C. americanus Nuttall – S]

**Pistacia** Linnaeus 1753 (Pistachio)


* **Pistacia chinensis** Bunge, Chinese Pistachio. Uncommonly planted, rarely persistent or naturalizing; native of China, the Philippines, and Taiwan. March-April. AL, GA. [= K1; > P. chinensis ssp. subintegerrima (Stewart) Rech. f. – K2]

**Rhus** Linnaeus 1753 (Sumac)


**Identification notes:** Two hybrids have been documented to occur naturally in our area: *Rhus ×pulvinata* Greene (glabra × typhina) and *Rhus ×ashei* (Small) Greene (glabra × michauxii). They are intermediate between their parents. For instance, *R. ×ashei* has sparsely pubescent leaves and stems, slight winging of the rachis between the terminal leaflets, potentially greater stature than *R. michauxii*, and leaflets with a length/width ratio of 2.5-3. Hardin & Phillips (1985b) discuss other natural and artificial hybrids in *Rhus*.

1 Leaves 3-foliolate; shrub to 2 m tall; inflorescence of small lateral and terminal clusters; [subgenus Lobadium]..............................................................
1 Leaves (5-) 7-31-foliolate; shrub or small tree, to 12 m tall; inflorescence of dense, terminal panicles; [subgenus Rhus].
2 Rachis of the leaf winged between each pair of adjacent leaflets; stems and petioles puberulent; leaflets entire to remotely toothed.
3 Leaflets 11-25, attenuate to base, 2-9 cm long, 1-2 cm wide, either >3× as long as wide or < 4 cm long; leaflet margins entire (rarely serrate); leaflet apex rounded, obtuse, acute, or acuminate (often at least the more basal leaflets with an obtuse tip).........................................................
3 Leaflets 5-13, rounded to base, 4-9 cm long, 1.5-5 cm wide, > 2.5× as long as wide; leaflet margins entire or serrate; leaflet apex acute or acuminate tip.................................................................
4 Leaflets densely pubescent (rarely sparsely pubescent); short shrubs to 1 m tall; stems densely long-pubescent; rachis of the leaf often winged terminally; leaflets mostly ovate, averaging about 2× as long as wide, acute.................................................................
4 Leaflets densely pubescent (rarely sparsely pubescent); short shrubs to 1 m tall; stems densely long-pubescent; rachis of the leaf often winged terminally; leaflets mostly ovate, averaging about 2× as long as wide, acute.................................................................
5 Stems essentially glabrous; pubescence of the fruit short and blunt-tipped.........................................................
5 Stems densely long-pubescent; pubescence of the fruit long and pointed.........................................................

**Rhus aromatica** Aiton var. *aromatica*. Fragrant Sumac, Squawbush. Rocky, rather dry, woodlands, usually over mafic rocks (such as gabbro or diabase) or calcareous rocks, less commonly in sandy soils. Late February-early May; late April-June. The species ranges throughout much of temperate North America; var. *aromatica* is the most eastern component of the complex, distributed from NH, ON, and MN south to Panhandle FL and TX. The foliage of *R. aromatica* bears some superficial
resemblance to *Toxicodendron pubescens*. [= C, F, G, K, WV; < *R. aromatica* – RAB, W, WH; = *Schmaltzia crenata* (P. Miller) Greene – S] *Rhus copallinum* Linnaeus var. *copallinum*, Winged Sumac, Flameleaf Sumac. Sandhills, dry woodlands, maritime thickets (especially from VA northward), old fields, roadsides. S. NY south to s. FL, mainly on the Coastal Plain and lower Piedmont. The Linnaean epithet “*Copallinum*” is grammatically a noun in apposition rather than an adjective, and therefore does not change grammatical gender. [= K; < *R. copallina* – RAB, W; < *R. copallinum* – C, G, WH; = *R. copallina* var. *copallina* – F; > *R. copallinum* – S; > *R. leucanthe* Jacquin – S; > *R. obtusifolia* (Small) Small – S] *Rhus copallinum* Linnaeus var. *latifolia* Engler, Eastern Winged Sumac. Rocky glades, dry woodlands. S. ME to n. IL, south to c. GA, AL, LA, and e. TX. [= K; < *R. copallina* – RAB, W; < *R. copallinum* – C, G, S; = *R. copallina* var. *latifolia* – F] *Rhus glabra* Linnaeus, Smooth Sumac. Disturbed areas, clearings, roadsides, woodlands. Late May-July; June-October. ME west to BC, south to Panhandle FL, TX, CA, and beyond. [= RAB, C, G, K, S, WH, WV, WV; > *R. glabra* var. *glabra* – F] *Rhus michauxii* Sargent, Michaux’s Sumac, Dwarf Sumac. In the fall line sandhills characteristically in submesic, loamy swales, usually associated with such species as *Paspalum bifidum, Helianthus divaricatus, Tridens carolinianus, Rhus copallinum, Anthaenantia villosa, Gymnopogon* sp., and *Aristida lanosa*; in the eastern Piedmont on sandy soils derived from granite; in the central Piedmont on clayey soils derived from mafic rocks such as gabbro or mafic Carolina slates, probably all of its habitats (formerly) in frequently burned situations. June; August-September. Rare and scattered (though formerly more common) from s. VA south to GA; disjunct in Alachua County, FL (just south of area). Large populations were found in sc. VA (Nottoway and Dinwiddie counties) in frequently burned military artillery “impact areas” (Fleming & Ludvig 1996). Barden & Matthews (2004) present a detailed account of its discovery by André Michaux in 1794 in what is now Union County, NC. [= RAB, K, S; = *R. pumila* Michaux] *Rhus typhina* Linnaeus, Staghorn Sumac. Roadsides, old pastures, thickets, clearings, rock outcrops, barrens. May-June; June-September. NS and NB west to MN, south to n. GA, AL, MS, and KS. The apparently older epithet “*hirta*” was rejected in 1999. The species, especially in its cut-leaved forms, forma *laciniata* (Wood) Rehder and forma *dissecta* Rehder, is very popular in Europe as a cultivated ornamental. [= RAB, C, F, G, K, W, WH, WV; = *R. hirta* (Linnaeus) Sudworth] *Schinus* Linnaeus 1753 (Brazilian-pepper) A genus of about 15 species, shrubs and trees of the tropics. References: Pell et al. in Kubitzki (2011). * Schinus terebinthifolius* Raddi, Brazilian-pepper. Disturbed areas, especially moist or wet; native of Brazil and Paraguay. A noxious invasive in the FL peninsula. [= *S. terebinthifolius* Raddi – GW, WH, orthographic variant; > *S. terebinthifolius var. raddianus* Engl. – K] *Toxicodendron* P. Miller 1754 (Poison Ivy, Poison Oak, Poison Sumac) A genus of about 10-15 species, trees and shrubs, primarily temperate, of North America, n. South America, Indonesia, and e. Asia. References: Gillis (1971)=Z; Pell et al. in Kubitzki (2011). 1 Leaflets 7-13, entire; small tree ................................................................................................................................................................... *T. vernix* 1 Leaflets 3, toothed, lobed, or entire; shrub or vine 2 Fruits pubescent or papillose; leaflets entire, coarsely toothed, undulate, or round-lobed; lower surfaces of leaflets either velvety puberulent, sometimes becoming glabrate in age (*T. pubescens*) or glabrous (glabrescent or rarely pilose beneath) but with prominent tufts of tannish hairs present in the vein axils (*T. radicans* ssp. *radicans*). 3 Leaves sparsely pubescent (rarely pilose beneath), the apex and the lobes (if present) generally acute to acuminate; drupes papillos, scabrous or puberulent; plant a high-climbing vine or stoloniferous shrub; [of mesic, swampy, or dry habitats] .................................................. ................................................................................................................................. *T. radicans* var. *radicans*
3 Leaves velvety puberulent (sometimes becoming glabrate in age), the apex and the lobes (if present) generally obtuse to broadly acute; drupes pubescent (becoming glabrate); plant a stoloniferous shrub; [of dry habitats, especially sandhills]...........................................Toxicodendron pubescens

2 Fruits glabrous (or very sparsely pubescent); leaflets coarsely toothed or notched (rarely entire); lower surfaces of leaflets glabrous to pubescent, but without tufts of tanish hairs in the vein axils.

4 Leaves densely pilose and velvety on the lower surface; leaves pubescent on the upper surface; pubescence of the leaves erect..................Toxicodendron radicans var. pubens

4 Leaves glabrous to sparingly strigose on the lower surface; leaves glabrous on the upper surface; pubescence of the leaves appressed.

5 Leaflets suborbicular or broadly ovate, nearly as wide as long; petiole glabrous (rarely glabresecnet); plant a shrub, the stems upright, entirely lacking aerial roots, not vining; fruits (3-) 4-7 mm in diameter ..............................................Toxicodendron rydbergii

5 Leaflets ovate to lanceolate; petiole puberulent to densely pubescent; plant a shrub or vine, the stems upright or twining; fruits 2.5-5.5 mm in diameter ..........................................................Toxicodendron radicans var. negundo

Toxicodendron pubescens P. Miller, Poison Oak. Dry woodlands, around dry rock outcrops in the Piedmont and Mountains, especially prevalent in sandhills. Late April-May; August-October. Primarily Southeastern: NY (Long Island) south to n. FL, west to e. TX, inland to WV, e. TN, c. TN, se. MO, and s. KS. The nomenclatural confusion may still not be resolved. [= C, K, WH; = Rhus toxicodendron – RAB, F, G; = T. toxicodendron (Linnæus) Britton – S; = T. toxicarium Gillis – W, Z; = T. quercifolium (Michaux) Greene]

Toxicodendron radicans (Linnæus) Kuntze var. negundo (Greene) Reveal, Midwestern Poison Ivy. In a wide range of habitats, including mesic forests, rock outcrops, open areas, and disturbed ground. Late April-May; August-October. NY west to MI, MN, and NE, south to sw. VA, KY, AR, and TX, almost entirely in or west of the Appalachians. In our area seemingly mostly in the New River drainage; to be expected in nw. NC. [= C = Rhus radicans var. vulgaris (Michaux) A.P. de Candolle forma negundo (Greene) Fernald – F, G; = T. radicans sp. negundo (Greene) Gillis – K, Z]

Toxicodendron radicans (Linnæus) Kuntze var. pubens (Engelmann ex S. Watson) Reveal. Xeric limestone sites. S. IL and MO south to LA and s. TX; disjunct eastward in c. KY, c. TN, and w. VA (Virginia Botanical Associates 2006). [= T. radicans – GW, W; = T. radicans sp. pubens (Engelmann ex S. Watson) Reveal. – K, Z; = Rhus radicans]

Toxicodendron radicans (Linnæus) Kuntze var. radicans, Eastern Poison Ivy. In a wide range of habitats, including mesic forests, rock outcrops, swamp forests, brackish marshes, open areas, disturbed ground, usually in more mesic to hydric sites than T. pubescens, and particularly common in areas with fertile soils, such as bottomlands or over calcareous rocks or calcareous sands (as in maritime forests). Late April-May; August-October. Var. radicans is the typical poison ivy of the Atlantic and Gulf Coastal Plains, rarely found west of the Appalachians. It ranges from NS south to s. FL (and the Bahamas), west to e. TX, inland to VT, c. PA, WV, KY, and AR. It is normally a vine, climbing by adventitious roots, and can attain diameters of 10 cm and climb to the crowns of forest trees. It can also resemble T. pubescens in habit, producing numerous meter-high upright stems from rhizomes. T. radicans is ubiquitous in our area, absent only from the high mountains of NC. [= C; = Rhus radicans Linnaeus – RAB; > Rhus radicans var. radicans – F, G, WV; > Rhus radicans vulgaris (Michaux) A.P. de Candolle forma vulgaris – F, G; < T. radicans – GW, S, W, WH; = T. radicans sp. radicans – K; > Rhus radicans vulgaris (Michaux) A.P. de Candolle – WV]

Toxicodendron rydbergii (Small ex Rydberg) Greene, Western Poison Ivy. Acid pine-oak forests and woodlands at moderate elevations. NS west to BC, south to New England, NY, n. OH, n. IL, IA, w. KS, w. TX, AZ, and OR; disjunct in the Appalachians in PA, WV, and VA. Reported for NC by Gillis (1971), but the location (Cumberland Co., in the fall-line Sandhills), does not seem plausible {investigate further with specimen}. [= C, K, Z; = Rhus radicans var. rydbergii (Small) Rehder – F, G, WV; = T. radicans (Linnæus) Kuntze var. rydbergii (Small ex Rydberg) Erskine]

Toxicodendron vernix (Linnæus) Kuntze, Poison Sumac, Thunderwood. In peaty habitats, in the Coastal Plain frequent in streamhead pocosins and sandhill seepage bogs, in the mountains in bogs. May-early June; August-September. NS west to MN, south to c. peninsular FL and TX. The leaf rachis and leaflet petiolules are usually a dark red or maroon color. The leaves turn a very attractive shade of orange-red in autumn. [= C, GW, K, S, W, WH; = Rhus vernix Linnæus – RAB, F, G, WV]

240. SAPINDACEAE A.L. de Jussieu 1789 (Soapberry Family) [in SAPINDALES]

A family of about 133 genera and 1465 species, trees, shrubs, vines, and herbs, primarily of tropical (rarely temperate) regions of the Old World and New World. APG III (2009) and others have recently included Hippocastanaceae and Aceraceae in the Sapindaceae. References: Buerki et al. (2009).
SAPINDACEAE

3 Leaves pinnately or biternately compound.
4 Vine; leaves biternately compound; [subfamily Sapindoideae] ................................................................. 3. Cardiospermum
4 Tree or shrub; leaves pinnately compound.
5 Leaflets entire; fruit drupe-like; [native, of coastal hammocks of se. SC southward]; [subfamily Sapindoideae] ....... 5. Sapindus
5 Leaflets coarsely toothed; fruit a samara or inflated "pod;" [native or alien, collectively widespread].
6 Fruit winged; [native]; [subfamily Hippocastanoideae] ..................................................................................... 1. Acer
6 Fruit inflated; [alien ornamental, rarely escaped]; [subfamily Sapindoideae] ...................................................... 4. Koelreuteria

I. Acer Linnaeus 1753 (Maple)


Section Parviflora, Series Caudata: spicatum
Section Palmata, Series Palmata: palmatum
Section Negundo, Series Negundo: negundo
Section Rubra: drumondii, rubrum, saccharinum
Section Macrantha: pensylvanicum
Section Platanoidae: platanoides, campestre
Section Acer, Series Acer: pseudoplatanus
Section Acer, Series Saccharodendron:
Section Ginnala: ginnala

1 Leaves compound, divided into 3-7 (-9) leaflets; [section Negundo].
2 Twigs glabrous .................................................................................................................................................. A. negundo var. negundo
2 Twigs puberulent ............................................................................................................................................... A. negundo var. texanum
1 Leaves simple, generally shallowly to deeply 3-5 (-7) lobes.
3 Leaves not toothed, or often with a few rounded, coarse, and irregular teeth on the principal lobes; these teeth 0-5 per principal lobe; sinuses between the principal leaf lobes generally broadly rounded, the sinus broader than deep.
4 Petioles and young twigs exuding milky sap when broken; inflorescence peduncled, the flowers on ascending, moderately stout pedicels; paired samaras held at >135° from one another; [section Platanoidae]; [alien].
5 Leaves 3-5-lobed, 4-8 (-10) cm wide .............................................................................................. A. campestre
5 Leaves 5-7-lobed, 10-18 cm wide .................................................................................................................... A. platanoides
4 Petioles and young twigs exuding clear sap when broken; inflorescence sessile, the flowers on drooping, filiform pedicels; paired samaras held at <110° from one another; [section Acer, Series Saccharodendron]; [native, also widely planted.
6 Leaves pale, grayish, silvery-gray, or strongly glaucous beneath, glabrous, pubescent on the veins, or pubescent across the surface; leaf sinuses on either side of the terminal lobe deep, the two sides of each sinus forming an angle of > 70 degrees (the terminal lobe typically with parallel margins, or even narrower toward the base than toward the tip); leaves usually planar, but sometimes with drooping lobe tips, especially in A. floridanum, and also in sun-exposed individuals of A. floridanum or A. saccharum.
7 Leaves small, (3-5-) avg. 8 (-11) cm broad; leaf undersurface usually pubescent; fruits 20-25 mm long; medium to large trees; bark gray, smooth and beech-like, becoming irregularly furrowed or plated in large individuals; [primarily of the Coastal Plain and Piedmont, extending into the Mountains in GA] A. floridanum
7 Leaves large, (8-) avg. 15 (-20) cm broad; leaf undersurface glabrous or pubescent only on the veins; fruits 25-30 mm long; large trees; bark grayish-brown, with loose-edged plates; [primarily of the Mountains and upper Piedmont] A. saccharum
6 Leaves green beneath, moderately to densely pubescent across the surface; leaf sinuses on either side of the terminal lobe shallow, the two sides of each sinus forming an angle of > 90 degrees (the terminal lobe typically broadly triangular); leaves sometimes planar, more usually with drooping lobe tips.
7 Leaves small, (3-) avg. 6 (-11) cm broad; small trees, often multi-trunked and crooked; bark whitish (in part because of dense growth of crustose lichens), becoming cracked and blackened on larger stems; [primarily of the Piedmont, extending into the lower Mountains in w. SC and n. GA] A. leucoderme
8 Leaves large, (8-) avg. 15 (-20) cm broad; large trees, single-trunked; bark dark brown or blackish, becoming furrowed in large individuals; [primarily of the Mountains and westward] A. nigrum

3 Leaves finely to coarsely toothed, the toothing often regular, the teeth 8-50 per principal lobe; sinuses between the principal leaf lobes generally sharp, forming a definite angle (or if rounded, then the sinus much deeper than broad).
9 Leaves deeply lobed, the two sinuses on either side of the central lobe deep and narrow, approaching the midrib, the terminal lobe thus narrower at its base than at its middle; flowers either with petals (A. palmatum) or without petals (A. saccharinum).
10 Leaves green beneath (or purple in many forms); main leaf lobes 5-9; these main lobes merely toothed or in some cultivars variously further divided; [small exotic tree, commonly planted and weakly naturalizing]; [section Palmata] A. palmatum
10 Leaves silvery white beneath; main leaf lobes 3-5, these main lobes with coarse teeth and smaller lateral lobes; [large native tree (also extensively planted)]; [section Rubra] A. saccharinum
9 Leaves shallowly lobed, the two sinuses on either side of the central lobe broadly wedge-shaped, not approaching the midrib, the terminal lobe thus broadest at its base and progressively (though often irregularly) narrowing toward the tip; flowers with petals.
11 Winter buds stalked, with 2-4 valvate scales; inflorescence an elongate drooping raceme or erect panicle; petals green to bright yellow, 2-10 mm long; fruits maturing in midsummer to autumn; leaves green beneath, shrub, small tree, or medium tree (to 35 cm DBH).
12 Bark with narrow white stripes on a green background (best seen on stems 3-10 cm in diameter); leaf blades 12-20 (-30) cm long and wide, finely serrate (5-10 teeth per cm), pubescent beneath with yellow to orange hairs 0.1-0.3 mm long (as seen at 10× magnification); inflorescence a drooping raceme; [section Macrantha] A. pensylvanicum
12 Bark brownish, never conspicuously striped; leaf blades 8-12 (-14) cm long and wide, coarsely serrate (2-3 teeth per cm), pubescent beneath with whitish hairs 0.3-1.0 mm long (as seen at 10× magnification); inflorescence an erect panicle; [section Parviflora] .............................................................. A. spicatum

11 Winter buds sessile, with 4-10 imbricate scales; inflorescence either a drooping panicle (A. pseudoplatanus) or a sessile or sub sessile cluster or fascicle; fruits maturing either in midsummer to autumn (A. pseudoplatanus) or in spring; leaves slightly to strongly glaucous-whitened beneath; medium to large tree (to 100 cm DBH).

13 Inflorescence a drooping panicle, flowering in May-June, fruiting August-September (and persisting overwinter); petals yellowish-green; leaf blades 8-17 cm long; [section Acer, series Acer] ......................................................... A. pseudoplatanus

13 Inflorescence a sessile or sub sessile cluster or fascicle, flowering in January-March, fruiting April-July (and dropping); petals red (rarely yellowish), 1-3 mm long; leaf blades 10 cm long; [section Rubra].

14 Mature leaves densely white tomentose (fely-pubescent) beneath; petioles usually with white tomentum; mature samaras 2.7-5 cm long ................................................................. A. saccharum

14 Mature leaves glabrous to densely pubescent (but not white-tomentose) beneath; petioles usually glabrous; mature samaras 1.5-3 cm long.

15 Leaves (3-) 5 (-9)-lobed, the central lobe 4-8 cm long, the 2 upper lateral lobes 2-5 cm long; leaf base generally cordate (rarely rounded); leaves 7-18 cm wide; [widespread, in nearly all habitats] ........................................... A. rubrum var. drummondii

15 Leaves unlobed or 3 (-5)-lobed, the central lobe 1-5 cm long, the lateral lobes (if present) 0.5-2 (-3) cm long; leaf base broadly cuneate to rounded or subcordate; leaves 2-10 cm wide; [primarily of wetlands, especially in the Coastal Plain] ....... A. rubrum var. trilobum

* Acer campestre Linnaeus, Hedge Maple. Suburban woodlands, planted and persistent and weakly spreading; native of Europe and w. Asia. Reported to be "occasionally spreading from cultivation to moist, rocky, disturbed woods" in sc. and se. PA (Rhoads & Klein 1993). Infraspecific taxa are often recognized in its native area. [= C, F, G, K, Z]

Acer floridanum (Chapman) Pax, Southern Sugar Maple, Florida Maple. Bottomland forests, mesic slopes, especially common over mafic or calcareous rocks, but not at all limited to such situations. April-May; June-October. S. VA, w. KY, se. MO, e. OK, c. OK, and n. TX, south to c. peninsular FL and e. TX. It is widely planted in southern cities and towns as a street tree. Ward (2004b) discusses the reasons for accepting *A. negundo* as the correct name for this species; the Michauxian name *A. barbatum* is associated with specimens that are demonstrably *A. saccharum*. [= A. saccharum ssp. floridanum (Chapman) Desmarais – RAB, WH, Z; = A. barbatum Michaux – C, K; > A. barbatum var. barbatum – F, G; > A. barbatum var. longii (Fernald) Fernald – F, G; = Saccharodendron floridanum (Chapman) Nieuwland – S]

* Acer ginnala Maximowicz, Amur Maple. Mt (WV), Ip (KY): disturbed areas; rare, native of e. Asia. Reported as "cultivated and escaped" in s. PA (Rhoads & Klein 1993). Infraspecific taxa are often recognized in its native area. [= F, K, Z] (not yet keyed)

Acer leucoderme Small, Chalk Maple. Rocky slopes and bluffs, particularly over mafic or calcareous rock, on the Gulf Coast in floodplains. March-April; May-September. A species of se. North America, primarily of the Piedmont from NC to AL, less commonly in the Ridge and Valley of se. TN (Chester, Wofford, & Kral 1997), low Blue Ridge of w. NC and adjacent TN and GA, Coastal Plain of Panhandle FL, GA, AL, MS, LA, and se. TX, and in sw. AR and se. OK. The leaves, at least those on lower and inner branches, tend to dry a tawny color and remain on the tree until spring, reminiscent of beech. [= K, W; = A. saccharum ssp. leucoderme (Small) Desmarais – RAB, WH, Z; = Saccharodendron leucoderme (Small) Nieuwland – S]

Acer negundo Linnaeus var. negundo. Eastern Box Elder, Ash-leaved Maple. Riverbanks, swamps, bottomlands, also upslope on calcareous substrates. March-April; May-October. The species, broadly treated, ranges nearly across North America, including well into the arid west along rivers. Var. *negundo* occurs from NB west to MB, south to c. peninsular FL and TX; also allegedly in nw. United States. *A. negundo* often grows on the banks of rivers, leaning out over the water at a 45 degree angle. The leaves can resemble poison ivy (*Toxicodendron radicans*), which has alternate leaves. The coarse toothing (approaching lobing) distinguishes it from any of our ashes (*Acer*). The leaves can also resemble the leaves of box elder. [section Rubra].

Acer negundo Linnaeus var. texanum Pax, Texas Box Elder. Riverbanks and bottomlands. April; June-October. Sw. NC, KY, MO, KS, and NM south to AL, MS, and TX. The status of this variety in our area is poorly known at present. [= C, F, G, K, Z; < A. negundo – RAB, GW, W; < Negundo negundo (Linnaeus) Karsten – S; < Negundo aceroides (Linnaeus) Moench]


* Acer palmatum Thunberg, Japanese Maple. Suburban woodlands; native of e. Asia. April; August-September. Frequently planted in its numerous cultivars. Infraspecific taxa are recognized in its native area. It is also reported as escaped in the DC area (Shetler & Orli 2000). [= K, Z]
Acer pensylvanicum Linnaeus, Striped Maple. Dry to mesic forests. May; June-September. NS west to MB, south to w. NC, nw. SC, ne. GA, e. TN, WI, and MN. The prominently striped bark of this common, mid-elevation understory tree is unmistakable. [= RAB, C, F, G, K, S, W, Z]

* Acer pictum Thunberg. Moist forests; native of Eurasia. [= A. mono Maximowicz] [not yet keyed]


* Acer pseudoplanatus Linnaeus, Sycamore Maple. Suburban woodlands; native of Europe. Planted widely in our area as a street and yard tree, especially in the mountains. It may be naturalized more extensively in our area; northward it is a noxious weed tree. [= C, G, K, Z; = Acer pseudo-platanus – F, orthographic variant]


Acer rubrum Linnaeus var. rubrum. Eastern Red Maple. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): upland deciduous forests, up to at least 1500m elevation, moist bottomlands and slopes; common. January-March; April-July. This variety is the most widespread and common in our area; indeed it is one of the most ubiquitous and common trees of e. North America. It is probably more abundant than formerly, because of its weedy abilities. Overall, it ranges throughout e. North America. Whether the varieties of A. rubrum are worthy of recognition is a matter of disagreement; I choose here to try to distinguish them. [= F, K, Z; < A. rubrum – RAB, C, GW, WH; < A. rubrum var. rubrum – G (also see var. trilobum); = Rufacer rubrum (Linnaeus) Small – S]

Acer rubrum Linnaeus var. trilobum Torrey & A. Gray ex K. Koch, Carolina Red Maple. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, VA, WV): wetlands, especially peaty, acid sites; common (rare in Piedmont and Mountains. January-March; April-June. Primarily a Southeastern Coastal Plain variety, the range of var. trilobum is unclear, possibly extending well inland and northward (see F). This variety has greatly increased in abundance in the Coastal Plain of our area because of fire suppression and mechanical disturbance of peaty wetlands. Former large pocosin tracts, such as the Dismal Swamp, are now largely dominated by this tree. [= F, K, Z; < A. rubrum – RAB, C, GW, WH; < A. rubrum var. rubrum – G; = Rufacer carolinianum (Walter) Small – S]

Acer saccharinum Linnaeus, Silver Maple, Soft Maple. Bottomlands, riverbanks, and disturbed areas. February-April; April-July. NS west to SK, south to Fanhandle FL, LA, and OK, rare and mostly introduced east of the Appalachians and south of VA. This is an abundant tree along major rivers in the Piedmont of VA. In our area (particularly from c. NC south), the species is more common as a street tree or an escape from cultivation than as a native tree. On the Coastal Plain of NC and SC, A. saccharinum is largely confined to the banks and levees of large brownwater rivers, such as the Roanoke and Congaree. The silvery undersides of the leaves are obvious in windy conditions. The hybrid Acer × freemani A.E. Murray [A. rubrum × saccharinum] has been collected at scattered locations in our area. [= RAB, C, F, G, GW, K, W, WH, Z; = Argentacer saccharinum (Linnaeus) Small – S]

Acer saccharum Marshall, Sugar Maple, Hard Maple, Sugar Tree. Cove forests, other rich forests, especially over mafic and calcareous rocks, on calcareous soils common and typical in dry-mesic forests and dry woodlands as well, less typically extending to high elevation northern hardwood forests where sometimes in acidic situations (as in Highlands County, VA), in parts of thye Piedmont perhaps more common than an introduction by ornamental planting than as a native, at least south of VA. April-June; June-July. Two varieties are sometimes recognized. Var. saccharum is distributed from NS west to ND, south to GA, LA, and OK. Var. schneckii Rehder, with petioles and lower leaf surfaces densely pubescent, is alleged to occur in s. PA (Rhoads & Klein 1993), IN, IL, and MO; it is probably only a form. A. saccharum is the primary source of maple sugar and maple syrup; formerly, commercial sugaring was done in w. NC and w. VA. Large individuals of this species are the favorite substrate of a number of lichens, including Lobaria pulmonaria. The brown, platy bark is often similar to that of Aesculus flava. For its bright orange fall color, A. saccharum is one of our most prized ornamental trees. In NC, it is most common northward and on mafic rocks, thus reaching perhaps its best development in the amphibolite peaks of Ashe, Watauga, Avery, and Mitchell counties; it is more general in VA. [= C; > A. saccharum var. saccharum – F, G, K, Z; = A. saccharum ssp. saccharum – RAB, Wh; = Saccharodendron barbatum (Michaux) Nieuwland – S]

Acer spicatum Lamarck, Mountain Maple. High elevation forests (northern hardwoods or spruce-fir), generally above 1500 m in NC, above 1000 m in VA, especially common in periglacial boulderfields. May-July; August-October. NL (Newfoundland), NL (Labrador), and SK south to PA, OH, and IA, and in the mountains to w. NC, e. TN, ne. GA, and ne. AL. The foliage is quite similar to that of A. rubrum var. rubrum, with which it can occur; in addition to the key characters, A. spicatum can be distinguished from A. rubrum by its leaves which have a strongly rugose texture, the secondary and tertiary veins
impressed on the upper surface, distinctly raised on the lower (vs. not rugose, the secondary and tertiary veins only slightly impressed on the upper surface, and slightly raised on the lower). *A. spicatum* is also sometimes confused with *A. pensylvanicum*, but these two species are readily distinguished by their leaves (see key). [= RAB, C, F, G, K, S, W, Z]

### Identification notes:

The following hybrids are known from our area: *Aesculus × neglecta* Lindley [*flava × sylvatica*] and *Aesculus × mutabilis* (Spach) Scheele [*pavia × sylvatica*]. They can be recognized by their intermediate morphology.

1. Petals usually 5, white with a reddish mark near the cordate base of the petal blade; buds glutinous (sticky); fruit spiny; leaflets 7 (-9) per leaf; [alien, uncommonly planted, rarely naturalized]; [section *Aesculus*] ................................................................................................................................. *A. hippocastanum*
2. Petals 4 (or 4-5 in *A. parviflora*), cream-colored, yellow, red, or white (and then lacking a red blaze); buds not glutinous; fruit smooth (or with some prickles in *A. glabra* var. *glabra*); leaflets 5 (-7) per leaf; [native].
2. Petals white, unmarked with red; stamens exerted, 2-4× as long as the petals; inflorescence 2-5 dm long; [section *Macrothyrsus*] .................. ................................................................. *A. parviflora*
3. Stamens about 2× as long as the petals, well-exserted beyond the corolla; petals only slightly unequal in size; fruit spiny with short prickles (rarely essentially smooth) ................................................................. *A. glabra* var. *glabra*
3. Stamens about 1× as long as the petals, included or barely exerted beyond the corolla; petals markedly unequal in size; fruit smooth.
4. Petal margins villous, not glandular; petals yellow; fruits 2-8 cm in diameter. .................................................................................................................. *A. pavia* var. *pavia*
4. Petal margins villous, not glandular; petals yellow; fruits 2-8 cm in diameter. .................................................................................................................. *A. sylvatica*
5. Calyx and pedicels stipitate-glandular; large tree; petiolules 2-3 (-4) mm long; fruits 5-8 cm in diameter .................. *A. flava*
5. Calyx and pedicels puberulent; shrub to small tree; petiolules 3-12 mm long; fruits 2-4 cm in diameter .................. *A. sylvatica*

### Aesculus flava Solander, Yellow Buckeye.

Moist forests, up to nearly 2000m, especially prominent in seepy cove forests, in the Piedmont only in "montane" habitats. Late April-mid June; August-September. A broad Southern Appalachian endemic: sw. PA, s. OH, s. IN, and s. IL south through KY, WV, sw. VA, and TN to n. AL, n. GA, nw. SC, and w. NC. *A. flava* is one of the largest, most massive, and commonest trees in Southern Appalachian coves, recognizable in winter by the bark of large plate-like slabs, thick twigs, and massive form. Meyer & Hardin (1987) discuss the nomenclatural issues relating to the names "A. flava" and "A. octandra." [= C, K, W; = A. octandra Marshall – RAB, F, G, Z; < A. octandra – S (also see *A. sylvatica*)]

### Aesculus glabra Willdenow var. *glabra*, Ohio Buckeye.

Mecis forests over limestone. April-May. Largely midwestern, but ranges east to sw. PA, e. TN, and nw. GA (Jones & Coile 1988); it is also sometimes introduced eastward of that distribution. It occurs in TN counties adjacent to both VA and NC. [= C, F, G, K, Z; < A. glabra – S, WV]

### Aesculus hippocastanum Linnaeus, Horsechestnut.

Urban and suburban areas, perhaps not definitely naturalized, but fairly often planted as a street tree and escaping as seedlings in the vicinity of plantings; native of se. Europe. [= C, F, G, K, Z]

### Aesculus parviflora Walter, Bottlebrush Buckeye.

Mecis forests on bluffs and in ravines (the SC occurrence is on Fall Line river bluffs, with shaley, subcalcareous soils). Wc. GA west to nc. AL, south to sw. GA and sw. AL; disjunct in wc. SC (Aiken County). See Wyatt (1985) for a discussion of the interesting, relicsual occurrence in SC. Occasionally planted outside its native range. [= C, S, Z]

### Aesculus pavia Linnaeus var. *pavia*, Red Buckeye.

Swamp forests, usually stagnant, usually blackwater (not receiving significant alluvium), and especially over marl (coquina limestone). April-early May; July-August. Var. *pavia* ranges from se. NC south to c. peninsular FL and west to e. TX, extending north into the Mississippi Embayment to se. MO and s. IL, and in scattered occurrences off the Coastal Plain, as in sc. TN; also it is sometimes cultivated further inland and persistent or slightly naturalizing. Var. *flavescens* (Sargent) Correll occurs in the Edwards Plateau of c. TX. Fernald reports this species from VA and WV, but there is likely taxonomic or nomenclatural confusion. [= K, Z; < A. pavia – RAB, C, G, S, W, WH; >> A. pavia – F; << A. discolor Pursh – F]

### Aesculus sylvatica Bartram, Painted Buckeye.

In the Piedmont in mesic, nutrient-rich forests, on bottomlands, lower slopes, and in ravines, in the Coastal Plain primarily on floodplains of brownwater (alluvium-carrying) rivers (most notably the Roanoke River in NC), in the Mountains only at low elevations. April-mid May; July-August. Primarily a Southeastern Piedmont endemic, occurring primarily in the Piedmont from sc. VA south through c. NC, c. SC, and nc. GA to nc. AL, with an extension north into e. TN. [= RAB, C, F, K, W, Z; = A. neglecta Lindley – G, misapplied; < A. octandra – S (also see *A. flava*); > A. georgiana Sargent]
3. Cardiospermum Linnaeus 1753 (Balloon Vine)

A genus of about 14 species, vines, of tropical regions (especially America).


4. Koelreuteria Laxmann 1772 (Golden Rain Tree)


1 Leaves pinnate (rarely bipinnate in part), the leaflets coarsely crenate to lobulate; capsule valves ovate, ca. 2 × as long as wide; capsules greenish to tawny when young, aging to dark brown............................................................K. paniculata
2 Leaves bipinnate, the leaflets entire to shallowly serrate; capsule valves orbicular, 0.9-1.4 × as long as wide; capsules rose-purple when young, aging to tawny-brown.

2 Leaflets weakly oblique, acute to short-acuminate, entire to shallowly serrate; petals 4 (-5) ............................................................K. bipinnata
2 Leaflets strongly oblique, long acuminate to caudate, entire to irregularly crenate-serrate; petals (4-) 5 ............................................................K. henryi

*Koelreuteria bipinnata* Franchet, Bougainvillea Golden Rain Tree. Disturbed areas, roadsides; native of s. China. Becoming popular horticulturally, and producing abundant seedlings near the planted specimens; potentially invasive. [= Z]

*Koelreuteria henryi* Dümmer, Flamegold. Disturbed areas, roadsides; native of Taiwan. This taxon appears to be distinct morphologically and geographically from *K. elegans*, and warrants recognition at the species level. Becoming popular horticulturally, and producing abundant seedlings near the planted specimens; potentially invasive, and established just south of our area in peninsular FL. [= Koelreuteria elegans (Seem.) A.C. Smith ssp. formosana (Hayata) F.G. Meyer – K, WH, Z]


5. Sapindus Linnaeus 1753 (Soapberry)

A genus of about 13 species, trees, of tropical and warm temperate regions of the Old and New World.

*Sapindus marginatus* Willdenow, Florida Soapberry. Coastal marsh hammocks, shell middens. May-June. Se. SC (?) and e. GA south to c. peninsular FL (Lee and Brevard counties), and on the Gulf Coast in s. MS. Small (1933) reports this species from SC, but there is doubt whether this species was actually ever documented to occur in SC; there are no recent records. Although sometimes combined (as by K) with the tropical *Sapindus saponaria*, I follow most recent Florida authors (Clewell 1985, Tomlinson 1986, Godfrey 1988, Nelson 1994, Nelson 1996) in maintaining it as distinct. *S. marginatus* is a species of n. FL, e. GA, and possibly SC and has wingless rachises, acuminate leaflets, and globose fruits; *S. saponaria* is a species of s. FL and tropical America and has winged rachises, rounded leaflet tips, and ovoid to globose fruits. [= RAB, S; < S. saponaria Linnaeus var. saponaria – K]

6. Dodonaea P. Miller 1754 (Varnishleaf, Hopbush)

A genus of about 65 species, shrubs, mainly Australian.

*Dodonaea viscosa* (Linnaeus) Jacquin, Varnishleaf, Hopbush. Widespread in the Old World and New World tropics, north in FL to St. Johns County. [= S, WH; < D. viscosa – K]
241. RUTACEAE A.L. de Jussieu 1789 (Citrus Family) [in SAPINDALES]

A family of about 156 genera and 1800 species, trees, shrubs, vines, and rarely herbs, cosmopolitan.

1 Leaves unifoliolate (appearing simple); [subfamily Aurantioideae] .............................................................................................. Citrus
2 Leaves pinnately or palmately compound.

2 Petiole not winged, and lacking an articulation at the juncture with the blade; fruit 4.5-15 cm long.................................................... C. trifoliata
2 Petiole winged, and with an articulation at the juncture with the blade; fruit 4.5-15 cm long.................................................... C. ×aurantium

* Citrus ×aurantium (Linnaeus) Burmann f., Lemon, C. ×paradisi Macfadyen in Hooker (pro sp.), Grapefruit, and C. sinensis (Linnaeus) Osbeck, Orange, have been grown on the Outer Banks of North Carolina in Buxton, Dare County, NC (Brown 1959). They are apparently not naturalized, being killed outright or severely damaged by occasional colder winters, and are not keyed or otherwise treated here.

1 Leaves trifoliolate; fruit densely pubescent, 3-6 cm long........................................................................................................ C. trifoliata
1 Leaves unifoliolate; fruit glabrous, 4.5-25 cm long.

* Phellodendron Ruprecht 1857 (Cork-tree)

A genus of about 10 species, trees, native of e. Asia.

* Phellodendron japonicum Maximowicz, Japanese Cork-tree. Pd (DE), Mt (WV): suburban woodlands; uncommon (rare in WV), native of Japan. [= C, K1; ? P. amurense Ruprecht – K2]
**RUTACEAE**

**Ptelea** Linnaeus 1753 (Hop-tree, Wafer-ash, Stinking Ash)

A genus of about 11 species, of North America (south into Mexico). References: Bailey (1962)=Z.

*Ptelea trifoliata* Linnaeus, Hop-tree. Cp (FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): rocky bluffs, especially calcareous or mafic; open woodlands, calcareous Coastal Plain river bluffs, granitic domes; uncommon. April-June; June-August. NJ, w. NY, MI, s. WI, and NE south to c. peninsular FL, c. AL, c. MS, e. and s. TX. Bailey (1962) treats two varieties in our areas, doubtfully distinguishable; they need additional study. [= RAB, WH; > *P. trifoliata* var. *mollis* – F, WV; > *P. trifoliata* var. *trifoliata* – F, WV; > *P. trifoliata* ssp. *trifoliata* var. *mollis* Torrey & A. Gray – C, K, Z; > *P. trifoliata* ssp. *trifoliata* var. *trifoliata* – C, K, Z; = *P. trifoliata* var. *trifoliata* – G; > *P. trifoliata* – S; > *P. servaisi* Small – S; > *P. microcarpa* Small – S; > *P. baldwinii* Torrey & A. Gray – S]

**Ruta** Linnaeus 1753 (Rue)

A genus of about 7 species, of the Old World.

* Ruta graveolens Linnaeus, Rue. Pd (NC, VA), Mt (VA, WV): cultivated in gardens as a medicinal herb, persistent and rarely escaping, sometimes locally abundant in pastures over limestone or gravelly floodplains; rare, native of Eurasia. May-August; June-September. This plant causes dermatitis in some people, apparently by removing the skin's sun-resistance. *Ruta* has a disagreeable smell, and has toxic properties. [= RAB, C, F, G, K, S, WV]

**Zanthoxylum** Linnaeus 1753 (Prickly-ash, Toothache Tree)

A genus of about 250 species, of America, Africa, Asia, and Australia. References: Porter (1976)=Z.

1 Leaves thin in texture, pubescent; flowers in small axillary clusters ................................................................. *Z. americanum*

1 Leaves coriaceous in texture, glabrous and waxy; flowers in large terminal compound cymes .................................... *Z. clava-herculis*

**Zanthoxylum americanum** P. Miller, Prickly-ash, Toothache Tree, Northern Prickly-ash. Woodlands and forests over calcareous or mafic rocks, often forming extensive colonies near outcrops. March-April; July-August. S. QC west to e. ND, south to e. SC, c. GA, Panhandle FL, e. TN, c. TN, and OK. Sometimes planted. There is only a single known site in SC. [= RAB, C, K, W, S, WH, WV, Z; = *Xanthoxylum americanum* – F, orthographic variant]

**Zanthoxylum clava-herculis** Linnaeus, Toothache Tree, Hercules'-club, Sea-ash, Southern Prickly-ash, Pepper-bark, Tickle-tongue. Maritime forests, dunes, shell middens, shell hammocks, maritime scrub, inland (in FL and GA) in hammocks. April-May; July-September. A Southeastern Coastal Plain endemic: se. VA south to FL and west to TX, AR, and OK. The compound leaves are armed with stout prickles along the rachis. The twigs are also spiny. On the larger branches and trunks, the spines become elevated on conical, pyramidal, or cylindrical corky bases up to 5 cm long and 4 cm in diameter, giving the trunk a very peculiar appearance. Many of the common names come from the numbing effect on the mouth of chewing the leaf or twig, the flavor, smell, and effect being very similar to *Ctenium aromaticum*, Toothache Grass. In the northern part of its distribution, it is restricted to the outer Coastal Plain, nearly entirely on the barrier islands. Although normally a small tree, it can reach considerable size, up to about 60 cm DBH. In the 5 km immediately north of Buxton, Dare County, NC one can see several hundred individuals growing on open, *Uniola*-dominated dunes. Because of salt-pruning, the trees often have 5 times as wide a spread as they are tall. Some trees have a basal diameter of 30-40 cm, a short trunk less than a meter tall, a total height of 2-3 m, and a spread of 10 m. [= RAB, C, G, K, S, WH, Z; = *Zanthoxylum clava-herculis* – F, orthographic variant]

**242. SIMAROUBACEAE** A.P. de Candolle 1811 (Quassia Family) [in SAPINDALES]

A family of about 13 genera and 111 species, trees and shrubs of primarily tropical areas of the New World and Old World. The Leitneriaceae has been traditionally considered to be a monotypic family, endemic to se. North America; a variety of recent studies have suggested its inclusion in the Simaroubaceae (Angiosperm Phylogeny Group 1998, 2003, 2009; Bogle in FNA 1997). References: Angiosperm Phylogeny Group (1998, 2003). [including LEITNERIACEAE]

1 Leaves compound; [species alien, aggressively naturalizing in upland sites].................................................................................. *Ailanthus*

1 Leaves simple; [species native, in wetland sites].................................................................................................................. *Leitneria*
**Simaroubaceae**

*Ailanthus* Desfais 1788 (Tree-of-Heaven)


* Ailanthus altissima* (P. Miller) Swingle, Tree-of-Heaven, Copal Tree, Stink-tree. Roadsides, forests, disturbed areas, including cities, especially in moist, fertile soils; native of e. Asia. Late May-early June; July-October. In our area, this tree is now an aggressive and noxious weed, colonizing even undisturbed forests and outcompeting the native vegetation. As serious a weed as it is here, it is (at the time of this writing, at least), much worse to the north, now the dominant tree in fencerows, woodlots, and forests in the urbanized, suburbanized, and even rural Northeast. It can be recognized vegetatively by its large pinnately compound leaves, very stout twigs (over 1 cm thick), and the characteristic and unpleasant odor of the crushed foliage. [= RAB, C, F, G, K, S, W]

*Leitneria* Chapman 1860 (Corkwood)


*Leitneria floridana* Chapman, Corkwood. Swamps and cabbage palm / sawgrass marshes. February-March. Sw. GA and Panhandle FL west to e. TX, and north in the Mississippi Embayment to AR and MO, very scattered in occurrence. [= FNA, GW, K, S, WH]

### 243. Meliaceae

A.L. de Jussieu 1789 (Mahogany Family) [in Sapindales]

A family of about 50 genera and 565 species, trees and shrubs, of tropical and subtropical areas. The only native member of the family in e. North America is *Swietenia mahogani* (Linnaeus) Jacquin (West Indian Mahogany), a very valuable timber tree which ranges north to s. FL. References: Miller (1990)=Z in the synonymy.

*Melia* Linnaeus 1753 (Chinaberry)

A genus of 3 species, trees, of the Old World tropics.

* Melia azedarach* Linnaeus, Chinaberry, Carolina Mahogany, Umbrella-tree, Pride-of-India. Disturbed areas, abandoned rural yards and fields; native to se. Asia, commonly cultivated in our area (mainly in the Coastal Plain) and commonly escaped. April-May; September-October. [= RAB, C, F, G, K, S, WH, Z]

### 250. Malvaceae

A.L. de Jussieu 1789 (Mallow Family) [in Malvales]

Malvaceae has always been difficult to circumscribe cleanly, relative to members of such families as Sterculiaceae and Tiliaceae. Molecular evidence now adds to morphologic evidence that traditional circumscriptions of these families are highly polyphyletic. Bayer et al. (1999) present a new classification of an expanded Malvaceae, with 9 subfamilies recognized. If circumscribed broadly (as here) to include Sterculiaceae and Tiliaceae, a family of about 243 genera and 4000-4500 species, herbs, shrubs, and trees, of cosmopolitan distribution, but especially diverse in the tropics and subtropics. This family includes several economically important species, including cotton (*Gossypium* spp.), cacao or chocolate, *Theobroma cacao* Linnaeus, and cola, *Cola acuminata* R. Brown. References: Bayer et al. (1999); Bayer & Kubitzki in Kubitzki & Bayer (2003); Fryxell (1988). [including Sterculiaceae and Tiliaceae]

1. Petals absent; carpels 5, whorled, each expanding into a stalked and papery structure which bears 1-4 pea-sized seeds along its margins; tree; leaves 10-40 cm wide, 3-5 lobed, the lobes acute, the margins entire; [subfamily Sterculioideae] .............................................................................. **Firmiana**

1. Petals present; carpels 1, 5, or many, united or separate, but not as above; tree, shrub, or herb; leaves< 15 cm wide, lobed or unlobed, but if lobed then also serrate.

2. Epicalyx of bracts (immediately subtending the calyx) absent.

3. Stamens 5; [subfamily Byttnerioideae].
MALVACEAE

4 Ovary with 5 carpels and 5 styles; capsule with 5-10 seeds; corolla pink, purple, or white. ............................................................. Melochia
4 Ovary with 1 carpel and 1 style; capsule with 1 seed; corolla orange to yellow .................................................................[Waltheria]
3 Stamens >10.
5 Stamens free.
6 Tree; fruit a woody drupe; [subfamily Tiliioideae] ............................................................ Tilia
6 Herb or shrub; fruit a capsule; [subfamily Grewioideae].
7 Leaves rounded or suborbate at base, acute at apex; fruit much longer than broad, unarmed ...............................Corchorus
7 Leaves cuneate at base, acuminate at apex; fruit subglobose, with hooked spines ................................................Triumphetta
5 Stamens united into a staminal column adnate to the corolla at its base; [subfamily Malvoideae; tribe Malveae].
8 Seeds 2 or more per carpel ............................................................................................................................ Abutilon
8 Seed 1 per carpel.
9 Leaves palmately and deeply cleft (> 9/10s of the way to the midrib) into linear segments ..............................Callirhoe
9 Leaves unlobed or lobed (if lobed, < 4/5’s of the way to the midrib and the lobes broad).
10 Flowers many in a terminal panicle; corolla white; style branches filiform, the stigmatic surface elongate along the inner side of the branches; leaves >10 cm wide, deeply 5-9-lobed; plants 1-2 m tall ..........................................................Napaea
10 Flowers solitary or a few in leaf axils (or many in a terminal panicle in Sida hermaphroditica); corolla blue-purple, yellow, or white; style branches truncate, the stigmatic surface terminal and capititate; leaves < 2cm wide, unlobed (or leaves >10 cm wide and deeply 3-7-lobed in Sida hermaphroditica); plants < 1 m tall (or 1-4 m tall in Sida hermaphroditica). ..............................................Anoda
11 Corolla yellow or white; lateral walls of the carpels disintegrating at maturity of the fruit ......................................................... Sida

2 Epicalyx of bracts (immediately subtending the calyx) present.
13 Fruit fleshy and berry-like; [subfamily Malvoideae; tribe Hibisceae] ................................................................. Malaviscus
13 Fruit a loculicidal capsule.
14 Calyx spathe-like, soon falling after anthesis; [subfamily Malvoideae; tribe Hibisceae] .................................Abelmoschus
14 Calyx radially symmetrical, 5-lobed.
15 Style branches short, erect, the stigmas nearly sessile; epicalyx bracts 3, large, foliaceous, and incised; seeds bearing long white fibers; [subfamily Malvoideae; tribe Gossypiae] ................................................................. Gossypium
15 Style branches elongate, spreading; epicalyx bracts 6-15, linear to lanceolate and untoothed; seeds sometimes pubescent but not withy long white fibers; [subfamily Malvoideae; tribe Hibisceae].
16 Locules of the fruit several-seeded; capsule longer than broad, the apex pointed or rounded, petals yellow, white, red, or pink (if pink, then > 4 cm long, or the plant a shrub). ................................................................. Hibiscus
16 Locules of the fruit 1-seeded; capsule depressed-globose, indented at the apex; petals pink, 2-4 cm long. ................................. Kosteletzkya
10 Fruit of radially disposed, 1- to several-seeded, dry carpels that split apart at maturity.
17 Bracts of the epicalyx 5 or more.
18 Shrubs or woody herbs, with leaves not basally disposed; flowers in axes of well-developed leaves; fruit spiny (or lacking spines in Pavonia hastata); [of SC southward]; [subfamily Malvoideae; tribe Hibisceae].
19 Bracts of the epicalyx 5-15, distinct; fruit with 0-3 spines per carpel; leaves lacking foliar nectaries ............................Pavonia
19 Bracts of epicalyx 5, fused basally; fruit covered with numerous glochidiate spines; leaves with 1-3 foliar nectaries (glands) on undersurface near base ......................................................... Urena
18 Herbs, with leaves basally disposed; flowers in terminal bracteates spikes or racemes; fruit lacking spines; [collectively widespread]; [subfamily Malvoideae; tribe Malveae].
20 Plant 1.5-3 m tall, usually unbranched; flowers 6-10 cm across ................................................................................. Alcea
20 Plant 0.5-1.2 m tall, branched; flowers 2-3 cm across ............................................................................................. Althaea
17 Bracts of the epicalyx 2-3; [subfamily Malvoideae; tribe Malveae].
21 Ovules and seeds 2 or more per carpel.
22 Herb 0.5-2.5 m tall, upright; petals 2-3 cm long, pink-purple; carpels not beaked at the tip ...................................................................... Iliamna
22 Herb to 0.5 m tall, prostrate to ascending; petals 0.3-0.5 cm long, orange-red; carpels beaked at the tip .................................................................... Mediola
21 Ovules and seeds 1 per carpel.
23 Leaf blades 1.5-8× as long as wide.
24 Style branches filiform, the stigmatic surface elongate along the inner side of the branches .............................. Callirhoe
24 Style branches truncate, the stigmatic surface terminal and capititate ............................................................. Malvastrum
23 Leaf blades orbicular, about as wide as long.
25 Leaves deeply palmately cleft ................................................................................................................................. Callirhoe
25 Leaves unlobed or shallowly lobed ................................................................................................................................. Malva

Abelmoschus Medikus 1787 (Okra, Gumbo)


* Abelmoschus esculentus (Linnaeus) Moench, Okra, Gumbo. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): frequently cultivated in gardens, rarely persistent or self-seeding the year following; common in cultivation, rare (as an escape), native of Africa. The young capsules are a famous component of southern cooking. [= FNA, K, S, WH; = Hibiscus esculentus Linnaeus – F]

Abutilon P. Miller 1754 (Indian-mallow, Indian-hemp)


Alcea Linnaeus 1753 (Hollyhock)


* Alcea rosea Linnaeus, Hollyhock. Cp (NC, VA), Pd (DE, NC, VA), Mt (NC, VA, WV) {GA}: roadsides, dumps, frequently cultivated, less commonly escaped or persistent; uncommon (rare in GA, NC, VA, and WV), native of Eurasia. Late May-August (rarely later). [= FNA, K; = Althaea rosea (Linnaeus) Cavanilles – RAB, C, F, G]

* Alcea rugosa Alefeld, Russian Hollyhock. Reported for MD. [= FNA] {not yet keyed}

Althaea Linnaeus 1753 (Marsh-mallow)


* Althaea officinalis Linnaeus, Marsh-mallow. Cp (VA): marshes; rare, native of Europe. The roots of this plant were the original source of the mucilaginous paste used to make marshmallows (which are now made with a synthetic mucilage). [= C, F, FNA, G, K]

Anoda Cavanilles 1785 (Anoda)


Callirhoe Nuttall 1821 (Poppy-mallow)


1. Calyx not subtended by an epicalyx.
2. Inflorescence racemose, corymbose, or nearly umbellate; petals white, pink, or mauve; plants ascending, 1.5-8.5 dm tall; mericarps pubescent with simple, appressed hairs................................................................. C. alcaeoides
3. Inflorescence paniculate; petals deep red, with a white basal spot; plants erect, 5-20 dm tall; mericarps glabrous................................. C. pedata

1. Calyx subtended by an epicalyx of 3 bractlets.
2. Calyx lobes distinct and divergent in bud; stems decumbent ................................................................. C. involucrata var. involucrata
3. Calyx lobes valvate in bud, forming a point; stems erect, ascending, or decumbent.
4. Bractlets of the epicalyx linear, 0.1-1.7 mm wide; peduncles 1-flowered; calyx lobes lanceolate, 7-15.4 mm long; mericarps indehiscent; leaves cordate or ovate in outline, palmately deeply divided into 5-7 lobes ................................................................. C. papaver
5. Bractlets of the epicalyx obovate, 2.5-4.6 mm wide; peduncles several-flowered; calyx lobes deltoid, 2.5 (-6.5) mm long; mericarps dehiscent; leaves triangular, not lobed or only slightly so ................................................................................................................. C. triangulata

Callirhoe alcaeoides (Michaux) A. Gray, Pale Poppy-mallow. Calcareous prairies, glades, and other open habitats. E. NE south through e. and OK to c. TX; disjunct and scattered eastwards in IA, MO, AR, nw. LA, IL, s. IN, c. KY, c. TN, and c. AL (Dorr 1990). [= C, F, G, K, Z; = Callirhoe alcaeoides – S, orthographic variant]

* Callirhoe involucrata (Torrey & A. Gray) A. Gray var. involucrata. Purple Poppy-mallow. Pd (VA): disturbed areas; rare, adventive from its native range in the midwestern United States. [= C, G, K, Z; < C. involucrata var. involucrata – F

* **Callirhoe pedata** (Nuttall ex Hooker) A. Gray, Palmleaf Poppy-mallow. Mt (GA): occasionally mowed roadside and adjacent powerline right-of-way, with other species of calcareous prairie habitats, one occurrence recorded to date; rare, plausibly native, but perhaps only adventive from a native range in prairies and glades of the sc. United States (w. AR and e. OK, south to c. TX). Previously misidentified as *C. digitata* Nuttall. [= K, Z]

**Callirhoe triangulata** (Leavenworth) A. Gray, Sand Poppy-mallow, Clustered Poppy-mallow. Sandhills, sandy scrub, and other dry, open habitats. Sc. NC south to GA and west to ec. MA (upper Coastal Plain and lower Piedmont); also sw. WI and ne. IA south to s. IN, s. IL, and se. MO. [= C, F, G, K, Z; = Callirhoë triangulata – S, orthographic variant]

**Corchorus Linnaeus 1753 (Jute)**


**Firmiana Marsili 1786 (Chinese Parasol-tree, Phoenix Tree)**


**Gossypium Linnaeus 1753 (Cotton)**


**Identification notes**: Agricultural cotton is now a complex set of cultivars, some involving cross-breeding between the two species treated below, and some plants may not be readily identifiable to species.

1 Capsule 3-6 cm long, narrowly ovoid to elongate, its surface deeply pitted with oil glands; leaves 3-7-lobed, the central lobe usually > 1.5× as long as wide; stipules 1-5 cm long; corolla deep yellow; long fibers of the seed completely separable from the seed; short fibers of the seed absent or present................................................................. **G. barbadense**

1 Capsule 2-3 cm long, ovoid to subglobose, its surface smooth; leaves 3-5-lobed, the central lobe usually 1.0-1.5× as long as wide; stipules 0.5-1.5 (-2.0) cm long; corolla pale yellow; long fibers of the seed firmly attached to the seed; short fibers of the seed present ...... **G. hirsutum**


* **Gossypium hirsutum** Linnaeus, Upland Cotton. Cp (FL, GA, NC, SC, VA): frequently cultivated crop, especially in sandy soils of the Coastal Plain, rarely adventive or a waif, common (as a crop), rare (as an adventive), native of Central America, South America, the West Indies, and s. FL. Probably first domesticated in the Yucatan Peninsula. [= C, G, WH, Z; > G. hirsutum var. hirsutum – K; = G. herbaceum Linnaeus – F, misapplied; > G. herbaceum – S; > G. hirsutum – S, misapplied]

**Hibiscus Linnaeus 1753 (Hibiscus, Rose-mallow)**

MALVACEAE

1 Woody shrub, the stems usually solitary from a creeping rhizome; [section Hibiscus].................................................................H. syriacus
2 Herb (sometimes robust and to as tall as 3.5 m), often several from ground level, from a crown or taproot.
3 Perennial from a crown, usually 0.7-3.5 m tall; calyx not inflated at maturity; capsule 1.7-3.5 cm long; petals 4-14 cm long; leaves 4-25 cm long, deeply cleft, hastate-lobed, or not at all lobed or cleft.
4 Leaves and stems harshly scabrous; calyx lobes each with an elongate purplish nectary on the back; [of pine savannas and dry sandy soils of maritime forest edges, from se. NC southward]; [section Furcaria].........................................................................................H. aculeatus
5 Leaves and stems glabrous, softly pubescent, or slightly scabrous; calyx lobes lacking nectaries; [of marshes and swamps (sometimes cultivated in drier soils), collectively widespread in our area]; [section Muenchhausia].
6 Stem glabrous; leaves glabrous; leaves either palmately 3-5-lobed, or prominently halberd-lobed at the base (uncommonly unlobed).
7 Leaves either palmately 3-5-lobed, petals bright scarlet;..............................H. coccineus
8 Leaves halberd-lobed at the base (uncommonly unlobed); petals pink or white with a purplish base;..............................H. laevis
9 Stem pubescent at least when young; leaves pubescent on at least one surface; leaves unlobed or slightly lobed toward the tip (except H. grandiflorus).
10 Staminal column 6.2-9.5 cm long, > ½ × as long as the petals; petals 8.5-14 cm long; [e. GA southwards].............................H. grandiflorus
11 Staminal column 1.2-5 cm long, < ½× as long as the petals; petals 4-12 cm long; [widespread].
12 Capsule pubescent (the dark surface largely or completely obscured); bracts of the involucel usually ciliate; upper leaf surface usually densely stellate-pubescent.................................................................H. lasiocarpus
13 Capsule glabrous and dark brown to black; bracts of involucel ciliate; upper leaf surface glabrous or nearly so .............................H. moscheutos

Hibiscus grandiflorus Michaux, Large-flowered Hibiscus. Cp (FL, GA): tidal marshes, lakeshores, wet flatwoods and savannas; rare. E. GA (Chatham Co., adjacent to the SC border) (Jones & Coile 1988) south to s. FL, west to e. LA; e. Cuba. [= FNA, GW, K, S, WH]

Iliamna Greene 1906 (Globe-mallow)

1 Leaves 5-7-lobed, the lobes narrowly triangular, the sinuses acute; flowers odorless; plant to ca. 1 m in height; [sandstone outcrops on ridgetop]..................................................................................................................I. corei
2 Leaves 5-7-lobed, the lobes broadly triangular or deltoid, the sinuses obtuse; flowers fragrant; plant to ca. 2.5 m in height; [of river shores and along railroads] ..................................................................................I. remota

Iliamna corei Sherff, Peters Mountain Mallow. Mt (VA): in shallow soil in crevices of outcroppings of Clinch sandstone, near the summit of Peters Mountain; rare (US Endangered, VA Endangered). June-August; July-October. Endemic to the
**MALVACEAE**

summit of Peters Mountain, Giles County, VA. The validity of *I. corei* as a species distinct from *I. remota* is supported by Bodo Slotta & Porter (2006). [= F, Y, Z; < *I. remota* – C, G, W; < *I. rivularis* (Douglas ex Hooker) Greene var. *rivularis* – K]

**Hliamna remota** Greene, Kankakee Globe-mallow. Mt (VA): shores and gravel bars along rivers, and along railroad embankments; rare. June-August; July-October. W. VA; nw. IN and ne. IL. Considered by some to be introduced only in our area, however, the VA populations are genetically different than those in IN and IL (Bodo Slotta & Porter 2006). [= F, Y, Z; < *I. remota* – C, G, W; < *I. rivularis* (Douglas ex Hooker) Greene var. *rivularis* – K; ? Sphaeralcea remota (Greene) Fernald]

**Kosteletzya** K. Presl 1835 (Seashore-mallow)


**Kosteletzya pentacarpos** (Linnaeus) Ledebour, Seashore-mallow, Saltmarsh-mallow, Fen-rose. Cp (FL, GA, NC, SC, VA): brackish to fresh water tidal marshes; common. July-October. NY (Long Island) south to s. FL, west to TX; West Indies. Several varieties have often been recognized on the basis of length of hairs and of parts of the flower and inflorescence (see synonymy). While geographic trends are readily apparent, the recognition of infraspecific taxa is made problematic by the non-correlation of various characters. In recent studies, neither Blanchard (2008) nor Alexander (2010) recognize varieties in our flora area. *K. smilacifolia* A. Gray, of peninsular FL, appears to warrant specific status, as treated by Small (1933). It also appears that the Eurasian *K. pentacarpos* represents an early introduction of North American *Kosteletzya* to the Old World (probably via ship’s ballast) and is conspecific; *K. pentacarpos* (based on European material) has nomenclatural priority over *K. virginica* (Blanchard 2008). [< WH, Z; < *K. pentacarpos* – FNA, orthographic variant; = *Kosteletzya virginica* – RAB, orthographic variant; > *Kosteletzya virginica* var. *aquilonia* Fernald – C, F, G; > *Kosteletzya virginica* var. *virginica* – C; > *Kosteletzya virginica* var. *virginica* – F, G; > *Kosteletzya virginica* var. *althaeifolia* Chapman – F, G; > *Kosteletzya virginica* Linnaeus) K. Presl ex A. Gray – GW, K; > *Kosteletzya althaeifolia* (Chapman) Rusby – S; > *Kosteletzya virginica* – S; = *Kosteletzya pentacarpos* var. *pentacarpos* – Y; = *Hibiscus pentacarpos* Linnaeus]

**Malva** Linnaeus 1753 (Mallow)

A genus of about 40 species, herbs, of temperate Eurasia and montane Africa. References: Hill in FNA (in prep.); Bayer & Kubitzki in Kubitzki & Bayer (2003). Key based in part on FNA.

1 Upper leaves 5-7-lobed, the sinuses cut over halfway to the middle; petals 20-35 mm long; erect perennial........................................... *M. moschata*

1 Upper leaves less deeply lobed, rarely to as deep as halfway to the middle; petals 5-30 (-45) mm long; prostrate to erect annual or biennial.

2 Epicalyx of 3 oblong-ovate bractlets; petals reddish purple, (12-) 16-30 (-45) mm long; biennial, erect, usually not branched at the base .......... *M. neglecta*

2 Epicalyx of 3 linear or linear to narrowly lanceolate bractlets; petals white or pink, 3-15 mm long; annual, sprawling, usually branched at the base (except *M. verticillata*).

3 Bractlets of the epicalyx linear; petals to 3-5 mm long, white to pale lilac .......................................................... *M. parviflora*

3 Bractlets of the epicalyx broadly linear to narrowly lanceolate; petals (3-) 5-10 mm long, pink or purple (rarely white).

4 Stems erect, usually < 5 dm long; leaf blades 3-8 (-17) cm long ................................................................. *M. neglecta*

4 Stems prostrate to ascending, to 5 dm long; leaf blades 1.5-5 cm long.

5 Petals 6-13 mm long, about 2× as long as the sepals; mature mericarps slightly roughened or obscurely reticulate........... *M. pusilla*

5 Petals 3-6 mm long, about 1× as long as the sepals; mature mericarps strongly rugose-reticulate.............................. *M. pusilla*


* Malva pusilla* Smith, Small Mallow, Dwarf Mallow, Cheeses. Mt (VA): pastures, roadsides, barnyards; rare, native of Europe. [= FNA; = *M. rotundifolia* Linnaeus – C, F, G, K, S, rejected because of uncertain application]


**Malvastrum** A. Gray 1849 (False-mallow)

1 Leaves glabrous or nearly so on the lower surface ........................................................................................................................

1 Leaves broadly lanceolate to broadly ovate, 1.5-2.5× as long as wide; plant (5-) 10-20 dm tall; [of near coastal habitats, mainly FL, waifs elsewhere].

2 Hairs of the stems stellate with 5-12 ascending rays; leaves often shallowly 3-lobed............................................................................

2 Hairs of the stems stellate with 2-5 appressed rays; leaves unlobed.

3 Mericarps with minute cusps, none longer than 0.1-0.4 mm long ....................................................................................

3 Mericarps with well-developed sharp cusps, the larger 1-2 mm long.................................................................

**Malvastrum angustum** A. Gray, Hairy False-mallow. Mt (VA): limestone barrens; rare (VA Rare). July-August; August-October. KY, w. VA (Lee Co.), and c. TN, west to IA, KS, and OK. Discovered in our area in 1994 by J.C. Ludwig (Fleming & Ludwig 1996). [= FNA; = Malvastrum hispidum (Pursh) Hochreutiner – C, K, epithet misapplied; = Malvastrum angustum A. Gray – G, S; ? Sphaeralcea angusta (A. Gray) Fernald – F; = Sidopsis hispidum (Pursh) Rydberg, epithet misapplied; = Sida hispida Pursh, misapplied]

**Malvastrum americanum** (Linnaeus) Torrey. Cp (FL): disturbed areas; rare. January-December. FL, TX south through Central America to South America; West Indies; also in the Old World tropics. [= FNA, K, WH]

**Malvastrum corchorifolium** (Desrousseaux) Britton ex Small. Cp (FL): coastal hammocks; rare. January-December. FL and AL south to Central America; West Indies. [= FNA, K, WH]

* * Malvastrum coromandelianum* (Linnaeus) Garcke, Cp (FL): coastal hammocks, waif on ballast; rare, native of tropical America (TX to Argentina). January-December. Northern occurrences, such as in PA (Rhoads & Klein 1993) and NJ (Kartesz 1999), represent old records of ballast waifs. [= FNA, K, WH]

**Malvaviscus** Fabricius 1759 (Wax-mallow)


1 Leaves pubescent on the lower surface.................................................................................................................................

1 Leaves glabrous or nearly so on the lower surface ...................................................................................................................


**Malvaviscus penduliflorus** DC., Turk’s-cap Mallow, Mazapan. Cp (FL): disturbed areas; rare, native of tropical America. April-November. [= K, WH; = M. arboreus Dillenius ex Cavanilles var. penduliflorus (DC.) Schery; *Hibiscus*]

**Melochia** Linnaeus 1753 (Chocolate-weed)


1 Petoles >1.5 cm long; pubescence of the stem and leaves sparse, of stellate, forked, and/or simple hairs; cymes terminal on primary and secondary branches..........................................................

1 Petoles < 1 cm long; pubescence of the stem and leaves dense (tomentose), of stellate hairs; cymes in upper leaf axils..........


**Melochia spicata** (Linnaeus) Fryxell, Bretonica-peluda. Cp (FL, GA*): disturbed areas; rare, native of tropical America, the original distribution uncertain. In GA (Kartesz 1999) and FL (Brizicky 1966). [= K, WH; = Riedlea hirsuta (Cavanilles) Alphonse de Candolle – S; = Melochia villosa (P. Miller) Fawcett & Rendle – Y]

**Modiola** Moench 1794 (Bristly-mallow)


**Modiola caroliniana** (Linnaeus) G. Don, Bristly-mallow. Cp (FL, GA, NC*, SC, VA*), Pd (GA, NC*, SC*, VA*): lawns, roadsides, disturbed areas, pondshores; uncommon (rare in DE), adventive in part of its range in our area. Late March-June...

1 Leaves ovate; calyx lobes lanceolate; carpels with 3 apical awns up to 10 mm long; [rare native] ........................................................ P. hastata
1 Leaves ovate; calyx lobes lanceolate; carpels with 3 apical awns up to 10 mm long; [rare native] ........................................................ P. spinifex


Pavonia spinifex (Linnaeus) Cavaines, Gingerbush. Cp (FL, SC): hammocks; rare. Reported for the vicinity of Charleston, SC on the basis of a specimen collected by Bachman (Chapman 1878). Small (1933) considers this species as likely native, at least in FL. [= K, S, WH]

Sida Linnaeus 1753 (Sida)


1 Leaves hastate; calyx lobes broadly ovate; carpels un-awned; [introduced species of disturbed habitats]................................................. S. hermaphrodita
1 Leaves hastate; calyx lobes broadly ovate; carpels un-awned; [introduced species of disturbed habitats]................................................. S. hermaphrodita


Sida cordifolia Linnaeus. Cp (AL, FL): disturbed sandhills, disturbed hammocks; rare, native of tropical America. [= K, S, WH, Z]

Sida elliottii Torrey & A. Gray var. elliottii, Coastal Plain Sida. Cp (GA, NC, SC, VA), Pd (NC), Mt (GA): stream banks, sandy openings, pineland pond margins, limestone glades and barrens, mesic hammocks; uncommon (GA Special Concern). July-October. Var. elliottii ranges from se. VA south to n. FL, west to LA and north in the interior to c. TN and se. MO. A second variety, var. parviflora Chapman, occurs in Peninsular FL, se. TX, and through montane e. Mexico to Guatemala. S. elliottii, of se. VA and ne. NC, is alleged to differ as follows: S. elliottii with calyx 7-10 mm long, leaves elliptic to narrowly elliptic, 4-20 mm wide, (3-) 4-10× as long as wide (vs. S. elliottii var. elliottii with calyx 5-7 mm long; leaves narrowly lanceolate to linear, 1.5-7 mm wide, 10-20× as long as wide). [= Y; < S. elliottii – RAB, C, F, G, K, S, WH, Z; > S. elliottii Femald – F, K, Z]

Sida hermaphrodita (Linnaeus) Rusby, Virginia Sida, Virginia-mallow. Mt (VA, WV), Pd (VA): sandy or rocky areas along riverbanks; rare. July-August. C. PA and MD west to s. OH, south to DC, WV, w. VA, and ne. TN; disjunct in nw. OH, ne. IN, and s. MI (where presumably native) and with additional collections from e. MA, NY (Long Island), and s. NJ (where probably adventive) (Spooner et al. 1985). Fryxell (1985) comments that this species is so different from the rest of the genus that "one might plausibly argue that it be elevated to generic rank." A molecular phylogenetic analysis suggests that its affinities
are not with Sida, but with the South American Sidasodes (Fuertes, Fryxell, & Jansen 2003). Spooner et al. (1985) provide a

* Sida rhombifolia Linnaeus var. rhombifolia, Arrowleaf Sida. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, SC):
roadsides, fields, gardens, disturbed areas; common. April-October. Verdcourt (2004) discusses variation in this taxon, and
suggests that "studies throughout the entire range of the species will necessitate recognition of more than one species." He
recognizes 6 varieties in e. Africa, aside from the Linnaean var. rhombifolia (with type in Jamaica). [= X; < S. rhombifolia – RAB,

* Sida spinosa Linnaeus, Prickly Sida, Prickly-mallow, False-mallow. Cp (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt
(GA, NC, SC, VA, WV): disturbed areas, wet fields; common, (uncommon in FL, rare in DE), native of the Tropics. June-

Tilia Linnaeus 1753 (Basswood, Whitewood, Linden, Linn)

A genus of about 25-45 species, trees, of temperate regions of North America, Europe and Asia. Hardin’s (1990) treatment of
American Tilia seems a practical and reasonable approach; it gives taxonomic status to the more distinctive (and geographically
based) elements of variation, while recognizing the intergradational nature of the variation. Further investigation of this complex
group is, however, warranted. References: Hardin (1990)=Z; Bayer & Kubitzki in Kubitzki & Bayer (2003). Key adapted from

Identification notes: While the varieties treated below are broadly distinctive and have definite geographic distributions across e. North
America, they are imperfectly distinct in geographic areas of overlap. In our area, their identification is particularly problematic in Virginia,
where individuals in many parts of the state show intergradation between the northern var. americana and the Southern and Central Appalachian
var. heterophylla.

1 Lower leaf surfaces puberulent with bulbous glands, acicular trichomes, and (rarely) sparsely scattered stellate trichomes; fruiting peduncles
and pedicels glabrous or sometimes puberulent; [generally northern, south to VA and w. NC].......................... T. americana var. americana

1 Lower leaf surfaces usually tomentose or becoming puberulent, with bulbous glands, acicular trichomes, and a predominance of stellate or
fasciculate trichomes; fruiting peduncles and pedicels stellate-tomentulose (becoming puberulent in age); [collectively widespread in our
area].

2 Lower leaf surfaces pale or whitish, densely stellate tomentose with appressed, sessile-stellate trichomes obscuring the surface (rarely
becoming puberulent with age but with some stellate trichomes persisting along major veins, the margin, and/or the apex; lateral buds 5-8
mm long; pericarp 0.8-1.0 mm thick; [widespread in our area]................................................................. T. americana var. heterophylla

2 Lower leaf surfaces grayish or brownish, loosely but densely tomentose with fasciculate and/or stipitate-stellate trichomes, either
remaining tomentose or becoming puberulent, or puberulent from emergence and green beneath; lateral buds 3-5 mm long; pericarp 0.5-
0.6 mm thick; [generally southern, Coastal Plain and Piedmont of NC, SC, GA and southward and westward]..........................

........................................................................................................................................................................

........................................................................................................................................................................

Tilia americana Linnaeus var. americana, Northern Basswood. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE, VA): rich
coves, rocky slopes, metabasalt boulderfields, rich north-facing river bluffs, calcareous Coastal Plain ravines; common (rare
in NC, rare in DE Coastal Plain). June; August-September. NB and MB south to e. VA, w. NC, and OK. In VA, var. americana
occurs throughout the northern half of the state, with scattered populations southward in the mountains. [= C, K, Z; = T. americana

Tilia americana Linnaeus var. caroliniana (P. Miller) Castiglioni, Southern Basswood, Carolina Basswood. Cp (FL, GA,
NC), Pd (GA, NC, SC): mesic forests, in the outer Coastal Plain usually associated with shell deposits, Indian shell middens, or
underlying coquina limestone ("marl"); uncommon. June-July; July-August. NC south to c. peninsular FL and west to OK and c.
S]............................ T. americana var. caroliniana

Tilia americana Linnaeus var. heterophylla (Ventenat) Loudon, Mountain Basswood, White Basswood, Linn. Mt (GA,
NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): rich coves and mesic to dry slopes (the drier sites usually
on limestone), often one of the most abundant trees in Southern Appalachian cove forests; common (rare in Coastal Plain). June;
July-August. Centered in the Southern Appalachians: sw. PA and WV south to c. NC, wc. GA, FL Panhandle, and westward as
disjunct populations to the Ozarkian Highlands of s. MO and n. AR. In VA, var. heterophylla dominates in sw. VA and along
southern Piedmont river bluffs, with disjunct populations in calcareous ravines in the upper Coastal Plain (Surry County); it also
extends less commonly into the Northern VA mountains and foothills, where var. americana is more prevalent, but seems to be
absent (or very uncommon) in the Potomac valley east of the Blue Ridge. [= C, K, WH, Z; = T. heterophylla Ventenat – RAB, F, W,
WV; > T. heterophylla – G, S; > T. monticola Sargent – G; > T. australis Small - S; > T. eburnea Ashe – S; > T. lasioclada Sargent – S; > T.
michauxii Nuttall – S; > T. venulosa Sargent]

Tilia ×europaea Linnaeus (pro sp.) [Tilia cordata × platyphyllos], European Linden. Mt (NC, WV): suburban woodlands; uncommonly
planted, rarely naturalizing, native of Europe. [= T. ×vulgaris Hill.] [not yet keyed]

Several additional European species, T. platyphyllos Scopoli and T. cordata P. Miller, are planted as street or yard trees; they differ from
the native species in having smaller leaves (usually 4-12 cm long vs. 8-25 cm long) and lacking staminodes. Planted material should be identified by
using appropriate manuals of cultivated species.
Triumfetta Linnaeus 1753


1 Capsule hispid; lower leaf surface not velutinous ................................................................. T. pentandra
1 Capsule glabrous; lower leaf surface velutinous ................................................................ T. semitriloba

* Triumfetta pentandra A. Richard. Cp (FL): disturbed areas; rare, native of tropical America. [= K, WH]
* Triumfetta semitriloba Jacquin, Mosote, Burweed. Cp (GA): disturbed areas; rare, native of tropical America. In sw. GA (Jones & Coile 1988) and s. peninsular FL. [= K, S, WH]

Urena Linnaeus 1753 (Caesarweed)


Waltheria Linnaeus 1753 (Raichie)


252. THYMELAEACEAE A.L de Jussieu 1789 (Mezereum Family) [in MALVALES]

A family of about 45-53 genera and 500-800 species, mostly trees and shrubs, of cosmopolitan distribution, but especially diverse in Africa (Van der Bank, Fay, & Chase 2002). Dirca, Edgeworthia, and Thymelaea are all in subfamily Thymelaeoideae (Van der Bank, Fay, & Chase 2002). References: Van der Bank, Fay, & Chase (2002); Herber in Kubitzki & Bayer (2003).

1 Annual herb, annual; leaf blades < 2 cm long; fruits capsular, indehiscent ................................................................................................................................. Thymelaea
1 Perennial shrub; leaf blades> 2 cm long; fruits drupaceous or berrylike.
2 Stems jointed; leaves scattered; stamens exserted ................................................................................................................................. Dirca
2 Stems not jointed; leaves clustered toward apex of stems; stamens included ........................................................................................................ Edgeworthia

Dirca Linnaeus 1753 (Leatherwood, Leatherbark)

A genus of 4 species, shrubs, of North America (including Mexico). Our species is most closely related to D. mexicana Nesom & Mayfield (of the Sierra Madre Oriental, Tamaulipas, Mexico) and D. decipiens Floden (of e. MS, mw. AR, and sw. MO); the other species is D. occidentalis A. Gray of California (Schrader & Graves 2004; Floden, Mayfield, & Ferguson 2009). References: Nevling (1962)=Z; Floden, Mayfield, & Ferguson (2009)=Y.

Dirca palustris Linnaeus, Leatherwood, Leatherbark, Wicopee, Rope-bark. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, VA, WV), Cp (FL, GA, VA); very rich forests, on slopes or bottomlands, limited to calcareous or mafic rocks such as limestone, calcareous siltstone, calcareous shale, gabbro, or amphibolite, in marl ravine bottoms in the Coastal Plain of VA, in Ashe County NC ascending to 1500 ft elevation; uncommon (rare in DE, FL, GA, NC, and SC, rare in VA Coastal Plain). March-April; June-July. Widespread in e. North America, from NS and s. QC, south to Panhandle FL, AL, and OK. The curiously flexible twigs and swollen nodes are distinctive. The common names refer to the extraordinary toughness of the tan-brown bark, which was used by native Americans for cordage. [= RAB, C, F, G, K, S, WH, WV, Y, Z]

Edgeworthia Meisner 1841 (Paperbush)
A genus of 3 species, shrubs, of e. Asia.


**Thymelaea** P. Miller 1754 (Mezereon)

References: Neving & Barringer in FNA (in prep.).

* * Thymelaea passerina (Linnaeus) Lange in Willkomm & Lange, Mezereon. Disturbed areas. AL and MS. [= K]

**255. CISTACEAE** A.L. de Jussieu 1789 (Rockrose Family) [in MALVALES]

A family of about 8 genera and 180 species, shrubs and herbs, of warm temperate and subtropical areas, centered in Mediterranean Europe. References: Arrington & Kubitzki in Kubitzki & Bayer (2003).

1 Shrub, usually much branched from the lower stem; flowers solitary, terminal on the branches; leaves 1-3 mm long and scalelike, or 3-7 mm long and aciculare; capsule cylindric, > 2× as long as wide ............................................................... *Hudsonia*

1 Succulent herb, usually little branched from the lower stem (often much branched above, and in *Lechea* with specialized short basal shoots at ground level); flowers axillary or terminal in branching inflorescences; leaves 4-50 mm long, mostly linear, lanceolate, oblanceolate, or elliptic; capsule globose, subglobose, ellipsoid, ovoid, or obovoid, < 2× as long as wide.

2 Flowers of 2 types, the chasmogamous with 5 showy yellow petals, the cleistogamous lacking petals; pubescence of the stem stellate; leaves 10-50 mm long, alternate; plants with shoots of one type only, not producing short basal shoots; capsules 1.3-12.5 mm long, the larger capsules of chasmogamous flowers at least 2.0 mm long .................................................. *Crocanthemum*

2 Flowers of 1 type, with 3 inconspicuous, dark red petals; pubescence of the stem simple; leaves 4-15 mm long (to 30 mm long in *C. pulchella* and *L. mucronata*), linear to linear-elliptic, 0.5-4 mm wide (to 13 mm wide in *L. mucronata*), alternate, opposite, or whorled; plants with shoots of two types, the short, prostrate to ascending basal shoots produced late in the season and overwintering; capsules 0.9-1.7 mm long ............................................................... *Lechea*

**Crocanthemum** Spach 1836 (Frostweed, Rockrose)

A genus of about 24 species, of eastern North America, California, Mexico, and s. South America. The eastern North American species previously attributed to *Helianthemum* are in a clade distinct from the Old World *Helianthemum*, and should be recognized as *Crocanthemum*. References: Daoud & Wilbur (1965)=Z; Wilbur & Daoud (1964)=Y; Arrington & Kubitzki in Kubitzki & Bayer (2003).

Identification notes: The identification of most of our species of *Crocanthemum* requires an understanding of the 2 types of flowers produced. Chasmogamous flowers have showy yellow petals and larger sepals, the distinct portion of the 2 linear outer sepals usually linear, (0.7-) 1.3-5.5 mm long, the distinct portion of the 3 broader inner sepals 2.5-12 (-14) mm long. Cleistogamous flowers lack petals and have smaller sepals, the distinct portion of the 2 linear outer sepals 0.2-3 mm long, the distinct portion of the 3 broader inner sepals 1.5-4.8 mm long. In some species (*C. canadense*, *C. bicknellii*, *C. propinquum*) the chasmogamous flowers open earlier (April-July) than the cleistogamous (June-September). In others (*C. ericoides*, *C. georgianum*, *C. nashii*, *C. rosmarinifolium*), the two types of flowers open at the same time (March-June) or cleistogamous flowers are nearly always absent (*C. carolinianum*). Capsules from chasmogamous flowers are larger and contain more seeds than those from cleistogamous flowers.

1 Leaves 1-4 (-7) mm wide, (5-) 7-15× as long as wide; capsules from chasmogamous flowers 2-3 mm long, with 1 (-2) seeds ............................................................... *C. rosmarinifolium*

1 Leaves 2-20 mm wide, 2-6 (-8)× as long as wide; capsules from chasmogamous flowers (2.4-) 3-9 (-10.5) mm long, with 6-92 (-135) seeds; capsules from cleistogamous flowers 1.5-4.2 mm long, with 1-20 seeds.

2 Leaves basally disposed, the largest and most prominent leaves in a basal rosette; stem leaves 2-5 below those subtending flowers or fruits; stem with spreading trichomes to 2.5 mm long; lower surface of leaves sparsely pubescent, the surface readily visible; cleistogamous flowers usually never produced; capsules 6-9 (-10.5) mm long, with 80-92 (-135) papillate seeds ............................................................... *C. carolinianum*

2 Leaves predominantly cauline (in some species a rosette of closely spaced smaller and caducous leaves present at the ground's surface); stem leaves 5-20 below those subtending flowers or fruits; stem glabrate to densely puberulent (the pubescence not long and spreading); lower surface of leaves densely pubescent, hiding the surface; cleistogamous flowers regularly produced, either intermixed with the chasmogamous or in separate inflorescences; capsules 1.3-7 (-8.5) mm long, with 1-46 papillate, reticulate, or smooth seeds (pebbled to somewhat papillate in *H. nashii*)

3 Ovary and capsule densely stellate pubescent

4 Inflorrence a terminal umbellate cluster; fruit 2-valved ............................................................... *C. arenicola*

4 Inflorescence a thyrse, the flowers borne in clusters the axis of leaves; fruit 3-valved ............................................................... *C. nashii*

3 Ovary and capsule glabrous.

5 Chasmogamous flowers usually solitary, terminal or subterminal, later overtopped by lateral branches; seeds papillate, 35-46 per chasmogamous capsule, 5-9 (-12) per cleistogamous capsule; chasmogamous capsules (4-) 5-7 (-8.5) mm long, cleistogamous capsules (2-) 2.3-3.0 (-3.8) mm long; upper surface of cauline leaves with some long simple trichomes mixed with the shorter stellate trichomes ............................................................... *C. canadense*
5. Chasmogamous flowers usually (1-) 2-18, rarely overtopped by lateral branches (often 1-3 in cymes in *H. georgianum*); seeds smooth or reticulate, 12-35 per chasmogamous capsule, 1-20 per cleistogamous capsule; chasmogamous capsules (2.4-) 3.5-5.7 mm long, cleistogamous capsules 1.5-4.2 mm long; upper surface of calyceal leaves with the shorter stellate trichomes only.

6. Chasmogamous and cleistogamous flowers borne together, the two types of flowers open at the same time (March–June); seeds smooth, 15-35 per chasmogamous capsule, 4-20 per cleistogamous capsule; outer sepals of the cleistogamous flowers 1.4-3.0 mm long; inner sepals of the cleistogamous flowers 2.0-4.8 mm long; [of the outer Coastal Plain (primarily barrier islands) of NC and SC].

7. Flowers borne in dense many-flowered flat-topped cymes terminating the stem and sometimes also the main branches; capsules of the cleistogamous flowers 1.6-3.8 mm long, with 4-8 (-10) seeds; pedicels and calyx with 0.5-1.5 mm long simple trichomes mixed with the shorter stellate trichomes; outer sepals of both chasmogamous and cleistogamous flowers with an expanded, obstate, spatulate tip, 0.3-1.2 mm wide……………………………………………………………………………………………………… *C. corymbosum*

8. Stems mostly 20-50 cm tall, clustered, arising from an upright caudex; distinct portion of the outer sepals of the cleistogamous flowers linear, (0.3-) 0.6-1.2 (-1.8) mm long, about 3-5× as long as wide; distinct portion of calyx of the chasmogamous flowers (2.4-) 3.5-4.5 (-8) mm long; cleistogamous capsules sharply 3-angled in cross-section; leaf with broadly cuneate base………………………………………………………………………………………………………………………………………………………………………………………. *C. bicknellii*

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*Crocanthemum arenicola* (Chapman) Barnhart, Gulf Coast Frostweed. Cp (FL): sandhills, dunes, scrub; rare. Panhandle FL west to s. MS. [= S; = *Helianthemum arenicola* Chapman – K, WH, Y, Z]

*Crocanthemum bicknellii* (Fernald) Barnhart, Hoary Frostweed, Plains Frostweed, Plains Sunrose, Bicknell's Hoary Rockrose. Mt (GA, NC, VA, WV), Pd (DE, NC, VA): woodlands, glades, barrens, rock outcrops, and grassy balds, to at least 1500m in elevation; rare. June–July (chasm.), July–September (cleist.); August–October. ME and s. ON west to MN and s. MB, south to ne. GA, e. TN, AR, KS, and CO. [= S; = *Helianthemum bicknellii* Fernald – RAB, C, F, G, K, W, Y, Z; = *Halimium*


*Crocanthemum georgianum* (Chapman) Barnhart, Georgia Sunrose, Georgia Frostweed. Cp (FL, GA, NC, SC): openings in maritime forests, sandy disturbed areas; uncommon (rare in GA, NC, and SC). April–May; May–October. E. NC south to n. FL, west to c. TX and AR. [= S; = *Helianthemum georgianum* Chapman – RAB, K, WH, Y, Z; = *Halimium georgianum* (Chapman) Grosser]


*Crocanthemum rosmarinifolium* (Pursh) Barnhart, Rosemary Sunrose. Cp (FL, GA, NC, SC): sandy roadsides, fields; common (uncommon in FL, rare in NC). May–June; July–October. S. NC south to Panhandle FL, west to c. TX; also disjunct in the West Indies. [= S; = *Helianthemum rosmarinifolium* Pursh – RAB, K, WH, Y, Z; = *Halimium rosmarinifolium*]

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*Hudsonia* Linnaeus 1767 (Sand-heather, Golden-heather, Beach-heather)

CISTACEAE

1 Pedicels 0-1 (-3) mm long; leaves 1-3 mm long, ovate, densely tomentose, appressed to the stem and overlapping; stamens 8-20; [of the outer Coastal Plain of VA and NC] .................................................................H. tomentosa

1 Pedicels 4-10 mm long; leaves 3-7 mm long, subulate, slightly pubescent, spreading; stamens 10-30; [collectively of the Mountains of NC and inner Coastal Plain of SC].

2 Sepals obtuse to acute, lacking long-acuminate apices; stamens 10-20; leaves 3-4.5 (-6) mm long, sparsely villous; fruits cylindric; [of the inner Coastal Plain of SC (in our area)] .........................................................................................H. ericoides

2 Sepals acuminate, with attenuate apices 1-2 mm long; stamens 20-30; leaves 5-7 mm long, glabrate to sparsely villous; fruits urceolate to campanulate; [of the Mountains of NC] ...........................................................................................................H. montana

Hudsonia ericoides Linnaeus, Northern Golden-heather. Cp (DE, SC): sandy flats in longleaf pine sandhills (SC) or Coastal Plain pitch pine barrens (DE); rare. May; August. NL (Newfoundland) south to ME, NH, MD (Sipple 2002), and DE; disjunct in NC. The disjunct occurrence in SC has every appearance of being native; it is discussed by Bozeman & Logue (1968). [= RAB, C, F, G, K, S, Z; = H. ericoides Linnaeus ssp. ericoides – Y]

Hudsonia montana Nuttall, Mountain Golden-heather. Mt (NC): shallow sandy soils on ledges of quartzite or other felsic rocks in the Blue Ridge Escarpment, at various sites along the eastern side of Linville Gorge, Burke County, NC, and disjunct further south in McDowell County, NC; rare. June-early July; mid-July-September. This species is endemic to w. NC; it is almost certainly a southern sibling of the more northern H. ericoides. As well as being a very narrowly distributed endemic, H. montana is endangered by fire suppression in its habitat. [= RAB, K, S, W, Z; = H. ericoides Linnaeus ssp. montana (Nuttall) Nickerson & J. Skog – Y]

Hudsonia tomentosa Nuttall, Woolly Beach-heather. Cp (DE, NC, VA), Mt (WV): dunes, sand flats, blowouts (in DE, NC, VA), high elevation quartzitic sandstone outcrops (in WV); common (rare in NC and WV). May-July; August-September. NL (Labrador) west to MB and NT, south to WV (Panther Knob), WI, and MN, and south along the Atlantic Coast from ME to VA and ne. NC (where it reaches its southern limit in Dare County). [= RAB, C, F, G, S, WV, Z; > H. tomentosa var. tomentosa – K; = H. ericoides Linnaeus ssp. tomentosa (Nuttall) Nickerson & J. Skog – Y]

Lechea Linnaeus 1753 (Pinweed)

( contributed by Bruce A. Sorrie)


Identification notes: Lechea is recognizable by its production of numerous basal shoots (usually prostrate) in the late summer and fall. These are evergreen and overwinter, and the fertile stems (usually erect or ascending) are produced from renewed growth of the basal shoots in the spring and summer.

1 Pubescence of the stems strongly spreading, not at all appressed; inner sepals carinate (U- or V-shaped in cross-section); plant tall, often > 5 dm tall ...............................................................L. mucronata

1 Pubescence of the stems more or less appressed, usually strongly so; inner sepals shallowly curved in cross section, not carinate; plants variable in height.

2 Outer (slender) sepals equaling or exceeding the inner (broad) sepals.

3 Base of the fruiting calyx clearly differentiated into a hardened, shiny, yellowish, obconic base 0.4-0.6 mm long, contrasting in color and texture with the rest of the calyx; pedicels averaging > 2 mm long; plant umbrella-like, with reflexed drops of water; capsules in a dense row ..............................L. racemulosa

3 Base of the fruiting calyx not conspicuously differentiated in texture and color; pedicels averaging < 1.5 (-2) mm long.

4 Capsule completely enclosed by the sepals, subglobose; leaves averaging > 10× as long as wide; plant short and usually densely bushy, < 3 dm tall .................................................................L. tenuifolia

4 Capsule exserted, usually conspicuously so, the sepals not enclosing the summit of the fruit, ellipsoid to ovate; leaves < 8× (usually < 6×) as long as wide; plant usually taller, 1-7 dm tall.

5 Outer sepals distinctly longer than the inner sepals, usually also longer than the capsule; stem leaves usually whorled, 2 mm wide; plant erect, with short, ascending branches .........................................................L. minor

5 Outer sepals shorter than to barely longer than the inner sepals, shorter than the capsule; stem leaves alternate, rarely wider than 1.5 mm wide; plant ascending (sometimes erect or spreading, branches spreading)...........................................................................L. sessiliflora

2 Outer (slender) sepals shorter than the inner (broad) sepals.

6 Capsules ellipsoid to narrowly pyriform, normally about 2× as long as wide (or even longer in L. racemulosa).

7 Stigmas not persistent; pedicels averaging about 2 mm long; base of the fruiting calyx clearly differentiated into a hardened, shiny, yellowish, obconic base 0.4-0.6 mm long, contrasting in color and texture with the rest of the calyx .................L. racemulosa

7 Stigmas persistent, reddish-brown, conspicuous on the summit of the capsule; base of the fruiting calyx not conspicuously differentiated in texture and color .............................................................L. sessiliflora

6 Capsules of a broader shape, ovoid, broadly ellipsoid, or subglobose, normally < 1.5× as long as wide.

8 Capsules obviously longer than the sepals.

9 Seeds 3 (-4), relatively narrow and 3-sided, like the sections of an orange; fruiting stems 2.5-5.5 dm tall; panicle ovoid to subcylindric, the principal branches subequal and relatively short; capsules clustered at branch tips, or in a dense row.................L. pulchella var. pulchella

9 Seeds 2 (-3), broad and compressed, or obscurely 3-sided; fruiting stems 3.5-8.5 dm tall; panicle subcylindric to subglobose, the principal branches diminishing upward, relatively long; capsules in a sparse row (rarely more dense).........................L. pulchella var. ramosissima

8 Capsules almost completely enveloped by the sepals.

10 Leaves sparsely pubescent on the midrib and margin only beneath; branches and stems sparsely subappressed-pilose; seeds 4-6....
Lechea pulchella

Lechea intermedia

Lechea minor

Lechea maritima

Lechea pulchella

Lechea racemulosa

Lechea tenuifolia

Lechea torreyi

Lechea minor

Lechea maritima

Lechea pulchella

Lechea racemulosa

Lechea tenuifolia

Lechea torreyi

Lechea minor

Lechea maritima

Lechea pulchella

Lechea racemulosa

Lechea tenuifolia

Lechea torreyi

Lechea minor

Lechea maritima

Lechea pulchella

Lechea racemulosa

Lechea tenuifolia

Lechea torreyi

Lechea minor

Lechea maritima

Lechea pulchella

Lechea racemulosa

Lechea tenuifolia

Lechea torreyi
258. TROPAEOLACEAE A.L de Jussieu ex A.P. de Candolle 1824 (Nasturtium Family) [in BRASSICALES]


_Tropaeolum_ Linnaeus 1753 (Nasturtium)

A genus of about 85-90 species, herbs, of tropical Central America and South America (s. Mexico to Peru). References: Tucker in FNA (2010); Sparre & Andersson (1991)=Z.

* _Tropaeolum majus_ Linnaeus, Nasturtium, is cultivated and rarely persistent or present around refuse areas, as in se. PA (Rhoads & Klein 1993). _T. majus_ is considered by Sparre & Andersson (1991) to be a taxon of hybrid origin, not known from wild populations. It is probably not truly established in our area. [= FNA, K, Z] [not mapped; not keyed; rejected as a component of our flora]

261. LIMNANTHACEAE R. Brown 1838 (False-mermaid Family, Meadow-foam Family) [in BRASSICALES]


_Floerkea_ Willdenow 1801 (False-mermaid)


264. BATAEAE von Martius ex Meisner 1842 (Batis Family) [in BRASSICALES]

A monogeneric family, of 2 species, low shrubs, of tropical and subtropical shores of the Americas, New Guinea, the Pacific, and Australia. References: Thorne in FNA (2010); Rogers (1982b); Bayer & Appel in Kubitzki & Bayer (2003).

_Batis_ P. Browne 1756 (Saltwort, Beachwort, Batis)

A genus of 2 species, low shrubs, of tropical and subtropical shores of the Americas, New Guinea, the Pacific, and Australia. The only other member of the family and genus is _B. argillicola_, of New Guinea and Australia. References: Thorne in FNA (2010); Rogers (1982b)=Z; Goldblatt (1976); Bayer & Appel in Kubitzki & Bayer (2003).

_Batis maritima_ Linnaeus, Saltwort, Beachwort, Batis, Turtleweed, Vidrillos. Brackish marshes. June-July; October. Se. SC south to s. FL, west to TX, and in Central and South America; West Indies; HI (where apparently introduced). _B. maritima_ is alleged (as by FNA and S) to occur as far north as NC, but the documentation is unknown; there is no twentieth century evidence to place _Batis_ in NC. [= RAB, FNA, GW, K, S, WH, Z]

270. RESEDACEAE A.P. de Candolle ex Gray 1821 (Mignonette Family) [in BRASSICALES]

A family of about 6 genera and 75-85 species, herbs and shrubs, of the northern hemisphere. References: Martín-Bravo, Tucker, & Daniel in FNA (2010); Kubitzki in Kubitzki & Bayer (2003).

_Reseda_ Linnaeus 1754 (Mignonette)


1 Upper and middle leaves deeply pinnately lobed.
2 Carpels 4; petals white; seeds tuberculate .................................................................................................................................................. _R. alba_
2 Carpels 3; petals yellowish; seeds smooth ............................................................................................................................................. _R. lutea_
1 Upper and middle leaves entire or finely toothed (sometimes with 1-2 lateral lobes).
RESEDACEAE

3 Sepals and petals 4; seeds smooth; fruits < 7 mm long, crowded, erect to ascending .................................................. R. luteola
3 Sepals and petals 6; seeds rugose; fruits > 7 mm long, well-spaced, pendent.
4 Capsules 7-11 mm long; sepals (in fruit) < 5 mm long ................................................................. [R. odorata]
4 Capsules (well-developed) 11-15 mm long; sepals (in fruit > 5 mm long) ................................................................. [R. phyteuma]


* Reseda luteola Linnaeus, Weld, Dyer's Rocket, Yellow-weed. Formerly cultivated as a dye plant; native of Eurasia. Reported from se. and sc. PA (Rhoads & Klein 1993) and elsewhere mainly north of our area. [= C, F, FNA, G, K]


* Reseda phyteuma Linnaeus, Corn Mignonette. Disturbed areas; native of Europe. Reported from se. PA (Rhoads & Klein 1993). [= K]

{no definite report for our area; not mapped; rejected as a component of our flora}

272. CLEOMACEAE Horaninow 1834 (Cleome Family) [in BRASSICALES]

The Cleomaceae is here circumscribed to include the members of the Capparaceae, subfamily Cleomoideae, following phylogenetic analyses which show this group to be a monophyletic clade more closely related to Brassicaceae than to the rest of Capparidaceae (Hall, Sytsma, & Iltis 2002). References: Rucker & Vanderpool in FNA (2010); Hall, Sytsma, & Iltis (2002); Judd, Sanders, & Donoghue (1994); Sanders & Judd (2000). Key based on FNA.

1 Stamens (8-) 10-27; petals notched or irregularly lacerate at the apex; gynophore (stipe of the pistil, above the calyx) 2-6 mm long; leaflets (1-) 3 ................................................................. Polanisia
1 Stamens 6 (except 14-25 in Arivela); petals obtuse or acute at the apex; gynophore (stipe of the pistil, above the calyx) 1-80 mm long; leaflets 5-7.
2 Plants with nodal spines (and sometimes with prickles on petioles and leaf veins).
3 Petals 5-10 mm long; gynophore 1-4 mm long; petioles and leaf blades unarmed ................................................................. [Hemiscola]
3 Petals 10-30 mm; gynophore 45-80 mm; petioles and sometimes leaf blades prickly ................................................................. Tarenaya
2 Plants lacking nodal spines and lacking prickles on petioles and leaf veins.
4 Filaments fused to lower half of gynophore (evident from scars near the midpoint of the gynophore of fruiting specimens) ................................................................. Gynandropsis
4 Filaments free from gynophore
5 Bracts subtending the pedicels minute ............................................................................................................ Cleoserrata
5 Bracts subtending the pedicels with expanded blades, sometimes even trifoliolate.
6 Style 0.2-0.8 mm long; gynophore 3-12 mm; stamens 6; sepals fused ¼-⅓ their length ................................................................. Cleome
6 Style 1-1.2 mm long; gynophore obsolete; stamens 14-25; sepals free ............................................................................ Arivela

Arivela Rafinesque 1838


* Arivela viscosa (Linnaeus) Rafinesque, Wild Caia, Yellow Cleome. Cp (GA, SC, VA?): disturbed areas; rare, introduced, native of Asia (now pantropical). Reported for sc. GA (Carter, Baker, & Morris 2009; Jones & Coile 1988), se. PA (Rhoads & Klein 1993), and recently from Beaufort County, SC (J. Nelson, pers.comm. 2006). Reported from chrome ore piles in Newport News (Reed 1959); presumably a waif. [= FNA; = Cleome viscosa Linnaeus – K] {synonymy incomplete}

Cleome Linnaeus 1753 (Cleome, Spiderflower)

A genus of about 20 species, annual herbs, of the Old World. References: Tucker in FNA (2010); Ilitis (1960)=Z; Kers in Kubitzki & Bayer (2003). {also see Arivela, Cleoserrata, Gynandropsis, Hemiscola, and Tarenaya}
CLEOMACEAE

1 Fruits (12-)15-25 mm long; bracts unifoliate; leaflets linear to elliptic ................................................................. [C. ornithopodioides]

1 Fruits 40-70 mm long; bracts trifoliate; leaflets oblanceolate to rhomboid-elliptic ...................................................... C. rutidosperma

* Cleome rutidosperma DC. Cp (FL, SC?): disturbed areas; rare, native of tropical Asia and Africa. Reported for SC by FNA. [= FNA, WH] {add to synonymy}

* Cleome ornithopodioides Linnaeus, Bird Spiderflower. Reported for KY, MD, PA, OH. [= FNA; > C. iberica de Candolle] {add to synonymy}

Cleoserrata H.H. Iltis 2007


1 Petals white, tinged with pink or red; bracts at most 1 mm long, subulate; gynophore 1-2 mm long................................................. C. serrata

1 Petals brilliant pink to purple, fading to pink or white (rarely initially white); bracts 3-18 mm long, ovate-cordate; gynophore 30-85 mm long ............................................................................................................................. C. speciosa

* Cleoserrata serrata (Jacquin) H.H. Iltis. {GA}; disturbed areas; rare, native of tropical America. Reported as introduced in GA (Kartesz 1999). [= FNA; = Cleome serrata Jacquin – K; = Neocleome serrata (Jacquin) Small – S] {not yet keyed; synonymy incomplete}

* Cleoserrata speciosa (Rafinesque) H.H. Iltis. Cp (FL): vacant lots, disturbed areas; rare, native of Mexico. [= FNA; = Cleome speciosa Rafinesque – K, WH]

Gynandropsis de Candolle 1824


Hemiscola Rafinesque 1838


1 Leaflets ovate to rhomboidal; sepals lanceolate; anthers 0.9-1.0 mm long; silique 20-40 (-60) mm long............................................................. [H. aculeata var. aculeata]

1 Leaflets obovate; sepals ovate; anthers 0.3-0.5 mm long; silique 15-20 mm long ............................................................................................... [H. diffusa]

* Hemiscola aculeata (Linnaeus) Rafinesque var. aculeata. Prickly Spiderflower. Cp (AL): disturbed areas; rare, native of tropical America. Reported for AL. [= FNA; < Cleome aculeata Linnaeus – K]

* Hemiscola diffusa (Banks ex de Candolle) H.H. Iltis. Cp (AL): on ballast (Mobile, AL); rare, native of South America. [= FNA; = Cleome diffusa Banks ex de Candolle – K]

Polanisia Rafinesque 1819 (Clammy-weed)


Identification notes: Polanisia has some resemblance to Warea.

1 Petals broadest toward the base, barely or not at all clawed; capsule valvate; [of xeric longleaf pine sandhills]................................. P. tenuifolia

1 Petals broadest toward the tip, narrowed to a long, distinct claw; capsule opening near the tip; [of floodplains and disturbed soils].

2 Larger petals 3.5-6.5 (-8) mm long; longest stamens 4-10 (-14) mm long ............................................................................................. P. dodecandra var. dodecandra

2 Larger petals (7-) 8-13 (-16) mm long; longest stamens (9-) 12-30 mm long ................................................................................. P. dodecandra var. trachysperma

Polanisia dodecandra (Linnaeus) A.P. de Candolle var. dodecandra. Clammy-weed, Spider-weed. Mt (VA, WV*), Pd (VA): sandy or gravelly floodplains along the James River in VA, also introduced on railroad ballast; rare. June-September. VT west to MB, south to MD, w. VA, TN, AR, and OK. Apparently both native and introduced in our area. [= C; = P. dodecandra ssp. dodecandra – FNA, K; = P. graveolens Rafinesque – F, S, WV; = P. dodecandra – G; < P. dodecandra – W; = Cleome graveolens (Rafinesque) Sch. & Sch.]

**Polanisia tenuifolia** Torrey & A. Gray, Slenderleaf Clammy-weed, Pineland Catchfly. Cp (AL, FL, GA, MS): sandhills; rare. E. GA (several counties from the SC border) (Jones & Coile 1988) south to s. FL, west to s. MS. [= FNA, K, WH; = Aldenella tenuifolia (Torrey & A. Gray) Greene – S]

**Tarenaya** Rafinesque 1838

A genus of about 33 species, annual herbs, of South America. References: Tucker & Iltis in FNA (2010). Key based on FNA.

1. Sepals, ovary, and fruit glabrous; fruit about as long as gynophore; petals deep pink or purple (infrequently white) .................... **Tarenaya hassleriana**

1. Sepals, ovary, and fruit glandular-pubescent; fruit longer than gynophore; petals white or greenish-white .......................................... **Tarenaya spinosa**

* **Tarenaya hassleriana** (Chodat) H.H. Iltis, Cleome, Spiderflower, Pinkqueen. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): gardens, disturbed areas, riverbanks, persistent and self-seeding from cultivation as an ornamental; rare, native of South America. June-November. The petals in bud are a pale pink to nearly white, they turn a deep pink upon opening late in the day; by morning the petals have once again faded to a pale pink or white. [= FNA; = Cleome hassleriana Chodat – C, K, WH; ? C. houtteana Schlechtendahl – RAB, misapplied; < C. spinosa Jacquin – F, G, misapplied; < Neocleome spinosa (Jacquin) Small – S]

* **Tarenaya spinosa** (Jacquin) Rafinesque. Cp (FL): disturbed areas; rare, native of South America. Also in AL. [= FNA; < Neocleome spinosa (Jacquin) Small – S; = Cleome spinosa Jacquin – WH]

**273. BRASSICACEAE** Burnett 1835 or CRUCIFERAE A.L. de Jussieu 1789 (Mustard Family) [in Brassicales]


Tribe a. Alyssaeae: Alyssum, Berteroa
Tribe b. Anchonieae: Matthiola
Tribe d. Arabideae: Arabis, Draba
Tribe e. Boehereae: Boeckera
Tribe f. Brassicaceae: Brassica, Cakile, Coincya, Diplotaxis, Eruca, Erucastrum, Orychophragmus, Raphanus, Rapistrum, Sinapis
Tribe g. Buniaeae: Bunias
Tribe h. Calepineae: Calepina
Tribe i. Camelineae: Arabidopsis, Camelina, Capsella, Turritis
Tribe j. Cardamineae: Armoracia, Barbarea, Cardamine, Iodanthus, Leavenworthia, Nasturtium, Planodes, Rorippa
Tribe k. Chorisopoeae: Chorisopoeae
Tribe m. Conringaeae: Conringia
Tribe n. Descruainaeae: Descruainia
Tribe o. Erysimaeae: Erysimum
Tribe p. Euclidieae: Braya
Tribe s. Hesperideae: Hesperis
Tribe t. Iberideae: Iberis, Teedsalia
Tribe v. Isatidaeae: Isatis, Myagrum
Tribe w. Lepidieae: Lepidium
Tribe x. Lunarieae: Lunaria
Tribe y. Malcolmieae: Lobularia
Tribe z. Noccaeeae: Microthlaspi
Tribe aa. Physarieae: Paysonia, Physaria
Tribe bb. Sisymbrieae: Sisymbrium
Tribe dd. Thelypodieae: Warea
Tribe ee. Thlaspiadeae: Alliaria, Thlaspi

**Alliaria** Heister ex Fabricius 1759 (Garlic Mustard)


* **Alliaria petiolata** (Bieberstein) Cavara & Grande, Garlic Mustard, Hedge Garlic. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE, VA) (GA, SC): moist forests in bottomlands and on slopes; common (uncommon in VA Piedmont, rare in NC, rare in VA Coastal Plain), native of Europe. April-May; May-June. This species has become a noxious weed in ne. United States, invading undisturbed moist forests. Dhillion & Anderson (1999) report on physiological characteristics that make Alliaria a successful invader in shaded situations. [= RAB, C, FNA, K, W, Y, Z; = Alliaria officinalis Andrzejowski ex Bieberstein – F, G]

* Alyssum alyssoides* (Linnaeus) Linnaeus, Yellow Alyssum. Mt (VA, WV), Pd (VA), Cp (VA): roadsides, disturbed areas, especially in dry, barren soil; uncommon (rare in WV), native of Europe. June-September. [= C, F, NFA, G, K, W, Z; > A. alyssoides var. alyssoides – Y]

**Arabidopsis** Heynhold (Mouse-ear Cress)


1 Fruit strongly flattened; petals 6-10 mm long; [native perennial, of calcareous and mafic rock outcrops] ................................................. *A. lyrata ssp. lyrata* 
1 Fruit terete; petals 2-4 mm long; [alien annual, of disturbed, weedy sites] .................................................. *A. thaliana* 


* Arabidopsis thaliana* (Linnaeus) Heynhold, Mouse-ear Cress. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed areas, fields, roadsides, lawns; common (rare in DE Piedmont), native of Eurasia. March-May. *Arabidopsis thaliana* has sometimes been referred to as the white mouse of the vascular plant world, having been very extensively used as an experimental plant; a journal, the Arabidopsis Information Service, publishes annual bibliographies of studies using this plant. [= RAB, C, F, NFA, G, K, S, W, X, Y, Z]

**Arabis** Linnaeus 1753 (Rockcress)

The circumscription of *Arabis* is in flux; there is increasing evidence that the broad circumscription traditionally employed in most North American floras includes discordant elements. Based on molecular phylogenetic studies and morphology, *Arabis* in our area should be divided into 4 genera, as follows: *Arabidopsis* (*A. lyrata*); *Arabis* sensu stricto (n=8) (*A. hirsuta var. adpressipilis, A. hirsuta var. pycnocarpa, A. georgiana); *Boechera* Löve & Löve (n=7) (*A. canadensis, A. drummondii, A. laevigata var. burkii, A. laevigata var. laevigata, A. missouriensis, A. patens, A. persiellata var. ampla, A. serotina, A. shortii); and *Turritis* (*A. glabra var. glabra*). References: Al-Shehbaz in FNA (2010); Hopkins (1937)=Z; Rollins (1993)=Y; Al-Shehbaz (1988a)=X; Al-Shehbaz (2003)>X; Al-Shehbaz (2003)=Q; Koch, Bishop, & Mitchell-Olds (1999); Koch & Al-Shehbaz (2002). [also see *Arabidopsis, Boechera, Turritis*]

1 Plants matted from a branching caudex, perennial; [cultivated and rarely persistent or escaped] .......................................................... *A. caucasica* 
1 Plants unbranched, biennial; [native to our area].

2 Petals 3-5 mm long; siliques 3-6 cm long; [collectively known from NC, TN, VA, and northward and westward from those states].
2 Petals 6-9 mm long; siliques 2-5 cm long.

3 Siliques (4.5-) 5-7 cm long; [endemic to w. GA and c. AL] ................................................................................................. *A. georgiana* 
3 Siliques 2.5-4 cm long; of se. PA, c. PA, and IN south to NC, e. TN, and AL] ............................................................................................. *A. patens* 

4 Stem pubescence primarily appressed and of 2-armed or dolabiform hairs .............................................................................. *A. pycnocarpa var. adpressipilis* 
4 Stem pubescence primarily spreading and of simple hairs .............................................................................. *A. pycnocarpa var. pycnocarpa* 

**Arabis georgiana** R.M. Harper, Georgia Rockcress. Mt (GA), Pd (GA), Cp (GA): nutrient-rich streambanks and rock outcrops; rare. April-May; May-early July. Endemic to n. and sw. GA and c. AL. It differs from our other species by the following combination of characters: fruits 5-7 cm long, borne appressed to ascending, leaves with bifurcate, trifurcate, or stellate hairs. See Patrick, Allison, & Krakow (1995). [= FNA, K, Y, Z]

**Arabis patens** Sullivant, Spreading Rockcress. Mt (GA, NC, VA, WV), Pd (VA): thin soils around calcareous or dolomitic outcrops, very rarely in nutrient-rich seepage from mafic rocks; rare. May-June; June-August. Irregularly distributed, primarily in the sedimentary rock Appalachians, from se. PA, c. PA, and IN south to NC, e. TN, and AL. In NC, this species occurs over marble at Blowing Spring, Nantahala River Gorge, Swain County, at various sites over calcareous sedimentary rocks in the Hot Springs Window, near Hot Springs, Madison County, and in nutrient-rich seepage from amphibolite at Chimney Rock, Rutherford County. [= RAB, C, F, NFA, G, K, S, W, X, Y, Z; = Boechera patens (Sullivant) Al-Shehbaz – Q]

**Arabis pycnocarpa** M. Hopkins var. *adpressipilis*. M. Hopkins, Slender Rockcress, Hairy Rockcress. Pd (NC), Mt (NC, VA): thin soils near outcrops of mafic or other rock weathering to nutrient-rich soils; rare. April-May; May-June. Var.
adpressipilis ranges from OH to IL, south to AR, c. TN, and LA; disjunct east of the mountains in NC. Related to, but specifically distinct from, A. hirsuta (Linnaeus) Scopoli of Europe and A. eschscholtziana Andrejeewski in Ledebour of w. North America. [= FNA, Z; = A. hirsuta (Linnaeus) Scopoli var. adpressipilis (M. Hopkins) Rollins – C, F, G, X, Y; < A. hirsuta var. pycnocarpa (M. Hopkins) Rollins – K; > A. ovata Michaux – S]

Arabis pycnocarpa M. Hopkins var. pycnocarpa, Slender Rockcress. Mt (WV): thin soils near outcrops of calcareous soils; rare. QC west to AK, south to e. and sw. PA (Rhoads & Klein 1993), AR, and AZ, primarily west of the Blue Ridge. Reports of this taxon from GA (Fernald 1950, Kartesz 1999, Hopkins 1937) are based on material collected by A.W. Chapman near Rome, and later described as Arabis georgiana. See discussion under A. pycnocarpa var. adpressipilis. [= FNA; = A. hirsuta (Linnaeus) Scopoli var. pycnocarpa (M. Hopkins) Rollins – C, F, G, X, Y; < A. hirsuta var. pycnocarpa – K (also see var. adpressipilis); = A. pycnocarpa M. Hopkins var. typica – Z]


Artoracia Gaertner, B. Meyer, & Scherbius 1800 (Horseradish)

A genus of 3 species, perennial herbs, of Eurasia. References: Al-Shehbaz in FNA (2010); Rollins (1993)=Y; Al-Shehbaz (1988a)=X.

1 Plant aquatic; stem submersed or prostrate; fruit unilocular .................................................................[see Rorippa aquatica]
1 Plant terrestrial; stem erect; fruit bilocular ............................................................................................A. rusticana

* Armoracia rusticana P. Gaertner, B. Meyer, & Scherbius, Horseradish. Mt (NC, VA, WV), Pd (DE), Cp (DE): persistent after cultivation, sometimes spreading (generally only very locally, but sometimes greater distances, probably by water transport of rhizomes); uncommon (rare south of DE), native of Europe. May-July. The root is grated to provide the condiment. [= RAB, C, G, K, X, Y, Z; = A. lapathifolia Giliberti – F; = A. armoracia (Linnaeus) Britton – S]

Barbara R. Brown 1812 (Winter-cress, Creasy Greens)

A genus of about 20 species, biennial and perennial herbs, semicosmopolitan. References: Al-Shehbaz in FNA (2010); Al-Shehbaz (1988a)=Y; Rollins (1993)=Z.

1 Basal leaves with 4–10 pairs of lateral lobes; siliques 4.5–7 cm long; pedicels 1.2–1.8 mm thick..................................................B. vulgaris
1 Basal leaves with 1–4 pairs of lateral lobes; siliques 1.5–3 cm long; pedicels 0.5–1.0 mm thick..................................................B. verna

* Barbarea vulgaris W. Aiton, Common Winter-cress, Yellow Rocket. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, NC, SC, VA): fields, disturbed areas; common, native of Eurasia. April-June. Additional study is needed of the various infraspecific or specific taxa recognized by some authors (particularly Europeans) in what is here considered a variable species; see Stace (2010), for instance. [= RAB, C, F, G, K, W, Y, Z; = B. vulgaris var. vulgaris – F, G; > B. vulgaris var. arcuata (Opiz ex J. & K. Presl) Fries – RAB, F, G; > Campe barbarea (Linnaeus) Wight ex Piper – S; > Campe stricta (Andrzejowski) W. Wight ex Piper – S, misapplied; > B. vulgaris var. sylvestris Fries]

Berteroa A.P. de Candolle 1821 (Hoary Alyssum)

A genus of about 5 species, annual or perennial herbs, of Europe and the Middle East. References: Al-Shehbaz in FNA (2010); Rollins (1993)=Z; Al-Shehbaz (1987)=Y.

* Berteroa incana (Linnaeus) A.P. de Candolle, Hoary Alyssum. Mt (VA, WV), Pd (VA): disturbed areas; uncommon, native of Europe. [= C, F, FNA, G, K, Y, Z]

Boechera Löve & Löve 1975 (Rockcress)


1 Pedicels of flowers or fruits deflexed..............................................................................................................B. canadensis
1 Pedicels of flowers or fruits erect, ascending, or spreading.
2 Mature fruits < 3 cm long; stems branched or simple at the base.
3 Stem leaves (most of them) < 5 mm wide; stems branched at the base .................................................[see Arabidopsis lyrata ssp. lyrata]
3 Stem leaves (most of them) > 8 mm wide; stems simple at the base.
4 Lower cauleine leaves glabrous or sparsely pubescent on the upper surface; fruits erect and appressed, 3-5 mm long ..........[see Arabis]
5 Petals 6-9 mm long; fruiting pedicels 10-16 mm long; mature fruits 2.5-4 cm long; pubescence of the lower leaf surface simple; seeds winged .................................................................[see Arabis patens]
5 Petals 2-5 mm long; fruiting pedicels 2-10 (-13) mm long; mature fruits 1.5-3 cm long; pubescence of the leaf surface stellate; seeds wingless.
6 Petals 3-5 mm long, pink or purplish; fruiting pedicels 5-10 (-13) mm long; siliques 1.5-2 cm long; pubescence of the upper leaf surface stellate .................................................................[B. perstellata]
6 Petals 2-3 mm long, white to cream; fruiting pedicels 2-3.5 mm long; siliques 1.5-3 cm long; pubescence of the upper leaf surface simple .................................................................[B. shortii]

Boechera burkii (Porter) Windham & Al-Shehbaz, Burks Smooth Rockcress. Mt (NC, VA, WV): limestone barrens, shale barrens, and other dry, rocky habitats; rare. April-May. e. and c. PA south to e. WV, ne. TN, and w. NC in the sedimentary rock Appalachians. Windham & Al-Shehbaz (2007) […] RAB assigns this plant (as Arabis laevigata var. burkii) to NC based on somewhat aberrant specimens from high elevation cove forests; these are better assigned to B. laevigata var. laevigata. Hopkins (1937), however cites a specimen from Hot Springs, Madison County, NC, an area with plausible habitats (dry sedimentary rock woodlands, shale barrens). [= FNA; = Arabis laevigata (Muhlenberg ex Willdenow) Poiret var. burkii Porter – C, K, X, Y; < A. laevigata var. burkii – F, G, Z (also see A. serotina); < A. burkii (Porter) Small – S, misapplied in part; < Boechera laevigata – Q]

Boechera canadensis (Linnaeus) Al-Shehbaz, Sicklepod, Canada Rockcress. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, VA): thin soils around rock outcrops, especially mafic or calcareous, and in dry to mesic, nutrient-rich, often rocky woodlands over mafic or calcareous rocks; uncommon (rare in Coastal Plain, rare in DE Piedmont). May-July; June-August. QC and ND south to Panhandle FL and TX. [= FNA, Q, WH; = Arabis canadensis Linnaeus – RAB, C, F, G, K, S, W, X, Y, Z]

Boechera laevigata (Muhlenberg ex Willdenow) Al-Shehbaz, Common Smooth Rockcress. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (VA): rocky woodlands and forests, rock outcrops, especially mafic or calcareous, but also on more acidic substrates, rarely also in bottomlands; common (uncommon in VA Coastal Plain, rare in DE Piedmont). April-May; May-June. ME west to MN and SD, south to GA, AL, MS, AR, OK, and CO. Of our Boechera, B. laevigata is the most common, being the least limited to calcareous substrates. [= FNA; = Arabis laevigata (Muhlenberg ex Willdenow) Poiret var. laevigata – C, F, G, K, W, X, Y, Z; < A. laevigata var. laevigata – RAB; > A. laevigata var. burkii – RAB, misapplied; > > A. burkii (Porter) Small – S, misapplied in part; > A. laevigata – S; < Boechera laevigata – Q]

Boechera missouriensis (Greene) Al-Shehbaz, Missouri Rockcress. Pd (GA, NC, SC), Mt (NC): thin soil around outcrops of metamudstone, diabase, or granite (generally on mafic or rich granitic substrates); rare. April-May; May-June. ME to WI, south to KY, AR, and OK; disjunct eastward in NC, SC, and GA. [= FNA, Q; = Arabis missouriensis Greene – C, K, X, Y; = A. laevigata var. missouriensis – RAB; > A. missouriensis var. missouriensis – F; > A. viridís Harger var. viridís – G, Z]

Boechera serotina (Steele) Windham & Al-Shehbaz, Shale Barren Rockcress. Mt (VA, WV): shale barrens; rare. Mid-July-September. Endemic to Devonian and Ordovician shales of w. VA and e. WV. Wieboldt (1987) has clarified the taxonomy of this species and A. laevigata var. burkii. Also see Porter & Wieboldt (1991) for further discussion. [= FNA; = Arabis serotina Steele – C, K, X, Y; < A. laevigata var. burkii – F, G, Z; < Boechera laevigata – Q]

Boechera shortii (Fernald) Al-Shehbaz. Mt (WV), Pd (VA): nutrient-rich alluvial and river bluff forests (in VA, along the Potomac River); rare (VA Rare). April-May. NY west to MN, south to n. VA, nc. TN (Chester, Wofford, & Kral 1997), and AR. [= FNA, Q; = Arabis shortii (Fernald) Gleason – C, G, K, X, Y; = A. perstellata E.L. Braun var. shortii Fernald – F; = A. dentata (Torrey) Torrey & A. Gray – S, Z (name preoccupied); > A. shortii var. phalacrocarpa (M. Hopkins) Steyermark]
BRASSICACEAE

Boechera stricta (Graham) Al-Shehbaz. Pd (DE): {habitat}; rare. April-June. NL (Labrador) and AK south to NJ, DE, OH, IL, NM, AZ, and CA. [= FNA, Q; = Arabis drummondii A. Gray – C, F, G, K, Y; > A. drummondii A. Gray var. typica – Z; = Boechera drummondii (A. Gray) Löve & Löve, illegitimate name]

Boechera perstellata (E.L. Braun) Al-Shehbaz is apparently endemic to KY and c. TN (Chester, Wofford, & Kral 1997). [= FNA, Q; = Arabis perstellata – K, Y; > Arabis perstellata E.L. Braun var. perstellata – X; > Arabis perstellata E.L. Braun var. ampla Rollins – X]

Brassica Linnaeus 1753 (Mustard, Turnip, Rape, Cabbage, Collard Greens, Kale, Broccoli, Cauliflower, Kohlrabi, Rutabaga, Bok-Choy, Chinese Cabbage, Brussels Sprouts)

A genus of about 40 species, herbs, of the Old World. References: Warwick in FNA (2010); Rollins (1993)=Z; Al-Shehbaz (1985b)=Y. Key adapted from Z. [also see Erucastrum, Sinapis]

1 Upper cauline leaves petiolate, or sessile and cuneate.
2 Pedicels and siliques widely spreading to divaricately ascending; siliques 2-4 cm long, terete or nearly so; [section Rapa]...........................................Br. juncea
3 Petals mostly 18-25 mm long; beak of the siliqua (3-4) 11 mm long .........................................................[Br. napus]
4 Petals 6-10 (-11) mm long, deep yellow; beaks of the siliqua usually (8-) 10-15 (-22) mm long; plant usually glaucous; siliques 5-10 cm long.................................................Br. rapa var. rapa
5 Petals 10-18 mm long, pale yellow; beak of the siliqua usually (5-) 7-10 (-16) mm long; plant usually glaucous; siliques 5-10 cm long .........................................................Br. rapa

* Brassica juncea (Linnaeus) Czernajew, Leaf Mustard, Brown Mustard, Indian Mustard, Mustard Greens, Chinese Mustard, Cp (DE, GA, SC, VA), Mt (NC, SC, VA, WV), Pd (DE, SC, VA): fields, disturbed areas; common (uncommon in GA, NC, SC, VA, and WV), native of Eurasia. April-June. This species is apparently a recently derived polyploid (n=18) of B. nigra (n=8) and B. rapa (n=10). The seeds of this species are one source of table mustard; other components include B. nigra and Sinapis alba. [= RAB, C, G, K, W, Y, Z; > B. juncea – S; > B. japonica (Thunberg) Siebold ex Miquel – S]

* Brassica napus Linnaeus, Rutabaga, Rape, Canola, Colza, Swede. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA,)?, Cp (SC): fields, disturbed areas; uncommon (rare in GA, NC, SC, and VA), native of Eurasia. May-July. This species is apparently a recently derived polyploid (n=19) of B. oleracea (n=9) and B. rapa (n=10). The seeds of this species are the source of "canola" oil, the name recently coined by marketers from "Canadian" + "oil" + "low" + "acid" to avoid the negative connotation of the ancient name "rape." [= K, W, Y, Z; < B. napus – RAB (also see B. rapa)]

* Brassica nigra (Linnaeus) W.D.J. Koch, Black Mustard, Charlock. Cp (DE, VA), Pd (DE, VA), Mt (VA, WV) [NC]: fields, disturbed areas; common (uncommon of DE), native of Eurasia. May-August. The seeds of this species are one source of table mustard; other species used include B. juncea and Sinapis alba. [= C, F, G, K, S, Y, Z; = Sinapis nigra Linnaeus]

* Brassica rapa Linnaeus var. rapa, Turnip, Bird’s-rape, Field Rape, Field Mustard, Bok-choy, Chinese Cabbage. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA): fields, disturbed areas; common, native of Europe. March-June. B. rapa is cultivated in a variety of forms, B. rapa var. chinensis (Linnaeus) Kitam. (Bok-choy or Pak-choi) and B. rapa var. amplexicaulis Tanaka & Ono (Chinese Cabbage). [= K; < B. rapa – C, Y, Z; < B. napus – RAB; > B. rapa – G; > B. campestris Linnaeus – G, S]

* Brassica oleracea Linnaeus. Commonly cultivated in our area in a variety of forms, including B. oleracea var. acephala A.P. de Candolle (Collard Greens, Kale), B. oleracea var. capitata Linnaeus (Cabbage), B. oleracea var. italica Plench (Broccoli), B. oleracea var. botrytis Linnaeus (Cauliflower), B. oleracea var. gemmifera Zenk (Brussels Sprouts), and B. oleracea var. gongylodes Linnaeus (Kohlrabi). [= FNA, K]

Braya Sternberg & Hoppe 1815

A genus of about 6 species, perennial herbs, of alpine and arctic Eurasia and North America. References: Harris in FNA (2010); Rollins (1993)=Z.


Bunias Linnaeus 1753 (Warty-cabbage)


1 Plant an annual; cauline leaves < 5 cm long; siliques 10-12 mm long, more-or-less straight, 4-winged, spiny; seeds 3-4 per siliqua..............................B. erucago
BRASSICACEAE

Cakile. P. Miller 1754 (Sea Rocket)


Identification notes: The siliques of Cakile are divided near their middle by an abscission zone into two halves, each with a single seed: the upper abscises and disperses by water or wind, the lower remains attached to the parent plant. The size of the two segments and the contour of the abscised surface remaining on the lower segment are important taxonomic characters.

1 Lower siliques 5-9 mm wide, the beak somewhat flattened and typically rather blunt; [of NC northward to NL (Labrador)] ................................................................. C. maritima
2 Infructescences usually >20 cm long; [of the Gulf Coast] ........................................................................................................ C. lanceolata
3 Siliques 3-4 mm wide, the beak conical and acute at the apex; [of the Gulf Coast] ......................................................................................... C. pseudoconstricta
4 Upper fruit segment 7-15 mm long, 4-angled (to weakly 8-ribbed); articulating surface of lower fruit segment flat to concave and without teeth; [of NC southward to St. Lucie County, FL] ..................................................................................... C. harperi


Cakile edentula (Bigelow) Hooker, Northeastern Sea Rocket. Cp (DE, MD, NC, VA): beaches, at or near the wrack line; common. May-June (-October). NL (Labrador) south to NC; introduced in various other shores around the world, including w. North America and Australia. See C. harperi for discussion of the relation between these taxa. [= RAB, S; = C. edentula var. edentula – C, F, G; = C. edentula var. pseudoconstricta – GW; = C. edentula var. edentula – FNA, K, X, Y, Z]

Cakile harperi Small, Southeastern Sea Rocket. Cp (FL, GA, NC, SC): beaches, at or near the wrack line; common. May-June (-October). A Southeastern Coastal Plain endemic: e. NC south to the east coast of c. peninsular FL. Rodman (1974) and most authors since have treated C. harperi as C. edentula var. harperi (Small) Rodman. Rodman further treats the Great Lakes and ne. United States coastal populations (respectively) as C. edentula var. pseudoconstricta – Fernald and C. edentula var. edentula. Rodman points out the morphologic distinctions between the three taxa, the chemical differences between "edentula" and "harperi," and the rarity or absence of intermediates in areas of pairwise overlap between the 3 entities. The geographic / morphologic pattern is not clinal, but is rather a sharp step function, with an overlap in the distribution of (and rare hybridization between) two largely distinct taxa. The few intermediates can be interpreted as hybrids or very limited and more southern taxa. For these reasons I prefer the simplicity of treating the three taxa as binomial species. [= RAB, S; = C. edentula (Bigelow) Hooker ssp. harperi (Small) Rodman – FNA, GW, K, WH, X, Y, Z]


Cakile maritima Scopoli ssp. maritima, European Sea Rocket. Cp (NC, VA): beaches, at or near the wrack line; uncommon, native of Europe. The other subspecies are also European but are apparently not introduced in our area. The NC location was on ballast at Wilmington, and is apparently not persistent. VA locations are, however, well-established. [= FNA, X, Y; < C. maritima – C, F, G, K, Z; = C. cakile (Linnaeus) Karstens – S]

Calepina Adanson 1763


Calepina irregularis (Asso) Thellung. Mt (NC), Pd, Cp (VA): fields, disturbed areas; rare, native of Eurasia. April. [= RAB, C, FNA, K, Y, Z]
Camelina Crantz 1762 (Gold-of-pleasure, False-flax)


1 Siliques 4-7 mm long; leaves and stem rough-hairy, the stellate trichomes exceeded by simple trichomes (which are 1-2 mm long)..............

1 Siliques 7-12 mm long; leaves and stem glabrate to sparsely hairy, the stellate trichomes as long as the few simple trichomes.............. C. microcarpa


* **Camelina sativa** (Linnaeus) Crantz, Gold-of-pleasure, False-flax. Pd (DE, NC, VA), Cp (DE, SC), Mt (WV); fields, disturbed areas; rare, native of Eurasia. April-May. [= RAB, C, F, FNA, G, S, WV, Y, Z; > C. sativa ssp. sativa – K]

Capsella Medikus 1792 (Shepherd's Purse)


* **Capsella bursa-pastoris** (Linnaeus) Medikus, Common Shepherd's Purse. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA); fields, roadsides, disturbed areas; common (uncommon in DE), native of Europe. March-June. C. rubella Reuter, Pink Shepherd's Purse, is sometimes distinguished (as by F, G, Stace 2010), and occurs in our area. It is alleged to be diploid (vs. tetraploid), to have pink petals 1-2 mm long (vs. white, 2-3 mm long), and lateral margins of the fruit concave (vs. straight to convex). Al-Shehbaz (1986) considered the character correlations to be poor, not warranting taxonomic recognition. [= RAB, C, FNA, K, W, Y, Z; > C. bursa-pastoris – F, G, X; > C. rubella Reuter – F, G, X; > C. gracilis Gren. – F; = Bursa bursa-pastoris (Linnaeus) Britton – S]

Cardamine Linnaeus 1753 (Bittercress, Toothwort)


1 Leaves palmately divided (if 1-ternate, then palmately so, the terminal leaflets on a petiolule the same length as the those of the lateral leaflets); [Dentaria].

2 Plants entirely glabrous (including on the leaf margins); leaflets highly dissected with linear to filiform segments; [in our area known from Piedmont of NC and VA].................................................................................................................... C. dissecta

3 Plants with marginal leaf trichomes, and often also pubescent on the stem, inflorescence, and petioles; leaflets entire, toothed, or deeply lobed; [collectively widespread in our area].

4 Rhizome with 2-3 cm long segments, each separated by a narrow and fragile connecting portion (which typically is broken on herbarium specimens), and lacking “teeth” (prominent reduced leaves) along it; leaflets of the stem leaves (2×-) avg. 3× (-4×) as long as wide (thus proportionately similar to the leaflets of the basal leaves); central leaflet of stem leaves (2.5-) avg. 3.25 (-4) cm long × (0.5-) avg. 0.75 (-1.0) cm wide; taste of fresh plants relatively mildly mustardy...................................................... C. angustata

4 Rhizome elongate and of uniform diameter, lacking definite segments, but with periodic “teeth” (prominent reduced leaves) along it; leaflets of the stem leaves (2×-) avg. 3× (-4×) as long as wide (thus proportionately similar to the leaflets of the basal leaves); central leaflet of stem leaves (4-) avg. 6 (-8) cm long × (1.5-) avg. 2 (-2.5) cm wide; taste of fresh plant strong, like horseradish or wasabi..... ..................................................................................................................... C. diphylla

5 Trichomes of leaf margins appressed and ca. 0.1 mm long; stem leaves 2 (-3), opposite; lateral leaflets of stem leaves very rarely incised, the leaf being (and appearing merely 3-foliolate, though teeth may be prominent and lacerate); basal leaves usually present at flowering.

5 Rhizome elongate and of uniform diameter, lacking definite segments, but with periodic “teeth” (prominent reduced leaves) along it; leaflets of the stem leaves (2×-) avg. 3× (-4×) as long as wide (thus proportionately similar to the leaflets of the basal leaves); central leaflet of stem leaves (4-) avg. 6 (-8) cm long × (1.5-) avg. 2 (-2.5) cm wide; taste of fresh plant strong, like horseradish or wasabi..... ..................................................................................................................... C. diphylla

6 Cauline leaves simple, sometimes the lower to middle cauline leaves with 1-2 pairs of very small lateral lobes.

7 Plant from a tuberous or bulbous base, erect and generally unbranched, not stoloniferous or rooting down from upper nodes after flowering; petals 7-20 mm long.
<table>
<thead>
<tr>
<th>623</th>
<th>BRASSICACEAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Stem glabrous; corolla white, rarely pink; stem leaves 4-12; silique 1.5-3 cm long, plus a 3-7 mm beak .................................................. <em>C. bulbosa</em></td>
</tr>
<tr>
<td>9</td>
<td>Stem cinereous-pubescent; corolla pink to lavender, rarely white; stem leaves 2-5; silique 1-2 cm long, plus a 2-4 mm beak .................. .......................................................... <em>C. douglasii</em></td>
</tr>
<tr>
<td>9</td>
<td>Plant from a fibrous root system, frequently much branched from the base, some of the branches becoming stoloniferous and rooting down at the upper nodes after flowering; petals 2-10 mm long or absent.</td>
</tr>
<tr>
<td>9</td>
<td>Petals absent or present, if present 0.7-2 mm long; silique 5-10 (-15) mm long, plus a 0.5-1.0 mm beak, on thick pedicels 1-3 (-6) mm long .................................................. <em>C. longii</em></td>
</tr>
<tr>
<td>9</td>
<td>Petals present, 2-10 mm long; silique 8-21 mm long, plus a 1-3 mm beak, on slender pedicels 10-20 mm long.</td>
</tr>
<tr>
<td>10</td>
<td>Petals 5-10 mm long, the tips spreading or ascending; anthers oblong, about 1 mm long; stylar beak of the silique 2-3 mm; mid-cauline and upper cauline leaves cuneate, often clasping around the stem or branch; basal leaves with 0-1 pairs of lateral leaflets .......................................................... <em>C. rotundifolia</em></td>
</tr>
<tr>
<td>10</td>
<td>Petals 3-5 mm long, the tips ascending or erect; anthers obicular, ca. 0.3 mm across; stylar beak of the silique 1-1.5 mm; mid-cauline and upper cauline leaves cuneate, rounded, or truncate (rarely the mid-cauline leaves subcordate, but not clasping); basal leaves with 1-3 pairs of lateral leaflets .......................................................... <em>C. micranthera</em></td>
</tr>
<tr>
<td>6</td>
<td>Cauline leaves 1-temate or pinnatifid (if 1-temate, the lateral leaflets about as large as the terminal leaflet).</td>
</tr>
<tr>
<td>11</td>
<td>Cauline leaves with 3-5 leaflets; petals 4-10 mm long; plant a perennial.</td>
</tr>
<tr>
<td>13</td>
<td>Stem glabrous at base; lower leaves green underneath; petioles auriculate at the base, the auricles 0.5-1.5 mm long, acute to acuminate; leaves 3-7-foliolate; silique 15-30 mm long .......................................................... <em>C. clematidis</em></td>
</tr>
<tr>
<td>13</td>
<td>Petals 6-9 mm long; stamens shorter than the petals by 1 mm or more; sepals 3-4 mm long; filaments glabrous or somewhat flattened .......................................................... <em>C. flagellifera var. flagellifera</em></td>
</tr>
<tr>
<td>13</td>
<td>Petals 4-6 mm long; stamens equal to slightly exceeding the petals; sepals 2.5-3.5 mm long; filaments terete to somewhat flattened .......................................................... <em>C. flagellifera var. hugeri</em></td>
</tr>
<tr>
<td>11</td>
<td>Cauline leaves with 7-numerous leaflets; petals 1-4 mm long or absent (8-15 mm long in <em>C. pratensis var. palustris</em>); plant an annual, biennial, or perennial.</td>
</tr>
<tr>
<td>14</td>
<td>Petals 1-4 mm long or absent.</td>
</tr>
<tr>
<td>14</td>
<td>Cauline leaves with prolonged sagittate-auriculate bases, the 13-19 leaflets acuminate .......................................................... <em>C. impatiens</em></td>
</tr>
<tr>
<td>15</td>
<td>Cauline leaves without basal auricles, the 15-19 leaflets mostly obtuse.</td>
</tr>
<tr>
<td>16</td>
<td>Plant with many, persistent basal leaves forming a rosette; stem bases and petioles hirsute .......................................................... <em>C. hirsuta</em></td>
</tr>
<tr>
<td>16</td>
<td>Plant with few or no basal leaves, not forming a rosette; stem bases and petioles glabrous (or sparsely hirsute).</td>
</tr>
<tr>
<td>17</td>
<td>Siliques &lt;1 mm wide .......................................................... <em>C. debilis</em></td>
</tr>
<tr>
<td>17</td>
<td>Siliques &gt;1 mm wide .......................................................... <em>C. pratensis var. palustris</em></td>
</tr>
<tr>
<td>18</td>
<td>Cauline leaves 2-4 cm long; terminal leaflet similar to the lateral leaflets in size and shape; leaflets neither decurrent along the rachis nor petiolulate; stem glabrous throughout .......................................................... <em>C. parviflora var. arenicola</em></td>
</tr>
<tr>
<td>18</td>
<td>Cauline leaves 4-10 cm long; leaflets broader than the lateral leaflets; leaflets either decurrent along the rachis or petiolulate; stem pubescent at base.</td>
</tr>
<tr>
<td>19</td>
<td>Leaflets petiolulate; stems flexuous; [alien weed] .......................................................... <em>C. flexuosa</em></td>
</tr>
<tr>
<td>19</td>
<td>Leaflets decurrent on the rachis; stems typically erect; [native] .......................................................... <em>C. pycnantha</em></td>
</tr>
</tbody>
</table>

**Cardamine angustata** O.E. Schulz, Eastern Slender Toothwort. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (NC, SC, VA): rich, mesic forests; common (rare in VA Coastal Plain, rare in DE Piedmont). March-April; April-May. NJ and IN south to n. GA, c. TN, and ne. MS; disjunct in the Ouachita Mountains of AR. Var. *ouachitana* E.B. Smith, alleged to differ from var. *angustata* in its non-ciliate leaves (vs. leaves with margins ciliate with antorse trichomes 0.1 mm long), is apparently not a valid taxon. [= *C. pratensis var. angustata* – RAB; = *Dentaria heterophylla* Nutall – F, G, S, W] |

**Cardamine bulbosa** (Schreber ex Muhlenberg) Britton, Sterns, & Poggenburg, Bulbous Bittercress. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): swampy woods and bogs, primarily (but not strictly) in circumneutral soils over limestone or mafic rocks; common (uncommon in GA, NC, SC, VA, rare in DE Coastal Plain). March-May; April-May. ME west to MB, south to FL, LA, and TX. [= RAB, F, FNA, G, GW, K, S, W, Z; = *Rhamboidea* (Persoon) A.P. de Candolle – C, X] |

**Cardamine clematidis** Shuttleworth ex A. Gray, Mountain Bittercress. Mt (GA, NC, VA): shaded brookbanks, rock outcrops with seepage, at high elevations (1200m and above); rare. April-May; June-July. Endemic to the high elevation Southern Appalachians of w. NC, e. TN, sw. VA, and ne. GA (Brassstown Bald). [= *C. pratensis var. clematidis* Shuttleworth ex Gray – RAB, F, G, GW (also see *C. flagellifera*); = *Dentaria heterophylla* Nutall – F, G, S, W] |


**Cardamine debilis** D. Don. Cp (GA): disturbed areas; rare, native of Europe. This species is similar to *C. pycnantha* and *C. flexuosa* and may be overlooked (Rollins 1993, Brown & Marcus 1998). It is reported for e. GA (Jones & Coile 1988). [= K, Z; < *C. flexuosa* Withersing – FNA] |


**Cardamine dissecta** (Leavenworth) Al-Shehbaz, Dissected Toothwort. Pd (NC, VA), Mt (GA): rich, mesic forests; rare. March-April; April-May. Al-Shehbaz (1988c) describes the range as separated into four areas: c. AL (3 counties); c. NC and sc.
**Cardamine douglassii** Britton, Limestone Bittercress, Douglass's Bittercress, Purple Cress, Pink Spring-cress. Pd (NC, VA), Cp (VA), Mt (WV); nutrient-rich, mesic forests, especially alluvial bottomlands, and in nutrient-rich seepages, in NC in the drainages of the Neuse, Meherin, and (rarely) Cape Fear rivers; uncommon (rare in NC). Mid-March-early April; April-May. NY, ON, and MN south to c. NC, se. TN, AL, and MO. [= RAB, C, F, FNA, G, K, GW, X, Z]

**Cardamine flagellifera** O.E. Schulz var. *flagellifera*, Large-flowered Blue Ridge Bittercress. Mt (GA, NC, SC, VA), Pd (NC): seepages, on streambanks, and in moist and moister bottomland forests, mainly at moderate to low elevations; uncommon (rare in GA, SC, VA, and WV). March-May; June-July. *C. flagellifera* is endemic to the Southern Appalachians of w. NC, SC, e. TN, GA, VA, and WV, and is quite distinct from *C. clematis*, as pointed out by Dudley (1974). Rollins's division of this species into two varieties (following Small's recognition of two species) needs further evaluation. [= K, Z, < C. flagellifera – C, FNA, W, X; < C. clematis – RAB, GW; = C. flagellifera – S]

**Cardamine flagellifera** O.E. Schulz var. *hugeri* (Small) Rollins, Small-flowered Blue Ridge Bittercress. Mt (NC, VA?), Pd (NC): seepages, on streambanks, and in moist and moister bottomland forests, mainly at moderate to low elevations; rare. March-April; June-July. Endemic to the Southern Appalachians of NC and TN. [= K, Z; < C. flagellifera – C, FNA, W, X; < C. clematis – RAB, GW; = C. hugeri Small – S]

* *Cardamine flexuosa* Withering, Woodward Bittercress. Mt (NC, VA, WV), Cp (NC, VA), Pd (NC, VA): disturbed sites; rare, native of Eurasia. February-May. Lihová et al. (2006) show that Asiatic *C. flexuosa* is a distinct taxon from European *C. flexuosa* and will need a new name; at least some of our material is the Asiatic species, whose proper name is unclear (Lihová et al. 2006). Both the European and Asiatic taxa are allotetraploids of unclear parentage. [= RAB, F, K, X, Z; < C. flexuosa Withering – FNA]


**Cardamine longiflora** Fernald, Long's Bittercress. Cp (DE, NC, VA): tidal freshwater marshes and cypress-gum swamps; rare. June-July. Coastal in distribution, irregularly from ME south to SC (or FL). Difficult to distinguish from depauperate or submerged forms of *C. pensylvanica* with few leaflets; the short style (capsule beak) and short and thick pedicels appear to be the most reliable characteristics. [= C, F, FNA, K, X, Z]

**Cardamine micranthera** Rollins, Streambank Bittercress, Small-anthered Bittercress. Pd (NC, VA): sand and gravel bars in creeks, swampy floodplain woods, seepage over rocks; rare. April-May; May-June. A narrow endemic, known only from Stokes County, NC and Patrick County, VA; apparently extirpated from Forsyth County, NC. The description and key in RAB are partly in error, being based on the inadequate and unrepresentative material available at the time. *C. micranthera* is most closely related to *C. rotundifolia*, but also shows some affinities to *C. pensylvanica*. It can be distinguished from *C. rotundifolia* by the characters in the key; additionally, *C. micranthera* does not form proliferative branches from the upper nodes, generally branching from the base in vigorous plants, or unbranched in smaller plants. It can be distinguished from *C. pensylvanica* by its predominately simple leaves, especially those on the upper stem, the larger flowers, the petals 3-5 mm long (vs. 1.5-3 mm long), the fruiting pedicels thin, 10-20 mm long, spreading to ascending (vs. thick, 4-10 mm long, ascending). Wieboldt (1992) reasonably speculates that *C. micranthera* may be an in-breeding relative derived from *C. rotundifolia* in the Piedmont/Mountain interface. [= RAB, FNA, K, X, Z]

**Cardamine parviflora** Linnaeus var. *arenicola* (Britton) O.E. Schulz, Sand Bittercress. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA): various habitats, primarily seasonally wet areas with shallow soil or sand, also on mafic outcrop glades, as on greenstone, diabase, and nutrient-rich granites; common (rare in DE and WV). March-May. The typic variety is Eurasian; our variety is widespread in e. North America, also occurring in the Pacific Northwest. Our plant may warrant specific status. [= RAB, C, F, K, X, Z; < C. parviflora – FNA, G, GW, S, W; = C. arenicola Britton – S]

**Cardamine pensylvanica** Muhlenberg ex Willdenow, Quaker Bittercress. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): various wet habitats, especially swampy depressions, streambanks, small woodland seeps; common. March-May. NL (Newfoundland), NL (Labrador), NT, and AK south to FL, TX, and CA. [= RAB, C, FNA, G, GW, K, S, W, X, Z; > C. pensylvanica var. pensylvanica – F; > C. pensylvanica var. brittoniana Farwell – F]

**Cardamine pratensis** Linnaeus var. *palastris* Wimmer & Graebner, American Cuckoo-flower, Lady's-smock. Mt (VA), Cp (VA): bogs and swamps; rare. April-July. Var. *palastris* ranges from Canada south to NJ, VA, OH, IN, MN, and BC. The Eurasian var. *pratensis*, with pink (vs. white) flowers, is introduced in ne. North America and may occur in our area. These two varieties may not be distinguishable; Rollins combines var. *palastris* into var. *pratensis*. [= C, F, G, < C. pratensis – FNA; < C. pratensis var. pratensis – K, Z]

**Cardamine rotundifolia** Michaux, American Bittercress, Mountain Watercress. Mt (GA?, NC, VA, WV), Pd (DE, NC, VA): seepages, streambanks, swampy depressions; common (rare in DE, NC, and VA). April-May; June-July. Characteristically, *C. rotundifolia* branches from the upper nodes while in flower, the branches rooting down and proliferating.
A Central/Southern Appalachian endemic: n. DE, PA, and w. NY, west to OH and KY, south to w. NC and n. GA. [= RAB, C, F, G, GW, K, S, W, X, Z]

(Cardamine maxima (Nuttall) Wood, Large Toothwort. NB, ON, and MI south to NJ, PA, OH, WV (?), and KY (?). [= FNA, K, Y, Z; = C. maxima – C; = Dentaria maxima Nuttall – F, G]

Chorispora R. Brown ex A.P. de Candolle 1821 (Chorispora)

* Chorispora tenella (Pallas) A.P. de Candolle, Chorispora, Blue Mustard. Mt (WV): disturbed areas; rare, native of w. Asia. Well established in the w. United States, and occurs at scattered locations eastward, as in c. and w. TN (Chester, Wofford, & Kral 1997) and s. PA (Rhoads & Klein 1993). [= C, FNA, K, Y, Z]

Coincya Porta & Rigo ex Rouy 1891 (Wallflower-cabbage, Coincya)


Conringia Adanson 1763 (Hare's-ear Mustard)
A genus of 6 species, herbs, of Europe and the Middle East. References: Warwick in FNA (2010); Rollins (1993)=Z; Al-Shehbaz (1985b)=Y.


Descurainia Webb & Berthelot 1836 (Tansy-mustard, Flixweed)
A genus of ca. 40 species, primarily of North and South America. References: Goodson & Al-Shehbaz in FNA (2010); Rollins (1993)=Z, Al-Shehbaz (1988b)=Y; Detting (1939)=X.

1 Silique 10-25 (-30) mm long, acute to acuminate, the seeds mostly in 1 row ................................................................. D. sophia
1 Silique 5-10 (-13) mm long, obtuse or clavate, the seeds mostly in 2 rows.
2 Leaves densely gray-canescent; angle between fruiting pedicels and rachis ca. 75 degrees; pedicels glandular-puberulent, 6-12 mm long; plants 2-5 dm tall; [primarily of the Coastal Plain]............................................................................................................................................................. D. pinnata var. pinnata
2 Leaves glabrous or glabrescent; angle between fruiting pedicels and rachis ca. 45 degrees; pedicels glabrous, 6-16 mm long; plants 3-7 dm tall; [primarily of the Mountains and Piedmont, rarely weedy in the Coastal Plain].
3 Stems moderately to densely glandular and pubescent (but not canescent); siliques 5-10 (-12) mm long; pedicels 8-16 mm long, ................................................................. D. pinnata var. brachycarpa
3 Stems sparsely pubescent to glabrous; siliques 8-12 mm long; pedicels 6-12 mm long, .............................................................................. D. pinnata var. intermedia

Descurainia pinnata (Walter) Britton var. brachycarpa (Richardson) Fernald, Northeastern Tansy-mustard. Mt (VA, WV), Pd (VA), Cp (NC)*: dry rocky openings and woodlands; rare. April-August. QC west to NT, south to VA, TN, and TX; introduced in the Coastal Plain of NC. [= C, F, G; = D. brachycarpa (Richardson) O.E. Schulz – RAB; = D. pinnata ssp. brachycarpa (Richardson) Detting – K, X, Y, Z; = Sophia millefolia Rydberg – S; < D. pinnata – W; > D. pinnata var. brachycarpa – WV; > D. pinnata var. pinnata – WV; misidentified; < D. pinnata ssp. brachycarpa – FNA]


Diplotaxis A.P. de Candolle 1821 (Wallrocket)


1 Leaves mostly basal or very low-cauline; plant annual or biennial; siliques lacking a gynophore (stipe) between the sepal scars and the base of the valves; [section Anacarpum] .......................................................... 2 D. reptans
2 Leaves mostly cauline; plant perennial, becoming somewhat woody at the base; siliques with a 0.5-2 mm gynophore (stipe) between the sepal scars and the base of the valves; [section Diplotaxis] .................................................................................. D. tenuifolia


Draba Linnaeus 1753 (Draba, Whitlow-grass)


1 Leaves mostly cauline; petals deeply bifid (about 1/2 way to base) ...................................................................................................................... D. verna
1 Leaves basal and cauline (the basal sometimes withering by fruiting); petals merely emarginate.


Draba cuneifolia Nuttall ex Torrey & A. Gray var. cuneifolia. Cp (AL, GA, *NC, *SC): open blackland prairies, preferring rocky, bare soil, also waste areas around wool-combing mills, possibly other habitats; rare, in NC and SC perhaps only native of further west. February-March; March-April. All three varieties are primarily distributed in sw. United States, but the species extends as a native at least as far east as c. GA (Houston County) (Echols 2007) and AL, where it occurs in prairies and on limestone outcrops (Diamond & Woods 2009). [= FNA, K, Z, ♂ D. cuneifolia – RAB, C, F, G, S]

Draba platycarpa Torrey & A. Gray. Cp (SC): waste areas around wool-combing mill; rare, perhaps not established, native of w. North America. [= FNA, K, Z]

Draba ramosissima Desvaux, Rocktwist, Appalachian Draba. Mt (NC, VA), Pd (VA): in crevices of rock outcrops, or in dry talus slopes, over a variety of rock types (including limestone, dolostone, schist, gneiss, shale); common (uncommon in NC and WV Mountains, rare in NC and VA Piedmont). April-May; May-July. W. MD and e. WV south through w. VA and e. KY south to w. NC and e. TN. [= RAB, FNA, K, S, W, WV, Z]
Draba reptans (Lamarck). Pd (NC), Cp (SC): dry soil; rare. February-March; March-April. MA and ON west to WA, south to NC, GA, TX and CA. The few occurrences in our area seem to make little ecological or phytochorographic sense; they may represent introductions. The first collection in our area was, however, by Walter. [= RAB, FNA, K, Z; > D. reptans var. reptans – C, F, G; > D. caroliniana Walter – S]

* Draba verna Linnaeus, Whitlow-grass Cp (DE, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed areas, especially in dry, barren soils, including granitic flatrocks; common (uncommon in DE), native of Europe. February-April; March-May. [= RAB, C, FNA, K, S, W, WV, Z; > D. verna var. verna – F, G; > D. verna var. boerhaavii van Hall – F, G; = Erophila verna (Linnaeus) Besser]

Eruca P. Miller 1754 (Rocket-salad, Arugula)

A monotypic genus, an annual herb, native to Mediterranean Europe. References: Warwick in FNA (2010); Rollins (1993)=Z; Al-Shehbaz (1985b)=Y.

* Eruca vesicaria (Linnaeus) Cavanilles ssp. sativa (P. Miller) Thellung. Garden Rocket, Rocket-salad, Arugula. Pd (NC), Mt (WV): cultivated as a salad green, persistent around gardens or occurring as a waif; rare, native of Mediterranean Europe. [= FNA, K, Y, Z; = E. sativa P. Miller – C, F, WV; < E. vesicaria – G; < E. eruc a (Linnaeus) Ascherson & Graebner – S]

Erucastrum K.B. Presl 1826 (Dog-mustard)

A genus of ca. 22 species, herbs, of Africa, Europe, and Arabia. References: Warwick in FNA (2010); Rollins (1993)=Z; Luken, Thieret, & Kartesz (1993); Al-Shehbaz (1985b)=Y.


Erysimum Linnaeus 1753 (Wallflower, Treacle Mustard)

A genus of ca. 150-180 species, of the Northern Hemisphere. References: Al-Shehbaz in FNA (2010); Al-Shehbaz (1988d)=Y; Rollins (1993)=Z.

1 Petals 13-25 (-30) mm long, 4-11 (-13) mm wide; seeds 2-3 mm long; biennial or perennial; [native, usually in thin rocky soil].................................

.........................................................................................................................................................................................E. capitatum var. capitatum

1 Petals 3.5-10 mm long, 1.5-3 mm wide; seeds ca. 1 mm long; annual or biennial; [introduced, usually in disturbed situations]

2 Sepals 1.8-3.5 mm long; petals 3.5-5.5 mm long; fruits (1-) 1.5-2.5 (-4) cm long; pedicels slender (much narrower than the fruit), 5-13 (-16) mm long……………………………………………………………………………………………………………………………………………..E. cheiranthoides

2 Sepals 4.5-6 mm long; petals 6-9 (-11) mm long; fruits (2-) 3-8 (-10) cm long; pedicels thick (as wide as the fruit or nearly so), 2-9 (-15) mm long.

3 Biennial or perennial; fruit 3-5.8 (-7) cm long; fruiting pedicel somewhat narrower than the fruit……………………………………...[E. inconspicuum]

3 Annual; fruit (2-) 3-8 (-10) cm long; fruiting pedicel as wide as the fruit………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………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**Hesperis** Linnaeus 1753 (Dame's Rocket)


* Hesperis matronalis Linnaeus, Dame's Rocket. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE, VA), {GA}: bottomlands, roadsides, moist forests; common (uncommon in VA Piedmont, rare in Coastal Plain), native of Europe. April-August. The flowers are white or pink. [= RAB, C, F, FNA, G, K, S, W, WV, Y, Z]

**Iberis** Linnaeus 1753 (Candytuft)


* Iberis sempervirens Linnaeus, Evergreen Candytuft, is reported for NC and TN by Kartesz (1999), but the specimens he cites are from cultivated material. [= FNA, K] {rejected; not keyed}

**Iodanthus** Torrey & A. Gray 1840 (Purple Rocket)


Identification notes: *Iodanthus pinnatifidus* somewhat resembles *Hesperis matronalis* in overall appearance, but differs in the following ways: petals 10-13 mm long (vs. 20-25 mm long), siliques 2-4 cm long (vs. 5-10 cm long), pubescence of the lower stem of simple trichomes (vs. branched trichomes).

* Iodanthus pinnatifidus (Michaux) Steudel, Purple Rocket. Mt (WV): rich forests of bottomlands and lower slopes; rare. May-June. W. PA west to MN and IA, south through WV and e. and c. TN to AL and TX. [= C, F, FNA, G, K, S, WV, Y, Z]

**Isatis** Linnaeus 1753 (Woad)


**Leavenworthia** Torrey 1837 (Glade Cress)


1 Petals entire, white, < 7 mm long; leaf lobes deeply dentate, the terminal lobe only slightly larger than the larger lateral lobes .......... *L. uniflora*
2 Siliques conspicuously torulose (constricted between the seeds), even when young ................................................................. *L. torulosa*
3 Petals 7-10 mm long, shallowly emarginate (notched at the tip), yellow, white, or lavender, 7-15 mm long; leaf lobes entire to shallowly dentate; the terminal lobe markedly larger than the largest lateral lobes.
4 Petals yellow; [of AL and TN] ................................................................. *L. exigua var. lutea*
5 Styles 2-3 mm long; sepals green; [of KY] ................................................................. *L. exigua var. laciniata*
6 Siliques thick, fleshy; styles 2.5-5 mm long; petals yellow, white, or lavender; [of n. AL and e. TN].
7 Styles 1.5-2 (-3) mm long; mature siliques cuneate at the base and acute at the tip; [of Colbert, Franklin, and Lawrence counties, AL] ................................................................. *L. stylosa var. stylosa*
8 Siliques 12-15 mm long, 3-4 mm wide; seeds slightly elongate, cleft at one side of the long axis; [of Sumner, Smith, Wilson, Davidson, Rutherford, Bedford, and Maury counties, TN] .................................................................................................................. *L. stylosa var. brachystyla*


Leavenworthia exigua Rollins var. exigua. Limestone glades, disturbed calcareous sites nearby. Endemic to the Central Basin of c. TN (8 counties) (Chester, Wofford, & Kral 1997), western Highland Rim (Decatur and Perry counties), and the Ridge and Valley of nw. GA (Walker and Catosa counties). [= K, Y, Z; <L. exigua – FNA]

Leavenworthia exigua Rollins var. laciniata Rollins. Limestone glades, disturbed calcareous sites nearby. April. Endemic to the Western Highland Rim and w. Knobs of c. KY (Bullitt and Jefferson counties). [= C, K, Y, Z; <L. exigua – FNA]

Leavenworthia exigua Rollins var. lutea Rollins. Limestone glades, disturbed calcareous sites nearby. March-April. Endemic to the Central Basin of n. AL (Jefferson County) and c. TN (Bedford and Maury counties) (Chester, Wofford, & Kral 1997). [= K, Y, Z; <L. exigua – FNA]


Leavenworthia torulosa A. Gray. Limestone glades, disturbed calcareous sites nearby. March-April. Endemic to the Central Basin of c. TN (10 counties), the Ridge and Valley of c. TN (Bradley and Meigs counties), and the Western Highland Rim of KY (Logan, Simpson, Todd, and Warren counties). [= C, F, FNA, G, K, S, Y, Z]

Leavenworthia uniflora (Michaux) Britton. Limestone glades, disturbed calcareous sites nearby. Endemic to the Central Basin of c. TN (8 counties), the Ridge and Valley of c. TN (Hamilton, Meigs, Bledsoe, and Knox counties), nw. GA (Walker and Murray counties), and c. KY (15 counties). [= C, F, FNA, G, K, S, Y, Z]

Leavenworthia uniflora var. lutea

Leavenworthia uniflora var. stylosa

Leavenworthia uniflora var. torulosa

Leavenworthia uniflora var. uniflora

Lepidium Linnaeus 1753 (Pepperwort, Peppergrass, Pepperweed)


section Lepidium: perfoliatum, graminifolium
section Cardamon: sativum
section Lepia: campestrae
section Diligentium: austrinum, densiflorum, oblongum, virginicum ssp. virginicum
??: didymum, draba, ruderale, africanum, bonariense, lasiocarpum, schinzii, coronopus

1Upper cauline leaves perfoliate or sagittate.


* Lepidium perfoliatum Linnaeus, Perfoliate Pepperwort, Clasping Pepperweed, Shieldcress. Cp (NC), Pd (GA, NC), Mt (WV), {SC, VA}: disturbed areas; rare, native of Europe. April-May. [= RAB, C, F, FNA, G, K, Y, Z]


* Lepidium africanum (Burmann f.) A.P. de Candolle, African Pepperwort. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= K, Y, Z]

* Lepidium austrinum Small, Southern Pepperwort. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our primary area. March-June. Also reported from MS (Bryson 1991, FNA). For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= FNA, K, Y, Z]

* Lepidium bonariense Linnaeus, Argentinian Pepperwort. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= K, Y, Z]

* Lepidium coronopus (Linnaeus) Al-Shehbaz. [AL, FL, TN]; disturbed areas; rare, of native Europe. [= FNA; > Lepidium squamatum Forsskål – X; > Coronopus squamatus (Forsskål) Ascherson – C, K; > Coronopus procumbens Gilibert – F, G; = Carara coronopus (Linnaeus) Medikus – S]

* Lepidium graminifolium Linnaeus, Grassleaf Pepperwort. Introduced, especially on ballast, south to MD, PA. April-June. [= K, Y, Z]

* Lepidium lasiocarpum Nuttall ssp. lasiocarpum. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. March-June. Also reported for information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= FNA; = L. lasiocarpum var. lasiocarpum – K, Z; < L. lasiocarpum – Y]

* Lepidium oblongum Small. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= FNA, Y; > L. oblongum var. oblongum – K, Z]

* Lepidium schinzi Thellung. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986). [= Y, Z]

**Lobularia** Desvaux 1815 (Sweet Alyssum)


* Lobularia maritima (Linnaeus) Desvaux, Sweet Alyssum. Pd (VA), Cp (DE, NC, VA), Mt (WV): disturbed areas, lawns; rare, native of Europe. June-November. The NC occurrences are doubtfully established, from gardens and a "lawn." [= C, F, FNA, G, K, Y, Z]

**Lunaria** Linnaeus 1753 (Honesty)


1 Upper cauline leaves coarsely and irregularly dentate, the teeth acute to obtuse, sometimes with a mucron or short linear tip < 0.5 mm long; siliques broadly rounded at both ends (when mature – young siliques may be cuneate and acute); plant annual or biennial.................L. annua
1 Upper cauline leaves spinulose-dentate, the teeth acuminate and usually with a linear tip > 0.5 mm long; siliques cuneate at the base, acute at the tip; plant perennial.[L. rediviva]

* _Lunaria annua_ Linnaeus, Annual Honesty, Silver-dollar. Cp (DE, VA), Pd (DE, VA), Mt (NC, VA, WV) {GA}: escaped from cultivation around gardens, not usually persistent; uncommon (rare in GA, NC, VA, and WV), native of se. Europe. April-June. [= C, F, FNA, G, K, Z]


**Matthiola** W.T. Aiton 1812 (Stock)

A genus of about 50 species, herbs, mainly of Eurasia and Africa. References: Al-Shehbaz in FNA (2010); Rollins (1993)=Z.


**Microthlaspi** F.K. Meyer 1973 (Penny-cress)


**Myagrum** Linnaeus 1753


* _Myagrum perfoliatum_ Linnaeus. {VA}; {habitat}; rare, native of s. Europe. [= FNA]

**Nasturtium** R. Brown 1812 (Watercress)


1 Petioles of emergent leaves lacking auricles toward the base; seeds yellowish-brown, finely reticulate, with 400-500 polygonal depressions on each side ......................... _N. floridanum_ .

2 Petioles of emergent leaves auriculate toward the base; seeds reddish-brown, rather coarsely reticulate, with 25-150 (-175) polygonal depressions on each side.

   1 Mature siliques 1-1.5 mm wide, terete or subterete; seeds in 1 row in each locule of the silique; seeds with (75-) 100-150 (-175) polygonal depressions on each side ......................... _N. officinale_ .

   2 Mature siliques 1.8-2.3 mm wide, flattened; seeds in 2 rows in each locule of the silique; seeds with 25-50 (-60) polygonal depressions on each side ......................... _N. microphyllum_ .

* _Nasturtium floridanum_ (Al-Shehbaz & Rollins) Al-Shehbaz & R.A. Price, Florida Watercress. Cp (FL): spring runs, blackwater bottomlands; rare. March-May. Ne. FL and e. Panhandle FL south to s. FL; endemic to FL, but north to counties adjacent to se. GA. [= FNA, V; = Rorippa floridana Al-Shehbaz & Rollins – K, WH, Z; < Nasturtium microphyllum Boenninghausen ex Reichenbach – GW, misapplied; Nasturtium stylosum Shuttleworth ex O.E. Schulz] {syonymy incomplete}

* _Nasturtium microphyllum_ Boenninghausen ex Reichenbach, Narrow-fruited Watercress. Mt (NC, VA): streams, springs; rare, native of Europe. See Green (1962) for additional information. [= FNA, V; = Rorippa microphylla (Boenninghausen ex Reichenbach) Hylander ex Löve & Löve – C, K, Q, X, Z; < Nasturtium officinale – RAB, G, W; = Nasturtium officinale R. Brown var. microphyllum (Boenninghausen ex Reichenbach) Thellung – F]

Paysonia O’Kane & Al-Shehbaz 2002 (Bladderpod)

A genus of 8-9 species, herbs, endemic to southeastern United States. O’Kane & Al-Shehbaz (2002) clearly show that Paysonia is not a part of Lesquerella, which itself is included within Physaria. References: O’Kane in FNA (2010); Rollins (1993)=Z; Rollins & Shaw (1973)=Y; O’Kane & Al-Shehbaz (2002)=X; Al-Shehbaz (1987)=V. Key adapted from X and Z.

1 Cauline leaves cuneate or petiolate at the base, not auriculate; flowers yellow. [see Physaria]
1 Cauline leaves expanded at the base, usually auriculate; flowers yellow or white.
2 Fruits (1-) 2-3 mm long, slightly pubescent on the exterior; petals 3.5-6.5 (-7.5) mm long, bright yellow; biennial or perennial from branched, woody caudex. [P. globosa]
2 Fruits 3-8 mm long, glabrous on the exterior; petals 5-11 mm long, either pale yellow or bright yellow to orange; annual, biennial, or short-lived perennial from a fine taproot. [P. filiformis]
3 Stems 1-7 dm long; basal leaves 1.5-5 (-8) cm long, lyrate-pinnatifid (rarely merely dentate or entire); petals bright yellow to orange. [P. gordonii]
4 Fruiting pedicels sigmoid, 5-15 (-25) mm long; gynophore 0.5-1 mm long. [Ph gracilis ssp. gracilis]

Physaria (Nuttall ex Torrey & A. Gray) A. Gray


1 Cauline leaves expanded at the base, usually auriculate; flowers yellow or white. [see Physaria]
1 Cauline leaves cuneate or petiolate at the base, not auriculate; flowers yellow.
2 Fruits 3-8 mm long, glabrous on the exterior; petals 5-11 mm long, either pale yellow or bright yellow to orange; annual, biennial, or short-lived perennial from a fine taproot. [P. globosa]
2 Fruits 1-2.4 cm long, entire or sinuate; petals pale yellow ................................................................. [P. filiformis]
3 Stems 1-7 dm long; basal leaves 1.5-5 (-8) cm long, lyrate-pinnatifid (rarely merely dentate or entire); petals bright yellow to orange. [P. gordonii]
4 Fruiting pedicels sigmoid, 5-15 (-25) mm long; gynophore 0.5-1 mm long. [Ph gracilis ssp. gracilis]

* Physaria gordonii (A. Gray) O’Kane & Al-Shehbaz, Gordon’s Bladderpod. Mt (VA): shaly roadside; rare, native of further west. Rollins (1993) reports this species (identification unconfirmed) as a waif along the Blue Ridge Parkway, VA; it may not be
established.  [= FNA; > P. gordonii ssp. gordonii – X; > Lesquerella gordonii (A. Gray) S. Watson var. gordonii – Z; = Lesquerella gordonii – K, Y]

Physaria filiformis (Rollins) O’Kane & Al-Shehbaz, Missouri Bladderpod.  Reported for AL (FNA), apparently erroneously (Yatskievich, 2010, pers. comm.).  [= FNA, X; = Lesquerella filiformis (Desvaux) S. Watson – K, V, Y, Z]  {rejected; not keyed}

Physaria globosa (Desvaux) O’Kane & Al-Shehbaz.  Endemic to an area from Posey County, IN and allegedly also s. OH south through c. KY to c. TN.  [= X; = Lesquerella globosa (Desvaux) S. Watson – C, F, G, K, S, V, Y, Z]  {not yet keyed}

Physaria gracilis (Hooker) S. Watson ssp. gracilis.  TN, IL, MO, and OK south to AL, MS, LA, and TX.  [= X; < Lesquerella gracilis – F, G; = Lesquerella gracilis (Hooker) S. Watson ssp. gracilis – K, V, Z]  {not yet keyed}

Planodes E.L. Greene 1912 (Virginia-cress)

A monotypic genus, of North America and Mexico. References:  Al-Shehbaz in FNA (2010); Al-Shehbaz (1988a)=Y; Rollins (1993)=Z.


Raphanus Linnaeus 1753 (Radish)


1 Siliques moniliform (constricted between the seeds), the silique body about the same diameter for most of its length, longitudinally grooved; petals usually yellow, fading white (rarely purple); seeds 4-12 per silique .................................................... R. raphanistrum ssp. raphanistrum

1 Siliques not moniliform, the silique body tapered from its widest point below the middle to the apex, smooth or slightly longitudinally grooved; petals usually purple (rarely white); seeds 1-3 (-5) per silique ......................................................... R. sativus


Rapistrum Crantz 1769 (Bastard-cabbage)

A genus of 2 species, herbs, of Europe. References:  Warwick in FNA (2010); Rollins (1993)=Z; Al-Shehbaz (1985b)=Y.

* Rapistrum rugosum (Linnaeus) Allioni, Annual Bastard-cabbage.  Cp (SC):  waste areas around wool-combing mills; rare, native of Mediterranean Europe.  Also naturalized at scattered sites in e. TN (Chester, Wofford, & Kral 1997), PA (Rhoads & Klein 1993), and elsewhere.  [= C, F, FNA, Z; > R. rugosum var. rugosum – G; > R. rugosum ssp. rugosum – K, Y]

Rorippa Scopoli (Yellow Cress, Marshcress)

A genus of about 75 species, herbs, cosmopolitan. The separation of Nasturtium from Rorippa is warranted (Al-Shehbaz & Price 1998); Franzke et al. (1998) provide corroboration based on molecular analysis. The species treated here as R. aquatica has been placed in several genera in recent years. References:  Al-Shehbaz in FNA (2010); Al-Shehbaz (1988a)=X; Rollins (1993)=Z; Stuckey (1972)=Y; Al-Shehbaz & Bates (1987)=V; Les, Anderson, & Cleland (1995)=U; Al-Shehbaz (1988a)=Q. Key modified from FNA.

1 Plant a submerged aquatic, rooting from lower nodes; leaves of two forms, the submerged pectinately divided, the emergent simple, sometimes lobed; fruit <2.5× as long as wide; petals white ...................................................... R. aquatica

1 Plant terrestrial or of wet places, not rooting from lower nodes; leaves of one form, pinnately lobed or simple; fruit >2.5× as long as wide; petals yellow or pale yellow (or absent).

2 Plant a rhizomatic, colony-forming perennial; petals (2.0-) 2.8-6.0 mm long; siliques 3-15× as long as wide.
A genus of 7 species, herbs, of s. Europe. References: Warwick in FNA (2010); Rollins (1993)=Z; Al-Shehbaz (1985b)=Y. Key adapted from Z and C.

1 Beak of silique strongly compressed; silique densely covered with long, stiff trichomes, ca. 4 mm in diameter; pedicels slender, mostly at right angles to the rachis; seeds 4-8 per silique; [section Sinapis] .............................................................................................................. \textit{S. alba}

1 Beak of silique conical; silique glabrous or nearly so, ca. 2 mm in diameter; pedicels thick, erect to spreading; seeds 7-13 per silique; [section Ceratosinapis] .............................................................................................................................................. \textit{S. arvensis}

* \textit{Sinapis alba} Linnaeus, White Mustard, Yellow Mustard. Mt (NC, WV), Pd (DE, NC), Cp (DE): disturbed areas; rare, native of Mediterranean Europe. April-June. The seeds of this species are one source of table mustard; other species used include \textit{Brassica juncea} and \textit{B. nigra}. = C, K, S, Y, Z; ? Brassica hirta = RAB, F, G, WV]

**Sisymbrium** Linnaeus (Jim Hill Mustard)


1 Silique linear, 5-10 cm long; spreading from the rachis; pedicels 5-20 mm long; petals 6-8 mm long ............................... *S. altissimum*

1 Silique subulate, 0.8-1.5 cm long, appressed to the rachis; pedicels 1.3 mm long; petals 3-4 mm long ............................... *S. officinale*


* Sisymbrium irio* Linnaeus, London-rocket. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986b). [= C, F, FNA, G, K, Y, Z]

* Sisymbrium loeselii* Linnaeus. Mt (WV), Cp (SC): disturbed areas, waif around wool-combing mills; rare, native of e. Europe and w. Asia. [= C, F, FNA, G, K, Y, Z] {not yet keyed}

* Sisymbrium tereaninowii* Sonderegger, Russian Rocket. Waif around wool-combing mills in Coastal Plain of SC; there appears to be little evidence that it is established in our area. For further information and keys, see Rollins (1993) and Al-Shehbaz (1986b). [= K, Y, Z] {not keyed}

**Teesdalia** Aiton f. 1812 (Shepherd's Cress)


**Thlaspi** Linnaeus 1753 (Penny-cress)


1 Siliques 5-8 mm long, 2-4 mm wide; seeds brown, alveolate; lower stem with scattered long hairs; fresh plant smelling of garlic when crushed; [section *Pterotropis*] ................................................................. *T. alliaceum*

1 Siliques (8-) 10-17 mm long, 7-12 mm wide; seeds brown, concentrically ridged; lower stem glabrous; fresh plant not smelling of garlic when crushed; [section *Thlaspi*] ........................................................................................................ *T. arvense*

* Thlaspi alliaceum* Linnaeus, Garlic Penny-cress. Pd (DE, NC, VA), Mt (WV), Cp (DE): fields, disturbed areas, roadsides; uncommon (rare in NC, VA, and WV, rare in DE Coastal Plain), native of Europe. March-April; April-May. [= RAB, FNA, K, Y, Z]


**Turritis** Linnaeus 1753 (Tower Mustard)

**BRASSICACEAE**


_Warea_ Nuttall 1834 (Warea, Pineland-cress)

A genus of 4 species, annual herbs, of se. North America. The genus is endemic to se. United States, consisting of our species and two others of peninsular FL. This is the only genus of tribe _Thelypodieae_ in our area. References: Al-Shebaz in FNA (2010); Rollins (1993) = Z; Al-Shehbaz (1985a) = Y; Channell & James (1964).

**Identification notes:** _Warea_ (Brassicaceae) and _Polanisia_ (Cleomaceae) are superficially similar. The genus is quite showy and conspicuous, reminiscent of a small _Cleome_ because of its white to pink, clawed petals and silique borne on a long gynophore.

1 Leaves opposite; dioecious shrubs.
2 Herb, < 2 (-3) dm tall; leaves 1-4 cm long, glabrous; inflorescence a terminal panicle of cymes; [tribe Comandraceae or family _COMANDRACEAE_]...
3 Aerial shrubs, parasitic on treetrunks and branches; leaves coriaceous, brittle when live; [tribe Viscaceae or family _VISCACEAE_]...

1 Leaves rounded or slightly auriculate at the base; petals deep purple ........................................ W. sessilifolia


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**277. OLACACEAE** A.L. de Jussieu ex R. Brown in Tuckey 1818 (Olax Family) [in SANTALALES]

A family of about 14 genera and 100 species, trees, shrubs, and woody vines, pantropical in distribution. Sometimes further divided, as by Nickrent et al. (2010), in which case _Ximenia_ is placed in Ximeniaceae. References: Nickrent et al. (2010).

_Ximenia_ Linnaeus 1753 (Tallow-wood)

A genus of about 8 species, root-parasitic shrubs, tropical. _Ximenia_ is placed in the segregate family Ximeniaceae by Nickrent et al. (2010).


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**279. SANTALACEAE** R. Brown 1820 (Sandalwood Family) [in SANTALALES]

A family of about 41 genera and 930 species, trees, shrubs, and herbs, primarily of tropical and warm temperate regions of the Old World and New World. All members of the family are hemiparasitic, attaching to the stems or roots of other plants. Viscaceae are closely related to and should either be included in the Santalaceae (Angiosperm Phylogeny Group 2003, 2009), as done here, or the contrasting approach should be taken, involving the segregation of smaller, monophyletic families (Nickrent et al. 2010). In our area, this would mean Santalaceae s.s. (Angiosperm Phylogeny Group 2003, 2009), as done here, or the contrasting approach should be taken, involving the segregation of smaller, monophyletic families (Nickrent et al. 2010). References: Nickrent et al. (2010); Nickrent & Malécot (2001).

1 Leaves alternate; monoecious herb or shrub.
2 Herb, < 2 (-3) dm tall; leaves 1-4 cm long, glabrous; inflorescence a terminal panicle of cymes; [tribe Comandraceae or family _COMANDRACEAE_]...
3 Shrub, > 4 dm tall; leaves 5-15 cm long, pubescent; inflorescence a terminal raceme; [tribe Pyrularaceae or family _PYRULARACEAE_]...

1 Leaves opposite; dioecious shrubs.
2 Aerial shrubs, parasitic on treetrunks and branches; leaves coriaceous, brittle when live; [tribe Viscaceae or family _VISCACEAE_]...
3 Stamineate flowers in terminal umbel-like dichasias; pistillate flowers (and fruits) solitary, terminal; clumped shrub to 4 m tall; [tribe _Thesiaeae_ or family _THESIAEAE_]...
4 Stamineate flowers in axillary umbels; pistillate flowers (and fruits) solitary, axillary; rhizomatous shrub to 1 m tall; [tribe _Santaleae_ or family _SANTALEAE_].

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**Ximenia americana** Linnaeus, Tallow-wood, Hog-plum. Cp (FL): hammocks, pine flatwoods, scrub; uncommon. Endemic to FL peninsula, north to Duval County, FL. [= K, S, WH]

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Buckleya Torrey (Piratebush)

A genus of 5 species, shrubs, of temperate e. North America and e. Asia; the 3 species other than our own are *B. lanceolata* of Japan, and *B. henryi*, *B. graebneriana*, and *B. angulosa* of China. *Buckleya* is placed in the segregate family Thesiaceae by Nickrent et al. (2010). References: Carvell & Eshbaugh 1982=Z; Massey et al. (1983).

*Buckleya distichophylla* (Nuttall) Torrey, Piratebush. Mt (NC, VA): dry or rocky bluffs and slopes; rare. April-May; June-October. A Southern Appalachian endemic: sw. VA south through ne. TN to sw. NC, in the western edge of the Blue Ridge and to the west in the Ridge and Valley. It is apparently parasitic on a variety of hosts – not limited to *Tsuga*, as has sometimes been reported. The branches are often mistaken for a compound leaf. [= RAB, C, F, G, K, S, W, Z]

Comandra Nuttall (Bastard-toadflax)

A genus of 2 species (the only other species European). *Comandra* is placed in the segregate family Comandraceae by Nickrent et al. (2010).


Nestronia Rafinesque (Nestronia)


**Identification notes:** In its clonal, usually knee-high growth, *Nestronia* has something of the aspect of an opposite-leaved lowbush blueberry.


Phoradendron Nuttall 1848 (Mistletoe)


*Phoradendron serotinum* (Rafinesque) M.C. Johnston ssp. *serotinum*, American Mistletoe, Christmas Mistletoe. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA, WV), Mt (GA, NC, SC, VA, WV): parasitic on various species of trees, especially abundant in swamp forests (perhaps because they are less frequently cut and have older, more mature hardwoods); common (uncommon in Piedmont and Mountains). October-November (-March); November-January (-May). Kuijt (2003) interprets this as a species with four subspecies; ssp. *serotinum* is the eastern component, ranging from NJ west to s. OH, s. IN, and s. MO, south to s. FL and s. TX; this interpretation is supported by genetic studies currently underway (Hawkins et al., in prep.). The other three subspecies are distributed in sw. United States and n. Mexico. The nomenclatural argument about which Rafinesquian epithet to adopt is arcane; the basionym *leucarpum* has nomenclatural precedence by 3 years, but the combination in *Phoradendron* can be considered a later homonym of *Phoradendron leucocarpum* Patshovsky. I here follow Kuijt (2003) in his decision to reject *leucarpum.* *Phoradendron* is, of course, the mistletoe familiar (at least traditionally) in e. United States as a Christmas decoration. Z comments that "the superficial likeness of *Phoradendron serotinum* to the European *Viscum album* has made the transfer of the latter's folklore to North America easy;" *Viscum album* was a sacred plant of Celtic and druidical pre-Christian European societies. The white berries of *P. serotinum* are extremely poisonous. Their sticky flesh promotes the dispersal of the seeds by birds from tree to tree. [= Y; = *Phoradendron leucocarpum* (Rafinesque) Reveal & M.C. Johnston – K; < *P. serotinum* (Rafinesque) M.C. Johnston – RAB, C, W, Z; < *P. flavescens* (Pursh) Nuttall – F, G, S, WV]

Pyrularia Michaux (Buffalo-nut)

A genus of 4 species, shrubs, of e. North America and e. Asia (the other 3 species are of e. Asia). *Pyrularia* is placed in the segregate family Cervantesiaceae by Nickrent et al. (2010).
VISCACEAE

Pyrularia pubera Michaux, Buffal-nut, Oak-nut. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA): moist forests; common. April-May; July-October. A Southern and Central Appalachian endemic. P. pubera ranges from sw. PA (Rhoads & Klein 1993), e. WV, and w. VA south and west to e. KY, w. NC, e. TN, and n. and wc. GA. The oil in the fruits is very poisonous. [= RAB, C, F, G, K, S, W, WV]

284. TAMARICACEAE Link 1821 (Tamarisk Family) [in CARYOPHYLLALES]

A family of about 4 genera and 78 species, shrubs and trees, of Eurasia and Africa (especially from the Mediterranean to c. Asia). References: Crins (1989b); Gaskin in Kubitzki & Bayer (2003); Gaskin et al. (2004).

Tamarix Linnaeus 1753 (Tamarisk, Salt-cedar)

A genus of about 54 species, trees and shrubs, native of Eurasia and Africa. References: Baum (1978)=Z; Crins (1989b)=Y.

Identification notes: An important character is the staminal disk; three terms are used. In holophytic disks, the lobe between each stamen is obvious and separate from the stamens on either side, and each is usually 2-lobed. In paralophic disks, each lobe is deeply binate and, each half-lobe is fused to the base of the adjacent stamen, but is still somewhat distinct from it. In synlophic disks, the lobes are also deeply binate, but each half-lobe is fused confluent with the stamen base, giving the appearance that the filament has swollen base.

1 Flowers 4-merous; [section Oligadenia].
2Petals 1.5-2.5 mm long; bracts subtending the pedicels diaphanous; young growth completely glabrous; [section Oligadenia; series Arbusculae] ....................................................................................................................................................... T. parviflora
3Petals 3.5-5 mm long; bracts subtending the pedicels herbaceous; young growth (especially the bracts and the raceme axis) papillose; [section Oligadenia; series Anisandrae] ....................................................................................................................................................... T. tetragyna
1 Flowers 5-merous.
3 Racemes 5-10 mm wide; [section Oligadenia].
4Bracts of the raceme linear to linear-oblong, about equaling the pedicel; disk holophytic; young growth glabrous; [section Oligadenia; series Lexae] ....................................................................................................................................................... T. chinensis
4Bracts of the raceme lanceolate to ovate, exceeding the pedicel; disk synlophic, paralophic, or holophytic; young growth glabrous or papillose; [section Oligadenia; series Anisandrae].
5Young growth glabrous (except sometimes papillose on the raceme axis); disk synlophic; flowers with 5 antepetalous stamens and 0 antepetalous stamens ................................................................. T. africana
5Young growth papillose; disk holophytic to paralophic; flowers with 4-5 antepetalous stamens and 0-4 antepetalous stamens ................................................................. T. tetragyna
3 Racemes 3-5 mm wide; [section Tamarix].
6Young growth papillose; disk synlophic; [section Tamarix; series Canariensis] ....................................................................................................................................................... T. canariensis
7Petals caducous; disk synlophic ....................................................................................................................................................... T. gallica
7Petals persistent; disk holophytic ....................................................................................................................................................... T. ramosissima

* Tamarix aralensis Bunge, Russian Tamarisk. Reported for NC (Kartesz 1999), but the specimen on which the report is based is of a plant in cultivation as an ornamental. Not keyed. [= K, Y, Z]
* Tamarix chinensis Loureiro, Chinese Tamarisk. Cp (NC): coastal sands; rare, native of China, Korea, and Japan. [= C, K, Y, Z; = T. chinensis Linnaeus – G, an illegitimate name]
* Tamarix gallica Linnaeus, French Tamarisk. Cp (GA, NC, VA?): brackish marshes; rare, native of the w. Mediterranean region of Europe. April-July. Most reports of this taxon from the Southeast represent misidentifications or a very broad interpretation of the species. [= F, G, K, Y, Z; = T. gallica – RAB, S]

285. PLUMBAGINACEAE A.L. de Jussieu 1789 (Leadwort Family) [in CARYOPHYLLALES]
A family of about 24-27 genera and 650-775 species, shrubs, vines, and herbs, of cosmopolitan distribution. Lledó et al. (1998) and other authors suggest that the portion of the Plumbaginaceae often recognized as tribe Staticeae or subfamily Stacteae (which includes Limonium) would be better treated as a distinct family. References: Morin in FNA (2005); Lledó et al. (1998); Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).

Limonium P. Miller 1754 (Sea-lavender)


Limonium carolinianum (Walter) Britton, Carolina Sea-lavender. Cp (DE, FL, GA, NC, SC, VA): tidal marshes, especially in hypersaline flats; common. August-October. Along the coast from NL (Labrador) south to s. FL, west to TX and ne. Mexico. Various treatments recognize from 1 to 4 taxa in our area. The most recent monographer, Luteyn (1976), recognizes only a polymorphic L. carolinianum – a treatment followed by most flora authors since. Godfrey & Wooten (1981) follow Luteyn's treatment, but state "we are not at all confident that Luteyn's treatment is a reasonable one." [= C, FNA, GW, K, WH, Z; Kubitzki in Kubitzki, Rohwer, & Bittrich (1993).]

PLUMBAGINACEAE

A family of about 43-48 genera and 1100-1200 species, trees, shrubs, vines, and herbs, cosmopolitan, but especially north temperate. Recent changes in the circumscription of various genera (including Polygonum, Persicaria, Fallopia, etc.) have received strong support from molecular phylogenetic studies (Kim & Donoghue 2008; Lamb Frye & Kron 2003). References: Freeman & Reveal in FNA (2005); Horton (1972)=Z; Mitchell & Dean (1978)=Y; Ronse Decraene & Akeroyd (1988); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993); Lamb Frye & Kron (2003); Kim & Donoghue 2008).

1 Woody vine, climbing by tendrils; [subfamily Polygonoideae, tribe Coccolobeae].
2 Leaf base deeply cordate.................................................................Antigonon
2 Leaf base truncate to broadly cuneate...............................................Brunnichia

3 Herb (sometimes very robust and rather woody), herbaceous vine, or (Fallopia baldschuaniaca) a somewhat woody vine lacking tendrils.

4 Stem leaves in our species) whorled; flowers in involucrate heads; ocreae absent; stamens 9; leaves densely white-tomentose on the lower surface; [of xeric situations of shale barrens and sandhills]; [subfamily Eriogonoideae, tribe Eriogoneae] ........................................Eriogonum
3 Stem leaves alternate; flowers in various inflorescences (not involucrate); ocreae present; stamens (3-) 5-8 (-9); leaves glabrous or variously pubescent, but not densely white-tomentose; [of various habitats, including xeric ones]; [subfamily Polygonoideae].
4 Tepals 6, in 2 series of 3 each, plants with leaves basally disposed, the largest basal (these withering in some species later in the season); [tribe Rumiceae].
5 Tepals (the outer series) spinose ..................................................................................Emex
5 Tepals foliaceous.
6 Fruit 3-winged; basal leaves very large, 20-40 cm wide; inner and outer tepals similar; [plant cultivated, rarely persistent or escaped] ..........................................................................................................................Rheum
6 Fruit 3-angled; basal leaves small to medium in size, 0.5-15 cm wide; inner tepals wider than the outer tepals; [plants common, mostly weedy] ..........................................................................................................................Rumex
4 Tepals mostly 5 in a single whorl; plants with leaves along the stem, lacking well-developed basal leaves.
7 Flowers in small clusters or very reduced racemes of 1-5 flowers, borne in the axils of normally sized or reduced leaves; plants erect or sprawling herbs with stems < 1 m long, from taproots; leaves jointed at base; [tribe Polygonaceae] ........................................Polygonum
7 Flowers in diffuse axillary panicles, or in terminal or long-peduncled axillary racemes, corymb, or heads; plants various, either erect or sprawling herbs, or erect, robust, and suffrutescent herbs, or climbing herbaceous or suffrutescent vines, or suffrutescent bushy herbs; leaves not jointed at base (except Polygonella).
8 Leaves cuneate at the base, either linear, spatulate, or oblanceolate, mostly < 4 cm long and < 5 mm wide; leaves jointed at the base; pedicels jointed at the base; [tribe Polygonaceae] .................................................................Poligonella
8 Leaves subulate, cordate, or hastate at the base, either lanceolate or ovate, mostly > 5 cm long and > 8 mm wide; leaves not jointed at the base; pedicels not jointed at the base.
9 Inflorescence corymbose, terminal; achenes strongly exerted at maturity; tepals almost free, horizontally spreading, white, 3-4 mm long; [erect annual, uncommonly cultivated and rarely persistent or escaped]; [tribe Persicarioideae] ..............Fagopyrum
9 Inflorescence paniculate, racemiform, or headlike, terminal and axillary; achenes enclosed in the perianth at maturity; tepals fused for much of their length, ascending, pink, green, or white.
10 Outer tepals mostly keeled or winged at maturity; inflorescence of spikelike racemes, heads, or sparse, interrupted racemes; [tribe Persicarioideae] .................................................................Persicaria
10 Outer tepals keeled or winged at maturity; inflorescence a compound panicle of racemes; [tribe Polygonaceae].
11 Plants climbing or sprawling, herbaceous to somewhat woody, the stems slender; perianth usually not enlarging in fruit; stigma capitate or peltate ..........................................................................................................................Fallopia
11 Plants erect, robust (1-4 m tall), woody, the stems generally over 1 cm in diameter, hollow; perianth enlarging in fruit; stigma fimbriate ..........................................................................................................................Reynoutria
**Antigonon** Endlicher 1837 (Love-chain, Coralvine, Corallita)


*Antigonon leptopus* Hooker & Arnott, Love-chain, Queen's-jewels, Confederate-vine, Corallita. Cultivated and persisting; commonly cultivated, rarely persisting or escaping, native of tropical America. [= FNA, K, WH; = *Corculum leptopus* (Hooker & Arnott) Stuntz]

**Brunnichia** Banks ex Gaertner 1788 (Buckwheat-vine)


*Brunnichia ovata* (Walter) Shinners, Buckwheat-vine, Eardrop-vine, Ladies'-eardrops, Redvine. Floodplain forests, swamp forests. June-July; August-September. Ne. SC south to n. FL, west to e. TX, and north in the interior to w. TN, w. KY, s. IL, and se. MO. Introduced in sc. VA. [= FNA, GW, K, WH; = *B. cirrhosa* Gaertner – RAB, C, F, G, S]

**Emex** Campderá (Emex, Devil’s-thorn, Cape Spinach)

A genus of 2 species, herbs, of Mediterranean Europe and s. Africa.

*Emex spinosa* (Linnaeus) Campderá. Disturbed areas; not recently collected and perhaps only a waif, native of Mediterranean Europe. [= K, S, WH]

**Eriogonum** Michaux 1803 (Wild-buckwheat)


1 Basal leaves absent; cauline leaves alternate; [of limestone glades and barrens of KY, TN, and n. AL]; [subgenus *Eriogonum*]..... [E. harperi]
1 Basal leaves well-developed; cauline leaves whorled; [of other habitats and areas (see below)].
2 Tepals bright yellow; plants 3-5 dm tall; achenes pilose at the beak; [of shale barrens of VA and WV]; [subgenus *Oligogonum*].....E. allenii
2 Tepals white to pink; plants 4-12 dm tall; achenes glabrous; [of sandhills of s. NC (at least formerly), SC, and southward]; [subgenus *Eriogonum*]...................................................................................................................................................................................


*Eriogonum tomentosum* Michaux, Sandhill Wild-buckwheat, Southern Wild-buckwheat, Dog-tongue. Sandhills, usually in white sand, primarily in the fall-line Sandhills and on riverine dunes in the middle and upper Coastal Plain. Late July-September; September-November. S. NC (at least formerly) south to c. peninsular FL, west to s. AL. There seems no reason to doubt the label data of an 1890's Biltmore Herbarium collection from Bladen County, NC (Pittillo, Horton, & Herman 1972), as *E. tomentosum* is fairly common not far away in SC; the species has apparently not been seen in NC since. [= RAB, FNA, K, S, WH, Y, Z]

**Fagopyrum** P. Miller 1754 (Buckwheat)
A genus of about 8-16 species, perennial and annual herbs, of e. Asia and Africa. The Latin and common name refer to the similarity of the seeds to beechnuts. References: Hinds & Freeman in FNA (2005); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers greenish; achene rough and dull .............................................................................................................................................. *Fagopyrum esculentum*

1 Flowers greenish; achene rough and dull ................................................................. *F. tataricum*


_Fallopia_ Adanson 1763 (Climbing Buckwheat)

A genus of about 9-10 species, woody and herbaceous vines, of temperate regions of the Northern Hemisphere. If accepted (as here) as a genus distinct from Polygonum, this group takes the name *Fallopia_ Adanson (1763), which has priority over *Tiniaria* (1832) and *Bilderdykia* (1827). *Reynoutria* is sometimes included. References: Ronse Decraene & Akeroyd (1988)=X; Brandbyge in Kubitzki, Rohwer, & Bittrich (1993). [also see *Reynoutria*

1 Plant herbaceous; inflorescences less-branch ed, usually a reduced panicle with only a few racemose branches; [collectively common and in various natural and disturbed habitats].

2 Ocreae reflexed bristly at the base; perianth white; achene glossy black; [of high elevation openings and woodlands]........... *F. baldschuanica*

2 Ocreae smooth; perianth greenish to yellowish; achene glossy or dull black; [mostly of lower elevations].

3 Achene dull black; outer sepals keeled, not expanding into obvious wings in fruit, the fruit therefore 3.5-4.5 mm long (measured from the pedicel joint to the tip); [weedy annual]................................................................. *F. convolvulus var. convolvulus*

3 Achene glossy black; outer sepals expanding into obvious wings in fruit, the fruit therefore 7-15 mm long (measured from the pedicel joint to the tip); [native perennial or weedy annual].

4 Fruiting perianth wings usually truncate to attenuate-decurrent on stipelike base, flat, or (less often) undulate or crinkled, margins entire (rarely undulate-crenate) ................................................................................................................................. *F. dumetorum*

4 Fruiting perianth wings decurrent on stipelike base, undulate or crinkled, rarely flat, margins wavy-crenulate to incised or lacerate (rarely entire).

5 Perianth 7-10 mm long at maturity (measured from the pedicel joint to the tip); achenes 2-3.5 mm long.......................... *F. cristata*

5 Perianth 10-15 mm long at maturity (measured from the pedicel joint to the tip); achenes 3.5-6 mm long...................... *F. scandens*

* Fallopia baldschuanica* (Regel) Holub, Silver-lace-vine, China Fence-vine. Disturbed areas, roadsides; rare, native of Asia. [= FNA; > *Fallopia aubertii* (Henry) Holub – X; > *Polygonum aubertii* Henry – C, F, K]


_Fallopia dumetorum* (Linnaeus) Holub. Mt (WV), Pd (DE, Cp (DE): disturbed areas, thickets; uncommon (rare in DE). Introduced at least as far south as scattered locations in e. and se. PA (Rhoads & Klein 1993), WV, KY, TN, and AL. NS and MI south to FL and TX (FNA). [= FNA; < *Polygonum scandens* Linnaeus var. *cristatum* (Engelmann & A. Gray) Gleason – RAB; = *Polygonum*
scandens Linnaeus var. dumetorum (Linnaeus) Gleason – C, G, K; < Polygonum scandens – F, W, WV; = Bylerderbya dumetorum (Linnaeus) Dumortier – S {add to synonymy}

Fallopia scandens (Linnaeus) Holub, Common Climbing Buckwheat. Mt (NC, SC, VA, WV), Pd (NC, SC, VA), Cp (FL, NC, SC, VA), {DE?, GA}: moist to wet open habitats; uncommon. July–October. NS, ON and MB, south to Panhandle FL and TX. = Polygonum scandens Linnaeus var. scandens – RAB, C, GW, K, WH, Y; < Polygonum scandens – F, W, WV; = Bilderdykia scandens (Linnaeus) Greene – S; < Fallopia scandens – X; < Polygonum scandens – Z; = Tiniaria scandens (Linnaeus) Small]

Persicaria P. Miller 1754 (Smartweed, Tearthumb, Jumpseed)


1 Stem, petioles, and lower surface of major leaf veins with abundant recurved prickles; [section Echinocaulon].
2 Ocreae foliaceous, green, orbicular, perfoliate; tepals becoming fleshy and blue in fruit ............................................................ P. perfoliata
3 Ocreae scarious, not as above; tepals not becoming fleshy or blue in fruit.
4 Leaf blades triangular in outline, the larger 6-11 cm wide; perianth 4-parted ............................................................ P. arifolia
5 Leaf blades lanceolate to narrowly elliptic, the larger 0.8-3 cm wide; perianth 5-parted.
6 Inflorescences glandular-pubescent; stamens 5, in 1 whorl; leaves sessile (rarely shortly petiolate), usually cuneate or rounded at the base (rarely slightly cordate) P. meissneriana var. beyrichiana
7 Inflorescences glabrous; stamens 8, an outer whorl of 5 and an inner whorl of 3; leaves petiolate, sagitate at the base ......... P. sagittata
8 Ocreae with a green, herbaceeous flange; leaves 3-17 cm wide ............................................................ P. orientalis
9 Ocreae hyaline, tan, brown, or reddish throughout; leaves < 6 (-8) cm wide.
10 Plants annual, lacking rhizomes or stolons; leaves often with a triangular reddish blotch in the middle of the upper surface (except for in P. minor). P. glabra
11 Plants perennial, with rhizomes or stolons; leaves lacking a triangular reddish blotch in the middle of the upper surface ............................................................ P. hirsuta
12 Peduncles glabrous; leaves often with a triangular reddish blotch in the middle of the upper surface P. glabra
13 Outer tepals with 3 strong veins, each forked in an anchor shape; tepals 4 (1-5); inflorescences usually arching-drooping P. lapathifolia
14 Outer tepals with inconspicuous and irregularly-forking veins; tepals 5; inflorescences erect P. pensylvanica
15 Achenes minutely textured, dull; axillary inflorescences sometimes included within ocrea P. hydropiperoides
16 Achenes smooth, shiny; axillary inflorescences never included within ocrea. P. hydropiperoides
17 Peduncles stipitate-glandular; leaves 2-4.5 cm wide .................................................................................................................. P. robustior
18 Plants annual, lacking rhizomes or stolons P. careyi
19 Peduncles not stipitate-glandular. P. hydropiperoides
20 Bristles of ocrea (0.5-)1-4 (-6) mm long; leaves lacking a triangular reddish blotch in the middle of the upper surface; achenes biconvex in ×-section; styles 3 ............................................................ P. longiseta
21 Bristles of ocrea 0.2-1.3 (-2) mm long; leaves often with a triangular reddish blotch in the middle of the upper surface; achenes biconvex or oval in ×-section; styles 2-3 ........................................................................ P. maculosa
22 Ocreae glabrous, or strigose towards the base (the hairs stiff and appressed) .......................................................... P. hydropiperoides
23 Ocreae strigose and hirsute, at least some of the hairs loosely ascending to spreading. P. hirsuta
24 Leaf blades rounded to cordate at the base; stem internodes pubescent (the hairs stiff and appressed) P. tuberosa
25 Leaf blades cuneate to truncate at the base; stem internodes glabrous or loosely spreading-hirsute near the nodes only .................................................................................. P. setacea
**Persicaria amphibia** (Linnaeus) S.F. Gray, Water Smartweed. Mt (NC, SC, VA, WV), Pd (NC, SC, VA), Cp (DE), {GA}: marshes, wet disturbed areas; common (uncommon in SC, VA, and WV, rare in GA and NC). June-August. Widespread in the Northern Hemisphere, in North America from NL (Newfoundland), NU, and AK south to SC, TN, TX, and CA, and southwards into the New World tropics. [= FNA; > Polygonum coccineum Muhlenberg ex Willdenow – RAB, G, Z; > Polygonum amphibium Linnaeus var. emersum Michaux – C, GW, K, W, Y; > Polygonum amphitheatrum Linnaeus – W; > Polygonum coccineum var. coccineum – F; > Polygonum natans (Michaux) Eaton – G; > Persicaria muhlenbergii (S. Watson) Small – S; > Persicaria amphibia (Linnaeus) S.F. Gray var. emersa (Michaux) Hickman; > Persicaria amphibia (Linnaeus) S.F. Gray var. stipulacea (Coleman) Hara; > Polygonum amphibium Linnaeus var. stipulacea Coleman – C, F, K, Y]

**Persicaria arifolia** (Linnaeus) Haraldson, Halberd-leaf Tearthumb. Cp (DE, GA, NC, SC, VA), Pd (DE, NC, VA), Mt (VA, WV): marshes, wet thickets; common (uncommon in WV, rare in GA). July-November; August-December. NS west to MN, south to se. GA w. NC, and w. TN. [= FNA; = Polygonum coccineum Linnaeus – RAB, C, GW, K, W, WV, X, Y, Z; > Polygonum arifolium var. arifolium – F, G; > Polygonum arifolium var. pubescens (R. Keller) Fernald – F, G; = Tracaulon arifolium (Linnaeus) Rafinesque – S; = Tracaulon arifolium (Linnaeus) Sojak]

**Persicaria careyi** (Olney) Greene. Cp (DE, FL*), Mt (WV), {VA}: moist soils, disturbed areas; rare. NB west to ON and MN, south to VA, KY, IL, seemingly widely scattered. Reported for sc. PA (Rhoads & Klein 1993), DE, NJ, and MD (Kartesz 1999). [= FNA; = Polygonum careyi Olney – C, F, G, WH] {synonymy incomplete}

* **Persicaria chinensis** (Linnaeus) H. Gross, Chinese Knotweed. Disturbed areas; native of Asia. Introduced in MD and NJ. [= FNA; = Polygonum chinense Linnaeus – K]

**Persicaria extremorientalis** (Voroshchilov) Tzvelev, East Asian Smartweed. Disturbed areas; roadsides, roadsides; native of Japan, China, Korea, and Sakhalin. August-November. See Atha, Nee, & Naczi (2010) for additional information. [] {not yet keyed!}


**Persicaria hydropiperoides** (Michaux) Small, Waterpepper. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, VA, WV): swamp forests, streams, ditches; common (uncommon in VA and WV Mountains). May-November. NS, ON, and AK, south to FL, TX, and CA, and into the New World tropics. [= FNA; > Polygonum hydropiperoides Michaux – GW, WH, Y; > Polygonum hydropiperoides – RAB, C, F; > Polygonum hydropiperoides Michaux – GW, WH, Y; > Polygonum hydropiperoides – K, W, WV, Z; > Polygonum hydropiperoides var. brevicallum Fernald – F; > Polygonum hydropiperoides var. euromortorum Fernald – F; > Persicaria hydropiperoides (Michaux) Small – S; > Persicaria hydropiperoides (Michaux) Small var. opolousana (Riddell ex Small) J.S. Wilson; > Polygonum hydropiperoides var. opolousana (Riddell ex Small) Riddell ex W. Stone – RAB, C; > Polygonum opolousanum Riddell – GW, Y; > Polygonum opolousanum Riddell var. opolousanum (Riddell ex Small) Riddell – GW, Y; > Polygonum opolousana Riddell – F; > Persicaria opolousana (Riddell ex Small) M. Gómez]


**Persicaria longiseta** (de Brujin) Kitagawa, Longbristle Smartweed, Bristly Lady’s-thumb. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed areas, ditches; common (uncommon in NC and SC
Mountains, rare in FL, native of Asia. May-October. [= FNA; = Polygonum cespitosum Blume var. longisetum (de Bruijn) A.N. Steward – RAB, C, F, G, GW, K, W, WV, Y, Z; = Polygonum caespitosum Blume var. longisetum (de Bruijn) A.N. Steward – WH; = Polygonum longisetum de Bruijn]


* Persicaria meinsieri (Chamisso & Schlechtendahl) M. Gómez var. beyrichiana (Chamisso & Schlechtendahl) C.C. Freeman, Mexican Tearthumb. Cp (FL, GA, SC): wet savannas, blackwater river floodplains, ditches; rare (GA Special Concern), sometimes considered only introduced in southeastern North America, but probably native. E. SC south to FL, west to LA; Mexico and Central America south to n. South America; Brazil; se. Africa. See Mitchell (1970) and Freeman (2004). [= FNA; = Polygonium meixnerianum Chamisso & Schlechtendahl var. beyrichianum (Chamisso & Schlechtendahl) Meinsner – GW, K, WH; < Polygonum meioserianum – Z; < Truellum meioserianum (Chamisso & Schlechtendahl) Sojak]

* Persicaria minor (Hudson) Opiz, Small Water-pepper. {VA}: disturbed moist areas; rare, native of Europe. [= FNA; = Polygonum minus Hudson]


* Persicaria punctata (Elliott) Small, Dotted Smartweed. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): swamp forests, bottomlands, marshes; common. July-November. NS, ON, and BC south to FL, TX, and CA, south into the New World tropics. [= FNA; = Persicaria punctata (Elliott) Small var. punctata – S; = Polygonum punctatum – RAB, GW, W, WH, WV; > Polygonum punctatum Elliott var. punctatum – C, F, G, K, Y; > Persicaria punctata (Elliott) Small var. leptostachya (Meisner) Small – S; > Polygonum punctatum Elliott var. leptostachya (Meisner) Small – F; > Polygonum punctatum parvum Marie-Victorin & Rousseau – F; > Polygonum punctatum Elliott var. confertiflorum (Meissner) Fassett – C, G, K, Y; < Polygonum punctatum – Z (also see Persicaria robustior)]

* Persicaria robustior (Small) E.P. Bicknell, Water Smartweed. {VA}: peaty shores or semi-aquatic in water; rare? NS, QC, MI, MO, south irregularly to FL s. and TX, and south into tropical America. Probably under-represented as to states of occurrence because of frequent synonymization. [= FNA; = Polygonum robustius (Small) Fernald – C, F, G, K, Y; < Polygonum punctatum – Z]


* Persicaria virginiana (Linnaeus) Gaertner, Jumpseed. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): floodplains, moist forests; common (uncommon in DE Coastal Plain). NH, QC, MN, and NE, south to FL and TX; disjunct in c. Mexico. Section Tovara consists of 3-5 species of e. North America and e. Asia (Mun & Park 1995); if the section is recognized as a genus (as it often has been), the correct name for this species is Antenoron virginianum. Variation in North America, previously sometimes recognized as varieties, as by F and G, is under study by M. Pyne. [= FNA; = Tovara virginiana (Linnaeus) Rafinesque – RAB, S, WV; > Tovara virginiana var. glaberrima Fernald – F; > Tovara virginiana var. virginiana – F; = Polygonum virginianum Linnaeus – C, GW, K, W, Y; > Polygonum virginianum var. virginianum – G; > Polygonum virginianum var. glaberrimum (Fernald) Steyermark – G; = Antenoron virginianum (Linnaeus) Roberty & Vau-tier – Z]

* Persicaria wallichii Greuter & Burdet var. wallichii, Himalayan Knotweed, Kashmir Plume. Mt (NC): persistent and spreading from plantings; rare, native of Himalayan Asia. [= FNA; = Polygonum wallichii Wallach ex Meisner – C, F, G (a later homonym); = Aconogonon polystachyum (Wallich ex Meissner) M.Král; = Rubrivena polystachya (Wallich ex Meissner) M.Král; = Reynoutria polystachya (Wallich ex Meissner) Moldenke]
**Polygonella** Michaux 1803 (Jointweed)

A genus of about 9 species, annual, perennial, and suffrutescose herbs, of warm temperate e. North America. Ronse De Craene, Hong, & Smets (2004) suggest that *Polygonella* should be merged into *PolYGONUM*, as section *Duravia*, subsection *Polygonella*.


1 Ocreae ciliate; inner perianth segments fimbriate; [subgenus *Thysanella*].

2 Leaves not hyaline-bordered; stem (below the inflorescence) minutely but densely scabrous; [of e. GA south to Panhandle FL]

3 Leaves (3-) 9-30 mm wide; [of sand pine scrub and coastal dunes in Panhandle FL and s. AL] ........................................... 

4 Style and stigma 0-0.1 (-0.2) mm long at anthesis; inner sepals (0.6-) 0.7-1.8 (-2.3) mm long in flower, (1.6-) 1.7-2.8 (-3.6) mm in fruit; annual or perennial; leaves (2.5-) 4.4-39.0 (-65.0) mm long, (0.3-) 0.6-5.0 (-8.0) mm wide, wider than thick.

5 Annual, simple to much-branched from near the distinctly woody base; leaves with hyaline margins toward the tip, persistent through fruiting; ocreae obtuse; achenes 1.0-1.4 mm wide.

6 Leaves (0.8-) 1.0-5.0 (-8.0) mm wide; flowers barely exserted from the ocreolae on pedicels ca. 0.1 mm long at anthesis; [of the outer Coastal Plain of ne. NC and ne. VA northward] ......................................................... P. articulata

7 Vernal leaves (larger leaves towards the base of the plant) 4-13 mm long, 0.5-1.2 (-2.1) mm wide, linear to linear-spatulate; leaf ocrea tips 1-1.5 mm long, acuminate to attenuate; floral ocreolae orange-reddish to orange-brownish throughout or pale distally, the pale portion no more than 1/5 the length of the ocreola; longitudinal grooves evident in ocreola. . . . . . . . . . . . . P. polygama var. croomii

Vernal leaves 7-30 mm long, 1.0-6 mm wide (flowers remaining at flowering often only 1-2 mm wide), spatulate to linear-spatulate; leaf ocrea tips 0.3-0.7 mm long, acute to long-acute; floral ocreolae olivaceous proximally, pale orange to beige distally, the pale portion 1/3-1/2 the length of the ocreola; longitudinal grooves absent or faint in ocreolae. ............................................. P. polygama var. polygama

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**Polygonella americana** (Fischer & Meyer) Small, Southern Jointweed. Sandhills, other dry habitats. June-September, August-November. Sc. NC south to s. GA west to TX and NM, north in the interior to ec. TN (Chester, Wofford, & Kral 1997), se. MO, and AR, perhaps adventive toward the northern part of the range. [= RAB, F, FNA, G, K, S, X; Polygonum]

**Polygonella articulata** (Linnaeus) Meisner, Northern Wireweed. Sandhills, dunes, and other dry, sandy habitats. September-October, October-November. ME and s. QC west to MN, south on the Coastal Plain to VA and ne. NC, otherwise south to se. PA, NY, s. ON, MI, n. IN, n. IL, and e. IA. *P. articulata* is the only northern member of an otherwise southern and predominantly Coastal Plain genus. The record cited for GA in Jones & Coile (1988) is a mis-identification. [= RAB, C, F, FNA, G, K; X; = Delopyrum articulatum (Linnaeus) Small – S; = Polygonum articulatum Linnaeus]

**Polygonella fimbriata** (Elliott) Horton, Sandhill Jointweed. Sandhills. E. GA (not far from SC) and se. AL south to Panhandle FL. It differs from all our other species in having the inner sepals fimbriate. [= FNA, K, Q, WH; = Thysanella fimbriata (Elliott) A. Gray – S; = Polygonella fimbriata var. fimbriata – X; = Delopyrum fimbriatum Elliott]

**Polygonella gracilis** Meisner, Wireweed. Sandhills. Late August-October, October-November. Sc. NC south to s. FL, west to s. MS, perhaps adventive toward the northern part of the range. [= RAB, FNA, K, WH, X; = Delopyrum gracile (Meisner) Small – S; = Polygonum gracile Nuttall]

**Polygonella macrophylla** Small, Largeleaf Wireweed. Sand pine scrub, coastal dunes. S. AL and Panhandle FL. [= FNA, K, S, WH, X; Polygonum]

**Polygonella polygama** (Ventenat) Engelmann & A. Gray var. croomii (Chapman) Fernald, Carolina October-flower. Sandhills, primarily in the fall-line Sandhills and middle Coastal Plain. August-October, October-November. [croomii] ranges from se. and sc. NC south to SC and GA. [croomii] occurs mainly in the fall-line Sandhills, scattered as well in the middle Coastal Plain (Robeson and Bladen counties, NC, Dillon, Darlington, and Lee counties, SC) and rarely the outer Coastal Plain (New Hanover County, NC). In addition to our 2 varieties, var. brachystachya (Meisner) Wunderlin is endemic to c. and s.
Polygonum Linnaeus 1753 (Knotweed)

A genus of about 20 species, herbs, of temperate regions of the Northern Hemisphere. References: Costea, Tardif, & Hinds in FNA (2005); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993); Costea & Tardif (2003a)=X. [also see Fallopia, Persicaria, Reynoutria] Key adapted from FNA and other sources.

1 Stems with 8-16 distinct ribs; leaf venation pinnate, the secondary veins apparent; anthers whitish yellow; [section Polygonella] ............................................ ............................... 6

2 Stems with 4 obscure ribs, or lacking apparent ribs; leaf venation parallel, with inconspicuous secondary veins; anthers pink-purple; [section Duravia].

3 Perianth bottle-shaped, constricted above the achene.

4 Fruiting perianth divided about ⅓ of its length; stem leaves (1-) avg. 1.8 (-3)× as long as branch leaves ............................................ ............................... 7

5 Inflorescences spikelike, the cymules borne in the axis of bracts shorter than the cymules ............................................ ............................... 8

6 Ocreae not pruinose; mature tepals yellow-green, white, pink, or reddish, appressed to the achene; achenes smooth, glossy; [of maritime situations] ................. ...............................P. glaucum

6 Ocreae not pruinose; mature tepals yellow-green, white, or reddish, appressed to the achene; achenes either smooth and glossy or textured and dull; [mainly of inland and disturbed situations]; [P. aviculare complex].

7 Outer 3 tepals flat, equaling or shorter than the inner 2 sepals. 10

8 Plants prostrate; leaves 2.5-5.6 (-10)× as long as wide ............................................ ............................... P. buxiforme

9 Plants bluish green when fresh, turning dark brown to black when dried; leaves rounded or obtuse at the apex; pedicels 1-2 mm long; stem leaves 1-2.5 (-3.5)× as long as the branch leaves ............................................ P. prolificum

10 Plants yellowish green when fresh, not darkening when dried; leaves acute to acuminate at the apex; pedicels 2.5-6 mm long; stem leaves 2.1-3.5 (-4.2)× as long as the branch leaves ............................................ P. ramosissimum

11 Tepals green, margins pink or red (rarely white), with branched veins; plants prostrate to ascending, with 3-15 stems; leaf blades 2.8-5.7 (-6.5)× as long as wide ............................................ ............................... P. aviculare complex

12 Leaf blades 2.4-5.5× as long as wide; perianth (2.3-) 2.8-4.7 (-5) mm long; achenes (of the early season) (2.1-) 2.7-3.7 mm long ................................................................. P. aviculare complex

13 Leaf blades (3.4-) 4.2-9.2× as long as wide; perianth 1.9-3.4 mm long; achenes (of the early season) 1.2-1.8 mm long ................................................................. P. aviculare complex

POLYGONACEAE


* Polygonum aviculare Linnaeus ssp. depressum (Meisner) Arcangeli, Dooryard Knotweed. Mt (WV), {DE, FL?, GA, NC, SC, VA}. [= FNA, X: = Polygonum arenastrum Boreau – C, K; < Polygonum aviculare – G]

* Polygonum aviculare Linnaeus ssp. neglectum (Besser) Arcangeli, Needle-leaf Knotweed. Cp (VA): fields, disturbed areas; rare, introduced. Also documented from scattered locations in s. PA (Rhoads & Klein 1993); DE, NJ, and MD (Kartesz 1999); and WV (as Polygonum ssp. rurivagum) (Costea & Tardif 2003). [= FNA: ? P. bellardii Allioni – K; < Polygonum aviculare var. aviculare – F; < Polygonum aviculare – G; Polygonum aviculare Linnaeus var. rurivagum (Jord. ex Boreau) Berther; Polygonum aviculare Linnaeus var. angustissimum Meisner]

Polygonum buxiforme Small, Small's Knotweed. Mt (WV), {NC, SC, VA}: disturbed areas, marsh edges; rare in WV {uncommon?}. NL (Newfoundland), NL (Labrador), NU, and NT, south to SC, AI, MS, LA, TX, and CA. [= C, K, S, Y: = Polygonum aviculare Linnaeus ssp. buxiforme (Small) Costea & Tardif – FNA, X; = Polygonum aviculare Linnaeus var. littorale (Link) Mertens – F; < Polygonum aviculare – G; Polygonum littorale Link]

Polygonum erectum Linnaeus, Erect Knotweed. Mt (NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (VA), {GA}: disturbed areas, open places; common (rare in GA, NC, SC, and VA). June-October; July-October. ME, ON, and AB south to GA, LA, and NM. [= RAB, C, F, FNA, K, S, W, WV, Y, Z]


Polygonum ramosissimum Michaux. {GA, NC, SC, VA}: disturbed areas; brackish marshes and shores; {uncommon?}. NS west to NU and BC, south to GA, LA, TX, CA. Reported for SC (Kartesz 1999); [investigate distribution] [= C, F, G: = Polygonum ramosissimum Michaux var. ramosissimum – K, Y; = Polygonum ramosissimum Michaux ssp. ramosissimum – FNA, X; = Polygonum ramosissimum – C, F, G] [synonymy incomplete]

Polygonum rurivagum Michaux. Glade Knotweed, Slender Knotweed. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, VA, WV), Cp (DE, VA): glades, barrens, and thin, rocky soils, over various rock types (including granite, diabase, amphibolite, greenstone, metagabbro, and shale); uncommon (rare in DE and NC). July-September; August-October. ME, ON, MN, SD, WV, south to GA, AL, MS, LA, TX. [= RAB, C, F, FNA, S, W, WV, Y, Z; > Polygonum rurivagum Michaux var. proliforum Fernald – F, K; > Polygonum rurivagum Michaux var. tenue – F, K]

Polygonum achoreum Blake. Mt (WV): disturbed areas; rare. NS and NT south to CT, WV, MO, KS, CO, UT, NV, OR. [= C, F, FNA, G, K]

* Polygonum douglasii Greene. Mt (WV), {VA}: [habitat not known]; rare, native of western North America. Reported for VA in FNA. [= C, F, FNA; ? P. douglasii ssp. douglasii – K]

Reynoutria Houttuyn 1777

A genus of about 15 species, perennial herbs, of temperate e. Asia. Ronse Decraene & Akeroyd (1988) and most other recent workers in Polygonaceae treat this group as Fallopia section Reynoutria (Houttuyn) Ronse Decraene. This treatment may prove to be better than the recognition of Reynoutria as a genus; either course is compatible with molecular phylogenetic analyses completed to date (Lamb Frye & Kron 2003). References: Freeman & Hinds in FNA (2005); Ronse Decraene & Akeroyd (1988); X; Brandbyge in Kubitzki, Rohwer, & Bittrich (1993); Zika & Jacobson (2003). Key based on Zika & Jacobson (2003).

1 Veins of leaf underside with multiseriaceous hairs (as seen at 20× magnification); mid-stem leaves with deeply cordate bases; inflorescence much shorter than the subtending mid-branch leaf..............................................................................................................R. sachalinensis

1 Veins of leaf underside with simple hairs, or merely minutely bumpy-scabrous; mid-stem leaves with truncate to slightly cordate or very broadly V-shaped bases; inflorescence shorter or longer than the subtending mid-leaf. 2

2 Veins of leaf underside with scattered simple, stout-based hairs; mid-branch leaf bases usually slightly cordate; well-developed stem leaves usually > 20 cm long.........................................................................................................................R. bohemica

2 Veins of leaf underside minutely scabrous with scattered bumps; mid-branch leaves truncate (to very broadly V-shaped); well-developed stem leaves < 18 cm long.........................................................................................................................R. japonica


A genus of about 30-60 species, perennial herbs, of temperate and subtropical Asia and Europe. References: Freeman in FNA (2005); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993).

*Rheum rhabarbarum* Linnaeus, Rubarb, Pie-plant. Mt (NC, VA, WV): uncommonly cultivated (primarily in gardens in the cooler portions of our area), rarely persistent or escaped; rare, native of Europe (though originally native of Asia). July-September. [= K.; = *R. rhabarbaricum* – C., misspelled; = *R. rhaponticum* – G, misapplied]

*POLYGONACEAE* 648

A genus of about 200 species, perennial and annual herbs (and a few shrubs), of cosmopolitan distribution. References: Mosyakin in FNA (2005); Brandbyge in Kubitzki, Rohwer, & Bittrich (1993). Key based on FNA and other sources.

1 Leaf blades hastate or sagittate on at least well-developed leaves; plants dioecious (rarely polygamo-monoecious), the flowers mostly unisexual; fresh foliage pleasant acid to taste.

2 Inner tepals (at fruiting) about as wide as the achene, with a minute or absent free wing; pedicel jointed just below the tepals; [subgenus *Acetosella*] ................................................................. *R. acetosella*

3 Inner tepals (at fruiting) enlarged, longer and wider than the achene; pedicel jointed near its middle or base, well below the tepals; [subgenus *Acetosa*] ................................................................. *R. patientia*

4 Leaves sagittate, the lobes pointing downwards towards the petiole; [subgenus *Acetosa*; section *Acetosella*] ................................................................. [subgenus *Acetosa*; section *Americanae*] ................................................................. *R. hastatus*

5 Leaf blades 2.5-5× as long as the inner tepals; pedicel joint between the midpoint of the pedicel and the inner tepals.

6 Leaf blades ca. 2× as long as wide; lateral veins of leaves forming angle of ca. 80° to midvein ................................................................. *R. fasciculatus*

7 Leaf blades 3-7 (-10)× as long as wide; lateral veins of leaves forming angle of 40-60° to midvein.

8 Leaf blades widest near the middle; inner sepals (2-) 2.5-4.5 (-5) mm long, (2-) 2.5-4 (-4.5) mm wide.

9 Inflorescence lax, distinctly interrupted; leaf blades thick and coriaceous, deep green, with veins prominent on the lower surface; leaf apex nearly obtuse; inner sepals 3.5-4.5 (-5) mm long, 3-4 (-4.5) mm wide ................................................................. *R. chrysocarpus*

10 Inflorescence dense, interrupted only towards its base; leaf blades light or yellowish green, the veins on the lower surface not noticeably prominent; leaf apex acute; inner sepals (2-) 2.5-3.5 (-3.8) mm long, (2-) 2.5-3 (-3.5) mm wide ................................................................. *R. triangularis*

11 Inner tepal margins entire, indistinctly erose, or (rarely) minutely denticulate (the teeth then < 0.2 mm long).

12 Inner tepals ca. 2× as long as wide, margins entire, largest tubercle almost as wide as the inner tepal.

13 Tubercles 3, equal or nearly so in size; inflorescence leafy through at least 2/3 of its length; pedicels 1.4 (-5) mm long......................... [R. conglomeratus]

14 Inner tepals ca. 1-1.5× as long as wide, margins entire or denticulate, largest tubercle much narrower than the inner tepal.

15 Leaf blade 15-30 (-35) cm long, 2-6 cm wide, the margins strongly undulate; inner tepals 3.5-6 mm long; tubercles normally 3 or 4, rarely 1-2.............................. [R. crispus ssp. crispus]

16 Leaf blade 30-45 (-50) cm long, 10-15 cm wide; the margins plane or weakly undulate; inner tepals (5-) 5.5-8 (-10) mm long; tubercles normally 1 (rarely 2-3).............................. [R. stenophyllus]

11 Inner tepal margins prominently dentate, at least some of the teeth > 0.3 mm long.

16 Inner tepals (not including the teeth) orbiculate-ovate to deltate, as wide as long ................................................................. *R. stenophyllus*

17 Inner tepals with 3-5 strongly hooked teeth on each side.............................. [R. brownii]

17 Inner tepals with straight teeth.
* Rumex acetosella * Linnaeus, Red Dock, Sheep Sorrel, Sourgrass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA), pastures, fields, roadsides, rock outcrops, grassy balds, gardens; common (rare in FL), native of Eurasia. March-June (sometimes later); May-July (sometimes later). Variation in *R. acetosella* has been studied in considerable detail in Eurasia, and a number of infrataxons have been named; the application of these to North American material is unclear at this time. [= RAB, C, FNA, G, GW, S, W, WV; > *R. acetosella* ssp. pyrenanensis (Pourret ex Lapeyrouse) Akerman, a hexaploid subspecies from western Europe, is apparently the predominant naturalized subspecies in North America. See Mosyakin in FNA (2005) and the references cited therein for further information.]


**Rumex brownii** Campderá, Brown's Dock. Cp (SC), Pd (NC): disturbed areas, floodplains, wool-combing waif; rare, native of Australia. [= FNA; = *R. brownii* – K, orthographic variant]

**Rumex chrysocarpus** Moris, Amamastla Dock. Cp (FL*, LA): swamps, disturbed wet areas; rare. Se. LA west to TX and Tamaulipas. [= FNA, WH]


**Rumex cuneifolius** Campderá. Cp (FL): disturbed areas; rare, not recently collected and perhaps only a waif, native of South America. A rare introduction from South America in AL, FL. [= FNA, S; = *R. frutescens* Thouars – K, misapplied]

**Rumex fascicularis** Small. Cp (FL, NC?): swamps and marshes; rare (if present). Peninsular FL, and perhaps north to se. NC. [= FNA, S; = *R. verticillatus* Linnaeus – F, G, WH; = *R. verticillatus* ssp. *fascicularis* (Small) Á. Löve]


**Rumex hastatulus** Baldwin, Wild Dock, Heartwing Dock. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, SC): fields (especially sandy fields in the Coastal Plain), roadsides, disturbed areas; common (rare in VA). March-May; April-June. NY, IN, IL, MO, and KS, south to c. peninsular FL, TX, and NM. [= RAB, C, F, FNA, G, GW, K, S, W; = *Acetosa hastatula* (Baldwin) Á. Löve]

**Rumex obvatus** Danser, Tropical Dock. Cp (FL, LA): maritime shores, riverbanks, pond margins; rare, native of South America. [= FNA, K]


**Rumex patientia** Linnaeus, Patience Dock, Monk’s-rhubarb. Mt (NC, WV), Pd (DE, NC), Cp (VA): disturbed areas; rare, native of Mediterranean Europe. April-May; May-June. [= RAB, C, F, FNA, G, K]


**Rumex stenophyllus** Ledebour, Narrowleaf Dock. Cp (SC), native of Eurasia. [= FNA, K]

**POLYGONACEAE**


* Rumex acetosa* Linnaeus, Green Sorrel. Introduced and naturalized as a weed at least far south as se. PA (Rhoads & Klein 1993). [= C, F, FNA, G; = R. acetosa ssp. acetosa – K; = Acetosa pratensis Miller]

*Rumex britannica* Linnaeus, Great Water Dock. Native species south to PA, NJ, KY (FNA). The specimen reported for VA as R. orbiculatus Gray (R. britannica of FNA) in Castanea 42:261 (1977) has subsequently been annotated to R. obtusifolius. No valid collections of R. britannica are known for VA. [= FNA; > R. orbiculatus A. Gray – C, F, G, W; > R. orbiculatus var. orbiculatus – K]

* Rumex sanguineus* Linnaeus, Bloody Dock, Red-veined Dock. Introduced at least as far south as se. PA (Rhoads & Klein 1993), MD, NJ, and AL (Kartesz 1999), perhaps only as a waif. Reported for AL, MS, LA, and VA by Small (1933). [= C, FNA, G, K, S]

### 287. DROSERACEAE

Salisbury 1808 (Sundew Family) [in Caryophyllales]

A family of 3 genera (*Drosera, Dionaea, Aldrovanda*) and about 100 species, nearly cosmopolitan. References: Schnell (2002b); Kubitzki in Kubitzki & Bayer (2003). [including DIONEAECAEAE]

1 Leaves catching insects via "snap-trap" leaves, with stiff marginal hairs; stamens 10-20; inflorescence cymose; [endemic to the Coastal Plain of se. NC and ne. SC] ...............................................................................................................................................................................................................

1 Leaves catching insects via "flypaper" leaves, with gland-tipped hairs; stamens 5; inflorescence racemose; [collectively widespread in our area] ...............................................................................................................................................................................................................

**Dionaea** Ellis 1768 (Venus Flytrap, Meadow Clam)

This monotypic genus is endemic to the Coastal Plain of NC and SC; it has been introduced in various places, including Panhandle FL, Yancey County in the mountains of NC, and s. NJ, where it persists and spreads to varying degrees (Evert 1957). References: Roberts & Oosting (1958); Wood (1960); Schnell (2002b)=Z.

**Dionaea muscipula** Ellis, Venus Flytrap, Meadow Clam, Tippitiwitchet. Cp (FL*; NC, SC): wet savannas, sandhill seepages; rare. The shiny black seeds are exposed at the maturity and dehiscence of the capsule. Perhaps the most remarkable species in our flora, *Dionaea* has become increasingly rare and now receives some protection as a NC Special Concern species and a Convention on International Trade in Endangered Species "Appendix 2" species. Although collection and trade as a novelty item have contributed to the decline of *Dionaea*, its more fundamental problem is that faced by the great majority of Coastal Plain species in our area – destruction of habitat and fire suppression. In the fall-line Sandhills, *Dionaea* is now restricted to a very few sites on Fort Bragg; in the central Coastal Plain, it is also nearly extirpated. Substantial populations remain only in the Outer Coastal Plain, primarily in Brunswick, Pender, and Onslow counties. Ellis's Latin phrase describing the plant to Linnaeus (quoted in Croom 1837) is worth repeating for its succinctness: "Miraculum naturae! – folia biloba, radicalia, ciliata, sensibilis, conduplicantia, insecta incarcerantia." The colonial governor of North Carolina, Arthur Dobbs, wrote in 1759, "we have a kind of Catch Fly Sensitive which closes upon anything that touches it." Gibson (1991) shows that trap size and prey size are correlated; trap leaves of *Dionaea* primarily capture insects about 5 mm smaller than the length of the trap. Deliberately introduced and at least somewhat naturalized at other places in the Coastal Plain, notably Apalachicola National Forest, FL. [= RAB, GW, K, S, WH, Z]

**Drosera** Linnaeus 1753 (Sundew)


1 Leaves filiform, the expanded leaf bases forming a corn-like base.
2 Petals 7-10 (12) mm long; leaves 8-25 (-30) cm long, < 1 mm wide; glandular hairs on the leaves red to purple, drying dark brown; scape 6-26 cm long ...............................................................................................................................................................................................................

2 Petals 12-17 (-20) mm long; leaves 30-50 cm long, > 1 mm wide; glandular hairs on the leaves pale green, drying pale greenish brown; scape 25-60 cm long ...............................................................................................................................................................................................................

1 Leaves spatulate or suborbicular, the leaf bases not expanded.
3 Inflorescence stipitate-glandular; basal rosettes 0.8-3.5 cm in diameter; stipules absent or obsolete (consisting of a few hair-like segments); seeds black, crateriform ...............................................................................................................................................................................................................

3 Inflorescence glabrous; basal rosettes (2-) 3-12 cm in diameter; stipules present, fimbriate; seeds light brown and longitudinally striate, or reddish brown to black and densely papillose, or brown and coarsely corrugated into 14-16 longitudinal ridges.
4 Leaf blades wider than long, suborbicular or reniform; seeds about 6× as long as wide; [primarily of the Mountains, rarely disjunct eastward] ...............................................................................................................................................................................................................

4 Leaf blades about as wide as long, spatulate to obovate; seeds 1-2× as long as broad; [primarily of the Coastal Plain, rarely disjunct westward].

**Drosera sanguinea** L., Bloody Dock, Red-veined Dock. Introduced at least as far south as se. PA (Rhoads & Klein 1993), MD, NJ, and AL (Kartesz 1999), perhaps only as a waif. Reported for AL, MS, LA, and VA by Small (1933). [= C, FNA, G, K, S]
**DROSERACEAE**

651

5 Petioles with few to many long trichomes; petals pink (sometimes fading to white); plants scapose; inflorescence straight at base; seeds coarsely corrugated into 14-16 longitudinal ridges .................................................. *D. capillaris*

5 Petioles glabrous; petals white; plants usually with a leafy stem 1-10 cm long; inflorescence arching at base; seeds reddish brown to black and densely papillose .......................................................... *D. intermedia*

*Drosera brevifolia* Pursh, Dwarf Sundew. Cp (FL, GA, NC, SC, VA), Pd (GA, NC), Mt (GA, SC): pine savannas, other wet sandy sites, rarely in seepage over rock outcrops; common (rare in lower Piedmont only and Mountains, rare in VA). April-May. The species ranges from se. VA south to s. FL and west to AR, OK, and TX; disjunct in sc. TN. *D. leucantha* may be the correct name for this taxon; see Shinners (1962) and Wood (1966) for a contentious discussion of nomenclatural issues. [= C, F, GW, G, K, Q, S, WH, X, Z; = *D. leucantha* Shinners – RAB, Y]  

*Drosera capillaris* Poiret, Pink Sundew. Cp (DE, FL, GA, NC, SC, VA), Pd (NC, SC, VA): pine savannas, other wet sandy or peaty sites; common (rare in Piedmont, rare in DE and VA). May-August. Se. VA south to s. FL and west to TX, rarely inland, as in TN; also extending into tropical America, in the West Indies, Mexico, and n. South America. [= RAB, C, F, G, GW, K, Q, S, W, WH, X, Y, Z]  

*Drosera filiformis* Rafinesque, Threadleaf Sundew. Cp (DE, FL, NC): margins of natural pools in pinelands, especially clay-based Carolina bays; rare. June; August. E. MA south to se. NC; disjunct in the FL Panhandle (Bay and Washington counties) and in sw. NS (Sorrie 1998a). Sorrie (1998a) has clarified the taxonomy and phytogeography of *D. filiformis* and *D. tracyi*. See comments about *D. tracyi* below. Reported as adventive in a single county in WV (Harmon, Ford-Werntz, & Grafton 2006). [= GW, K, WH, Y; < *D. filiformis* – RAB, C, G (also see *D. tracyi*); = *D. filiformis* var. *filiformis* – F, Q, X, Z; < *D. tracyi* Macfarlane in L.H. Bailey – S (also see *D. filiformis*)]  


*Drosera tracyi* MacFarlane in L.H. Bailey, Tracy's Sundew. Cp (FL, GA): savannas; common (rare in GA). Sc. GA and Panhandle FL, west to e. LA; it has been reported for SC by various authors, including Wynne (1944), but the basis for these reports is unknown. The notion that this species is not distinguishable from *D. filiformis* (or is only varietally distinct) is erroneous (Sorrie 1998a); see Schnell (1995) for a contrary view. [= GW, K, WH, Y; = *D. filiformis* Rafinesque var. *tracyi* (MacFarlane in L.H. Bailey) Diels – Q]

296. CARYOPHYLLALES A.L. de Jussieu 1789 (Pink Family) [in CARYOPHYLLALES]


1 Stipules present and readily apparent, scarios or hyaline.  
2 Fruit a utricle; seed 1 per fruit; petals absent; [subfamily *Paronychoideae*] ........................................................................................................... Key A  
2 Fruit a capsule; seeds 3-many per fruit; petals present; [subfamily *Polycarpoideae*] ........................................................................................................... Key B  
1 Stipules absent.  
3 Sepals fused into a toothed or lobed tube; [subfamily *Caryophylloideae*] ........................................................................................................... Key C  
3 Sepals distinct, or slightly fused at their bases; [subfamily *Alsinoideae*] ........................................................................................................... Key D

**Key A – Paronychioideae**

1 Leaves alternate; staminodes petaloid, ovate to oblong .......................................................... [Corrigiola]  
1 Leaves opposite (or the uppermost alternate in *Herniaria*); staminodes not petaloid, subulate.  
2 Stipules inconspicuous; sepals green-margined, obtuse, lacking awns ............................................... [Herniaria]  
2 Stipules usually conspicuous; sepals white-scarios-margined, hooded or awned ........................................ [Paronychia]

**Key B – Polycarpoideae**

1 Stem leaves subulate, 1-2 mm long, pectinate-fringed at the base; basal rosette leaves spatulate (usually withering quickly after overwintering; stems wiry, stiff, subdichotomously branched; [of xeric sands on the Coastal Plain from se. VA southward] ............... *Sipulpilda*  
1 Stem leaves larger, mostly both longer and broader, not pectinate-fringed at the base; basal rosette present or absent; stems either thicker, more flexuous, or not subdichotomously branched; [collectively more widespread].  
2 Leaves appearing verrucellate, 10-16 per node; filiform to linear .................................................. *Spergula*  
2 Leaves opposite or in whorls of 4, linear to ovate or spatulate.
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**CARYOPHYLLACEAE**

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1 **Calyx immediately subtended by 1-3 pairs of bracts.**
2 **Calyx 20-40-nerved.** .............................................................. *Dianthus*
3 **Calyx lacking subtending bracts.**
4 **Sepals 25-62 mm long; calyx lobes longer than the calyx tube, the lobes as long as or longer than the corolla lobes.** ........*Agrostemma*
5 **Sepals (1-)10-28 (-40) mm long; calyx lobes shorter than the calyx tube, the lobes much shorter than the corolla lobes (except *Gypsophila*).**
6 **Styles 3-5 (or 0 in staminate plants); fruit valves 3, 4, 5, 6, 8, or 10; petals generally appendaged.** .............................................. *Silene*
7 **Styles 2; fruit valves 4; petals appended or not.**
8 **Sepals 1-5 mm long, the commissures between the sepals scarious.** ........................................................................................... *Gypsophila*
9 **Sepals 7-25 mm long, lacking commissures.**
10 **Calyx tubular, 20-nerved; petals appended; perennial.** .............................................................. *Saponaria*
11 **Calyx ovoid, 5-nerved; petals not appended; annual.** ................................................................................................. *Vaccaria*

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**Key C – Caryophylloideae**

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1 **Leaves mostly in whorls of 4, obovate-spatulate, 2-8 mm long.** .......................................................... *Polycarpon*
2 **Leaves opposite, linear or orbicular, 5-40 mm long.**
3 **Leaves orbicular-ovate; styles partly united.** .............................................................. *Drymaria*
4 **Leaves linear; styles separate.** ........................................................................................................... *Spergularia*

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**Key D – Alsinioideae**

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1 **Petals absent; fruit a 1-seeded, indehiscent utricle; styles 2.** ............................................................... *Scleranthus*
2 **Petals present (rarely obsolete or essentially absent); fruit a few-many seeded capsule; styles 3-5.**
3 **Leaves fleshy; seeds > 3 mm long; [of seabeaches and dunes].** ................................................................. *Honckenya*
4 **Leaves membranaceous or stiff; seeds < 2 mm long; [of various habitats].**
5 **Styles 4-5.**
6 **Valves or teeth of the capsule twice as many as the styles.** ............................................................................ *Moenchia*
7 **Valves or teeth of the capsule as many as the styles.** ................................................................................. *Sagina*
8 **Leaves ovate, obovate, > 4 mm wide; styles 5.**
9 **Capsule cylindric, dehiscent by 10 apical teeth.** ......................................................................................... *Cerastium*
10 **Capsule ovoid, dehiscent by 5 valves, each apically 2-cleft.** ............................................................................. *Myosoton*
11 **Styles 3.**
12 **Capsule cylindrical, and often somewhat curved; petals entire or barely emarginated.** .................................................. *Arenaria*

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**Agrostemma Linnaeus 1753 (Corncockle)**


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**Arenaria Linnaeus 1753 (Sandwort)**

A genus of about 150-210 species, herbs, of temperate and subarctic regions of the Northern Hemisphere, extending southward to the montane tropics of South America and Africa. References: Hartman, Rabeler, & Utech in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993). [also see *Minuartia*]
CARYOPHYLLACEAE


* Arenaria leptoclados (Reichenbach) Gussone, Small Thyme-leaved Sandwort, slender Sandwort. Cp (FL), [GA, NC, SC, VA, WV]; rare in FL, native of Eurasia. The relative ranges, habitats, and abundance of the A. leptoclados and A. serpyllifolia are poorly known [additional herbarium work]. March-June. [= S; A. serpyllifolia – RAB, K, W; = A. serpyllifolia Linnaeus var. leptoclados (Reichenbach) Nyman – WH]

* Arenaria serpyllifolia (Michaux) Rohrbach var. serpyllifolia, Large Thyme-leaved Sandwort. Cp (DE, FL), [GA, NC, SC, VA, WV]; uncommon in DE and FL. The relative ranges, habitats, and abundance of this and A. leptoclados are poorly known. March-June. [= S; A. serpyllifolia – RAB, K, W; = A. serpyllifolia Linnaeus var. serpyllifolia – WH]

Cerasium Linnaeus 1753 (Mouse-ear Chickweed, Mouse-ear)

A genus of about 100 species, herbs, especially north temperate but nearly cosmopolitan. References: Morton in FNA (2005); Bittrich in Kubitzki, Rohrer, & Bittrich (1993); Rabeler & Thieret (1988); Scheen et al. (2004). Key based in part on FNA.

1 Petals 10-18 mm long, 2-3× as long as the sepals; leaves 2-7 cm long; plants perennial, typically with some shoots not flowering.
2 Leaf blades narrowly to broadly linear, acute or short-acuminate at tip, tapered to base; stems erect nearly whole length
3 Plants strongly rhizomatous with long-creeping shoots, lacking taproot; flowering stems usually 25-30 cm long; stem pubescence eglandular (glandular hairs present in the inflorescence only); sepals 5-7 mm long; anthers 1.0-1.1 mm long; petals often turning brown when dry; [alien] .................................................................C. arvense ssp. arvense
4 Plants clumped, with taproots or short rhizomatous; flowering stems usually 5-20 cm long; stem pubescence glandular; sepals 3.5-6 (-7) mm long; anthers 0.8-0.9 mm long; petals usually remaining white when dried; [native] .................................................................C. arvense ssp. strictum

5 Annual, taprooted.
6 Sepals with long, appressed, eglandular hairs extending beyond the tip of the sepal.
7 Inflorescence an open cyme, most of the pedicels longer than the sepals .........................................................C. brachypetalum
8 Inflorescence a compact, cymose cluster, most of the pedicels shorter than the sepals ............................................C. glomeratum

9 Styles, sepals, and petals 3-4(-5); capsule teeth 6-8 (-10).
10 Capsules 8-10 mm long; capsules ca. 1.5 × as long as the sepals; cauleine leaves 2.3 × as long as wide .................................................................C. diffusum
11 Styles, sepals, and petals 3 (-4); capsule teeth 6 (-8); capsules 2 × as long as the sepals; cauleine leaves 8-10 × as long as wide ...

12 Styles, sepals, and petals 5; capsule teeth 10.
13 Bracts of the inflorescence with distinctly scarious margins; leaves mostly 0.5-1.0 (-1.5) cm long.
14 Petals equaling or surpassing the sepals; cleft in petal apex 0.2-0.5 (-0.9) mm deep .........................................................C. pumilum
15 Petals shorter than the sepals; cleft in petal apex 0.8-1.5 mm deep .................................................................C. semidecandrum
16 Bracts of the inflorescence with green margins; leaves mostly (1.0-)1.5-8 cm long.
17 Pedicels 3-10 (-15) mm long; leaves to 3.5 cm long .................................................................C. brachypodium
18 Pedicels (10-)15-40 (-55) mm long; leaves to 8 cm long .................................................................C. nutans

Cerasium arvense Linnaeus ssp. strictum (Linnaeus) Ugborough. Mt (WV): sandy and gravelly areas; rare. [overall distribution]. Reported for GA, TN, KY, WV, MD, DE, and NJ, among other states (Kartesz 1999), the GA record not validated in FNA. [= FNA, K; < C. arvense – C, G; < C. arvense var. arvense – F]

* Cerasium brachypetalum Desportes, Gray Mouse-ear. Mt (NC, SC, WV), Pd (NC, SC, VA), Cp (NC, VA): roadsides, disturbed areas; common (rare in SC and WV), native of Europe. April-June. The reports of C. tetrandrum for e. VA in F and G are actually this species. [= RAB, C, F, FNA, G, W; > C. brachypetalum ssp. brachypetalum – K; >= C. tetrandrum W. Curtis – F, G, misidentified]

Cerasium brachypodium (Engelmann ex A. Gray) B.L. Robinson. Mt (NC, VA), Pd (SC, VA), Cp (VA): disturbed areas, roadsides; rare. April-May. IL west to AB and OR, south to NC, ne. GA (Jones & Coile 1988), and AZ. This taxon is perhaps...
only introduced in our area from further west. [= F, FNA, K, S; = C. nutans Rafinesque var. brachypodium Engelmann ex A. Gray – RAB, G, W; < C. nutans – C]


*Cerasium nutans* Rafinesque. Mt (NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, VA): alluvial forests, bottomlands, moist forests; common (uncommon in NC, rare in DE). April-May. NS west to NT, south to SC, GA, AZ, Mexico, and OR. [= F; = C. nutans var. nutans – RAB, G, K, W; < C. nutans – C; > C. nutans var. nutans – FNA; > C. longipedunculatum Willdenow ex Britton – S]

*Cerasium pumilum* W. Curtis, Dwarf Mouse-ear. Cp (NC, VA), Pd (NC, SC, VA), Mt (NC, WV): disturbed areas; rare, native of Europe. April-May. See Rabeler & Thieret (1988) for discussions and reports. [= C, F, FNA, G, K; > C. glatino-sus Fries]


*Cerasium velutinum* Rafinesque var. *velutinum*, Field Mouse-ear, Starry Grasswort. Pd (DE, VA), Mt (VA): rocky riverscour areas, other open situations; rare. April-August. [= FNA; < C. arvense – C, G, S; < C. arvense Linnaeus var. velutinum (Muhlenberg ex Darlington) Hollick & Britton – F; > C. arvense Linnaeus ssp. velutinum (Rafinesque) Ugborogho var. velutinum (Rafinesque) Britton – K; > Cerasium arvense Linnaeus var. velutinum (Rafinesque) Britton]

*Corrigiola* Linnaeus (Strapwort)


*Dianthus* Linnaeus 1753 (Pink, Carnation)

A genus of about 300-320 species, herbs, of Eurasia and Africa. Species other than those treated here are grown in gardens and may escape or perish. References: Rabeler & Hartman in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers clustered in crowded cymes, short-pedicelled; [subgenus *Carthusianastrum*].
2 Leaves 2-5(-8) mm wide; annual or biennial; inflorescence pubescent .................................................. *D. armeria*
3 Leaves mostly (8-)10-20 mm wide; perennial; inflorescence glabrous .................................................. *D. barbatus*
1 Flowers solitary, or few, long-pedicelled; [subgenus *Dianthus*].
3 Petal blade 5-9(-10) mm long, toothed ................................................................................................... *D. deltoides*
3 Petal blade 8(-10) 12-18 mm long, fringed .............................................................................................. *D. plumarius*


*Dianthus barbatus* Linnaeus ssp. *barbatus*, Sweet William. Pd (DE, NC, SC), Mt (VA, WV), Cp (DE), (GA); cultivated as an ornamental, rarely escaped to disturbed areas; rare, native of Europe. June-August. [= FNA; < D. barbatus – RAB, C, F, G, K, WV]
**Dianthus deltoides** Linnaeus, Maiden Pink, Meadow Pink. Pd (NC, VA), Mt (NC, WV): cultivated as an ornamental, rarely escaped to adjacent areas; rare, native of Europe. May. See Rabeler & Thieret (1988) for additional information. [= FNA; < *D. deltoides* – C, F, G, K]

**Dianthus plumarius** Linnaeus ssp. plumarius, Garden Pink, Grass Pink. Cp (NC), Pd (NC, SC), Mt (VA): cultivated as an ornamental, rarely escaped to disturbed areas; rare, native of e. Europe. June-August. [= FNA; < *D. plumarius* – RAB, C, F, G, K]

**Drymaria** Willdenow ex J.A. Schultes 1819 (Drymary)


**Drymaria cordata** (Linnaeus) Willdenow ex Schultes var. cordata, Drymary, West Indian Chickweed. Cp (FL, GA): moist hammocks, moist disturbed areas; uncommon (rare in GA). Sc. GA south to s. FL south into the New World tropics; also old World tropics. Var. *diandra* Blume is restricted to the Old World. [= FNA; = *D. cordata* ssp. cordata – K, Z; < *D. cordata* – S, WH]

**Gypsophila** Linnaeus 1754 (Baby’s-breath)


G. muralis

1 Leaves 0.2-2 (-3) mm wide; stems diffusely and repeatedly branched near the base and upward..........................................................G. muralis
1 Leaves (1-) 3-16 mm wide; stems simple, few-branched toward the top, or much-branched
2 Annual; plants strict or few branched upwards; petals 6-15 mm long..........................................................G. elegans
2 Perennial; plants much-branched 1-4 (-8) mm long................................................................................................................G. paniculata

**Gypsophila elegans** Bieberstein, Annual Baby’s-breath. Cp (NC), Pd (NC), Mt (WV): disturbed areas, persistent from cultivation, doubtfully established; rare, native of Eurasia. See Rabeler & Thieret (1988) for additional information. [= C, FNA, K]


**Gypsophila paniculata** Linnaeus, Tall Baby’s-breath. Cp (FL): disturbed areas; rare, native of Eurasia. [= FNA, K, WH] {add to synonymy}

**Herniaria** Linnaeus (Rupture-wort)


**Holosteum** Linnaeus 1753 (Jagged Chickweed)


**Honckenya** Ehrhart 1788 (Seabeach-chickweed, Sea-sandwort)


**Honckenya peploides** (Linnaeus) Ehrhart ssp. *robusta* (Fernald) Hultén, Southern Seabeach-chickweed, Southern Sea-sandwort. Cp (DE, VA): seabeaches and dunes; rare. June-July. The species is circumboreal, in North America ranging south to e. VA. Ssp. *robusta* ranges from NL (Newfoundland) south to e. VA; 3 other subspecies do not occur south of NL.
CARYOPHYLLACEAE

Minuartia Linnaeus 1753 (Sandwort)

A genus of about 120-175 species, herbs, of the northern hemisphere (and rarely South America). References: Rabeler, Hartman, & Utech in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

1 Sepals acute, with prominent nerves; [of calcareous or mafic barrens of VA, and westward or northward].
2 Primary leaves with axillary fascicles of secondary leaves ................................................................. M. michauxii var. michauxii
3 Sepals 3-nerved; seeds 0.7-0.9 mm long .................................................. [M. muscorum]
4 Lower stem leaves not imbricate; [of xeric sands of the Coastal Plain] .............................................. M. caroliniana
5 Stems erect, leafy near the base, the stem leaves few in number and reduced in size upward; pedicels and sepals glabrous; [of rock outcrops of the Piedmont and Mountains].
6 Larger stem leaves 2.5-7 mm long; petals 1-7 mm long .................................................. M. uniflora
7 Leaves distinctly oblanceolate, very thin in texture, prominently veined; flowers 1-3 per stem ............. M. cumberlandensis
8 Plants 5-10 cm tall, annual, not mat-forming; cymes 9-15-flowered; sepals 3-4 mm long; petals 4-6 (-8) mm long; [of Piedmont and low mountain granitic flatrocks and other outcrops] ........................................... M. glabra
9 Plants 1.5-3 cm tall, perennial, mat-forming; cymes 3-7-flowered; sepals 3.5-5.5 mm long; petals 6-10 mm long; [of mountain peaks and Piedmont monadnocks] .................................................. M. greggii


Minuartia cumberlandensis (B.E. Wofford & Kral) Meinck, Cumberland Sandwort. Vertical sandstone outcrops in the Cumberland Plateau of NE TN; it might be expected in extreme SW VA. [= FNA, K; = Arenaria cumberlandensis B.E. Wofford & Kral – C]

Minuartia glabra (Michaux) A. Mattfeld, Appalachian Sandwort. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): granitic flatrocks, other outcrops of granite, granitic gneiss, or other felsic gneisses and schists, in the mountains restricted to low or medium elevations; uncommon. April-May. ME and NH south to w. GA (Jones & Coile 1988) and AL, primarily on the Piedmont and also in the Cumberlands (Chester, Wofford, & Kral 1997). [= FNA, K; = Arenaria groenlandica (Retzius) Sprengel var. glabra (Michaux) Fernald – RAB, C, F, G; = A. glabra Michaux – GW, W; = Sabulina glabra (Michaux) Small – S; = Porsildia groenlandica (Retzius) Á. Löve & D. Löve spp. glabra (Michaux) Á. Löve & D. Löve]

Minuartia godfreyi (Shinners) McNeill, Godfrey's Sandwort. Cp (FL, NC, SC), [GA]: tidal freshwater marshes, other wetlands; rare. April-June. Peculiarly and irregularly distributed, with isolated and scattered locations in the Coastal Plain and Mountains: w. VA, ne. TN, c. NC, ne. SC, e. Panhandle FL, n. peninsula FL, w. FL, and se. AR. [= FNA, K, WH; = Arenaria godfreyi Shinners – RAB, GW, W; = Sabulina uniflora – S, misapplied; = Stellaria paludicola Fernald & Schubert]

Minuartia groenlandica (Retzius) Ostenfeld, Mountain Sandwort, Greenland Sandwort. Mt (NC, VA, WV), Pd (NC): low elevation rock outcrops (such as sandstone pavements in the VA Ridge and Valley) to high elevation rock outcrops in the Mountains (ascending to nearly 2000m on Roan Mountain), also disjunct on the summits of quartzite monadnocks in the upper Piedmont (such as Pilot Mountain, Surry County, NC and Hanging Rock, Stokes County, NC); rare. May-October. Greenland, NS, and QC south to the higher mountains of New England and NY; disjunct in the Southern Appalachians of VA, w. NC, and c. TN. [= FNA, K; = Arenaria groenlandica (Retzius) Sprengel var. groenlandica – RAB, C, F, G; = Sabulina groenlandica (Retzius) Small – S; = A. groenlandica (Retzius) Sprengel – W; = Porsildia groenlandica (Retzius) Á. Löve & D. Löve spp. groenlandica]

Minuartia michauxii (Fenzl) Farwell var. michauxii, Rock Sandwort. Mt (VA, WV), Pd (DE): limestone, dolostone, calcareous sandstone, and calcareous shale outcrops and barrens; uncommon (rare in DE and WV). June-July. Var. michauxii ranges from NY west to MN, south to sw. VA and AR. Var. texana (B.L. Robinson) Mattfeld occurs from MO and NE south to TX. [= K; = Arenaria stricta Michaux var. stricta – C, F; < M. michauxii – FNA; = A. stricta Michaux spp. stricta – G; < Sabulina stricta (Michaux) Small – S; < A. stricta Michaux – W, WV]

Minuartia patula (Michaux) Mattfeld, Lime-barren Sandwort. Mt (GA, VA), Pd (VA), Cp (GA): rocky barrens of calcareous or mafic rocks, locally common in Lee County, VA; rare (VA Watch List). April-June. Ec. PA and w. VA west to IN and MN, south to AL and TX. [= FNA, K; = Arenaria patula Michaux var. patula – C, G; < A. patula Michaux – F; < Sabulina patula (Michaux) Small – S]

Minuartia uniflora (Walter) Mattfeld. Pd (GA, NC, SC), Cp (GA): granitic flatrocks, outcrops of Altamaha grit; uncommon (rare in NC and SC). April-May. SC south to c. GA, west to ec. AL, on the Piedmont and extending into the Coastal Plain of Georgia on Altamaha grit. M. alabamenensis, named on the basis of its tiny flowers, has been shown to be a self-
pollinating form of *M. uniflora* which has arisen repeatedly and independently at various sites in the range of *M. uniflora.* [ = FNA, K; = *Arenaria uniflora* (Walter) Muhlenberg – RAB; > *A. uniflora* (Walter) Muhlenberg – GW, W; > *A. alabamensis* McCormick, Bozeman, & Spongberg – GW, W; = *Sabulina brevifolia* (Nuttall ex Torrey & A. Gray) Small – S; > *M. alabamensis* (McCormick, Bozeman, & Spongberg) Wyatt]

*Minuartia muscorum* (Fassett) Rabeler. KY and TN west to MO. [ = FNA, K; = *Arenaria patula* Michaux var. *robusta* (Steyermark) Maguire – C, G; < *A. patula* – F; < *Sabulina patula* (Michaux) Small – S; = *M. patula* (Michaux) Mattfeld var. *robusta* (Steyermark) McNeill]

**Moehringia** Linnaeus 1753 (Grove-sandwort)


**Moehringia lateriflora** (Linnaeus) Fenzl, Grove-sandwort, Blunt-leaved Sandwort. Pd (VA), Mt (WV): rocky, disturbed areas (powerline) over mafic rocks (diabase); rare. May-July. Circumboreal, ranging south in North America to n. VA (Fairfax County), n. WV (Morton et al. 2004), MO, and CA. [ = FNA, K; = *Arenaria lateriflora* Linnaeus – C, F, G]

**Moenchia** Ehrhart 1788


* Moenchia erecta* (Linnaeus) P.G. Gaertner, B. Meyer, & Scherbius *ssp. erecta*, Upright Chickweed. Cp (SC): disturbed areas; rare, introduced. This species was collected as a "wool alien" in Berkeley County, SC in 1958 (Rabeler 1991). [ = FNA, < *M. erecta* – K; = *Sagina erecta* Linnaeus]

**Myosoton** Moench 1794 (Water-chickweed)


**Paronychia** P. Miller 1754 (Whitlow-wort, Nailwort)

A genus of about 110 species, herbs and shrubs, nearly cosmopolitan in distribution. This genus consists mostly of plants of dry rocky or sandy habitats. References: Hartman, Thieret, & Rabeler in FNA (2005); Chaudhri (1968)=Z, Ward (1977a, 1977b)=Y; Shinners (1962h)=X; Bittrich in Kubitzki, Rohwer, & Bittrich (1993). Key adapted from Y and Z.

Identification notes: Magnification of at least 10× is necessary for the identification of many of the taxa.

1 Leaf surfaces with silky, appressed pubescence (usually densely so, but sometimes sparse), giving the plant a silvery appearance; flowers 3.5-6 mm long, largely concealed by scarious bracts; [subgenus *Paronychia*].......................................................................................................................... ..........................P. argyrocoma

1 Leaf surfaces glabrous or with very short pubescence (neither appressed nor silky), the plant green; flowers 1-4 mm long, not concealed by scarious bracts.

2 Sepals petaloid, the tip, margins, or entire sepal whitish; perigynous zone very well developed (mostly equaling or somewhat longer than the sepals); [of the Coastal Plain, from SC southward and westward]; [subgenus *Siphonychia*].

3 Sepals glabrous to the base; plant a cespitose perennial with ascending annual stems.

4 Stems minutely gray-puberulent............................................................P. erecta *var. corymbosa*

4 Stems glabrous and often also glaucous............................................................P. erecta *var. erecta*

5 Pubescent portion of the sepal nearly ½ its length; sepal broadly rounded and hooded; stem glabrous or one side with curly hairs.....

6 Stem spreading or ascending, the branching unevenly dichotomously, the flowers therefore in diffuse cymes; glabrous portion of the sepal 0.8 mm long ............................................................P. rugelii

6 Pubescent portion of the sepal <1/3 its length; sepals narrowed toward the apex, with a short tooth or awn; stem uniformly pubescent with retrorse hairs.

6 Stem erect, the branching symmetrical and dichotomous, the flowers therefore in weirdly geometric, tight square cymes; glabrous portion of the sepal > 1.1 mm long.............................................................................................................................................P. americana
2 Sepals not petaloid, green, sometimes scarious-margined; perigynous zone somewhat shorter than the sepal; [of various provinces, collectively widespread in our area]; [subgenus Paronychia].

7 Sepals tipped with a distinct awn, 0.35-0.75 mm long; flowers 2-4 mm long.

8 Serrate or serrulate leaf margins; flowers 15-25 (-30) mm long, 0.5-1 mm wide, acute; [of Mountain and Piedmont rocky areas] = Paronychia americana var. virginica

8 Prostrate annual; leaves oblanceolate or spatulate, 3-12 (-16) mm long, 1.5-3.5 (-5) mm wide, obtuse; [of Coastal Plain sands from sc. NC southward] .......................................................... P. virginiaca var. virginica

7 Sepals tipped with a short cusp or mucro; flowers 1-1.6 mm long.

9 Leaves with a distinctly ciliate margin; plants prostrate, the branching below the inflorescence not pseudo-dichotomous.

10 Plant an annual (biennial); stems 1-4 dm long, uniformly and minutely recurved-puberulent; flowers 1.25-1.4 mm long, shortly ciliate to nearly glabrous; sepal ca. 1 mm long, oval-oblong, the margin ciliate; style 0.4-0.5 mm long, bifid; fruit rounded at the top .......................................................... P. baldwinii ssp. baldwinii

10 Plant a perennial; stems 2-12 dm long, glabrous or minutely puberulent in longitudinal bands; flowers 1.45-1.55 mm long, more or less glabrous; sepals 1.1-2 mm long, oblong, with a brownish margin; style 0.35-0.4 mm long, the 2 lobes divergent-recurved at maturity; fruit narrowed to the top .......................................................... P. baldwinii ssp. riparia

9 Leaves entirely glabrous or with a slightly ciliate-serrulate margin; plants erect, suberect, or somewhat prostrate, pseudo-dichotomously branched.

11 Style elongate, 0.6-0.75 mm long; anthers 0.25-0.3 mm in diameter; stipular bracts subtending the flowers narrowly lanceolate, ca. 0.5× as long as the flowers ............................................................................................................................................................................. P. montana

11 Style short, 0.3-0.35 mm long; anthers ca. 0.15 mm in diameter; stipular bracts subtending the flowers lanceolate, from much shorter to exceeding the flowers.

12 Stems glabrous; leaves oblanceolate, 5-25 mm long, 2-8 (-10) mm wide, obtuse (rarely sub-oblanceolate or acute), very thin in texture, deep-green; calyx 0.9-1.3 mm long; sepal 0.5-1 mm long, herbaceous .................................................................................................................. P. canadensis

12 Stems retrorsely puberulent (sometimes sparsely so); leaves oblanceolate, 3-15 mm long, 2.5-5 mm wide, acute (rarely sub-obtuse to obtuse), firm in texture, dull brownish-green; calyx 1.1-1.6 mm long; sepal 1.1-2 mm long, leathery.

13 Stipular bracts subtending the flowers exceeding the flowers (calyx) ................................................................................................................................................................................. P. fastigiata var. paleacea

13 Stipular bracts subtending the flowers so much shorter than the flowers (calyx).

14 Sepals with a minute cusp or mucro. ............................................................................................................................................................................................. P. fastigiata var. fastigiata

14 Sepals with a distinct white awn to 0.2 mm long ............................................................................................................................................................................................. P. fastigiata var. nuttallii

Paronychia americana (Nuttall) Fenzl ex Walpers, American Whitlow-wort. Cp (FL, GA, SC): sandhills; rare. June-September. S. SC south to GA and s. FL. Two taxa have been unquestionably distinguished. Ssp. americana, with the cymes many-flowered and forming spheroidal glomerules, has the range of the species; ssp. pauciflora (Small) Chaudhri, differing in its laxer, more open cymes, is restricted to s. GA and n. FL. [= FNA, WH, X, Y; > Paronychia americana (Nuttall) Fenzl ex Walpers ssp. americana – K, Z; > Paronychia americana (Nuttall) Fenzl ex Walpers ssp. pauciflora (Small) Chaudhri – K, Z; > P. americana – RAB; > Siphonophyllum americana (Nuttall) Torrey & Gray – S; > Siphonophyllum pauciflora Small – S]


Paronychia baldwinii (Torrey & A. Gray) Fenzl ex Walpers ssp. baldwinii, Annual Dune Whitlow-wort. Cp (FL, GA, NC, SC): dry sandy sites, woodlands or dunes; uncommon. June-October. E. NC south to c. peninsular FL and west to AL (and LA?), on the Coastal Plain. [= K, Y, Z; < P. baldwinii – FNA, WH; < P. riparia – RAB; = Anychiastrum baldwinii (Torrey & Gray) Small – S]

Paronychia baldwinii (Torrey & A. Gray) Fenzl ex Walpers ssp. riparia (Chapman) Chaudhri, Perennial Dune Whitlow-wort. Cp (FL, GA, NC, SC, VA): dry sandy sites, woodlands or dunes; uncommon (VA Watch List). June-October. Se. VA south to n. FL (and AL?), on the Coastal Plain. Though Chaudhri (1968) and Ward (1977a and 1977b) independently reached the conclusion to reduce P. riparia to a subspecies of P. baldwinii, neither stated any reasons for their choice of subspecific status. I here follow the independent conclusions of Chaudhri and Ward, but the appropriate taxonomic rank remains unclear. [= K, Y, Z; < P. riparia – RAB, F; < P. baldwinii – FNA, WH; = P. riparia Chapman – C, F; = Anychiastrum riparium (Chapman) Small – S; > P. baldwinii ssp. riparia var. riparia – Z; > P. baldwinii ssp. riparia var. ciliata Chaudhri – Z]

Paronychia canadensis (Linnaeus) Wood, Canada Whitlow-wort, Forked Chickweed. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA): dry rocky woods, shale barrens; uncommon (common in WV, rare in the NC, SC, and VA Coastal Plain). June-October. NH and s. ON west to MN, south to n. GA (Jones & Coile 1988), AL, MO, and KS. This species is somewhat taller on average than P. fastigiata or P. montana. [= RAB, C, F, FNA, G, K, W, WV, Z; = Anychiastrum canadensis (Linnaeus) Britton, Sterns, & Poggenburg – S]


Paronychia fastigiata (Rafinesque) Fernald var. fastigiata, Common Forked Whitlow-wort. Mt (NC, SC, VA, WV), Pd (DE, NC, VA), Cp (DE, NC, SC, VA): dry, usually rocky, woodlands, often on thin soil around outcrop edges; uncommon (rare in DE). June-October. MA west to MN south to FL and TX. The three varieties of P. fastigiata (though accepted by Chaudhri
and many recent floras) need additional investigation to confirm their taxonomic status, habitats, and geographic ranges. [= C, F, G, K, WV, Z; < *P. fastigiata* – RAB, W; < *P. fastigiata* var. *fastigiata* – FNA; < *Anychia polygonoides* Rafinesque – S]


**Paronychia fastigiata** (Rafinesque) Fernald var. **paleacea** Fernald, Green Forked Whitlow-wort. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (NC, VA): dry, mostly rocky woodlands; uncommon (rare in WV). June-October. NJ, DE, and PA west to IL, south to VA, NC, KY, TN, MO, and TX. [= C, F, G, K, WV, Z; < *P. fastigiata* – RAB, W; < *P. fastigiata* var. *fastigiata* – FNA; < *Anychia polygonoides* Rafinesque – S]

**Paronychia hermarioides** (Michaux) Nuttall, Michaux's Whitlow-wort. Cp (FL, GA, NC, SC): sandhills; rare. April-July. Sc. NC south to c. peninsular FL and e. Panhandle FL. The NC distribution ascribed by Small, Chaudhri, and FNA is based on the type specimen of André Michaux ("in arenosis aridis Carolinae septentrionalis"); the species has been relocated in NC (Scotland County) by Harry E. LeGrand, Jr, over two centuries later. [= RAB, FNA, K, WH, Y, Z; =*Gastronchya hermarioides* (Michaux) Small – S]

**Paronychia montana** (Small) Pax & K. Hoffmann, Shale-barrow Whitlow-wort. Mt (NC, VA): dry rock outcrops and talus bars, especially on shale barrens; uncommon. June-October. C. PA (and OH?) south through w. VA and e. WV to a few localities in NC, TN, GA, and AL. [= K, Z; < *P. fastigiata* – RAB, W; < *P. fastigiata* var. *pumila* (A. Wood) Fernald – C, F, FNA, G; = *Anchyiastrum montanum* Small – S]

**Paronychia patula** Shiners, Pineland Nailwort. Cp (FL, GA): sandhills; uncommon (rare in GA). July-September. Sw. GA west to s. AL, south to c. peninsular FL. [= FNA, K, WH, X, Y, Z; = *Siphonochrya diffusa* Chapman – S]


**Paronychia virginica** Sprengel var. **virginica**, Virginia Whitlow-wort. Mt (VA, WV), Pd (GA, VA): shale barrens, rocky riversides, calcareous rock outcrops and talus, serpentine outcrops; rare. June-August. The ranges of the two varieties are variously stated; the distinguishing characteristics and distributions are not clear. Var. **virginica** occurs in w. MD, w. VA, WV, GA, and AL (or allegedly also in NC, AR, OK, and TX). Var. **parksii** (Cory) Chaudhri occurs in TX (or also in OK). [= C, Z; < *P. virginica* – F, FNA, K, W, WV; = *P. virginica* ssp. *virginica* – S; = *P. dichotoma* (Linnaeus) Nuttall – S]

**Paronychia chartacea** Fernald var. **minima** (L.C. Anderson) R.L. Hartman, Paper Nailwort. Cp (FL): scrub; rare. (May-) July-October. Endemic to Panhandle FL. [= FNA; < *P. chartacea* – WH; < *Nyachia pulvinata* Small = *P. chartacea* Fernald ssp. *minima* L.C. Anderson – K] {add to synonymy; add to key}*

**Petrohragia** (Seringe) Link 1831 (Pink)


1 Flowers in capitate inflorescences (solitary in impoverished or very young plants); bracts subtending the calyx broad and long, usually completely enclosing the calyx; [section *Koltruschia*].................................................................................................................... *P. prolifera*

1 Flowers solitary (or in fascicles of 2-3); bracts subtending the calyx narrow and short, enclosing about ½ of the calyx; [section *Petrohragia*]...


* Petrohragia saxifraga* (Linnaeus) Link var. *saxifraga*, Saxifrage Pink, is "cultivated and occasionally escaped" south to se. PA (Rhoads & Klein 1993), s. NJ, and MD (Rabeler 1985). Rabeler (1985) reports a location from Page Co. VA, but it appears that this is persistent from cultivation. [= FNA; < *P. saxifraga* – C, K, Z; < *Tunica saxifraga* (Linnaeus) Scopoli]

**Polycarpon** Linnaeus 1759 (Allseed)

A genus of about 18 species, herbs, primarily of Europe, with several species in South America, and 1 cosmopolitan. References: Thieret & Rabeler in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993).

**Sagina** Linnaeus 1753 (Pearlwort)


1 Leaf blades fleshy; seeds reniform or nearly spherical, lacking a groove on one side; flowers 5-merous. ................................................................................. **S. japonica**
1 Leaf blades thin; seeds obliquely triangular, with a groove on one side; flowers 4-merous or 5-merous.

2 Annual, usually without a persistent rosette of leaves; flowers (4-)5-merous; seeds 0.3–1.4 mm long; sepalss erect-appressed in fruit. ................................................................................. **S. decumbens**
2 Perennial, usually with a persistent rosette; flowers 4 (-5)-merous; seeds (0.3-) 0.4 (0.5) mm long; sepals spreading in fruit. ................................................................................. **S. procumbens**

**Sagina decumbens** (Elliott) Torrey & A. Gray, Eastern Pearlwort. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed ground, fields, cracks in pavement or sidewalks; common (uncommon in Mountains of GA, NC, SC, and VA, rare in Mountains of WV). March–June. NB west to IL and MO, south to c. peninsular FL and TX, with adventive occurrences further west. Crow (1978) and Crow in FNA (2005) treat *S. decumbens* and *S. occidentalis*. Watson of the Pacific Coast of North America as subspecies. They differ primarily in seed architecture. Though clearly closely related, they seem equally well (and more simply) regarded as sibling species. A report of *S. subulata* (Swartz) K. Presl for Bedford County, VA, is apparently actually *S. decumbens*.


*Sagina procumbens* Linnaeus, Northern Pearlwort, Bird’s-eye. Cp (DE), Pd (DE), Mt (NC, WV): disturbed soils; uncommon (rare in NC), native of Eurasia (or, at least, ne. North America). May–September. Crow (1978) questions whether *S. procumbens* is native in all of the Western Hemisphere. In North America, it is concentrated in 2 main regions, from NS and QC south to MD, and from sw. BC south to e. CA, with scattered occurrences elsewhere, such as around the Great Lakes, CO, AR, s. OH, and w. NC. Whether or not the species is native in the New World, the occurrence in NC (in a gravel parking lot on top of Roan Mountain) is almost certainly adventive.

*S. procumbens* var. *procumbens* – F; > *S. procumbens* var. *procumbens* ssp. *decumbens* – F

**Saponaria** Linnaeus 1753 (Soapwort)

A genus of about 40 species, herbs, of temperate regions of Eurasia. References: Thieret & Rabeler in FNA (2005); Bittrich in Kubitzki, Rohwer, & Bittrich (1993). [also see *Vaccaria*]


[* Saponaria subulata* (Swartz) K. Presl for Bedford County, VA, is apparently actually *S. officinalis*. [= C, FNA, G, K, WV, Z; > S. procumbens var. procumbens – F; > S. procumbens var. compacta Lange – F]

**Silene** Linnaeus 1753 (Catchfly, Campion, Fire-pink, Wild-pink)


1 Styles mostly 5; capsule with 5 or 10 teeth; calyx tubular at anthesis, becoming strongly inflated later in *S. dioica* and *S. latifolia*.
2 Petal limbs deeply divided into 4 linear segments ................................................................................. **S. flos-cuculi**
2 Petal limbs unlobed, emarginate, or shallowly 2-lobed.

3 Leaf blades with dense silky white hairiness; flowers bisexual. ................................................................................. **S. coronaria**
3 Leaf blades variously pubescent, but not with silky-appressed pubescence.

4 Petals pink; capsule teeth revolute .................................................................................................................. [S. dioica]
4 Petals white; capsule teeth spreading to slightly reflexed ............................................................................... **S. latifolia**

1 Styles mostly 3; capsule with 3 or 6 teeth; calyx tubular or campanulate at anthesis, not greatly inflated (except in *S. vulgaris*).

**S. latifolia** Linnaeus 1753 (Catchfly, Campion, Fire-pink, Wild-pink)


1 Styles mostly 5; capsule with 5 or 10 teeth; calyx tubular at anthesis, becoming strongly inflated later in *S. dioica* and *S. latifolia*.
2 Petal limbs deeply divided into 4 linear segments ................................................................................. **S. flos-cuculi**
2 Petal limbs unlobed, emarginate, or shallowly 2-lobed.

3 Leaf blades with dense silky white hairiness; flowers bisexual. ................................................................................. **S. coronaria**
3 Leaf blades variously pubescent, but not with silky-appressed pubescence.

4 Petals pink; capsule teeth revolute .................................................................................................................. [S. dioica]
4 Petals white; capsule teeth spreading to slightly reflexed ............................................................................... **S. latifolia**

1 Styles mostly 3; capsule with 3 or 6 teeth; calyx tubular or campanulate at anthesis, not greatly inflated (except in *S. vulgaris*).


Silene caroliniana Walter var. caroliniana, South Carolina Wild-pink, Rock Catchfly. Pd (FL, GA, NC, SC), Cp (GA, NC, SC): in acidic, sandy, open woodlands, especially woodlands around granitic flatrocks and sandy Coastal Plain woodlands; uncommon (rare in GA and NC). April-July. Sc. NC south through the e. three-quarters of SC just into e. GA; disjunct in Panhandle FL. See Wilbur (1970b) and Clausen (1939) for additional discussion of these infraspecific taxa in *S. caroliniana.* (= S. virginiaca – RAB, S, WH; = S. caroliniana ssp. caroliniana – FNA, G, K, Z, = S. caroliniana ssp. caroliniana var. caroliniana – Y)

Silene caroliniana Walter var. wherryi (Small) Fernald. Mt (VA?, WV): dry, rocky places; rare. April-July. OH and WV (and VA according to FNA) south and west to AL, KY, MO, and KS. [= F; > S. caroliniana var. pensylvanica – C; = S. caroliniana ssp. wherryi (Small) Clausen – FNA, G, K, Y, Z; = S. wherryi Small]


* Silene cseresi Baumgarten, Balkan Bladder-campion. Mt (NC, WV): habitat not known; rare, native of Europe. Documented for w. NC (J.K. Morton, pers.comm.). Also reported in se. PA (Rhoads & Klein 1993) and e. WV. [= FNA; K; = S. cseresi – C, F, G, orthographic variant]

* Silene dichotoma Ehrhart ssp. dichotoma, Forked Catchfly. Mt (NC, VA, WV), Pd (VA), {GA}: fields, disturbed areas; common (uncommon in WV), native of Europe. May-August. [= FNA; < S. dichotoma – RAB, C, F, G, K, S, W, WV]

* Silene flos-cuculi (Linnaeus) Clairville ssp. flos-cuculi, Ragged Robin. Mt (NC): rare; native of Europe. Introduced and established in Allegheny County, NC (Poindexter 2008) and elsewhere in ne. North America, as in MD and PA. [= FNA; < Lychnis flos-cuculi Linnaeus – C, F, G, K]


* Silene nivea (Nuttall) Muhlenberg ex Othl, Snowy Campion. Mt (GA, VA, WV), Pd (VA): rocky or sandy flood-scoured riversides or creek-sides; rare (VA Rare). June-July. NJ west to ND, south to n. VA, w. VA, WV, nw. GA (Jones & Coile 1988), TN, and MO. [= C, F, FNA, G, K, W, WV; = Silene alba Muhlenberg – S, misapplied]


* Silene ovata Pursh, Mountain Catchfly. Mt (GA, NC, SC, VA), Cp (GA): circumneutral soils of woodlands and forests, especially over mafic or calcareous rocks, mostly at medium elevations in the mountains; rare. August-September. Sw. VA and KY west to AR, south to nw. GA, n. AL, and AR; disjunct in sc. and sw. GA. [= RAB, C, F, FNA, G, K, S, W]

* Silene regina Sims, Royal Catchfly. Cp (FL, GA): prairies and calcareous woodlands and forests; rare (GA Rare). OH and e. MO south to e. TN (Chester, Wofford, & Kral 1997), nw. and sw. GA (Jones & Coile 1988), FL Panhandle (Jackson County), and AL. [= C, F, FNA, G, K, S, WH]

* Silene rotundifolia Nuttall, Roundleaf Fire-pink, Sandstone Fire-pink. Mt (GA, VA, WV): sandstones cliffs, ledges, and talus, and at bases of sandstone cliffs; rare. S. OH and WV south to nw. GA (Jones & Coile 1988) and n. AL, nearly restricted to the Cumberland Plateau. [= FNA, G, K, S, W, WV]


* Silene virginica Linnaeus, Fire-pink. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): woodlands, rock outcrops, crevices in cliffs, roadbanks; common (rare in Coastal Plain, rare in DE Piedmont). April-July. NJ and NY west to s. ON and SE. MI, south to Panhandle FL (Bay County), GA and OK. Var. robusta Strausbaugh & Core, named from locations in e. WV, extends as well to se. KY and e. TN. It differs in its greater size and numerous pairs of cauleine leaves, the leaves larger (7-15 cm long, 2-4 cm wide, vs. 7.5-10 cm long, 0.5-2 cm wide) and smaller calyx (1.5-2 cm long, vs. ca. 2.2 cm long) (Strausbaugh & Core 1952, 1978); additional study is needed. [= RAB, C, F, FNA, G, S, W, WH; > S. virginica var. virginica – K, WV; > S. virginica var. robusta Strausbaugh & Core – K, WV]


*Spergula* Linnaeus 1753 (Spurrey)

1 Wing of the seed narrower than the body of the fruit; leaf blades terete or nearly so, 1.5-3 (-5) cm long. .................................................. Sp. arvensis
1 Wing of the seed as wide as or wider than the body of the seed; leaf blades usually flat, 0.3-1.5 (-2.0) cm long.
2 Seed wings light brown or darker, 0.2-0.3 mm wide; stamens usually 10 ................................................................. [Sp. morisonii]
2 Seed wings white to tan, 0.4-0.6 mm wide; stamens usually 5 ................................................................. Sp. pentandra

* Spargula arvensis Linnaeus, Corn Spurrey. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, NC, SC, VA), Mt (VA, WV): fields, roadsides, disturbed areas; uncommon (rare in FL and WV), native of Europe. April-June. Two varieties are sometimes recognized; var. arvensis, with seeds ornamented with white, clavate papillae, the plants sparsely glandular, and var. sativa, with seeds reticulate and lacking papillae, the plants sparsely to densely glandular. Additional information is needed on the distinctiveness, range in our area, etc. of the two putative varieties. [= RAB, C, F, K, S, WH, WV; > S. arvensis Linnaeus var. arvensis – F, G; > S. arvensis Linnaeus var. sativa (Boenninghausen) Mertens & W.D.J. Koch – F, G]

* Spargula morisonii Boreau, Morion’s Spurrey. Fallow fields, disturbed areas. Native of Europe, known from MD (Prince Georges County) (Steuery 2004a), MA, and NJ (FNA). [= C, FNA]

Spargularia (Persoon) J. & K. Presl 1819 (Sand-spurrey)


1 Stamens 6-10; seeds either 0.4-0.6 or 0.8-1.1 mm long; axillary leaf clusters of 2-4 leaves (or sometimes absent in Sp. media). [Sp. media var. media]
2 Seeds 0.8-1.1 mm long, smooth, without sculpturing except for wings; leaf blades fleshy ................................................................. Sp. echinosperma
2 Seeds 0.4-0.6 mm long, sculptured with wavy lines, not winged but with peglike papillae; leaf blades scarcely fleshy .......... Sp. rubra
1 Stamens 1-5; seeds 0.5-0.7 (-0.8) mm long; axillary leaf clusters usually absent.
3 Seeds shiny and silvery; stipules wider than long; styles 0.3-0.4 mm long ................................................................. Sp. echinosperma
3 Seeds dull, not silvery; stipules longer than wide; styles 0.4-0.7 mm long ................................................................. Sp. salina


* Spargularia media (Linnaeus) K. Presl var. media. Mt (WV): disturbed areas; rare, native of {}. Known from salted highways in NY, OH, MI, and IL and salt or brackish marsh habitats in coastal NY. [= FNA; < S. media – C, F, G; ? Spargularia maritima (Linnaeus) Chiovenda – K] {synonymy incomplete}

Stellaria Linnaeus 1753 (Chickweed, Stitchwort, Starwort)


1 Leaves narrow, usually linear, lanceolate, oblanceolate, or narrowly elliptic, the blade 3-10× as long as wide, 0.8-10 mm wide; stems prominently 4-angled.
2 Sepals 2.0-3.5 mm long; petals 0-3.0 mm long, shorter than the sepals or absent; seeds 0.3-0.9 mm long.
3 Inflorescence a leafy terminal cyme of 1-5 flowers; seeds 0.7-0.9 mm long, smooth or slightly rugose .......... S. borealis var. borealis
3 Inflorescences axillary, solitaire or in small cymes of 2-5 flowers; seeds 0.3-0.8 mm long, distinctly papillose.
4 Flowers in axillary inflorescences of 1-5 flowers; sepals 5; petals 5; seeds 0.3-0.4 mm long, with small, rounded tubercles; [widespread]................................................................. S. alsine
4 Flowers solitary in leaf axils; sepals 4 (-5); petals absent; seeds 0.6-0.8 mm long, with stalked, knoblike tubercles; [of c. KY and TN] ................................................................. [S. fontinalis]
1 Sepals 3.5-9 mm long; petals 3.5-13 mm long, equaling or longer than the sepals; seeds 0.7-2.5 mm long.
5 Seeds 2.2-5.5 mm long; bracts of the inflorescence herbaceous; petals notched < halfway to the base .................................................. S. holostea
5 Seeds 0.7-1.2 mm long; bracts of the inflorescence scarious; petals notched > halfway to the base.
6 Sepals 4.5-5.5 mm long, strongly 3-nerved; seeds 0.8-1.2 mm long, coarsely tuberculate; inflorescence diffuse, many-flowered........... S. graminea
6 Sepals 3.5-4.5 mm long, weakly 3-nerved; seeds 0.7-1.0 mm long, obscurely sculptured and appearing almost smooth; inflorescence more compact, fewer-flowered. ............................... S. longifolia

1 Leaves broad, usually ovate, obovate, or broadly elliptic, the blade 1-2.5× (or to 4×) as long as wide, 4-30 mm wide (if > 2.5× as long as wide, then definitely > 10 mm wide); stems terete or 4-angled.
2 Leaves long-petiolate, the petiole about as long as the blade, the blades cordate to truncate at the base; sepalas 2.5-3.5 mm long, obtuse to broadly acute; seeds 0.6-0.8 mm long; stem glabrous or glandular-puberulent (the pubescence not in lines). ............................... S. prostrata
3 Leaves sessile, short-petiolate, to long-petiolate (if long petiolate, the blades cuneate), the blades rounded to cuneate at the base; sepalas 3.0-6.5 mm long; stem pubescent always in vertical lines; annual, the stems weak and in part prostrate, the tips or vigorous growth ascending; [alien].
4 Leaves 0.5-4.0 cm long; seeds 0.6-1.7 mm long; sepalas 3.0-6.5 mm long; stem pubescence always in vertical lines; annual, the stems weak and in part prostrate, the tips or vigorous growth ascending; [alien].
5 Leaves 0.5-6.5 mm long; stamens 8-10; seeds 1.1-1.7 mm long........................................ S. neglecta
6 Leaves 3.0-5.2 (-6.0) mm long; stamens 1-5 (-8); seeds 0.4-1.3 mm long.
7 Leaves 0.5-4.0 cm long; (with strong dimorphism between sterile and fertile shoots, the leaves of sterile shoots much larger); seeds 1.7-2 mm long; sepalas 4-11 mm long; stem pubescence in vertical lines or uniformly distributed; perennial, the stems strong and ascending to erect; [native].
8 Sepals 7-11 (-12) mm long, acuminate, ciliate, but more-or-less glabrous on the back; [of the mountains]................................. S. corei
9 Sepals 3.5-7 mm long, acute, ciliolate and more-or-less pubescent on the back; [widespread in our area]................................. S. pubera
10 Leaves 0.5-4.0 cm long; seeds 0.6-1.7 mm long; sepalas 3.0-6.5 mm long; stem pubescence always in vertical lines; annual, the stems weak and in part prostrate, the tips or vigorous growth ascending; [alien].
11 Stamens 3-5 (-8); seeds 4.5-5.2 (-6.0) mm long; seeds 0.9-1.4 mm long; petals usually present ........................................ S. media
12 Stamens 0-3 (-5); sepalas 3.0-4.0 mm long; petals usually absent........................................ S. pallida


Stellaria borealis Bigelow var. borealis, Northern Chickweed. Mt (WV): cold swamps; rare. May-September. Greenland and NL (Labrador) west to AK, south to MD, n. WV (Canaan Valley, Tucker Co.), sc. PA, MI, WI, MN, CO, NV, and OR. Var. stichana (Steudel) Fernald is restricted to nw. North America. [= C; = S. borealis ssp. borealis – FNA, K; > S. calycantha (Ledebour) Bongard var. florigonda Fernald – F, G; > S. calycantha var. isophylla Fernald – F, G, WV, misapplied]

Stellaria corei Shinners, Tennessee Starwort. Mt (NC, VA, WV), Pd* (DE*): cove forests and seepages at moderate to high elevations, rarely escaped from cultivation; rare. April-June. W. VA, WV, and sw. PA west to OH and IN, south to w. NC, e. and c. TN, and n. AL. Cronquist (1991) reports that S. corei has a chromosome number of 2n = 60, as opposed to 2n = 30 for S. pubera. In mountain coves, S. corei and S. pubera sometimes grow intermixed; they are best regarded as species. Both species have an interesting seasonal growth form, producing short and relatively small-leaved flowering shoots in the spring (which wither following fruiting), followed by taller, more vigorous growth shoots with larger and tougher leaves and lacking flowers, which persist until autumn. Some of the description in various manuals of differences in petiole length and leaf size and shape between the two species is obscured or complicated by these seasonal differences; more careful observation is needed. [= RAB, FNA, K, W, WV; > S. pubera Michaux var. silvatica (Béguinot) Weatherby – C, F; > S. silvatica (Béguinot) Maguire – G, preoccupied; = Alsin tennesseensis (C. Mohr) Small – S, misapplied]


* Stellaria holostea Linnaeus, Easter-bell, Greater Stitchwort. Cp? (NC): escaped or persistent from cultivation; rare, native of Europe. [= C, F, FNA, G, K]


* Stellaria neglecta Weihe. Mt (NC): disturbed areas; rare, native of Europe. Similar to S. media and S. pallida. It has been found at scattered localities in e. North America and will presumably eventually be found elsewhere in our area. [= FNA, G; < S. media (Linnaeus) Villars – RAB, C, W; < S. media var. media – F; = S. media ssp. neglecta (Weihe) Murbeck – K; = Alsin neglecta (Weihe) A. & D. Love]


Stellaria prostrata Baldwin. Cp (FL, GA, SC): moist soil along streams; rare. March-April. Apparently ranging from SC south to c. peninsular FL, west to c. TX. This species has been reported repeatedly for SC and sometimes for VA as well; the VA reports are referable to S. pallida. More information is needed about its occurrence in our area. [= K, WH; = S. cuspidata Willdenow ex Schlechtendahl ssp. prostrata (Baldwin) J.K. Morton – FNA; = Alsin baldwinii Small – S]

Stellaria pubera Michaux, Star Chickweed, Common Starwort, Giant Chickweed, Great Chickweed. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): bottomland forests, moist slopes, coves, hammocks; common (uncommon

Stellaria fontinalis (Short & Peter) B.L. Robinson is a native species of c. TN (Chester, Wofford, & Kral 1997) and c. KY, occurring in seepages and wet cliffs. Its generic placement has been controversial and uncertain (see synonymy). [= F, FNA, G, K; = Sagina fontinalis Short & Peter – C; = Alside fontinalis (Short & Peter) Britton – S; = Arenaria fontinalis (Short & Peter) Shinners; = Spergula fontinalis (Short & Peter) Dietrich]

Stipulicida Michaux 1803 (Wire-plant)


Identification notes: Stipulicida is immediately recognizable by its very wiry, dichotomously branched stems, the stem leaves reduced to subulate scales 0.5-2 mm long. Often overlooked are the basal rosette of spatulate leaves, to 15 mm long and 4 mm wide.

1 Sepal margin entire or nearly so; outer sepal tips acute to obtuse; [of se. VA south to s. FL, west to LA]............................

Stipulicida setacea Michaux var. lacerata C.W. James. Cp (FL): xeric sands of sandhills, dry pine flatwoods, maritime forests; rare. May-August. Ne. FL south to s. FL; Cuba. [= FNA, K, WH, X, Y, Z; < S. setacea – S]

Stipulicida setacea Michaux var. segetalis. Wire-plant. Cp (FL, GA, NC, SC, VA): xeric sands of sandhills, dry pine flatwoods, maritime forests; common, rare in VA. May-August. Se. VA south to s. FL, west to e. LA (Florida parishes). A third variety, var. filiformis (Nash) D.B. Ward, endemic to c. Peninsular FL, is often considered a mere form of var. setacea (see synonymy and references). [= Y; < S. setacea var. setacea – FNA, K, WH, X, Z (including var. filiformis, but not var. lacerata); < S. setacea – RAB, C, S; < S. setacea – S (including var. lacerata but not var. filiformis)]

Vaccaria von Wolf 1781 (Cow-cockle, Cow-herb)


298. AMARANTHACEAE A.L. de Jussieu 1789 (Amaranth Family) [in CARYOPHYLLALES]

A family of about 175 genera and 2250 species, mostly herbs, but including shrubs and trees, nearly cosmopolitan, but most diverse in subtropical and temperate regions (Judd & Ferguson 1999). References: Robertson & Clements in FNA (2003b); Townsend in Kubitzki, Rohwer, & Bittrich (1993); Welsh, Crompton, & Clements in FNA (2003b); Judd & Ferguson (1999)=Z; Kühn in Kubitzki, Rohwer, & Bittrich (1993). [including CHENOPODIACEAE]

{Note: several of the genera below have been treated in very different ways by various authors. Complicating the situation is the pantemperate or pantropical distribution of some species, questions of application of names having priority, and the use of technical characters not readily observed on herbarium specimens. The treatments below of Salicornia, Sarcocornia, Atriplex, and Suaeda may require considerable change prior to publication}

Subfamily Amaranthoideae

Tribe Celosiae: Celosia.

Tribe Amarantheae, subtribe Amaranthinae: Amaranthus.

Tribe Amarantheae, subtribe Aervinae: Achyranthes.

Subfamily Gomphrenoideae

Tribe Gomphrenae, subtribe Froelichiniae: Alternanthera, Froelichia, Guellimenea.

Tribe Gomphrenae, subtribe Gomphreninae: Gomphrena, Irisine.

Former Chenopodiaceae

1 Leaves opposite, reduced to scales a few mm long, clasping and appressed against the succulent stem; flowers in groups of 3, sunken into the stem; [subfamily Salicornioideae, tribe Salicorniae].

2 Annual from a taproot; central flower (of each group of 3) above the 2 lateral flowers............................... Salicornia

2 Perennial from a horizontal rhizome; central flower (of each group of 3) inserted at the same level as the 2 lateral flowers......... Sarcocornia
1 Leaves mostly or entirely alternate (the lower sometimes opposite), not reduced to appressed scales; flowers not usually grouped into groups of 3, not sunken into the stem.

3 Fruit enclosed and concealed by paired accrescent bracteoles (these usually deltoid, diamond-shaped, or ovoid).

4 Leaves pale green to silvery green; stigmas 2; plants without basal leaves, the stems freely and rather divergently branched; [native or introduced, primarily in saline situations]; [subfamily Chenopodioidae, tribe Atripliceae] — Atriplex

4 Leaves bright to dark green; stigmas 4-5; plants with basal leaves, the flowering stems erect, strict or with ascending branches in the inflorescence; [introduced, frequently cultivated as a garden vegetable, rarely escaped]; [subfamily Chenopodioidae, tribe Atripliceae] — Spinacia

3 Fruit enclosed by the persistent calyx.

5 Leaves sessile, linear, entire, succulent or not.

8 Leaves spine-tipped; [subfamily Salsoioideae; tribe Salsoleae] — Salsola

8 Leaves not spine-tipped.

9 Leaves pubescent to villous; [subfamily Chenopodioidae, tribe Camphorosmeae] — Bassia

9 Leaves glabrous; [subfamily Salsoioideae, tribe Suaedae] — Suaeda


1 Inflorescences borne on peduncles 1-7 cm long, these from the leaf axis or terminal

2 Bracts keeled; tepals pilose; leaves not succulent, acute to acuminate at the tip. — A. flavescens

2 Bracts not keeled; tepals glabrous; leaves somewhat succulent, obtuse to rounded at the tip. — A. philoxeroides

1 Inflorescences sessile, in the leaf axil.

3 Tepals dimorphic; tepal hairs barbed.

4 Leaf blades longer than broad; tepals 3-5 mm long, densely villous — A. caracasana

4 Leaf blades as broad as long; tepals 5-7 mm long, sparsely villous — A. pungens

3 Tepals monomorphic; tepal hairs not barbed.

5 Mature fruit exerted between the tepals; spikes globular; stems sericeous. — A. paronychioides

5 Mature fruit included within the tepals; spikes globular; stems glabrous or pubescent in lines (the nodes also pubescent) — A. sessilis

* Alternanthera caracasana Kunth. Cp (FL, GA, NC, SC): disturbed areas; rare, native of South America. Reported for Coastal Plain of SC, and in s. Coastal Plain of GA (Jones & Coile 1988) and for NC (FNA, K) and MD (K). [= A. flavescens repens Linnaeus – S, misapplied]

* Alternanthera flavescens Kunth, Yellow Joyweed. Cp (FL): hammocks, sandbars; rare. Widespread in the FL peninsula, north to ne. FL (Clay County) (Wunderlin & Hansen 2004). [= K; > A. flavescens repens Linnaeus – S; > Alternanthera floridana (Chapman) Small] [add synonymy]
A genus of about 60 species, all annual herbs, of tropical and temperate regions. References: Mosyakin & Robertson in FNA (2003b); Costea & Tardif (2003b) = Y; Henrickson (1999) = Z; Sauer (1955) = X; Costea, Sanders & Waines (2001a, 2001b); in the Southeast from SC, FL, AL, MS, LA, TX (Brown & Marcus 1998) and GA (Jones & Coile 1988). = FNA, GW, K

Amaranthus Linnaeus 1753 (Amaranth, Pigweed)


1 Plants dioecious; [subgenus Acnida].........................Key B
2 Plants monoecious (the pistillate and staminate flowers intermingled, or in separate inflorescences on the same plant); [subgenera Albersia and Amaranthus] .................................................................Key B

Key A – Amaranthus, subgenus Acnida

1 Plants pistillate.
2 Tepals present and well-developed (usually 5 present, at least the outer tepals >2 mm long and with a visible midvein).
3 Tepals 1 or 2, lanceolate to linear; [subgenus Acnida, section Acnida] ...............................................................A. tuberculatus
4 Tepals 5, at least the inner spatulate; [subgenus Acnida, section Sauerauthus].
5 Outermost tepal obtuse or notched (similar to the others), the midvein excurrent slightly or not at all .........................A. arenicola
6 Outermost tepal acute or acuminate (dissimilar to the inner obtuse tepals), the midvein excurrent into a rigid point ..........A. palmeri

2 Tepals lacking, or rudimentary (only often 1-2 present, these <1 (2) mm long and lacking a visible midvein); subgenus Acnida, section Acnida
5 Seeds 2-3 mm long; utricle 2.5-4 mm long .........................A. cannabinus
6 Seeds 0.7-1.2 mm long; utricle 1-2.5 mm long.
7 Utricle with conspicuous and regular longitudinal ridges; bract > 1.5 mm long, with a stout midrib not far excurrent beyond the bract blade ...............................................................A. australis
8 Utricle smooth or irregularly tuberculate; bract < 1.5 mm long, with a slender excurrent midrib
9 Leaf blades narrow, all or nearly all < 1 cm wide .........A. floridanus
10 Leaf blades broader, well-developed leaves 1-3 cm wide ........A. tuberculatus
11 Plants stamine (some identifications following this lead may not be reliable).
8 Outer tepals with prominent midrib, usually longer than the inner tepals; bracts >2 mm long (or 1-2 mm long in A. tuberculatus), mostly with prominent midribs.
9 Outer tepals with apex acute or obtuse; dark midribs not excurrent .................................................................A. arenicola
10 Outer tepals with apex acuminate; midribs excurrent as rigid spines.
11 Bracts ca. 4 mm long, equaling or exceeding the outer tepals .................................................................A. palmeri
12 Leaf blades narrow, all or nearly all < 1 cm wide ........A. floridanus
13 Leaf blades broader, well-developed leaves 1-3 cm wide
14 Outer tepals without prominent midribs, not appreciably longer than the inner tepals; bracts <2 mm long, the midribs usually not prominent (except sometimes in A. australis).
11 Bracts < 1 mm long; midribs scarcely excurrent .................................................................A. cannabinus
12 Bracts > 1 mm long; midribs often conspicuously excurrent.
14 Leaf blades narrow, all or nearly all < 1 cm wide ........A. floridanus
15 Leaf blades broader, well-developed leaves 1-3 cm wide
16 Outer tepals excurrent .................................................................A. tuberculatus
14 Bracts with slender midribs; midribs of outer sepals not excurrent .................................................................A. tuberculatus

Key B – Amaranthus, subgenera Albersia and Amaranthus

1 Inflorescences axillary clusters of glomerules (sometimes leafy terminal spikes also present); [subgenus Albersia].
2 Pistillate flowers usually with 3 tepals; utricles usually regularly dehiscent (indiscent in A. blitum).
3 Utricles indehiscent; leaf blades usually deeply notched at the tip .................................................................A. blitum
4 Utricles dehiscent; leaf blades obtuse, acuminate, or very shallowly notched at the tip.


* Alternanthera philoxeroides* (Martius) Grisebach, Alligator-weed. Cp (FL, GA, NC, SC, VA): floating in mats on the surface of the waters of blackwater rivers, sloughs, ditches, ponds, and in very moist soil of ditches and shores; common, native of tropical America. April-October. This plant is a serious weed of natural areas. [= RAB, C, FNA, K; = *Achyranthes philoxeroides* (Martius) Standley – S]


<table>
<thead>
<tr>
<th>AMARANTHACEAE</th>
<th>668</th>
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<tbody>
<tr>
<td>4</td>
<td>4 Tepals of pistillate flowers acute to short-acuminate at the tip, not reflexed; seeds 0.6-1.0 mm in diameter ..................................................</td>
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<tr>
<td>4</td>
<td>4 Tepals of the pistillate flowers long-aristate at the tip, usually reflexed outward; seeds 1.0-1.4 mm in diameter.</td>
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<tr>
<td>2</td>
<td>2 Inflorescences usually with (4-5) tepals; utricles usually indehiscent or tardily dehiscent (regularly dehiscent in A. blitoides).</td>
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<td>5</td>
<td>5 Inflorescences axes thickened, becoming indurate at maturity ..................................................................................</td>
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<tr>
<td>5</td>
<td>5 Inflorescences axes not thickened, not indurate at maturity.</td>
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<tr>
<td>6</td>
<td>6 Utricles with regular, circumcissile dehiscence.</td>
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<tr>
<td>6</td>
<td>6 Utricles indehiscent (or tardily and irregularly dehiscent).</td>
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<td>7</td>
<td>7 Leaves crisp-erose, conspicuously undulate (non planar) .................................................................................................</td>
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<tr>
<td>7</td>
<td>7 Leaves entire or erose, plane or slightly undulate.</td>
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<td>8</td>
<td>8 Leaves ovate, obovate-rombic; to narrowly ovate or lanceolate; plants not fleshy; [alien of disturbed situations]</td>
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<td>8</td>
<td>8 Leaves orbicular or obovate; plants fleshy; [native of sea-beaches] .........................................................................................</td>
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<tr>
<td>9</td>
<td>9 Utricles indehiscent; tepals of pistillate flowers usually 2-3 (5 in A. spinosus); inflorescence bracts shorter than the tepals.</td>
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<td>10</td>
<td>10 Stems with paired nodal spines; tepals of pistillate flowers 5; [subgenus Amaranthus] ...........................................................................</td>
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<tr>
<td>10</td>
<td>10 Stems lacking spines; tepals of pistillate flowers 2-3; [subgenus Albersia].</td>
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<tr>
<td>11</td>
<td>11 Utricles distinctly rugose, equaling or slightly exceeding the tepals; terminal inflorescences usually thin and interrupted........</td>
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<tr>
<td>11</td>
<td>11 Utricles smooth to faintly rugose (occasionally wrinkled or rugose in dried material), distinctly exceeding the tepals; terminal inflorescences usually thick and dense (or thin and interrupted in some forms of A. blitum).</td>
</tr>
<tr>
<td>12</td>
<td>12 Utricles subglobose to obovate, compressed; seeds filling the fruit almost completely; leaf blades usually deeply notched at the tip; annual ..................................................</td>
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<tr>
<td>12</td>
<td>12 Utricles ellipsoid, slightly to distinctly inflated; seeds filling only the proximal portions of the fruit; leaf blades shallowly notched at the tip; short-lived perennials, or annuals ..................................................</td>
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<td>13</td>
<td>13 Fully developed inflorescences large and robust, usually brightly colored (red, purple, occasionally white or yellow, rarely green); bracts usually not exceeding the style branches at maturity (occasionally longer than the style branches in A. hypochondriacus); seeds white, ivory, red, brown, or black; [cultivated, only weakly naturalized].</td>
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<tr>
<td>14</td>
<td>14 Inflorescences stiff, erect.</td>
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<td>14</td>
<td>14 Inflorescences lax, erect to drooping.</td>
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<td>15</td>
<td>15 Tepals of pistillate flowers of at least the inner tepals of the pistillate flowers obovate or spatulate, the tip obtuse to slightly notched; style branches spreading or reflexed ..........................................................</td>
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<tr>
<td>15</td>
<td>15 Tepals of pistillate flowers oblong to lanceolate, the tip acute; style branches erect or slightly reflexed.</td>
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<tr>
<td>16</td>
<td>16 Fully developed inflorescences moderately large, usually green (rarely with some whitish or reddish coloration); bracts exceeding the style branches and tepals; seeds brown or black; [wild and weedy.</td>
</tr>
<tr>
<td>16</td>
<td>16 Tepals of pistillate flowers obtuse, rounded, or slightly notched at the tip; plants rather densely pubescent.</td>
</tr>
<tr>
<td>17</td>
<td>17 Tepals of pistillate flowers acute, acuminate, or aristate at the tip; plants slightly pubescent when young, becoming glabrous or nearly so.</td>
</tr>
<tr>
<td>17</td>
<td>17 Bracts 2-4 mm long; inflorescences usually soft and lax, with spreading branches .................................................................</td>
</tr>
<tr>
<td>17</td>
<td>17 Bracts 4-7 mm long; inflorescences usually stiff, with erect branches ..............................................................................</td>
</tr>
</tbody>
</table>


* A. australis (A. Gray) J.D. Sauer, Southern Water-hemp, Careless. Cp (FL, GA, NC), Mt* (VA*): tidal marshes, ditches, disturbed areas; uncommon. E. NC, TN, AR, and TX south into West Indies, Mexico, and n. South America; perhaps adventive in most of our range, from an original distribution on the Gulf Coast, in FL, and southward into the New World tropics. *This annual is alleged to get as large as 9 m tall and 30 cm diameter at the base of the stem!* [= FNA, GW, K, WH, X; = Acnida cuspidata Bertero ex Sprengel – S; = Acnida alabamensis Standley – S]


**Amaranthus cannabinus** (Linnaeus) J.D. Sauer, Salt-marsh Water-hemp. Cp (DE, FL, GA, NC, SC, VA): salt, brackish, and freshwater tidal marshes, also along the banks of tidal guts; common (rare in FL). July-December. ME south to ne. FL; AL? Extremely variable in size, flowering and fruiting at heights ranging from 3 dm to 4 m tall. The stem can reach 10 cm in diameter at the base. [= RAB, C, FNA, GW, K, WH, X; = A. cannabinus Linnaeus – F, G, S]

**Amaranthus caudatus** Linnaeus, Love-lies-bleeding. Cp (DE), Pd (DE): disturbed areas; rare, native of India. Cultivated and rarely escaped or persistent, as in TN (Chester, Wofford, & Kral 1997), and scattered in PA (Rhoads & Klein 1993). [= FNA, C, F, G, K, Y]

**Amaranthus crispus** (Lespinasse & Thévenau) A. Braun, Crisp-leaved Amaranth. Cp (NC): disturbed areas, especially around seaports; rare, native of South America. Reported for VA by Massey (1961), but no documentation is known. [= FNA, C, F, G, K, S]

**Amaranthus cruentus** Linnaeus, Red Amaranth, Blood Amaranth, Purple Amaranth. Mt (VA, WV), [NC, SC]: disturbed areas, old gardens; rare, native of Central America. [= RAB, C, F, FNA, K; S, WV, Y]


**Amaranthus hypochondriacus** Linnaeus, Prince's-feather. (VA): Type locality is "Virginia". Possibly of hybrid origin, from *A. cruentus × powelli*. [= FNA, C, K, S]


**Amaranthus powelli** S. Watson, Green Amaranth, Powell's Amaranth. Mt (VA, WV), [GA, NC, SC, VA]: disturbed areas; rare. Widespread and common in PA (Rhoads & Klein 1993). Many earlier reports of *A. retroflexus* may actually pertain to this species. [= FNA, C, F, G, K; =* A. retroflexus* Linnaeus var. powelli (S. Watson) Boivin; =* A. powelli ssp. powelli* – Y]

**Amaranthus pumilus** Rafinesque, Seabeach Amaranth, Dwarf Amaranth. Cp (DE, NC, SC, VA): sea beaches, fore-dunes, island end flats, rarely on sound-side beaches; rare. Se. MA south to c. SC; presently known to be extant only from NC, n. SC, e. MD, DE (McAvoy 2002), se. NY (Long Island), VA, and NJ. Seeds of this plant require cold stratification, high temperatures, and light to germinate (Baskin & Baskin 1998); this is apparently responsible for the late seasonality of the species (germination in late spring and early summer) and its seed-banking. See Hancock & Hosier (2003) for discussion of the ecology of this interesting species. [= RAB, C, F, FNA, G, K, WH, X]


**Amaranthus viridis** Linnaeus, Slender Amaranth, Tropical Green Amaranth. Cp (FL, VA), Mt (VA), [GA, NC, SC]; disturbed areas; rare, native of South America. [= RAB, C, F, FNA, G, K, WH, Y; =* Amaranthus gracilis* Desfontaines – S]

**Amaranthus thunbergii** Moquin-Tandon, Thunberg's Amaranth. Native of Africa. Collected from near wool-combing mills in SC; probably not naturalized. [= FNA, K]

**Atriplex Linnaeus 1753 (Orach)**


Identification notes: There are a number of idiosyncratic characters that are used for the identification of the species of *Atriplex*. Many important characters are associated with the mature fruits. The fruit is closely invested by 2 arenariae, which are variously shaped and ornamented. Mature seeds are dimorphic in most of our species, with large, brown seeds and small, black seeds. The radicle of the seeds is variously apical, lateral, or basal (which can be seen by observing the seed through the clarified bracteoles or with strong transmitted light).

1 Leaves white to gray, densely and finely scurfy, especially adaxially.
2 Seeds dimorphic, black and brown; branches not angled; [introduced, of disturbed situations]; [subgenus *Atriplex*, section *Semibaccata*]...
3 Seeds monomorphic, brown; branches obtusely angled; [native, of coastal saline situations]; [subgenus *Obione*, section *Obione*, subsection *Arenariae*].
3 Fruit bracteoles (3.5-) 4.5-7 mm long, 3.5-5.6 mm wide, longer than broad; faces with or without appendages.............. *A. muconata*
3 Fruit bracteoles 2.5-4.5 mm long, 2.6-5 mm wide, as wide as or wider than long; faces with appendages ..................... *A. pentandra*

1 Leaves usually green on both surfaces, glabrous or only sparingly powdery or scurfy; [subgenus *Atriplex*, section *Teutiolpis*].
Atriplex dioica Rafinesque. Cp (NC, VA?), Mt (VA): brackish flats; rare? July-frost. NL (Newfoundland) west to AK, south to NC and CA. [= FNA; Atriplex subspicata (Nuttall) Rydberg – K, Y; < A. littoralis Linnaeus – C, misapplied; < A. patula Linnaeus var. littoralis (Linnaeus) A. Gray – F, misapplied]

Atriplex mucronata Rafinesque, Seabeach Orach. Cp (DE, FL, NC, VA): ocean beaches, island-end flats; uncommon. July-frost. NH south to FL west to TX. This species and A. pentandra are closely related, and have been variously treated as species, subspecies, varieties, and forms. [= FNA; < A. arenaria Nuttall – RAB, C, G, GW, S, Y (also see A. patula); < A. cristata Humboldt and Bonpland ex Willenow – K (also see A. patula); < A. pentandra ssp. arenaria H.M. Hall & Clements] * Atriplex patula Linnaeus, Spear Orach. Pd (VA), Mt (VA, WV): disturbed areas, inland saline areas; rare, native of Eurasia. July-frost. [* = C, FNA, K, S, Y; < A. patula Linnaeus – RAB, W (also see A. prostrata); = A. patula var. patula – F, G] * Atriplex pentandra (Jacquim) Standley in N.L. Britton et al., Seabeach Orach. Cp (FL, GA, NC, SC): ocean beaches, island-end flats; uncommon. July-frost. NC to FL, west to TX; West Indies; South America. This species and A. mucronata are closely related, and have been variously treated as species, subspecies, varieties, and forms. [= FNA; < A. arenaria Nuttall – RAB, C, G, GW, S, Y (also see A. mucronata); < A. cristata Humboldt and Bonpland ex Willenow – K (also see A. mucronata); = A. pentandra ssp. pentandra] * Atriplex prostrata Bouche ex A.P. de Candolle, Thinleaf Orach, Fat-hen. Cp (DE, NC, SC, VA), Mt (VA?, WV): marsh edges, brackish flats; uncommon (rare in WV). July-frost. Widespread in e. North America, also in w. North America and Eurasia, usually considered to be native of Eurasia. [Is Saltville VA occurrence of Atriplex this taxon?] [* = FNA, K, Y; < A. hastata Linnaeus – C, S, misapplied; < A. patula Linnaeus – RAB, W, in part; < A. patula var. hastata (Linnaeus) A. Gray – F, G, GW]

Atriplex acadiensis . Saltville VA.

Bassia Allioni 1766 (Bassia)


1 Calyx segments (1 lower and 2 upper) bearing stout knobs ............................................................................................................... B. hirsuta
1 Calyx segments (all 5) bearing a horizontal wing ........................................................................................................................................ B. scoparia


Beta Linnaeus 1753 (Beet)


1 Seeds arranged vertically or both horizontally and vertically in the fruit; leaf blades glabrous or occasionally sparsely farinose; [subgenus Blitum].
2 Perianth segments 5; plants perennial; [subgenus Blitum, section Agathophyllum].............................................................. [C. bonus-henricus]
2 Perianth segments 3; plants annual.
3 Leaves lanceolate or oblanceolate, glaucous on the lower surface ...............................................................[C. glaucum]
3 Leaves triangular or rhombic, green on the lower surface.
4 Leaves farinose on the lower surface; [subgenus Blitum, section Degenia].................................................................[C. macrosporum]
4 Leaves glabrous on the lower surface.
5 Glomerules 3-10 mm in diameter, borne sessile on unbranched terminal and occasionally axillary spikes; perianth segments fleshy and red at maturity; [subgenus Blitum, section Blitum].................................................................[C. capitatum var. capitatum]
5 Glomerules 2-5 mm in diameter, borne sessile on lateral branched spikes; perianth segments membranaceous, green at maturity; [subgenus Blitum, section Pseudoblitum].................................................................[C. rubrum]

Chenopodium Linnaeus 1753 (Goosefoot, Lamb's-quarters, Pigweed)


1 Seeds arranged horizontally in the fruit; leaf blades usually farinose; [subgenus Chenopodium].
6 Flowers individually dispersed in panicles; leaf blades glabrous; [subgenus Chenopodium, section Grossefaveata]..........................[C. simplex]
6 Flowers in loose or dense glomerules; leaf blades usually farinose; [subgenus Chenopodium, section Chenopodium].
7 Primary leaves linear, linear-lanceolate, at least 2-3× as long as wide, usually untoothed and unlobed (but often with 2 basal lobes in C. foggii); [subsection Leptophylla].
8 Leaves 2-3× as long as wide...............................................................[C. atrovirens]
8 Leaves > 3× as long as wide.
9 Perianth spreading from fruit at maturity; plants strictly erect...............................................................[C. pratericola]
9 Perianth enclosing the fruit at maturity; plants erect to spreading.
10 Plants usually spreading; perianth segments obtuse; leaf blades usually unlobed ...............................................................[C. desiccatum]
10 Plants erect; perianth segments acute; leaf blades often with basal lobes ...............................................................[C. foggii]
7 Primary leaves ovate, rhombic, triangular, or lanceolate, usually with basal lobes and often also with additional teeth on the margins.
11 Seeds honeycomb-pitted; [subsection Favosa].
12 Seeds 1.2-2.0 mm in diameter.
13 Style bases with yellow area; seeds 1.2-1.5 mm in diameter ...............................................................[C. berlandieri var. zschackei]
13 Style bases without yellow area; seeds 1.3-2.0 mm in diameter.
14 Inflorescences large and drooping; seeds 1.7-2.0 mm in diameter ...............................................................[C. berlandieri var. bushianum]
14 Inflorescences small and erect; seeds 1.3-1.9 mm in diameter ...............................................................[C. berlandieri var. macrocalyx]
12 Seeds 1.0-1.3 mm in diameter.
15 Leaves rhombic-triangular, usually without basal lobes; inflorescences becoming bractless ........[C. berlandieri var. boscianum]
15 Leaves 3-lobed; inflorescences with or without bracts.
16 Inflorescences bracteolate .................................................................................................................................[C. berlandieri var. berlandieri]
16 Inflorescences with leafy bracts .................................................................................................................................[C. berlandieri var. zschackei]
11 Seeds smooth or areolate.
17 Leaves triangular.
Chenopodium album
Linnaeus, Lamb's-quarters, Pigweed. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed soils, gardens; common. June-October. As broadly interpreted, this species includes both native and alien races and is now distributed nearly worldwide. [= FNA, W; < C. album – RAB, in part (also including C. berlandieri and all vars); > C. album Linnaeus var. album – K; > C. album Linnaeus var. missouriense (Aellen) I.J. Bassett & C.W. Crompton – K; > C. album – C; < C. album – G; > C. missouriense Aellen – C, Y; > C. paganum – F, S, misapplied; < C. album – FNA, G; > C. album var. album – Y; > C. album var. lanceolatum (Muhlenberg ex Wildened) Goss. & Germ. – Y; > C. giganteum Don – Y; > C. lanceolatum Muhlenberg ex Wildened] * C. album

Chenopodium berlandieri
Moquin-Tandon var. boscianum (Moquin-Tandon) H.A. Wahl. Cp (GA, NC, SC, VA): beaches, marshes; uncommon. August-September. FL west to e. TX; with scattered occurrences further north (these of unknown nativity). [= FNA, K, Y; < C. album – RAB]

Chenopodium berlandieri
Moquin-Tandon var. bushianum (Aellen) Cronquist, Soybean Goosefoot. Cp (NC, SC, VA), Mt (WV): disturbed areas, alluvial forests; rare. June-November. ME west to ND, south to VA, TN, LA, and KS. [= C, FNA, K; < C. album – RAB, G; < C. berlandieri – S; = C. bushianum Aellen – Y]

Chenopodium berlandieri

Chenopodium berlandieri

Chenopodium foggii
H.A. Wahl. Mt (NC, VA): rocky, mountain slopes; rare. July. ME and ON south to w. VA and w. NC. [= FNA, K, Y; < C. pratericola Rydberg – C]

Chenopodium fremontii
S. Watson. Cp (SC): waste areas near wool-combing mills; rare, perhaps merely a waif, native of w. North America. [= FNA; < C. fremontii var. fremontii – K, Y] [not yet keyed]

Chenopodium glaucum
Linnaeus, Okkleaf Goosefoot. Pd (DE, VA), Mt (WV), SC: disturbed areas; rare, native of ne. North America and Europe. [= FNA, K; < C. glaucum – C, F, G, WV; = C. glaucum var. glaucum – Y]

Chenopodium incanum
(S. Watson) Heller var. incanum. Cp (SC): waste areas near wool-combing mills; rare, perhaps merely a waif, native of w. North America. [= FNA, K; < C. incanum – Y] [not yet keyed]

Chenopodium macroperpus

Chenopodium mirale

Chenopodium opulifolium

Chenopodium pratericola
Rydberg, Narrowleaf Goosefoot. Cp (GA, NC, SC, VA), Mt (WV): sandy soils, roadsides, disturbed areas; uncommon. May-November. Maine and ON west to YT, south to FL, TX, and CA. [= FNA, K; = C. desiccatum A. Nelson var. leptophylloides (J. Murray) H.A. Wahl – RAB, W, misapplied; < C. pratericola – C (also see C. foggii); ? C. leptophyllum – F, G, misapplied; = C. pratericola var. pratericola – Y]

Chenopodium simplex
(Torrey) Rafinesque, Mapleleaf Goosefoot. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE): in shaded situations, generally at cliff bases; common (uncommon in WV, rare in NC and VA). July-October. NS west to AK, south to nw. NC, LA, TX, and UT. [= FNA, K; = C. giganteospermum Aellen – C, W, Y; = C. hybridus Linnaeus var. giganteospermum (Aellen) Aellen] [not yet keyed]

Chenopodium standleyanum
Aellen, Woodland Goosefoot. Mt (VA, WV), Pd (VA), Cp (VA), [GA, NC, SC]: rock outcrops, steep slopes, shaded disturbed soils; uncommon (rare in WV). QC west to ND, south to FL and e. TX. [= RAB, C, FNA, G, K, W; < C. boscianum – F, S, misapplied]

Chenopodium urbicum
Linnaeus, City Goosefoot. Mt (WV), Pd (DE): disturbed areas; rare, native of Eurasia. Introduction in waste ground south to MD, s. PA (Rhoads & Klein 1993), WV, KY, and TN (Kartesz 1999, FNA 2003b). [= C, FNA, K, Y]

AMARANTHACEAE

18 Seeds 1.0-1.5 mm in diameter, the seed margin sharp; leaf blades without basal lobes; [subsection Undata] .............. C. murale
18 Seeds 0.8-1.2 mm in diameter, the seed margin rounded; leaf blades often with basal lobes; [subsection Urbica] ...... C. urbicum
17 Leaves ovate to broadly ovate, rhombic, or lanceolate, variously lobed or toothed.
19 Leaf blades without teeth, except for the often present basal lobes or teeth.
20 Leaves not aromatic; flowers in each glomerule in markedly different stages of development; [subsection Standleyanum] .............. C. standleyanum
20 Leaves strongly malodorous; flowers in each glomerule in similar stages of development; [subsection Chenopodium] .............. C. vulvaria
19 Leaf blades with lateral teeth and often basal lobes; [subsection Chenopodium].
21 Leaves widely ovate, 1× as long as wide; lateral leaf lobes as large as the terminal lobe................................. C. opulifolium
21 Leaves ovate, rhombic, or lanceolate, > 1× as long as wide; lateral leaf lobes smaller than the terminal lobe (or absent).
22 Leaf margins tapering to an acute apex; leaves ovate, rhombic, or lanceolate; inflorescence branched (spicate or cymose).
22 Leaf margins more or less parallel below the obtuse apex; leaves lanceolate or narrowly elliptic; inflorescence generally moniliform, not profusely branched .......................................................... C. strictum
**Chenopodium vulvaria** Linnaeus, Stinking Goosefoot. Pd (DE); disturbed areas; rare, native of Eurasia. Introduced at scattered locations in eastern North America, as in MD, PA, DE, FL (FNA 2003b). [= C, FNA, K, Y]


*Chenopodium bonus-henricus* Linnaeus, Good King Henry, is cultivated and is known from as far south as MD and PA. [= FNA, C, K, Y]

*Chenopodium capitatum* (Linnaeus) Ascherson var. capitatum, Indian-paint, Strawberry-blithe, a native, occurs south to scattered locations in PA (Rhoads & Klein 1993). [= FNA; Y; < C. capitatum – C; = C. capitatum – K, in a narrow sense; *Blitum capitatum* Linnaeus]

*Chenopodium desciscatum* A. Nelson. (SC?, VA?). (VA Watch List). [Resolve against *C. pratericola*]. [= FNA; = *C. pratericola* var. oblongifolium (S. Watson) H.A. Wahl – Y]

*Chenopodium rubrum* Linnaeus, Red Goosefoot, alien, reported as far south as MD and in other widely scattered sites (such as AL) (Kartesz 1999) and PA (FNA). [= C, K; > C. rubrum var. rubrum – FNA, Y]

*Chenopodium strictum* Roth. Scattered locations south to se. PA. Reported for SC (Kartesz 1999). [= FNA; = *Chenopodium album* Linnaeus var. strictum (Kraanal) comb. nov. ined. – K; > *Chenopodium strictum* ssp. glaucophyllum (Aellen) Aellen & Just.; > *Chenopodium strictum* Roth var. glaucophyllum (Aellen) H.A. Wahl – Y]

**Cycloloma** Moquin 1840 (Winged-pigweed)


**Dysphania** R. Brown 1810

A genus of about 32 species, annual and perennial herbs, nearly cosmopolitan, mostly in the tropics, subtropics, and warm temperate areas. References: Clemants & Mosyakin in FNA (2003b); Wahl (1954)=Y.

1 Leaves deeply pinnately lobed, the lobes linear; plant perennial; mature calyx shallowly toothed, obovoid-urceolate, reticulate-veiny; [section *Adenois*] ............................. *D. multifida*

2 Leaves serrate to sinuate-pinnatifid, the lobes broad-based and triangular-tapered; plant annual; mature calyx deeply lobed, neither reticulate nor prominently veined.

2 Flowers in a slender thyrsoid inflorescence of lateral cymes; [section *Botryoides*].......................................................... *D. botrys*

3 Flowers in dense glomerules arranged in spikes and panicles.

3 Leaf blades 0.5-2.7 cm long; seeds horizontal; stems 3-15 dm tall; [section *Adenois*].

4 Inflorescences flosiform throughout ................................................................................................................................. *D. ambrosioides*

5 Perianth segments keeled and crested ........................................................................................................................................

5 Perianth segments rounded ..........................................................................................................................................................

5 Perianth segments rounded ..........................................................................................................................................................

673

**Dysphania ambrosioides** (Linnaeus) Mosyakin & Clemants, Mexican-tea, Epazote. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed habitats; common, probably native southward. Widespread in North America to South America, the original range unclear. [= FNA; < *Chenopodium ambrosioides* – RAB, C, G, W, Y (also see *Dysphania anthelmintica*); = *C. ambrosioides* var. ambrosioides – F; < *C. ambrosioides* var. ambrosioides – K (also see *Dysphania anthelmintica*); < *Ambrina ambrosioides* (Linnaeus) Spach – S (also see *D. anthelmintica*); < *Teloxys ambrosioides* (Linnaeus) W.A. Weber] **Dysphania anthelmintica** (Linnaeus) Mosyakin & Clemants, Wormseed, Epazote. Cp (GA, NC, SC, VA): dunes; common. NY south to FL, west to TX; Mexico, West Indies, Bermuda, Central America; scattered inland in North America probably as an introduction. [= FNA; < *C. ambrosioides* – RAB, C, G, W, Y; = *C. ambrosioides* var. anthelminticum (Linnaeus) A. Gray – F; < *C. ambrosioides* var. ambrosioides – K; < *Ambrina ambrosioides* (Linnaeus) Spach – S].


**Froelichia** Moench 1794 (Cottonweed, Snake-cotton)
AMARANTHACEAE


1 Calyx conical in fruit, ca. 3-4 mm long; plant 2-7 dm tall, branching from the base ......................................................... F. gracilis
2 Calyx flask-shaped in fruit, ca. 5 mm long; plant 3-20 dm tall, not branching from the base
2 Hairs of the peduncles mostly 1-2 mm long; plants typically 10-20 dm tall; [of the Southeastern Coastal Plain] .......... F. floridana


Froelichia floridana (Nuttall) Moquin-Tandon, Florida Cottonseed, Common Cottonweed. Cp (DE*, FL, GA, NC, SC): sandhills, sandy fields, sandy roadsides; common (rare in NC, uncommon in DE). June-October. S. NC south to FL, and west to LA, north in the interior to w. TN; disjunct (probably introduced) in DE and e. MD. F. campestris Small is more midwestern, ranging from OH, IN, WI, and SD south to KY, AR, and TX; it is sometimes treated as a variety of F. floridana, but seems amply distinct in morphology, and with an allopatric distribution. [= RAB, S; = F. floridana var. floridana – C, F, G, K, Z; < F. floridana – FNA, WH]


Gomphrena Linnaeus 1753 (Globe-amaranth)


1 Heads 20-28 mm in diameter; stems erect .............................................................. G. globosa
1 Heads 8-16 mm in diameter; stems prostrate or decumbent ......................................... G. serrata

* Gomphrena globosa Linnaeus, Globe-amaranth. Cp (SC) {VA?): disturbed areas; rare, native of s. Asia. Introduced and known from scattered locations in s. PA (Rhoads & Klein 1993). Also reported for VA (Kartesz 1999) and MD (Reed1961b). [= FNA, C, F, G, K]


Guilleminea Kunth 1823


Iresine P. Browne 1856 (Bloodleaf)


1 Plant an annual to weak perennial, 4-30 dm tall, with fibrous roots; tepals 0.6-0.8 mm long, the tips obtuse to rounded .......... I. diffusa
1 Plant a perennial, 3-10 dm tall, with stolons; tepals 1.0-1.3 mm long, the tips acute to acuminate ............................................. I. rhizomatosa

* Iresine diffusa Humboldt & Bonpland ex Willdenow, Judas-bush. Cp (FL): hammocks, disturbed areas; rare. Reported for NC by Small (1933), so far as is known in error. Ne. FL, Panhandle FL, south to s. FL. [= FNA, K, WH; < Iresine celosia Linnaeus – S]

* Iresine rhizomatosa Standley. Cp (FL, GA, NC, SC, VA), Pd (VA): moist interdune thickets, hammocks, edges of maritime forests, moist thickets inland, floodplain forests, bluff forests of the Coastal Plain; rare. August-October. MD south to FL, west to se. TX; also inland from KY and TN west and south to KS and n. TX. [= RAB, C, F, FNA, G, K, S, WH]

Salicornia Linnaeus 1753 (Glasswort)

A genus of about 10-20 species, succulent herbs, of cosmopolitan distribution. References: Judd & Ferguson (1999)=Z; Ball in FNA (2003b); Kadereit et al. (2007); Kühn in Kubitzki, Rohwer, & Bittrich (1993). [also see Sarcocornia]
AMARANTHACEAE

Salicornia bigelovii Torrey, Dwarf Glasswort, Dwarf Saltwort. Cp (DE, GA, NC, SC, VA): salt pannes in coastal marshes; common (rare in DE). July-October. ME (NS?) south to FL; west to TX; also West Indies; also CA. [= RAB, C, F, FNA, G, GW, K, S, Z]

Salicornia virginica Linnaeus, Samphire. Cp (DE, GA, NC, SC, VA), Mt (VA): salt pannes in coastal marshes; common. July-October. NS and QC south to FL. It is unclear whether our eastern North American plants are distinct from European plants of the S. europaea complex. Recent European workers recognize multiple species in the S. europaea complex. S. europaea (in the narrow sense) is a diploid species; our plants are apparently all tetraploid and may or may not be conspecific with one of the European tetraploid entities in this complex. Until further studies are completed, it seems best to recognize our plants as distinct. The oldest name available for the American plants is Salicornia virginica Linnaeus, which has unfortunately been generally misapplied to the perennial glasswort, Sarcocornia perennis. [= K; = Salicornia depressa Standley in N.L. Britton et al. – FNA; < Salicornia europaea Linnaus – RAB, C, G, GW, S, W, Z, misapplied; >: Sarcocornia europaea var. europaea – F]

Salicornia maritima Wolff & Jefferies, Sea Saltwort, supposedly occurs south to MD (Kartesz (1999); FNA (2003b) does not map it south of the Canadian Maritimes. [= FNA, K] (not keyed; synonymy incomplete)

Salsola Linnaeus 1753 (Saltwort, Russian-thistle)


1 Leaf blades not fleshy in fresh material, narrowly linear to filiform, < 1 mm wide in herbarium material; leaves with a weak apical spine .............................................................. S. bigelovii

1 Leaf blades fleshy in fresh material, linear, 1-2 mm wide in dried specimens; leaves with a strong apical spine.

2 Perianth segments with a weak non-spiny apex and obscure midvein; bracteoles connate at base, swollen ............................................. S. perennis

2 Perianth segments with a subspineose apex and prominent midvein; bracteoles distinct, not swollen ..................................................... S. kali


Sarcocornia A.J. Scott 1978 (Woody Glasswort)


Spinacia Linnaeus 1753 (Spinach)

AMARANTHACEAE


Suaeda Forsskål ex Scopoli 1777 (Sea-blite)


1 Calyx segments keeled on the back; flowers in 1-3-flowered glomerules, these aggregated in a dense panicule; seeds dimorphic, black seeds shiny, 1-1.8 mm in diameter, brown seeds dull, 1.5-2.6 mm in diameter.............................................................. S. linearis
1 Calyx segments rounded or obscurely keeled on the back; flowers in axillary glomerules of 1-3 (-4) flowers; seeds monomorphic, reddish brown or black, 1-2.2 mm in diameter..............................................................S. maritima

Suaeda linearis (Elliott) Moquin, Southern Sea-blite. Cp (DE, FL, GA, NC, SC, VA), Mt* (WV*): island-end flats, marsh edges, brackish flats, rarely adventive in inland disturbed areas; uncommon (rare in WV). August-frost. ME south to FL, west to TX; West Indies. [= C, F, FNA, G, GW, K, WH, Y, Z; = Dondia linearis (Elliott) Heller – S]

*? Suaeda maritima (Linnaeus) Dumortier, White Sea-blite. Cp (DE, VA): salt marsh edges and disturbed saline habitats; common (uncommon in DE), possibly native, introduced, or a combination. Usually considered (as by C, GW, S) to be naturalized from Eurasia, but Ferren & Schenk (2003b) consider S. maritima in North America to include native and naturalized components. [= C, F, FNA, G, GW, K, WH, Y, Z; > S. maritima ssp. maritima – K; = Dondia maritima (Linnaeus) Druce – S]

304. AIZOACEAE Rudolph 1830 (Fig-marigold Family) [in CARYOPHYLLALES]

A family of about 128 genera and about 1850-2500 species, mostly succulent herbs and subshrubs, of tropical and subtropical regions, especially in s. Africa and Australia. References: Boetsch (2002); Vivrette, Bleck, & Ferren in FNA (2003b); Hartmann in Kubitzki, Rohwer, & Bittrich (1993). [also see MOLLUGINACEAE]

1 Leaves opposite, connate-perfoliate around the stem, triangular in cross-section; fruit a fleshy, indehiscent berry; [subfamily Ruschioideae] ...
1 Leaves opposite or alternate, sessile or short-petiolate, flattened in cross-section (though often succulent-thickened); fruit either a dry, indehiscent nut or a capsule.

2 Leaves linear, lanceolate, or oblanceolate, the blade > 3× as long as wide; [subfamily Sesuvioideae]................................................................. Sesuvium
2 Leaves orbicular, obovate, or triangular-ovate, the blade < 2.5× as long as wide.
3 Leaves opposite to subopposite; fruit a circumcissile capsule; [subfamily Sesuvioideae]................................................................. Trianthema
3 Leaves alternate; fruit either a loculicidal capsule or an indehiscent nut.

4 Fruit a loculicidal capsule; ovary superior; stems densely covered with white scales; [subfamily Aizioideae]................................. Galenia
4 Fruit an indehiscent nut; ovary inferior; stems green; [subfamily Tetragonioidae]................................................................. Tetragonia

Carpobrotus N.E. Brown 1925 (Fig-marigold)


* Carpobrotus edulis (Linnaeus) N.E. Brown, Hottentot-fig. Cp (FL): dunes, disturbed sandy sites; rare, native of s. Africa. [= FNA, WH]

Galenia Linnaeus 1753


* Galenia secunda (Linnaeus f.) Sonder. Cp (FL): disturbed areas; rare, native of s. Africa. [= FNA, S, WH]

Sesuvium Linnaeus 1759 (Sea-purslane)


1 Flowers and fruits on pedicels (3-) 5-20 mm long................................................................. S. portulacastrum
1 Flowers and fruits sessile (or on pedicels to 1 mm long).
2 Stamens numerous, in fascicles; leaves 3-6 cm long, 10-20× as long as wide; [rare waif]................................................................. S. crithmoides
2 Stamens 5, distinct; leaves 1-3.5 cm long, 3-10× as long as wide; [native]................................................................. S. maritimum


*Sesuvium portulacastrum* (Linnaeus) Linnaeus, Large Sea-purslane, Shoreline Sea-purslane. Cp (FL, GA, NC, SC): island end flats and sea beaches; uncommon (rare in NC). May-December. A pantropical coastal species, in North America from e. NC south to s. FL, west to e. TX; also in the West Indies and south into the tropics (introduced on ballast in se. PA). [= RAB, FNA, GW, K, S, WH, Z]

**Tetragonia** Linnaeus 1753 (New Zealand Spinach)


**Trianthema** Linnaeus 1753 (Horse-purslane)


**305a. PHYTOLACCACEAE** R. Brown 1818 (Pokeweed Family) [in CARYOPHYLLALES]

A family of about 18 genera and 70 species, herbs, shrubs, vines, and trees, of tropical and warm temperate regions, especially America. References: Nienaber & Thieret in FNA (2003b); Rohwer in Kubitzki, Rohwer, & Bittrich (1993). [also see PETIVERIACEAE]

**Phytolacca** Linnaeus 1753 (Pokeweed)


1 Fruiting pedicels (6-) 7-12 (-15) mm long; raceme (not including the peduncle) 10-20 (-25) cm long, divergent or drooping in flower and fruit (or erect in flower); [widespread in our area] ...................................................................................................................................... *P. americana*

1 Fruiting pedicels (2-) 4-6 (-7) mm long; raceme (not including the peduncle) (3-) 6-9 (-13) cm long, erect (rarely divergent) in flower and fruit; [restricted in our area to maritime habitats] .................................................................................................................. *P. rigida*

**Phytolacca americana** Linnaeus, Common Pokeweed. In a wide variety of natural and disturbed habitats, usually associated with exposed mineral soil. May-frost. An abundant "native weed" occurring throughout e. North America, *P. americana* is widely dispersed by birds and quickly colonizes exposed mineral soil even in undisturbed forests, such as on tree-fall tip-up mounds or flood scars. It is most abundant, as a weed of urban, suburban, and agricultural disturbances. The berries and mature stems are poisonous; the young stems have been used as a potherb and the purple berries as a source of ink. [= C, F, G, S, W, WV, X, Y; < *P. americana* – RAB, GW, WH (also see *P. rigida*); = *P. americana* var. americana – FNA, K, Z]

**Phytolacca rigida** Small, Maritime Pokeweed. Dune slacks, dune slopes, edges of tidal marshes, disturbed areas on barrier islands, xeric sandhills near the coast. May-frost. DE (reportedly), se. VA south to FL and west to TX in the Southeastern Coastal Plain. In the northern parts of our area, in NC and VA, *P. rigida* is rather rare, limited to the vicinity of the coast, and less weedy than *P. americana*. Caulkins and Wyatt (1990) reduce *P. rigida* to a variety of *P. americana*, but it seems distinct at the species level. [= S, X, Y; < *P. americana* – RAB, GW, WH; = *P. americana* var. rigida (Small) Caulkins & Wyatt – FNA, K, Z]

**305b. PETIVERIACEAE** C. Agardh 1824 (Petiveria Family) [in CARYOPHYLLALES]

A family of about 9 genera and 13 species, herbs, vines, and trees, of tropical areas. Sometimes included in the Phytolaccaceae.
**PETIVERIACEAE**

_**Rivina** Linnaeus 1753 (Rouge-plant)_

A monotypic genus, an herb, of the American tropics.


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**307. NYCTAGINACEAE** A.L. de Jussieu 1789 (Four-o'clock Family) [in CARYOPHYLLALES]

A family of about 31 genera and 400 species, trees, shrubs, vines, and herbs, of tropical, subtropical, and (less commonly) warm temperate regions, especially diverse in the New World. Both our genera are in tribe Nyctagineae (Douglas & Spellenberg 2010). References: Bogle (1974)=Z; Spellenberg in FNA (2003b); Bittrich & Kühn in Kubitzki, Rohwer, & Bittrich (1993).

1 Flowers < 3 mm long, lacking involucral bracts subtending the petaloid calyx ................................................................. _Boerhavia_

1 Flowers > 10 mm long, with involucral bracts (simulating a calyx) subtending the petaloid calyx ........................................... _Mirabilis_

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**Boerhavia** Linnaeus 1753 (Spiderling)

A genus of about 20-40 species, annual and perennial herbs, of tropical, subtropical, and warm temperate regions of the Old and New World. References: Spellenberg in FNA (2003b); Bogle (1974)=Z; Bittrich & Kühn in Kubitzki, Rohwer, & Bittrich (1993). Key based on Spellenberg in FNA.

1 Fruit truncate at the apex, glabrous, with longitudinal ribs acute and winglike; annual................................................................. _B. erecta_

1 Fruit rounded at apex, stipitate-glandular, with longitudinal ribs rounded; perennial.

2 Leaves well-distributed throughout the plant; inflorescences axillary and terminal; branches spreading-villous or hispid to minutely and finely pubescent ...................................................................................................................................................................... _B. coccinea_

2 Leaves mostly concentrated in the basal ½ of the plant; inflorescences mostly terminal; branches glabrate or glabrous ............... _B. diffusa_

* _Boerhavia coccinea_ P. Miller, Wineflower. Disturbed areas, adventive on ballast; native of tropical America. June-September. Contrary to the statement in RAB that this species is "apparently not established," it is well established on the Wilmington (New Hanover County, NC) waterfront. [= RAB, FNA, K; = Boerhaavia coccinea – S, orthographic variant]

_B. diffusa_ Linnaeus, Red Spiderling, Spreading Hogweed. Vacant lots, road shoulders, other disturbed areas. Pantropical and subtropical. [= FNA, K, Z]

_B. erecta_ Linnaeus, Erect Spiderling. Sandy fields, roadsides, disturbed areas, railroad yards. May-October. NC south to FL, west to TX and AZ, perhaps only introduced in our area, at least in the Carolinas. [= RAB, FNA, K, Z; = Boerhaavia erecta – G, S, orthographic variant]

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**Mirabilis** Linnaeus 1753 (Umbrella-wort, Four-o'clock)


1 Petaloid calyx with a narrow tube 3-4 cm long, the spreading portion to 5 cm in diameter; involucre with 1 flower, not expanding in fruit; [section Mirabilis] .............................................................................................................................................................................. _M. jalapa_

1 Petaloid calyx with a broad tube < 0.5 cm long, the spreading portion < 1.5 cm in diameter; involucre with 3-5 flowers, expanding in fruit; [section Oxybaphus].

2 Leaves linear to narrowly lanceolate, 0.1-1 cm wide, 7-15× as long as wide ........................................................................ _M. linearis var. linearis_

2 Leaves lanceolate to ovate, 1-8 cm wide, 1-6× as long as wide.

3 Leaves cordate at the base, 1-2× as long as wide; [introduced, of disturbed habitats] ........................................................................ _M. nyctaginea_

3 Leaves cuneate at the base, 2.5-6× as long as wide; [native, of dry sandy habitats in s. SC southward] ............................................ _M. albida_

* Mirabilis jalapa Linnaeus, Garden Four-o’clock, Marvel-of-Peru. Disturbed areas, or persistent at former garden sites; native of tropical America. June-November. [= RAB, C, F, G, K, S, Z]

* Mirabilis linearis (Pursh) Heimerl var. linearis. Disturbed areas; native of c. North America, scattered further east as a rare introduction. [= FNA; < M. linearis – C, F, K; < Oxybaphus linearis (Pursh) B.L. Robinson – G]


308. MOLLUGINACEAE Hutchinson 1926 (Carpetweed Family) [in CARYOPHYLLALES]


Mollugo Linnaeus 1753 (Carpetweed)

A genus of about 35 species, annual herbs, of tropical and subtropical regions of both hemispheres, introduced in temperate regions. References: Endress & Bittrich in Kubitzki, Rohwer, & Bittrich (1993).


309. MONTIACEAE Rafinesque 1820 (Montia Family) [in CARYOPHYLLALES]

A family of about 14 genera and 250 species, annual and perennial herbs and subshrubs, primarily of the Southern Hemisphere, but also occurring in North America and e. Asia. References: Packer in FNA (2003b); Nyffeler & Eggli (2010); Carolin in Kubitzki, Rohwer, & Bittrich (1993).

1 Leaves terete, alternate; subshrubs with woody bases................................................................................................................Phermeranthus

1 Leaves flat, opposite or alternate; herbs.

2 Stems with 2 opposite cauline leaves; petals 6-14 mm long...........................................................................................................Claytonia

2 Stems with > 2 leaves, opposite or alternate; petals 1-6 mm long..............................................................................................Montia

Claytonia Linnaeus 1753 (Spring-beauty)


1 Cauline leaves either fused together, perfoliate, the pair together nearly round, or not fused but each broadly ovate; annual, from fibrous roots with minute tubers; [cultivated, rarely naturalizing].

2 Basal rosette leaves erect or ascending, the blade 1-7 cm long......................................................................................................C. perfoliata ssp. perfoliata

2 Basal rosette leaves flattened against the ground, the blade 0.5-1.5 cm long........................................................................C. rubra ssp. rubra

1 Cauline leaves not fused, each linear, lanceolate, or ovate; perennial, from tubers 1-2 cm in diameter; [native, of moist forests].

3 Cauline leaves 3-6 (-11) cm long (including the evident petiole), the blade narrowly diamond-shaped, 2.5-6 (-8)× as long as wide; leaves 10-15 (-30) mm wide ..............................................................................................................C. caroliniana

3 Cauline leaves (5-) 7-20 cm long (including the poorly differentiated petiole), the blade > 8× as long as wide; leaves 1-10 (-20) cm wide.

4 Broadest leaves on a plant 1-2 (-4) mm wide .........................................................................................................................C. virginica var. acutiflora

4 Broadest leaves on a plant 5-10 (-20) mm wide .........................................................................................................................C. virginica var. virginica

Claytonia caroliniana Michaux, Carolina Spring-beauty. Moist forests, especially northern hardwood forests and cove forests at moderate to high elevations. March-May. NS west to MN, south to w. NC, e. TN, and n. GA; disjunct in AR. [= RAB, C, F, FNA, G, S, W, Y, Z; > C. caroliniana var. caroliniana – K; > C. caroliniana Michaux var. lewisi McNeill – K]

* Claytonia perfoliata Donn ex Wildenow ssp. perfoliata. Miners'-lettuce. Disturbed areas, lawns, gardens; native of w. North America. [= FNA, K]

Claytonia virginica Linnaeus var. acutiflora A.P. de Candolle, Southern Spring-beauty. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (GA, NC, SC, VA): moist forests; common. (January-)February-April. VA west to IL, south to sw. GA and TX. This variety has chromosome numbers of n=6, n=7, and polyploid and polyploid/aneuploid derivatives of those numbers. [= C, Ki; < C. virginica – RAB, F, FNA, G, W, Y; = C. virginica – S; = C. virginica var. simplicifolia (Sweet) R.J. Davis – Z; = C. simplicifolia Sweet]

Montia Linnaeus 1753 (Blinks, Montia)


1 Leaves opposite .................................................................................................................................................................M. fontana
2 Leaves alternate ...........................................................................................................................................................................M. linearis


Phemeranthus Rafinesque 1814 (Rock-pink, Fameflower)

A genus of about 20 species, herbs and dwarf shrubs, of America. Our North American "Talinums" are not closely related to the broad-leaved type of *Talinum* and are transferred to *Phemeranthus* (Kiger 2001). Adaptation of our native species of *Phemeranthus* to different rock substrates is discussed by Ware & Pinion (1990). References: Kiger in FNA (2003b); Wilson (1932)=X; Ware (1967)=Y; Kiger (2001)=Z; Murdy & Carter (2001)=Q; Carter & Murdy (1985); Rose & Standley (1911); Carolin in Kubitzki, Rohwer, & Bittrich (1993); Hershkovitz & Zimmer (2000).

1 Stamens 4-8; flowers open in late afternoon.................................................................[P. parviflorus]
2 Stamens 12-80; flowers variously open from early or late afternoon.
   1 Style 2-3.5 mm long, shorter than or about the same length as the stamens; stamens 12-30; flowers open from (3-) 3:30 to 7 p.m. E.D.S.T. .................................................................P. teretifolius
   2 Style 3.8-7 mm long; stamens 25-80 (-90); flowers open from about 1 to 7 p.m. E.D.S.T. ............................P. mengesi
      3 Stamens 40-50; mature seeds covered with a dull gray coating; [of mafic and ultramafic rocks, known from noncalcareous rocks].
      4 Stamens 25-42; mature seeds covered with a dull gray coating; [of mafic and ultramafic rocks, known from noncalcareous rocks].

Phemeranthus calcaricus (S. Ware) Kiger, Cedar-glade Rock-pink. Calcareous glades. C. TN south to n. AL. A tetraploid species, probably derived from *P. calycinus* Engelmann. [= FNA, Z; = Talinum calcaricum S. Ware – K, Q, Y]

Phemeranthus mengesi (W. Wolf) Kiger, Large-flowered Rock-pink. Pd (GA, SC), Cp (GA): in shallow soil over felsic rocks (granite) or sandstone (in GA and AL), or Altamaha Grit (GA), where periodically wet by seepage; rare (locally common in GA). June-September. C. SC south to c. GA (where it extends into the Coastal Plain on outcrops of Altamaha Grit), west to n. AL and sc. TN. *P. mengesi* and *P. parviflorus* Nutall of the midwestern United States (and disjunct as far east as AL) are apparently the parents of the allotetraploid *P. teretifolius*. Diploid and tetraploid populations are known of this taxon; further investigation is needed to determine if the tetraploids are allotetraploids or autotetraploids. [= Phemeranthus mengesi – FNA, Z (also see *P. species 1*); = Talinum mengesi W. Wolf – Q, S, X; = Talinum mengesi – K (also see *P. species 1*)]

**Phemeranthus species 1.** Pd (NC, VA): in periodic seepage on mafic or ultramafic rocks; rare. (June?) July-September. This taxon was discovered at a diabase glade in Granville County, NC and ultramafic barrens in Franklin County, VA, floristically rich in other species of disjunct and relict distribution. [< *Talinum mengesi* – K; < *Phemeranthus mengesi* – FNA, Z]

**Phemeranthus teretifolius** (Pursh) Rafinesque, Appalachian Rock-pink. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (GA): in shallow soil over felsic or mafic rocks (granite, gneiss, schist, granite, diabase, greenstone, metabasalt, sandstone, Altamaha grit), especially where periodically wet by seepage (often in mats of the moss *Grimmia*); common (rare in WV). June-September. DE (at least formerly), se. PA, and WV, south to se. TN, GA (where it extends into the Coastal Plain on outcrops of Altamaha Grit), and AL, in the Appalachians and adjacent provinces. *P. teretifolius* is an allotetraploid, probably derived from hybridization followed by polyploidization of the diploids *P. mengesi* and *P. parviflorus*. [= FNA, Z; = *Talinum teretifolium* Pursh – RAB, C, F, G, K, Q, S, W, WV, X, Y]

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**311. BASELLACEAE** Moquin-Tandon 1840 (Madeira-vine Family) [in CARYOPHYLLALES]

A family of 4 genera and about 20 species, fleshy perennial vines and herbs, of the tropics and subtropics. References: Vincent in FNA (2003b); Sperling & Bittrich in Kubitzki, Rohwer, & Bittrich (1993); Nyffeler & Eggli (2010).

1 Filaments free nearly to base, adnate for < ¼ of their length to the petals. .................................................. **Anredera**

1 Filaments adnate for > ½ of their length to the petals .......................................................................................... **Basella**

**Anredera** Jussieu (Madeira-vine)


* **Anredera cordifolia** (Tenore) Steenis, Madeira-vine. Cp (FL): disturbed areas; rare, native of South America. In Panhandle FL (Leon County) and n. peninsular FL (Alachua County) (Wunderlin & Hansen 2004). [=FNA, K1, K2, WH; < *Boussingaultia leptostachya* Moquin – S]

**Basella** Linnaeus 1753

A genus of 5 species, perennial vines, of the tropics and subtropics. References: Sperling & Bittrich in Kubitzki, Rohwer, & Bittrich (1993). *(also see *Phemeranthus*)

**Basella alba** Linnaeus. Disturbed areas, grown as a vegetable, and rarely found as a waif; native of s. Asia. Reported for Calhoun County, AL (AL Atlas in prep.; Kartesz 2010). [= K2]

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**313. TALINACEAE** Doweld 2001 (Fameflower Family) [in CARYOPHYLLALES]

A family of about 2 genera and 35 species, herbs and shrubs, primarily of the Southern Hemisphere, but also occurring in North America and e. Asia. References: Packer in FNA (2003b); Carolin in Kubitzki, Rohwer, & Bittrich (1993); Nyffeler & Eggli (2010).

1 Leaves linear, terete, 1-2 mm wide; plants to 5 dm tall; [native] ...................................................................................... [**Phemeranthus** in MONTIACEAE]

1 Leaves obovate or elliptic, 20 mm or more wide; plants to 8 dm tall; [alien, persistent or escaped] ................................................................ **Talinum**

**Talinum** Adanson 1763 (Jewels-of-Opar)

A genus of about 15 species, herbs, and dwarf shrubs, mainly of Africa but with 2 species of the New World tropics. References: Kiger in FNA (2003b); Wilson (1932) = X; Carolin in Kubitzki, Rohwer, & Bittrich (1993). *(also see *Phemeranthus*)

* **Talinum paniculatum** (Jacquin) Gaertner, Jewels-of-Opar. Fairly commonly cultivated, locally escaped to disturbed areas and garden edges; native of the West Indies. June-September. [= FNA, S, X; † *T. paniculatum var. paniculatum* – K]
**TALINACEAE**

### 314. PORTULACACEAE A.L. de Jussieu 1789 (Purslane Family) [in CARYOPHYLLALES]

A family of 1 genus and 40-100 species, annual and perennial herbs, primarily of the Southern Hemisphere, but also occurring in North America and e. Asia. References: Packer in FNA (2003b); Carolin in Kubitzki, Rohwer, & Bittrich (1993); Nyffeler & Eggli (2010).

1. Flowers sessile or subsessile; capsule circumscissile. .................................................. *Portulaca*
2. Flowers pedicelled; capsule opening longitudinally.
   1. Flowers borne on a scape, with cymose branching. .................................................. [see TALINACEAE]
   2. Flowers solitary or in racemes. .................................................................................. [see MONTIACEAE]

*Portulaca* Linnaeus 1753 (Purslane, *Portulaca*)

A genus of about 40-100 species, annual and perennial herbs, nearly cosmopolitan, but especially in tropical, subtropical, and warm temperate regions. *Portulaca* flowers open only for a few hours each on sunny days (Matthews & Levins 1985).


1. Plants in flower.
   2. Petals yellow, orange, copper, bronze, or white.
      3. Flowers > 25 mm across (single petals > 15 mm long).
         4. Leaves terete; capsule not encircled by an expanded, membranaceous wing. ........................................... *P. grandiflora*
         5. Flowers < 20 mm across (single petals < 12 mm long).
         6. Leaf blades flattened in cross-section, linear, usually < 2 mm wide; [rare waif]. ........................................... *P. halimoides*
         7. Leaf blades flat in cross-section, obovate or spatulate, > 2.5 mm wide; [collectively common].
      8. Leaves terete to hemispherical in cross-section, usually < 2 mm wide, linear to lanceolate.
      9. Petals deeply bilobed; stamens > 40; [of sandstone (Altamaha Grit) outcrops in s. GA] ..................................... *P. biloba*
      10. Petals not bilobed; stamens usually < 30; [collectively widespread and of various habitats].
      11. Petals dark pink to purple; seeds < 0.6 mm wide, round. .................................................. *P. pilosa*
      12. Petals medium to pale pink; seeds > 0.6 mm wide, elongate. .................................................... *P. smallii*

1. Plants in fruit.
   13. Capsule not encircled by an expanded membranaceous wing.
      14. Leaves flattened in cross-section, > 2.5 mm wide, obovate to spatulate.
      15. Nodes and inflorescences with inconspicuous trichomes. ........................................... *P. pilosa*
      16. Capsule encircled by an expanded membranaceous wing.
         17. Trichomes at nodes conspicuous; seeds round, < 0.6 mm wide. ............................................... *P. umbratica*
         18. Trichomes at nodes inconspicuous; seeds elongate, > 0.6 mm long. ......................................... *P. oleracea*
      19. Leaves terete to hemispherical in cross-section, usually < 2 mm wide, linear to lanceolate.
      20. Capsules 1.5-5 mm in diameter; seeds (0.4-) 0.5-0.6 mm in diameter ........................................... *P. biloba*
      21. Longest leaves mostly < 20 mm long; capsules mostly < 3.5 mm in diameter; [native, on granitic or diabase flatrocks] ........................................... *P. smallii*
      22. Longest leaves mostly > 20 mm long; capsules mostly > 3.5 mm in diameter; [introduced, usually in obviously disturbed sites] ............................ *P. grandiflora*
      23. Leaves > 0.65 mm wide.

* *Portulaca amilis* Spegazzini, Broadleaf Pink Purslane. Sandy fields, lawns, and other dry, sandy, disturbed habitats; native of South America. May-September. Matthews & Levins (1985) describe the spread of this alien species in North America, apparently from an introduction in North Carolina (the earliest North American collection in 1932 in Robeson County, NC). Reported for Lowndes County, MS (Whitson 2010). [= FNA, K, WH, Z]

*Portulaca biloba* Urban, Grit Purslane. Outcrops of the Altamaha Grit. This species has been collected repeatedly on outcrops of the Altamaha Grit in s. GA (Matthews, Faircloth, & Allison 1991); it also occurs in Cuba. Matthews, Faircloth, & Allison (1991) hypothesize introduction to the United States by hurricane. [= FNA, K; < *Portulaca teretifolia* ssp. cubensis (Urban) Ortega]

Portulaca grandiflora  Hooker, Rose-moss. In sandy soil or around granitic flatrocks; native of Argentina. [= RAB, C, FNA, G, K, S, Z]

Portulaca halimoides  Linnaeus. Waste area along railroad; probably only a waif, native of sw. North America. Reported by Reed (1964). [= FNA, K; > P. parvula A. Gray]

Portulaca oleracea  Linnaeus, Common Purslane, Garden Purslane, Pussley. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): gardens, disturbed areas, cracks in sidewalks; common (uncommon in DE and FL), originally native (apparently) of Asia, probably introduced to North America from Europe. May-October. The various subspecies recognized may or may not be taxonomically significant; a decision awaits an analysis of variation worldwide, or, at least, in the native range of the species. In North America, P. oleracea is a widespread, sometimes noxious weed, probably representing numerous introductions of various genotypes, treated as multiple subspecies by some authors. In North America, these genotypes appear to have intermixed; in our area (at least), the recognition of infraspecific taxa has been considered unwarranted, difficult, and unmeaningful (see Matthews, Ketron, & Zane 1993); see Danin & Anderson (1986) for a contrasting opinion. During the Great Depression, P. oleracea was eaten extensively in the Valley of Virginia as a potherb. [= RAB, C, F, FNA, G, K, S, W, WH, WV, Z]

Portulaca pilosa  Linnaeus, Kiss-me-quick. Disturbed sandy soils. June-October. NC south to s. FL, west to NM, north in the interior to c. TN, AR, and OK, and in Central America; the native range perhaps obscure. See Matthews, Ketron, & Zane (1992a) for a further discussion of this species. [= RAB, FNA, K, S, WH, Z]

Portulaca smallii  P. Wilson, Small's Portulaca. In thin soils on granitic and diabase flatrocks, sometimes locally spreading to adjacent fields, mowed areas, or other disturbed areas. June-October. Sc. VA south to c. GA. Generally considered an endemic limited to granitic flatrocks, P. smallii also occurs on a diabase flatrock, growing with an interesting mixture of granite flatrock and limestone cedar glade species (LeGrand 1987, Schafale & Weakley 1990). [= RAB, FNA, K, S, Z]

Portulaca umbraticola  Kunth. Disturbed areas, spreading weakly or persistent following cultivation; native of South America and the West Indies. See P. coronata for further discussion. [< P. umbraticola Kunth – Z; = P. umbraticola Kunth ssp. umbraticola – K]

Opuntia  P. Miller 1754 (Prickly-pear Cactus)

**Identification notes:** New joints sometimes bear reduced leaves and have not yet developed spines; look for spines 1 or 2 joints back from the growing tip.

1 Spines absent.
2 Joints narrowly obovate, narrowly elliptic, or oblong, mostly 12-25 (-35) cm long, 7.5-10 (-20) cm broad; [of the Coastal Plain] .................. **C. stricta var. stricta**

2 Joints orbiculate to obovate, 5-7.5 (12.5) cm long, 4-6 (-7.5) cm broad; [widespread in our area].
3 Joints mostly 7.5-10 (-15) cm long, 5-9 (-12.5) cm broad; hypanthium with 7 or more areoles; style diameter < 3.5 mm; petals > 3 cm long; [of the Coastal Plain] ................................................................. **C. humifusa var. australis**
4 Joints mostly 5-7.5 (-12.5) cm long, 4-6.2 (-7.5) cm broad; hypanthium with 6 or fewer areoles; style diameter > 3.5 mm; petals < 3 cm long; [widespread in our area] ................................................................. **C. humifusa var. humifusa**

1 Spines present.
2 Spines strongly and retrorsely barbed; joints slender, (2-) 3-6 (-13) cm long, 2-5 (-7) cm broad, easily detached from the plant; spines to 3.7 cm long, 0-2 per areole (usually some areoles on a plant with 2 well-developed spines); [of coastal dunes] .................. **C. pusilla**
3 Spines not strongly and retrorsely barbed; joints broad, 10-30 cm long, 7.5-12.5 cm broad, not easily detached from the plant; spines to 7.5 cm long, 0-2 (-12) per areole; [of various habitats, including coastal dunes].
4 Spines (at least the larger) flattened throughout or basally, narrowly elliptic in cross-section, 0-11 per areole.
5 Spines white, tan or pale-brown at maturity; pads 22.5-30-60 cm long, 20-40 cm broad; [rare introduction] ........... **C. ficus-indica**
6 Spines yellow at maturity; pads 10-30 cm long, 5-15 (-25) cm broad; [common native in the southern part of our area].
7 Spines 1-11 per areole, 1.2-4 (-6) cm long; pads 20-30 cm long, 5-12 cm broad. ................................................................. **C. stricta var. dillenii**
8 Spines 0 (-1 per areole only in marginal areoles), usually < 2 cm long; pads 10-30 cm long, 7-15 (-25) cm broad ................................................................. **C. stricta var. stricta**

5 Spines needle-like, not flattened, elliptic to circular in cross-section, 1-6 (-12) per areole.
6 Plants not mat-forming or prostrate, rising the height of several joints, commonly 3-20 dm tall; largest joints (7.5-) 10-30 cm long, (5-) 7.5-12.5 cm broad; spines gray, reddish-brown, or yellowish-brown; fruit 5-7.5 cm long, 4-5 cm in diameter; [introduced, rarely spread or persistent from cultivation] .................. **C. monacantha**
7 Plants low and mat-forming, usually prostrate and < 3 dm tall, the joints usually in series of 3-5; largest joints 3.8-10 cm long, 4-6 cm broad; spines white, gray, brown or brown; fruit 2.5-4 cm long, 2-3 cm in diameter; [native].
8 Joints mostly 7.5-10 (-15) cm long, 5-9 (-12.5) cm broad; spines to 8 cm long; hypanthium with 7 or more areoles; style diameter < 3.5 mm; petals > 3 cm long; [of the Coastal Plain] ................................................................. **C. humifusa var. australis**
9 Joints mostly 5-7.5 (-12.5) cm long, 4-6.2 (-7.5) cm broad; spines to 3 cm long; hypanthium with 6 or fewer areoles; style diameter > 3.5 mm; petals < 3 cm long; [widespread in our area] ................................................................. **C. humifusa var. humifusa**

**? Opuntia cantabrigiensis** Lynch. Small (1933) also reports *O. cantabrigiensis* Lynch from dunes near Beaufort, NC, based on a fragmentary 1930 collection accompanied by a photograph. Similar plants were apparently seen near Beaufort by Engelmann, prior to 1856. Benson (1982) refers the collection tentatively to *O. lindheimeri* Engelmann var. *cuija* (Griffiths & Hare) L. Benson, treated in K as *O. engelmannii* Salm-Dyck var. *cuija* Griffiths & Hare, a native of Mexico. Benson (1982) also states, however, that it could also be var. *lindheimeri* (primarily of TX and Mexico), or, indeed, *O. tuna* (Linnaeus) P. Miller (native to the West Indies). Benson (1982) failed to relocate the plant in the field in 1956, but stated there was “insufficient time for a thorough search.” Unless relocated (and hope is fading for that, with the extensive destruction of maritime vegetation in the vicinity of Beaufort by construction), the identity of the plant will probably remain a mystery, as well as whether it represents a native species, an established population from aboriginal use, or a more recent introduction or adventive. [= S] [excluded; not keyed]


**Opuntia humifusa** (Rafinesque) Rafinesque var. *austrina* (Small) Dress, Southern Prickly-pear. Cp (FL, GA, SC): dunes, shell middens, and other dry sandy soils, mostly but not entirely on barrier islands; rare. Var. *austrina* (Small) Linnaeus Benson occurs throughout FL, and at scattered locations north to se. SC and west to se. TX; Ward (2009e) considers this (as *O. australis*) to be endemic to FL. A third variety, var. *ammophila* (Small) L. Benson, is apparently endemic to FL, occurring in most of the state; it might occur in the southern portion of our area. It has more elongate joints than the other two varieties, the joints with a length-to-width ratio of 2-4 (vs. 1-2) and is a more erect plant, often 3-4 joints high. [K, Y, Z; < O. humifusa var. humifusa – FNA; > O. australis – S; > O. cumulicola Small – S; = O. australis Small – X; = O. compressa (Salisbury) J.F. Macbride var. *austrina* (Small) L. Benson]

**Opuntia humifusa** (Rafinesque) Rafinesque var. *humifusa*, Eastern Prickly-pear. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): dry open places, such as in thin soil around rock outcrops, sandhill forests and woodlands, dry barrens and woodlands, barrier island dunes, dry pastures; common (uncommon in Piedmont and Mountains). May-June; August-October. The only cactus widespread in e. North America, var. *humifusa* ranges from MA, MI, and e. IA, south to s. FL and e. TX, with some outlying stations farther west. Various authors, including Small (1933) and Ward (2009e), separate the Coastal Plain *O. pollardii* from the inland *O. humifusa* (s.s.); this may have merit. Ward (2009e) separates *O. pollardii* as always having spines, these 2-3 cm long, leaves prior to shedding 6-8 mm long, fruits 2.2-5 cm long (vs. often lacking spines, when present these fewer and < 1 cm long, leaves 2-3 mm long, fruits 1-1.5 cm long in *O. humifusa*). Where growing in proximity to *O. pusilla*, the two species hybridize rather freely, sometimes producing hybrid swarms. See Doyle (1990) for discussion of the correct nomenclature for this taxon (*O. compressa* vs. *O. humifusa*). [K, Y, Z; < O. humifusa var. *humifusa* – FNA; > O. compressa (Salisbury) J.F. Macbride var. *compressa* – G; < O. compressa – RAB; < O. humifusa (Rafinesque)]

Opuntia pusilla (Haworth) Nuttall, Dune Prickly-pear, Sand-bur Prickly-pear, Little Prickly-pear, Creeping Cactus. Cp (FL, GA, NC, SC): dunes on barrier islands; uncommon. May-June; August-October. A Southeastern Coastal Plain endemic: NC (Dare County) south to c. peninsular FL and west to se. TX, nearly always within a few hundred meters of the sea. As mentioned by Small (1933) and RAB, this little coastal cactus is inconspicuous and often becomes attached by its retrorsely barbed-spines to the pants or shoes of people walking through the dunes. It can inflict painful wounds, the spines not easily removed from flesh or clothing because of the retrorse barbs. O. pusilla sometimes forms hybrid swarms with O. humifusa on coastal dunes (see Y for additional discussion). [= FNA, K, WH, X, Z; = O. drummondii Graham – RAB, S]

Opuntia stricta (Haworth) Haworth var. dillenii (Ker-Gawler) L. Benson. Cp (FL, GA, NC?, SC): dunes on barrier islands; rare. Se. SC south to s. peninsular FL. This taxon was reported from NC by Small (1933), as (1982) and Doyle (1990) do not verify this distribution, showing var. stricta reaching its northern limit along the coast in se. SC. [= K, X, Y, Z; < O. stricta – FNA, WH; > O. tunicata Gibbs – S]

Opuntia stricta (Haworth) Haworth var. stricta. Cp (FL, GA, NC, SC, VA?): dunes, shell middens, sandhills, dry woodlands; rare. Sc. NC (Robeson County) and c. SC south to s. peninsular FL, with a single collection from Isle of Wight County, VA (Benson 1982), mostly near the coast. Small (1933) describes the habitat of O. stricta as "shell mounds, kitchenmiddens, and aboriginal village sites" and identifies it as the "the prickly-pears the early Spanish records tell us the aborigines feasted on for three months of each year and also cured, like figs, for food when out of season." [= K, X, Y, Z; < O. stricta – FNA, WH; > O. stricta – S]

320a. CORNACEAE (Berchtold & J. Presl) Dumortier 1829 (Dogwood Family) [in CORNALES]

A family of 2 genera and about 85 species, trees, shrubs, lianas, and subshrubs, semicosmopolitan (mainly northern hemisphere). The Cornaceae is best circumscribed to exclude Nyssa (Xiang et al. 2002). References: Xiang et al. (2002); Kubitzki in Kubitzki (2004).

Cornus Linnaeus 1753 (Dogwood, Cornel)

(contrasted by Z.E. Murrell & A.S. Weakley)

A genus of about 65 species, trees, shrubs, and subshrubs, mainly north temperate. The generic limits are controversial. Phylogenetic analyses show that Cornus is monophyletic, but various clades within it are also monophyletic and have levels of genetic and morphologic divergence often regarded as warranting generic distinction. Zhang et al. (2008) estimate the time of divergences of the various subgenera as having been from the Paleocene to the Oligocene. At very least, the subgenera are well-marked. References: Godfrey (1988)=Z; Wilson (1965); Murrell (1993); Zhang et al. (2008); Xiang et al. (2006); Fan & Xiang (2001); Eyde (1987); Xiang, Solis, & Soltis (1998); Ferguson (1966c, 1966d)=Y; Kubitzki in Kubitzki (2004).

1 Leaves alternate (the internodes typically short and therefore the leaves looking nearly whorled); [subgenus Mesomora]..............C. alternifolia
2 Leaves opposite.
3 Herb or dwarf shrub from a woody rhizome, to 2 dm tall; leaves in 2-4 pairs below the inflorescence; [of NJ and montane VA and WV northward]; [subgenus Arctocrania]..................................................................C. canadensis
4 Shrub or tree, much taller than 2 dm when mature; leaves many; [collectively widespread].
5 Inflorescence subtended by 4 showy (white, creamy, or pink) bracts.
6 Showy bracts subtending the inflorescence rounded and notched; fruits separate in a compact cluster; [common native small tree]; [subgenus Cynoxylon]..................................................................C. floridana
7 Showy bracts subtending the inflorescence acute; fruits fused together; [exotic uncommonly planted, rarely escaped or persistent]; [subgenus Syncaerpe]........................................................................................................[C. kousa]
8 Inflorescence lacking bracts; [subgenus Kraniopsis].
9 Veins usually 5 or more per leaf side.
10 Bark of older branches and stems splitting longitudinally, appearing braided; leaves without tufts of trichomes in axils of secondary veins on abaxial surface. 7 Abaxial leaf surface not coronulate, trichomes appressed and rigid, and erect and curling, on the same leaf, leaf base usually rounded or truncate .................................................................C. ammonum
11 Abaxial leaf surface coronulate, trichomes appressed and rigid, leaf base usually cuneate .........................................................C. obliqua
12 Bark of older branches and stems smooth, with scattered protruding lenticels; leaves with tufts of trichomes in axils of secondary veins on the abaxial surface. 8 Area surrounding lenticels suffused with purple; leaves suborbicular or broadly ovate; 7-9 veins per leaf side; tertiary veins usually prominent. ........................................................................................................C. rugosa
13 Area surrounding lenticels not differentiated; leaves lanceolate, elliptic, or ovate; 5-7 veins per leaf side; tertiary veins not prominent.................................................................C. stolonifera
**CORNACEAE**

10 Petioles 8-25 mm long; leaf veins emanate from the basal half of the leaf .................................................. *C. drummondii*

9 Trichomes appressed or slightly raised on abaxial leaf surface.

11 Rhizomatous, forming large colonies; lenticels protrude slightly, older stems appear verrucose; fruit white ............... *C. racemosa*

11 Multiple stems from a single rootstock (occasionally appearing rhizomatous from decumbent stems); lenticels not protruding, bark swelling between lenticels; fruit blue .................................................. *C. stricta*

*Cornus alternifolia* Linnaeus f., Alternate-leaf Dogwood, Pagoda Cornel, Pagoda Dogwood. Moist forests. May-June; August-September. NL (Newfoundland) west to MN, south to Panhandle FL, AL, s. MS, and AR. [= RAB, C, F, G, K, W, WH, WV, Y, Z; = *Swida alternifolia* – S; = *Cornus alternifolia* (Linnaeus f.) Small]

*Cornus amomum* P. Miller, Silky Dogwood. Shores, streams, bottomlands. May-July; August-September. NV and MA west to IN, south to GA, Panhandle FL, and MS. [= RAB, F, G, K, W, WV; = Cornus amomum var. amomum – C; = *Cornus amomum* P. Miller ssp. amomum – GW, Y, Z; = *Swida amomum* – S; = *Swida amomum* (P. Miller) Small]

*Cornus asperifolia* Michaux, Eastern Roughleaf Dogwood. Mesic calcareous forests and thickets, shell middens, calcareous hammocks. May-June; August-September. Se. NC south to n. peninsular FL, west to s. AL. Nash (1896) collected *C. asperifolia* Michaux at River Junction, Florida; based upon conflicting reports of fruit colors given by Chapman (1860) and Coulter and Evans (1890) for the two rough-leaved dogwoods (*C. asperifolia* and *C. drummondii*), Nash decided to name the rough-leaved dogwood with blue fruit as *C. microcarpa*. However, Michaux's (1803) description, even without reference to fruit color, is clearly attributable to this species, since its locality was given as "Carolinae inferiores." The populations of this rough-leaved dogwood in NC and SC have morphology intermediate between *C. stricta* and *C. asperifolia* and these should possibly be attributed to a hybrid origin. More analysis needs to done on this complex. [= RAB, K, Y, Z; = *Cornus foemina* P. Miller ssp. microcarpa (Nash) J.S. Wilson – GW; = *Swida asperifolia* (Michaux) Small]

*Cornus canadensis* Linnaeus, Bunchberry, Dwarf Cornel, Dwarf Dogwood. High elevation forests, in humus or on talus, under Betula cordifolia, Picea rubens, or Pinus rigida. Greenland west to AK, south to NJ, VA, WV, and CA. [= C, F, G, K, W, WV, Y; = *Chaemapericlymenum canadense* (Linnaeus) Ascherson & Graebner]

*Cornus drummondii* C.A. Meyer, Midwestern Roughleaf Dogwood. Open woodlands and glades over calcareous rocks (limestone, calcareous shale). NY, ON, and SD south to e. TN, nw. GA, LA, and TX. [= C, G, GW, K, Y; = *Cornus drummondii* – F; > *Cornus priceae* Small – F; > *Swida priceae* Small – S; > *Swida asperifolia* – S, misapplied; = *Swida drummondii* (C.A. Meyer) Sojak]

*Cornus florida* Linnaeus, Flowering Dogwood. May-June; August-September. Me to MI, south to c. peninsular FL; disjunct in montane ne. Mexico (Veracruz and Nuevo Léon). The Mexican plants may warrant recognition as *C. urbaniana*. *C. florida* has been impacted since the 1980s by widespread infection by the dogwood anthracnose fungus (*Discula destructiva*). [= RAB, C, F, G, K, W, WH, WV, Y, Z; = *Cynoxylon floridum* (Linnaeus) Rafinesque ex B.D. Jackson – S, Benthamidia florida (Linnaeus) Spach]

*Cornus kousa* Hance, Kousa Dogwood. Suburban areas, sometimes planted as an ornamental and may persist or seed down in the immediate vicinity of the parent tree. [= K; Benthamidia japonica (Siebold & Zuccarini) Hara; = *Cynoxylon kousa* (Hance) Nakai] [not mapped; rejected as a component of our flora]

*Cornus obliqua* Rafinesque, Silky Dogwood. Swamps, moist thickets, (in VA) rocky rivershores where periodically scoured. May-July. ME and QC west to MN, south to VA, KY, c. TN, AR, and OK. Some material intermediate between *C. amomum* and *C. obliqua* has been found in the Mountains of nw. NC and w. VA. These plants are recognizable by leaves intermediate between the putative parents, ovate with an attenuate base, abaxial surface papillose; abaxial and adaxial surfaces with mostly appressed ornamented trichomes, but with scattered unornamented trichomes with erect arms on both blade surfaces and midvein and secondary veins. [= F, K, WV; = *Cornus amomum* P. Miller var. schuetzeana (C.A. Meyer) Rickett – C; = *Cornus purpurii* Koehne – G; = *Cornus amomum* P. Miller ssp. obliqua (Rafinesque) J.S. Wilson – GW, Y; = *Swida amomum* var. schuetzeana (C.A. Meyer) A. Haines; = *Swida obliqua* (Rafinesque) Moldenke]

*Cornus racemosa* Lamark, Northern Swamp Dogwood. Wet to moist forests and thickets. May-July; August-September. ME and s. QC west to s. MB, south to VA, nc. NC, s. IL, and MO. [= RAB, C, F, G, K, WV; = *Swida feminina* (P. Miller) Small – S, misapplied; = *Cornus foemina* P. Miller ssp. racemosa (Lamark) J.S. Wilson – W, Y; = *Swida racemosa* (Lamark) Moldenke]

*Cornus rugosa* Lamark, Roundleaf Dogwood. At high elevations, usually on talus (greenstone, quartzite, sandstone). QC to MB, south to NJ, PA, w. VA, OH, IN, and IL. [= C, F, G, K, W, WV; = *Swida rugosa* (Lamark) Rydberg]

*Cornus stolonifera* Michaux, Red Osier Dogwood. Shrub swamps, bottomlands, suburban areas. At least some of the occurrences in VA represent horticultural introductions. NL (Labrador) and AK south to VA, WV, KY (Clark et al. 2005), IL, NM, AZ, and CA. Attempts to link the name *C. sericea* Linnaeus to the red-osier dogwood have focused on the Linnaean description of "foliis subtus sericeis" and "ramis rubicundis." The reference to the red branches has been emphasized to rule out any other species, yet *C. amomum* and *C. obliqua* also have reddish-maroon branches. The description of "fructo nigro-caeruleo" cannot be dismissed as a reference to individuals of the red-osier dogwood which have pale blue fruit, often considered to be due to hybridization with *C. amomum* or *C. obliqua*. It seems clear that the description fits *C. obliqua* better than it does the red-osier dogwood. Although there is a specimen in the Linnaean herbarium which has been identified as the red-osier dogwood, it is

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* = *Cornus kousa* Hance, Kousa Dogwood. Suburban areas, sometimes planted as an ornamental and may persist or seed down in the immediate vicinity of the parent tree. [= K; Benthamidia japonica (Siebold & Zuccarini) Hara; = *Cynoxylon kousa* (Hance) Nakai] [not mapped; rejected as a component of our flora]
neither dated nor is the label of *C. sericea* in Linnaeus' hand. Also, considering the similarity of the red-osier dogwood and *C. alba* Linnaeus, it is doubtful *Nyssa* would have described the red-osier dogwood without reference to *C. alba*. Therefore, we agree with Ricket's description of *C. sericea* as a *nomen dubium*. This species is also sometimes considered to be indistinguishable from the Eurasian *C. alba*. [= G, W, WV; = *C. sericea* Linnaeus – C, nomen dubium; = *Cornus stolonifera* Michaux – G, W; > *Cornus stolonifera* var. stolonifera – F; > *Cornus stolonifera* var. baileyi (Coulter & Evans) Drescher – F; > *C. sericea* ssp. sericea – K, nomen dubium; = *Swida sericea* (Linnaeus) Holub, nomen dubium; = *Swida stolonifera* (Michaux) Rydberg; < *C. alba* Linnaeus]

*Cornus stricta* Lamarck, Southern Swamp Dogwood. Swamps, streambanks, marshes, alluvial forests. April-May; July-August. DE south to s. FL, west to TX, and north in the interior to TN, s. IN, s. IL, AR, and se. OK. Although the name *C. foemina* P. Miller predates *C. stricta* Lamarck, it is very unclear what plant was intended by that name (the description is very obscure and no type is available), so *C. foemina* is best rejected as a *nomen dubium*. [= RAB, C, G; = *Cornus foemina* P. Miller – F, K, WH, Z; = *Cornus stricta* Lamarck – RAB, C, G; = *Swida stricta* (Lamarck) Small – S; = *Cornus foemina* P. Miller ssp. foemina – GW, W, Y; = *Swida foemina* (P. Miller) Rydberg; = *Swida stricta* (Lamarck) Small]

320b. NYSSACEAE A.L. de Jussieu ex Dumortier 1829 (Tupelo Family) [in CORNALES]

A family of 5 genera and 22 species, trees and shrubs, of e. Asia, se. Asia, e. North America, and Central America. The circumscription and recognition of this family has been controversial; Nyssaceae has sometimes been included in a broadly circumscribed Cornaceae, but this appears to be phylogenetically incorrect (Xiang et al. 2002). References: Xiang et al. (2002).

*Nyssa* Linnaeus 1753 (Tupelo, Sour Gum, Black Gum)


Identification notes: *Nyssa sylvatica* is often mistaken (especially as seedlings, saplings, or fire-sprouts) for *Diospyros virginiana*, because of their similar, alternate, glossy-green, acuminate leaves. *Nyssa* can be distinguished by its three vascular bundle scars per leaf scar (vs. one *Diospyros*), leaves often with a few irregular teeth (vs. never toothed), leaves pale to medium green beneath (vs whitish-green beneath), leaves lacking dark glands on the midrib above and the outer petiole (vs. present), and leaves glabrous or nearly so below (vs. glabrate to tomentose with curly hairs) (McKenney 1967).

1 Petioles of mature leaves 3-6 cm long; leaves to 30 cm long and 15 cm wide, at least the larger on a tree normally > 8 cm wide, often with a few irregular teeth, these typically located near the widest part of the blade.................................................................*N. aquatica*

2 Petioles of mature leaves 0.5-2.0 (-2.5) cm long; leaves to 18 cm long and 10 cm wide, the largest leaves on a tree rarely > 7 cm wide, generally entire, rarely with a few irregular teeth, these typically located toward the leaf apex.

2 Fruits 20-40 mm long, yellow, orange, or red when mature, the stone winged; pistillate flowers and fruits 1 per peduncle; trees often multiple-trunked, the trunks crooked; mature leaves densely pubescent beneath .........................................................*N. ogeche*

3 Fruits 6-15 mm long, blue-black when mature, the stone slightly ridged to nearly smooth; pistillate flowers (1-) 2-5 per peduncle; trees typically single-trunked, the trunk fairly straight; mature leaves glabrous to pubescent beneath.

3 Pistillate flowers and fruits (2-) 3-5 (-8) per peduncle; leaves with thick texture, pliable, typically widest near the middle, the apex typically acuminate, the margins often with a few irregular teeth near the apex (though sometimes an entire tree with no toothed leaves); trunk not swollen or buttressed at base (even when growing in moist or wet habitats); bark of large trees rough, divided by deep vertical and horizontal furrows into a pattern of squarish checks; [trees of dry to mesic upland forests, less commonly in bottomlands or other wetlands, where flooding occurs at most occasionally and is of short duration; throughout our area].................................................*N. sylvatica*

4 Petioles of mature leaves 0.5-2.0 (-2.5) cm long; leaves to 18 cm long and 10 cm wide, the largest leaves on a tree rarely > 7 cm wide, generally entire, rarely with a few irregular teeth, these typically located toward the leaf apex.

4 Fruits 6-15 mm long, blue-black when mature, the stone slightly ridged to nearly smooth; pistillate flowers (1-) 2-5 per peduncle; trees typically single-trunked, the trunk fairly straight; mature leaves glabrous to pubescent beneath.

3 Pistillate flowers and fruits (2-) 3-5 (-8) per peduncle; leaves with thick texture, pliable, typically widest near the middle, the apex typically acuminate, the margins often with a few irregular teeth near the apex (though sometimes an entire tree with no toothed leaves); trunk not swollen or buttressed at base (even when growing in moist or wet habitats); bark of large trees rough, a vertical ridge-furrow pattern most prominent; [trees of swamps with periodic or seasonal flooding; mostly on the Coastal Plain].

5 Tree; leaves 5-14 cm long, 1.5-4 cm wide; fruit ovoid, 7-14 mm long; [widespread in our area].................................................*N. biflora*

4 Shrub or small tree, 1-3 (-5) m tall; leaves 3-6 cm long, 1-2 cm wide; fruit globose, 6-11 mm long; [restricted to c. FL Panhandle (Apalachicola lowlands region, Bay, Calhoun, Franklin, Gulf, Liberty, and Wakulla counties)].................................................*N. ursina*

*Nyssa aquatica* Linnaeus, WaterTupelo, Tupelo Gum, Cotton Gum. River swamps, where inundated for substantial periods of time. April-May; September-October. Se. VA south to Panhandle FL, west to se. TX, north in the Mississippi Embayment to se. MO, s. IL, and e. KY, primarily on the Coastal Plain, but with scattered locations in other physiographic provinces, such as in se. TN. [= RAB, C, F, GW, K, S, V, WH, X, Y, Z; = *N. uniflora* Wangenheim – G]
**Nyssa biflora** Walter, Swamp Tupelo, Water Gum, Swamp Black Gum. Blackwater river swamps, depressions in pine lands, pocosins, either where inundated for substantial periods of time or in more-or-less permanently saturated organic peaty soils. April-June; August-October. NJ south to s. FL, west to e. TX, primarily on the Coastal Plain, but scattered inland to c. NC, w. SC, c. TN, w. KY (Clark et al. 2005), se. MO, and c. AR. [= G, K, S, Z; = *N. sylvatica* Marshall var. biflora (Walter) Sargent – RAB, C, F, X, Y; < *N. sylvatica* Marshall var. biflora (Walter) Sargent – GW, WH; = *N. biflora* var. biflora – V]

**Nyssa ogeche** Bartram ex Marshall, Ogeechee Lime, Ogeechee Tupelo, Ogeechee Plum. River swamps and wet forests with peaty soils, also in upland depression ponds. April; August-October. A Southeastern Coastal Plain endemic: se. SC south to c. peninsular FL, west to s. AL. [= RAB, GW, K, V, WH, X, Y, Z; > *N. acuminate* Small – S; > *N. ogeche* – S]

**Nyssa sylvatica** Marshall, Sour Gum, Black Gum, Pepperidge. Dry or mesic upland forests, less commonly in bottomlands, pine savannas, or upland depressions, where occasionally inundated briefly. April-June; August-October. S. ME west to MI and se. WI, south to c. peninsular FL, west to e. TX and e. OK. *N. sylvatica* is quite variable in morphology and ecology, at least some of the morphologic variation correlated with geography and ecology. The status of varieties recognized by previous authors (such as Fernald 1950) needs reassessment. In the Mountains of our area *N. sylvatica* is typically found in dry woodlands, such as pine-oak/heath, with xerophytic species such as *Pinus virginiana* and *Quercus montana*. In the outer Coastal Plain of the Carolinas, *N. sylvatica* often occurs in wet savannas with *Pinus serotina*, where often mistaken (because of the wetland habitat) for *N. biflora*. The leaves turn a brilliant orange-red in fall (often a few on any tree turning prematurely in July or August). [= G, K, S, V, VW, Z; = *N. sylvatica* var. sylvatica – RAB, C, GW, WH, X, Y; > *N. sylvatica* var. sylvatica – F; > *N. sylvatica* var. dilatata Fernald – F; > *N. sylvatica* var. caroliniana (Poiret) Fernald – F]

**Nyssa ursina** Small, Bear Tupelo, Apalachicola Tupelo. Stringers, flatwoods depressions. Endemic to Panhandle FL (Apalachicola lowlands region; Bay, Calhoun, Franklin, Gulf, Liberty, and Wakulla counties). A 2-5 m tall shrub or small tree, intricately branched, related to *N. biflora*. Because of the co-occurrence of this and *N. biflora* in the FL Panhandle, it seems best to recognize this taxon at the species level. [= K, S, Z; < *N. sylvatica* Marshall var. biflora (Walter) Sargent – GW, WH, X; = *N. biflora* Walter var. ursina (Small) D.B. Ward – V; > *N. sylvatica* Marshall var. ursina (Small) Wen & Stuessy – Y]

### 321. HYDRANGEACEAE

Dumortier 1829 (Hydrangea Family) [in CORNALES]

A family of about 17 genera and 190-220 species, trees, shrubs, vines, and herbs, primarily north temperate. As here interpreted, the family Hydrangeaceae includes two well-marked groups, the Hydrangeae (including *Decumaria* and *Hydrangea*) and the Philadelpheae (including *Deutzia* and *Philadelphus*). This group has been shown by molecular research to be unrelated to the Saxifragaceae, and to have its closest affinities to the Loasaceae, Cornaceae, and Nyssaceae (Xiang et al. 2002; Soltis, Xiang, & Hufford 1995; Morgan & Soltis 1993). References: Spongberg (1972); Soltis, Xiang, & Hufford (1995); Morgan & Soltis (1994); Xiang et al. (2002); Hufford in Kubitzki (2004).

1 Woody vine, climbing by aerial rootlets; petals 7-10; [tribe Hydrangeae].......................................................................................................................... *Decumaria*
1 Shrub; petals 5 (rarely 10 in the cultivars of the alien *Deutzia*).
2 Pubescence of leaves and twigs stellate; stamens 10; [a cultivated alien, rarely escaped]; [tribe Philadelphaceae]........................................................................... *Deutzia*
2 Pubescence of leaves and twigs simple; stamens 8-10 (Hydrangea) or 25-90 (Philadelphus); [natives and aliens].
3 Leaf blades 10-30 cm long; inflorescences of 25-many flowers; stamens 8-10; [tribe Hydrangeae].......................................................................................................................... *Hydrangea*
3 Leaf blades 3-8 cm long; inflorescences of 1-7 flowers; stamens 25-90; [tribe Philadelphaceae].......................................................................................................................... *Philadelphus*

**Decumaria** Linnaeus (Climbing Hydrangea, Woodvamp)


**Identification notes:** *Decumaria* is readily distinguished from the other opposite-leaved, woody vines in our flora (*Gelsemium*, *Trachelospermum*, *Lonicera*, *Bignonia*, *Campsis*, and *Clematis*) by its leaves (simple, ovate, and usually serrate) and climbing structures (adventitious roots).

**Decumaria barbara** Linnaeus, Climbing Hydrangea, Woodvamp. Swamp forests and bottomlands, moist forests in the mountains. May-June; July-October. Se. VA south to FL and west to LA and e. TX (Singhurst, Keith, & Holmes 2005), inland to nw. SC, se. TN, and w. TN. This handsome vine climbs to the tops of trees via adventitious roots. The opposite leaves are somewhat fleshy in texture. [= RAB, C, F, G, GW, K, S, W]

**Deutzia** Thunberg (Deutzia)
**HYDRANGEACEAE**


*Deutzia scabra* Thunberg, Deutzia, Pride-of-Rochester. Fairly commonly cultivated, persistent around old homesites and escaping to adjacent woodlands; native of Japan and China. First reported for NC (Jackson Co., NC) by Pittillo & Brown (1988); now known from scattered sites. *D. crenata* Siebold & Zuccarini, Chinese Deutzia, is reported as introduced in GA by Kartesz (1999); this may not be taxonomically distinct from *D. scabra*. [= K, F; > *D. scabra* – K; > *D. crenata* Siebold & Zuccarini – K; > *D. scabra* var. *candisissima* (Froebel) Rehder]

**Hydrangea** Linnaeus (Hydrangea, Sevenbark)


<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leaves pinnately lobed, the lobes toothed; inflorescence a panicle; large sterile flowers many (&gt; 20 per inflorescence), borne throughout the inflorescence.</td>
</tr>
<tr>
<td>2</td>
<td>Inflorescence a panicle; large sterile flowers many (&gt; 20 per inflorescence), borne throughout the inflorescence; [large shrub to small tree, to 8 m tall and 10 cm trunk diameter]; [alien, cultivated and sometimes persistent].</td>
</tr>
<tr>
<td>3</td>
<td>Lower leaf surface glabrous or inconspicuously puberulent, appearing green; trichomes of the lower leaf surface restricted to the midrib and major veins; sterile flowers absent, or, if present, usually &lt; 1 cm in diameter.</td>
</tr>
<tr>
<td>4</td>
<td>Lower leaf surface velutinous, pilose, or tomentose, appearing gray; trichomes usually not dense enough to entirely mask the green leaf surface; trichomes with prominent tubercles (as seen at 40× magnification); sterile flowers generally very few (0-3 per inflorescence).</td>
</tr>
<tr>
<td>5</td>
<td>Lower leaf surface densely floccose-velutinous, felt-like, appearing bright white or silver; trichomes dense enough to entirely mask the green leaf surface; trichomes without tubercles, or with small and inconspicuous tubercles (as seen at 40× magnification); sterile flowers generally fairly many (2-15 per inflorescence).</td>
</tr>
</tbody>
</table>

**Hydrangea arborescens** Linnaeus, Smooth Hydrangea. Forests, especially around rock outcrops and along streambanks. May–July. NJ, s. NY, OH, IN, IL, and se. KS south to e. NC, c. SC, c. GA, Panhandle FL, s. AL, LA, and OK. [= K, S, W, WH, Z; = *H. arborescens* ssp. *arborescens* – RAB, Y; = *H. arborescens* var. *arborescens* – C, G, WV; > *H. arborescens* var. *arborescens* – F; > *H. arborescens* var. oblonga Torrey & A. Gray – F]

**Hydrangea paniculata** Siebold, Panicle Hydrangea. Persistent after cultivation at old home-sites, sometimes appearing naturalized; native of e. Asia. July–August. [= C, F, G, K]

**Hydrangea quercifolia** Bartram, Oakleaf Hydrangea. Native in hammocks, moist forests, also in disturbed areas, thickets, or forests adjacent to urban or suburban areas. May–July. C and sw. TN, south through w. GA, AL, and MS to Panhandle FL and e. LA; scattered elsewhere as a remnant or escape from cultivation. Boufford & Wood (1977) describe a purportedly native occurrence in nw. SC, but it seems more likely to be n escape from cultivation (R. Clark, pers. comm.). This southeastern native is a spectacular garden plant, frequently planted, rarely escaping or persisting. [= C, F, G, K, S, WH]

**Hydrangea radiata** Walter, Snowy Hydrangea, Silverleaf. Mt (GA, NC, SC), Pd (NC, SC): rocky forests and rock outcrops, often common and conspicuous on roadbanks; common. May–July. A Southern Appalachian endemic: sw. NC (in the valley of the French Broad River and to its southwest), nw. SC, ne. GA, and se. TN, with outliers (perhaps escaped from cultivation?) in Stokes County, NC and Calhoun County, SC. This attractive species is especially typical of the escarpment gorge region near the tricorner of NC, SC, and GA, in the vicinity of the towns of Highlands, Cashiers, and Rosman, NC, where it is conspicuous along roadbanks. [= K, S, W, Z; = *H. arborescens* ssp. *radiata* (Walter) McClintock – RAB, Y]
Philadelphus Linnaeus (Mock-orange)

A genus of 65 (or fewer) species, shrubs, of north temperate areas. The most recent monographer of the genus, Hu (1954-1955) recognizes many species and varieties on the basis of minor differences in pubescence. Many of the recognized taxa are based only on cultivated material. The native distributions of the varieties have little phytochoristic coherence, and several varieties are often reported from the same site, suggesting that they reflect merely variation within a population (if genetically based at all). For instance, Hu recognizes three varieties in *P. hirsutus* and five in *P. inodorus*, but these seem to be no more than forms. As Hu writes, "the formerly recognized species, *P. grandiflorus* Willd., and *P. laxus* Schrad., are merely different forms of a species with heterogeneous leaf shape, size, and margins. Fostered by growers, propagated and distributed through cuttings, these forms have maintained their distinction in gardens since their discoveries. But when they are projected on the spectrum of variations exhibited by a large number of specimens collected from the homeland of *P. inodorus* Linn. they appear to be nothing but a few transitional forms. In this paper, these forms are treated as varieties." Hu's "varieties" should be treated as forms or cultivars, if recognized at all. I have taken a conservative approach, though variation in several of our native species could use additional study. References: Weakley & Henrickson in FNA (in press); Hu (1954-1956)=Z; A.E. Weakley (2002); Hufford in Kubitzki (2004).

1. Axillary buds exposed above the petiole base (best observed in mature long-shoot leaves, not always visible in axils of young leaves or on short-shoot leaves); twigs of the current year villous-hirsute; seeds not caudate; [subgenus Deutzioideae, section Deutzioideae]........... *P. hirsutus*

1. Axillary buds contained within a distinct pouch directly below the petiole (best observed in mature, long-shoot leaves); twigs of the current year glabrous; seeds with caudate tails about as long as the embryo; [subgenus Philadelphus].

2. Flowers 1-3 (-9) in a cyme or cyme-like cluster; stamens 60-90; [subgenus Philadelphus, section Paeoniflorus]............................. *P. inodorus*

2. Flowers 5-9 in a determinate raceme; stamens 20-50; [subgenus Philadelphus, section Philadelphus].

3. Bark of the current year brown, exfoliating in its second year; flowers fragrant................................................................. *P. coronarius*

3. Bark of the current year gray, not exfoliating later; flowers not fragrant or only slightly so.......................................................... *P. pubescens*

*Philadelphus coronarius* Linnaeus, European Mock-orange. Cultivated (though more so in the past than now), and sometimes escaped or persisting around old homesites; native of Europe. May-July. *P. coronarius* is the most commonly cultivated *Philadelphus* in our area, though it is currently considered rather old-fashioned. [= C, FNA]

*Philadelphus hirsutus* Nuttall, Hairy Mock-orange, Cumberland Mock-orange. Bluffs, rock outcrops, rocky woodlands, often with seepage, over mafic or calcareous rocks. April-May; June-August. A Southern Appalachian species: sw. VA and KY south and west to w. NC, TN, n. GA, and n. AL. *P. sharpianus* Hu, known from e. TN and nc. AR, is similar to *P. hirsutus*, allegedly differing in the hypanthium glabrous (vs. more or less pubescent), the leaves strigose-pilose above, glabrous or sparsely strigose or with the nerves only villous beneath (vs. scabrous-hirsute above, uniformly villous beneath); it is probably best considered only a form of *P. hirsutus*. *P. hirsutus* is cultivated and it may escape outside of the range stated. [= RAB, C, F, FNA, G, S, W; > P. hirsutus var. strigosus Hu – K, Z; > P. hirsutus var. intermedium Hu – Z; > P. hirsutus var. nanus Hu – Z; > P. sharpianus Hu var. parviflorus Hu – Z]

*Philadelphus inodorus* Linnaeus, Appalachal Mock-orange. Rich forests and woodlands, rocky bluffs over mafic or calcareous rocks, and also cultivated and persistent. April-May; June-August. VA and TN south to Panhandle FL (Gadsden, Liberty, and Jackson counties), GA, and s. AL (and according to C, also in e. PA). *P. floridus* Beadle, known from nw. GA, is similar to *P. inodorus*, allegedly differing in the pedicels and hypanthium pubescent (vs. glabrous); it is probably only a form of *P. inodorus*. [= RAB, C, FNA, G, W, WH; > P. inodorus var. inodorus – F, S, Z; > P. inodorus var. carolinus Hu – Z; > P. inodorus var. grandiflorus (Wildenow) A. Gray – F, Z; > P. inodorus var. laxus (Schrader) Hu – Z; > P. inodorus var. strigosus Beadle – S, Z; > P. grandiflorus Wildenow – S; > P. gloriosus Beadle – S; > P. inodorus var. intermedium Hu – Z; > P. floridus Beadle – K, S, Z]

*Philadelphus pubescens* Loiseleur, Ozark Mock-orange, Hairy Mock-orange. Limestone bluffs. E. TN, KY, nw. GA (Jones & Coile 1988), AL, MO, OK, and AR, west of the Blue Ridge. It has been documented from TN counties adjacent to both VA and NC, and is likely to be found in VA, at least. [= FNA; > P. inodorus Beadle – S; > P. lattifolius Schrader ex A.P. de Candolle – S; > P. intercus var. intercus – Z; > P. intercus var. pubigerus Hu – Z; > P. pubescens var. verrucosus (Schrader) Hu – Z; > P. pubescens var. pubescens – K, Z; > P. pubescens var. intercus (Beadle) A.H. Moore – K]

322. LOASACEAE A.L. de Jussieu 1804 (Loasa Family) [in CORNALES]


*Mentzelia* Linnaeus (Blazingstar)

*Mentzelia floridana* Nuttall ex Torrey & A. Gray, Stickleaf. Hammocks, shell middens, dunes, other dry sands. Ne. FL (Duval County) south to s. FL. [= K, S, WH]

### 323. BALSAMINACEAE

A Richard 1822 (Touch-me-not Family) [in ERICALES]


**Impatiens** Linnaeus (Jewelweed, Touch-me-not, Snapweed, Balsam)


1. Corolla purple, pink, or white; plants 3-6 (-8) dm tall; stems puberulent or glabrous; [cultivated alien, rarely escaped].
2. Sepal spur strongly recurved; stems puberulent. .......................................................... *I. balsamina*
3. Sepal spur slightly curved; stems glabrous or with widely scattered hairs. .......................................................... *I. walleriana*


*Impatiens capensis* Meerburgh, Orange Jewelweed, Orange Touch-me-not, Spotted Touch-me-not. Moist forests, bottomlands, cove forests, streambanks, bogs. May-November. NL (Newfoundland) west to SK, NT, and BC, south to SC, Panhandle FL, AL, TX, CO, ID, and OR. Within the portion of our area where *I. capensis* and *I. pallida* overlap, the two species often occur in mixed populations. *I. capensis* tends to have the leaf apices and crenulations more rounded than *I. pallida*, but the character is overlapping and variable. [= RAB, C, F, GW, K, W, WV; = *I. biflora* Walter – G, S]

*Impatiens pallida* Nuttall, Yellow Jewelweed, Yellow Touch-me-not, Pale Touch-me-not. Cove forests, streambanks, seepages, moist forests, bogs, roadsides. July-September. NS and QC west to SK, south to e. VA, we. NC, TN, WV, MO, and OK. [= RAB, C, F, GW, K, S, W, WV]

*Impatiens walleriana* Hooker f., Garden Impatiens. Suburban woodlands, weakly spreading from horticultural plantings; native of Africa. [= K, WH]

### 327. POLEMONIACEAE

A.L. de Jussieu 1789 (Jacob’s-ladder Family) [in ERICALES]

A family of 18 genera and 350-380 species, herbs, vines, and shrubs (rarely trees), mainly of temperate North America, but extending into tropical America and also in Eurasia. References: Wilson (1960a); Grant (1997); Grant (1998); Prather, Ferguson, & Jansen (2000); Wilken in Kubitzki (2004).

1. Leaves simple; [tribe Polemoniae] .......................................................................................... 5. *Phlox*
2. Leaves compound.
3. Leaf segments ovate or elliptic, 5-16 mm wide; corolla blue; [tribe Polemoniae] .......................................................................................... 4. *Polemonium*
4. Leaf segments linear, ca. 1 mm wide; corolla red, yellow, or blue; [tribe Gilieae] .......................................................................................... 3. *Ipomopsis*
5. Inflorescences elongate; flowers red or yellow .................................................................................. 2. *Gilia*
6. Inflorescences spherical; flowers blue or white
7. Inflorescence bracts not spinose; inflorescence on a long peduncle; flowers blue; plant 1-9 dm tall .................................................................. 1. *Gilia*
8. Inflorescence bracts spine-tipped; inflorescence not long-pedunculate, subtended by bracts; flowers white; plant < 1 dm tall ...............

*Gilia* Ruiz & Pavón 1794 (*Gilia*)
A genus of about 40 species, herbs, of w. North America.


2. **Navarretia** Ruiz & Pavón 1794 (Navarretia)


3. **Ipomopsis** Michaux 1803 (Standing-cypress)


**Ipomopsis rubra** (Linnaeus) Wherry, Standing-cypress. Sandhills, sand rims of Carolina bays, dunes, roadbanks, disturbed areas. June-August; August-September. Sc. NC south to e. peninsular FL, west to TX and OK, spread from cultivation in other areas to the north (including sites in the Piedmont and Mountains of GA and NC). [= RAB, K, WH, Z; = *Gilia rubra* (Linnaeus) A.A. Heller – C, F, G, S]

4. **Polemonium** Linnaeus 1753 (Jacob's-ladder)


1 Stamens exserted 5-7 mm from the corolla; flowers in a compact panicle, the pedicels usually shorter than the calyx; flowering in July .............. *P. vanbruntiae*
1 Stamens included in the corolla; flowers in a diffuse, corymbiform panicle, the pedicels usually longer than the calyx; flowering in April-May.
2 Inflorescence minutely puberulent; corolla 12-16 mm long .......................................................... P. reptans var. reptans
2 Inflorescence densely glandular-villous; corolla 8-12 (-13) mm long, ........................................ P. reptans var. villosum

**Polemonium reptans** Linnaeus *var. reptans*, Spreading Jacob's-ladder. Moist, nutrient-rich forests, such as bottomlands and rich slopes. April-May; June. NY west to MN, south to VA, nc. NC, nw. GA, AL, and e. OK. [= C, K; < P. reptans – RAB, F, G, S, W, WV]

**Polemonium reptans** Linnaeus *var. villosum* E.L. Braun. Moist forests. Appalachian Plateau and vicinity, in s. OH and e. KY. [= C, K; < P. reptans – F, G]

**Polemonium vanbruntiae** Britton. Calcareous fens, swamps, and streambanks. May-July. ME, VT, and n. NY south to se. PA, sw. PA, and e. WV. [= K; = *P. van-bruntiae* – C, F, G, WV, orthographic variant]

5. **Phlox** Linnaeus 1753 (Phlox)

A genus of about 70 species, herbs (to subshrubs), of temperate North America (with 1 species in ne. Asia). References: Wherry (1955)=Z; Ferguson, Krämer, & Jansen (1999); Wilken in Kubitzki (2004). Key based on C and Z.

1 Stems woody or suffrutescent, trailing or decumbent; leaves to 25 mm long (-60 mm long in *P. bifida*), to 3 (-5) mm wide, generally with short-shoots or fascicles of leaves in the axils of leaves of the sterile shoots.
2 United portion of the style 5-12 mm long, the cleft portion ca. 1 mm long.
3 Larger leaves > 3 cm long; nodes 4-5, spaced; petals deeply notched, the notch 1.5-5 mm deep .................................................... *P. bifida*
3 Larger leaves < 2.5 cm long; nodes >6, crowded; petals shallowly notched, the notch 0.5-3 mm deep................................................. *P. subulata*
2 United portion of the style 1.5-4 mm long, the cleft portion 0.5-2 mm long.
POLEMONIACEAE

1 Stems herbaceous, erect or decumbent; leaves (at least the larger) > 25 mm long and/or > 5 mm wide, generally lacking axillary fascicles of leaves.

5 Style short, 1-4 mm long, the united portion 1-1.5 × as long as the cleft portion; stamens shorter than the corolla tube (thus included).

6 Upper leaves alternate; annual; corolla red, white, or variegated; [alien, mostly naturalized in dry sandy soils of roadsides, fields, and disturbed areas]................................................................................................................. P. drummondi

11 Plants forming colonies by rhizomes, stolons, and/or prostrate sterile shoots with evergreen to semi-evergreen leaves; flowering shoots 1-4 (-5) dm tall.

12 Plants with rhizomes and stolons tipped with clustered, evergreen, linear to lanceolate leaves 3-12 cm long, 5-10 (-12) mm wide.............................................. P. buckleyi

13 Leaf margin ciliate-serrulate; lateral veins of the leaves readily apparent, these joining to form a connecting vein parallel to the leaf margin.

14 Bracts of the inflorescence pubescent with non-glandular hairs; corolla tube pubescent (rarely glabrous); leaves subopposite (at least near the inflorescence); nodes usually 15-40; leaves usually 3-4 × as long as wide.............................................. P. paniculata

18 Nodes 16-35, crowded; upper leaves lanceolate to ovate-oblong; flowering late summer............. P. thalii

19 Calyx subcampanulate, the sepals narrow with a well-developed midrib, the junction-membranes thin, narrow, becoming markedly plicate-keeled (to slightly plicate-keeled)......................................................................................... P. glabrerrima

Phlox amoena
Sims, hairy Phlox, Chalice Phlox. Dry woodlands and forests, roadbanks, sandhills. April-June, June-July.
W. NC west to s. KY, south to n. FL and MS. (= C, F, G, S, W; = P. amoena ssp. amoena – K, Z; < P. amoena – RAB, WH (also see P. lighthei))

Phlox amplifolia
Britton, Broadleaf Phlox. Moist forests, particularly over mafic rocks. July-August. W. VA west to s. IN and se. MO, south to w. NC, AL, and n. AR. (= RAB, C, F, G, K, S, W, WV, Z)

Phlox bifida

Phlox buckleyi

Phlox carolina
Linnaeus, Carolina Phlox, Thick-leaf Phlox, Giant Phlox. Forests, woodlands, woodland borders, barrens. May-July. VA, WV, IL and MO south to s. GA, s. AL, s. MS, se. LA and e. TX. (= RAB, G, S, W; < P. glabrerrima – C; > P. carolina
POLEMONIACEAE


**Phlox drummondii** Hooker, Annual Phlox, Drummond Phlox. Dry sandy soils of road sides, fields, disturbed areas; native of TX. April-July. Wherry recognized 3 subspecies in *P. drummondii*, all endemic to TX; it does not seem meaningful to try to distinguish infraspecific taxa in our area, since our plants are the progeny of various cultivars derived from hybrids and selections of the wild taxa. [= RAB, F, G, S, WH; > P. drummondii ssp. drummondii – K, Z]


**Phlox drummondii** Hooker, Annual Phlox, Drummond Phlox. Dry sandy soils of road sides, fields, disturbed areas; native of TX. April-July. Wherry recognized 3 subspecies in *P. drummondii*, all endemic to TX; it does not seem meaningful to try to distinguish infraspecific taxa in our area, since our plants are the progeny of various cultivars derived from hybrids and selections of the wild taxa. [= RAB, F, G, S, WH; > P. drummondii ssp. drummondii – K, Z]

**Phlox floridana** Bentham. Sandhills. SW GA and SE AL south to FL Panhandle and nw. peninsular FL. [= K, S, WH, Z]


**Phlox lighthipei** Small, Lighthipe’s Phlox. Dry to moist sandy soils. April-May; June-July. S. SC south to n. FL. [= S; = P. amoena ssp. lighthipei (Small) Wherry – K, Z; < P. amoena – RAB, WH]

**Phlox maculata** Linnaeus var. maculata, Northern Meadow Phlox. Moist forests and openings. June-July. S. QC west to MN, south to c. NC, KY, and IA. [= F, G, WV; = P. maculata ssp. maculata – K, Z; < P. maculata – C, S]


Phlox pulchra Wherry, Alabama Phlox. [habitat] Endemic to c. AL. [= K] {add to synonymy}

Phlox stolonifera Sims, Creeping Phlox. Moist forests. April-May; May-June. PA and s. OH south to w. NC, n. GA, and e. TN, essentially a Southern and Central Appalachian endemic. This species is sometimes locally abundant, as in parts of Great Smoky Mountains National Park. [= RAB, C, F, G, K, S, W, WV, Z]

Phlox subulata Linnaeus, Moss Phlox, Mountain-pink. Dry and exposed rock outcrops, rocky flood-scoured riversides, dry woodlands over a wide variety of rocks, shale barrens. April-May. NY and OH south to w. NC and TN; escaped or naturalized more widely from horticultural use. Infraspecific taxa that are sometimes recognized seem poorly correlated with morphology and geography. [= RAB, S, W; > P. subulata var. australis – G; > P. subulata var. setacea (Linnaeus) Brand – C; > P. subulata var. brittonii – F, WV; > P. subulata var. setacea (Wherry) Wherry – K, Z; > P. subulata ssp. brittonii (Small) Wherry – K, Z; > P. brittonii Small – S; > P. subulata var. subulata – C, F, WV; < P. subulata var. subulata – C (also see var. brittonii); > P. subulata var. ciliata Wherry – G; > P. subulata ssp. subulata – K, Z]

330. PENTAPHYLACACEAE Engler 1897 (Pentaphylax or Sakaki Family) [in ERICALES]

A family of 12 genera and ca. 340 species, of the tropics and subtropics (a few of warm temperate areas), mainly of Asia and America. There is nomenclatural dispute over whether to use the name Pentaphylacaceae (which is conserved) or the older Ternstroemiaceae. References: Weitzman, Dressler, & Stevens in Kubitzki (2004).

Cleyera Thunberg 1783 (Sakaki)

A genus of about 8 species, of e. Asia, se. Asia, and tropical America.

* Cleyera japonica Thunberg, Sakaki. Moist forests and bluffs; native of e. Asia (Japan, China, Nepal, n. India, Myanmar). Locally and aggressively naturalizing at Kalmia Gardens, Coker College, Hartsville, Darlington County, SC, where perhaps planted as long ago as the 1930s. [= K1; = Ternstroemia japonica (Thunberg) Thunberg]

331. SAPOTACEAE A.L. de Jussieu 1789 (Sapodilla Family) [in ERICALES]

A family of about 53-54 genera and 1100-1250 species, trees and shrubs, primarily tropical (rarely temperate), of Old World and New World. References: Elisens, Whetstone, & Wunderlin in FNA 2009); Pennington in Kubitzki (2004); Govaerts, Frodin, & Pennington (2001).

Sideroxylon Linnaeus 1754 (Bumelia, Buckthorn, Bully)

As defined broadly by Pennington (1991), Sideroxylon includes about 75 species, widely distributed in the New World and Old World Tropics (our species are the northern tip of a "tropical iceberg"). Pennington found that no consistent set of characters could be used to separate Bumelia from other New World genera (such as Mastichodendron and Dipholis), and that the New World segregate genera were also not separable from several Old World genera. The Linnaean Sideroxylon has nomenclatural priority. References: Elisens & Jones in FNA (2009); Clark (1945)=V; Cronquist (1945)=Q; Pennington (1991)=Z; Godfrey (1988)=Y; Govaerts, Frodin & Pennington (2001)=X; Allison (2006)=U. Key adapted from Y.

1 First-year twigs persistently pubescent; leaves pubescent beneath with appressed to tomentose hairs, ranging in color (depending partly on age) from silvery through coppery to dark brown.

2 Mature leaves densely pubescent beneath, the hairs sericeous, matted and shiny; leaves 2-5 (-7) cm long, 0.5-2 (-3) cm wide .......... S. tenax
1 First-year twigs pubescent when young, soon becoming glabrous or nearly so; leaves glabrous, glabrate, or sparsely pubescent beneath with pubescent hairs on upper leaf surface, deciduous. Leaf blade oblong or obovate, more or less asymmetrical, 1-4 (-5.2) cm long; 

2 Mature leaves pubescent beneath, the hair s woolly-tomentose, neither matted nor shiny; leaves 1-10 cm long, 0.5-4 cm wide. 

3 Low shrub, 0.1-0.5 (-1) m tall, clonal from subterranean stems; leaves 1-4 (-5.2) cm long; [endemic to xeric sands in GA] ...........................

4 Leaf pubescence slightly tawny when leaves are first emerging, later becoming gray or white ..........S. lanuginosum

5 Shrub or small tree, to 20 m tall, sometimes multi-stemmed but not extensively clonal; leaves 1-12 (-15) cm long; [collectively widespread].

6 Lower leaf surface glabrous or glabrescent, green; {stems…}. 

7 Leaf blade not conspicuously reticulate ...............................................................................................................................S. alachuense

8 Upper surfaces of the mature leaf blades faintly and coarsely reticulate-veined (at 20× or greater magnification), the veins of the reticulum not at all raised, usually somewhat impressed, and, although pale, not bony-cartilaginous ..........S. thornei

9 Larger leaf blades 8-12 (-15) cm long; large shrub or small tree, the stem usually solitary; berries 10-15 mm long, 10-12 mm in diameter; [of NC, SC, and VA and southward] ..............................................................S. lycioides

10 Larger leaf blades 2-5 (-7) cm long; small to large shrub, usually multi-stemmed; berries 5-8 mm long, ca. 5 mm in diameter; [of NC and SC and southward]..............................................S. reclinatum ssp. reclinatum

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Sideroxylon alachuense L.C. Anderson, Alachuah Bella, Silver Buckthorn. Sandy hammocks, shell middens. S. GA south to c. peninsular FL. [= FNA, K; = Bumelia anomala (Sargent) R.B. Clark – V, Y; = S. alachense – K, misspelled: = B. lanuginosa (Michaux) Persoon var. anomala Sargent]

Sideroxylon celastroides (Kunth) T.D. Pennington, Saffron-plum. Sandy hammocks. Peninsular FL (immediately south of our area), s. AL, s. TX, south through Mexico and Central America to n. South America; West Indies. [= FNA, K2, WH; X; = Bumelia celastroides Kunth]

Sideroxylon lanuginosum Michaux ssp. lanuginosum, Eastern Gum Bumelia, Eastern Gum Bull. Mesic to floodplain forests. E. GA south to nc. FL, west to LA. Other subspecies are more western. Reported for SC by Kartesz (1999) {investigate}. [= FNA, X; > S. lanuginosum ssp. lanuginosum – K; > S. lanuginosum ssp. albicans (Sargent) Kartesz & Gandhi – K; = Bumelia lanuginosa ssp. typica Q; < B. lanuginosa (Michaux) Persoon – S; > B. lanuginosa var. lanuginosa – V; > B. rufa Rafinesque – Y; = B. lanuginosa ssp. lanuginosum – Y; < S. lanuginosum – Z]


Sideroxylon lycioides Linnaeus, Buckthorn Bumelia, Buckthorn Bull. Maritime forests, maritime scrub, river bluffs, swamp margins, usually in circunnatural soil (over shell hash, coquina limestone, marl, or limestone), in the Piedmont and Mountains in rich, mesic forests over mafic or calcareous rocks. June-July; September-October. Se. VA south to Panhandle FL, west to se. TX, north in the interior to s. IN, s. IL, and se. MO, mostly on the Coastal Plain, but extending (in our area in NC and SC) to the upper Piedmont and north in the interior (primarily on limestone) to KY and TN. This species is extremely variable in leaf shape; though described in most works as 10-12 cm long and up to 4 cm wide, the leaves can be 15 cm long and 8 cm wide. The leaf apex can be acuminate, acute, rounded, or notched. [= FNA, K, X, Z; = Bumelia lycioides (Linnaeus) Persson var. RAB, C, G, GW, S, Y; > B. lycioides var. lycioides – F, V; > B. lycioides var. virginiana Fernald – F, V; > B. lycioides var. ellipsoidalis R.B. Clark – V; > B. smallii R.B. Clark – F]

Sapotaceae

Sideroxylon rufohirtum Herring & Judd, Red-haired Bully. Endemic to FL: ne. FL south to c. peninsular FL. (= FNA; = S. reclinatum Michaux ssp. rufotomentosum (Small) Kartesz & Gandhi – K; = Bumelia rufotomentosa Small – V, S, Y; = B. reclinata (Michaux) Ventenat var. rufotomentosa (Small) Cronquist – Q)

Sideroxylon tenax Linnaeus, Tough Buckthorn, Tough Bumelia, Tough Bully. Maritime scrub, maritime forests, also inland in hammocks. May-June; September-October. Se. NC south to s. peninsular FL. (= FNA, K, X, Z; = Bumelia tenax (Linnaeus) Willdenow – RAB, Q, V, Y; > B. tenax – S; > B. lacuum Small – S)

Sideroxylon thornei (Cronquist) Pennington, Thorne’s Bumelia, Swamp Bumelia. Bottomlands and limesink depressions, particularly over calcareous substrates. May-June; August-early October. Ne. GA south to Panhandle FL, and west to AL. The validity of this species has been supported by Anderson (1996). (= FNA, K, X, Z; = Bumelia thornei Cronquist – Y)

332. Ebenaceae Gürke 1891 (Ebony Family) [in ERICALES]

A family of 2-6 genera and 500-600 species, trees and shrubs, distributed in tropical and subtropical (rarely warm temperate) regions. References: Eckenwalder in FNA (2009); Wallnöfer in Kubitzki (2004).

Diospyros Linnaeus 1753 (Persimmon)

A genus of 500-600 species, trees and shrubs, of tropical and subtropical regions (with very few exceptions). The genus includes a variety of tropical trees called ebony in the wood trade. References: Eckenwalder in FNA (2009); Spongberg (1977)=Z; Wallnöfer in Kubitzki (2004).

Identification notes: Seedlings and fire sprouts are superficially very similar to Nyssa sylvatica, but can be separated in the following ways: bundle scar 1 per bud scar, narrowly crescent-shaped (vs. Nyssa with 3 distinct, circular, bundle scars arranged in a broad V pattern), leaves never with teeth (vs. Nyssa leaves sometimes with a few irregular teeth), leaves glabrate to tomentose with curly hairs (vs. glabrous or with a few straight, forward-pointing hairs), leaves with sessile to short-stipitate glands on upper surface of midrib and outer petiole, later becoming necrotic spots (vs. leaves without glands).

1 Twigs stout, reddish-pubescent; fruits to 10 cm in diameter; [cultivated alien] .................................................................................................................. [D. kaki]
1 Twigs slender, glabrous or with gray pubescence; fruits to 4 cm in diameter; [native] .................................................................................. D. virginiana

* Diospyros kaki Linnaeus f., Kaki, Kaki-plum, Japanese Persimmon. Rarely grown in our area for its fruits, which are much larger than D. virginiana (to 9 cm in diameter). (= FNA, Z) {not mapped; rejected as a component of our flora}

Diospyros virginiana Linnaeus, American Persimmon, Possumwood. Dry woods, sandhills, disturbed places, floodplain and mesic forests, fencerows. May-June; September-December (and persisting). CT, PA, OH, IN, IL, MO, and e. KS south to s. FL and TX. East of the Mississippi River, D. virginiana var. virginiana has leaves cuneate to rounded at the base, and glabrous or glabrescent; mostly west of the Mississippi River and perhaps eastward along the Coastal Plain, D. virginiana var. pubescens (Pursh) Dippel has leaves subcordate, and persistently pubescent. Though these differences seem relatively trivial, they are consistent, geographically correlated, and may be worthy of varietal recognition. Persimmons are famous for their sweet and edible fruits, and infamous for the bitter-astringency of the not fully ripe fruit. The species is dioecious, the male trees appear to reach a greater size than the females. The wood is one of the heaviest and hardest in e. North America. (= RAB, FNA, GW, K, W, WH, WV; > D. virginiana var. virginiana – C, F, G, Z; > D. virginiana var. pubescens (Pursh) Dippel; > D. virginiana – S; > D. mosieri Small – S]

333. Primulaceae Ventenat 1799 (Primrose Family) [in ERICALES]

As broadly circumscribed to include Myrsinaceae and Samolaceae, cosmopolitan in distribution. Following the discovery that various herbaceous and more largely temperate genera (Lysimachia, Trientalis, Anagallis, Samolus, etc.) traditionally placed in Primulaceae actually were more closely related to the largely tropical and woody Myrsinaceae, various authors, including Källersjö, Bergqvist, & Anderberg (2000) and Martins, Oberprieler, & Hellwig (2003) proposed the transfer of Lysimachia, Anagallis, and Trientalis to Myrsinaceae and of Samolus to Theophrastaceae. APG III (2009) alternatively merges Samolaceae and Myrsinaceae into Primulaceae, and recognizes variation at the subfamilial and tribal ranks; this approach is followed here. References: Cholewa in FNA (2009); Cholewa & Kelso in FNA (2009); Cholewa, Pipoly, and Rickston in FNA (2009); Channell & Wood (1959); APG III (2009); Källersjö, Bergqvist, & Anderberg (2000); Martins, Oberprieler & Hellwig (2003);

1 Pedicels ebracteate; corolla 3-7.5 mm long, the flowers 5-7 mm across; leaves all below the inflorescence; calyx lobes equaling or longer than tube; staminodes absent .................................................. Samolus ebracteatus
1 Pedicels with a minute bract near the middle; corolla 1.2-3 mm long, the flowers 2-3 mm across; leaves extending into the inflorescence; calyx lobes equaling or shorter than tube; staminodes present ............................................................................................... Samolus parviflorus

Samolus ebracteatus Humboldt, Bonpland, & Kunth, Limewater Brookweed. Cp (FL): brackish marshes, swamps over calcareous substrate; rare. Peninsular FL, coastal Panhandle FL, sw. LA, and TX, south into Mexico; West Indies. [=FNA, GW, WH; > S. ebracteatus ssp. ebracteatus – K; > S. ebracteatus ssp. alyssoides – K]

Samolus parviflorus Rafinesque, Water-pimpernel, Brookweed. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, VA, WV): stream banks, brackish marshes, pools in floodplains, interdune ponds; common (uncommon in WV). April-October. NB west to BC, south to Central America; also in c. and s. South America. Sometimes treated as a subspecies of the European S. valerandi; the American plant is sufficiently distinct to warrant specific status. S. parviflorus has priority over S. floribundus by a month. [=RAB, F, FNA, GW, W, WV; = Samolus floribundus Kunth – C, G, S; = S. valerandi Linnaeus ssp. parviflorus (Rafinesque) Hultén – K, WH]

2. Hottonia Linnaeus 1753 (Water-violet)


Hottonia inflata Elliott, Featherfoil, Water-violet. Cp (DE, NC, SC, VA), Pd (GA, NC), Mt (WV): slow-moving or stagnant waters of swamps, millponds, beaverponds, sag ponds, oxbows, rivers, probably dispersed by waterfowl, primarily in the Coastal Plain, very rarely in the Piedmont and Mountains; rare. April-July; May-August. ME south to GA, west to TX, inland up the Mississippi Embayment to IL, and at other scattered locations inland (as w. WV, and especially around the Great Lakes). The species shows large population fluctuations, and may be essentially ephemeral at many locations. Townsend (1995) documents its first SC record. [=RAB, C, F, FNA, G, GW, K, S, WV]

3. Primula Linnaeus 1753 (Shooting star)

A genus of about 450 species, primarily of the temperate Northern Hemisphere. Mast et al. (2004) show that Dodecatheon is nested within Primula, and is closely related to (and derived from) Primula subgenus Auriculastrum, apparently via a relatively

1 Leaves cordate, subcordate, or abruptly narrowed to the petiole .............................................................. *P. frenchnii *
1 Leaves long-cuneate at the base, gradually narrowed to the petiole .............................................................. *P. meadia*

**Primula frenchnii** (Vasey) A.R. Mast & Reveal, French's Shooting-star. Ledges, cliffs. April-May. IN, IL, and MO south through KY to AL and AR. [= Y; = Dodecatheon mediana Linnaeus var. frenchnii Vasey – C, F, G, Z; = D. frenchnii (Vasey) Rydberg – FNA, K]

**Primula meadia** (Linnaeus) A. R. Mast & Reveal, Eastern Shooting Star. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (FL, SC): rich forests, woodlands, and rock outcrops (primarily calcareous or mafic), especially with nutrient-rich seepage; uncommon (rare in NC). Late March–early June; late May–June. MD and PA west to s. WI, se. MN, IA, and OK, south to sc. SC, n. GA, n. FL (Gadsden County), AL, and TX. [= Y; = Dodecatheon mediana – RAB, FNA, W, WH, WV; > D. meadia Linnaeus var. mediana – C, F, G, Z; > Dodecatheon mediana Linnaeus var. brachycarpum (Small) Fassett – C, F, G, Z; > D. meadia ssp. mediana – K; > D. meadia ssp. brachycarpum (Small) R. Knuth – K; > D. brachycarpus Small – S; > D. meadia – S; > D. hugeri Small – S; > D. meadia var. genuinum – Z; > D. meadia var. obesum Fassett – Z]

4. **Ardisia** Swartz 1788 (Marlberry)


5. **Myrsine** Linnaeus 1753 (Cocicwood)

A genus of about 300 species (if circumscribed to include *Rapanea*), shrubs and trees, pantropical. References: Pipoly & Ricketson in FNA (2009); Ståhl & Anderberg in Kubitzki (2004).

* *Myrsine cubana* A. de Candolle, Myrsine, Colicwood. Cp (FL): hammocks; rare. Dixie, Levy, and Volusia Counties FL, south to s. FL; West Indies and Central America. [= FNA; = M. guayanensis (Aublet) Kuntze – GW, misapplied; > M. floridana A. de Candolle – K (superfluous name); > M. guayanensis – S, misapplied, orthographic variant; > Rapanea punctata (Lamarck) Lundell – WH]

6. **Anagallis** Linnaeus 1753 (Pimpernel)


1 Leaves alternate; flowers subsessile, on thick pedicels 0.3-1.0 mm long; leaf blades 3-10 mm long ................................................................. *A. minima*
1 Leaves opposite (occasionally in whorls of 3); flowers pedicellate, on slender pedicels 10-25 mm long; leaf blades 5-30 mm long.
2 Petals blue, ca. 2× as long as the sepals .............................................................................................................................................. *A. monelli*
2 Petals red or white (rarely blue), ca. 1× as long as the sepals.
3 Flowers red (rarely white); pedicels usually longer than the leaves ............................................................................................ *A. arvensis* ssp. arvensis
3 Flowers blue; pedicels usually shorter than the leaves ................................................................................................. *A. arvensis* ssp. foemina


* *Anagallis arvensis* Linnaeus ssp. foemina (P. Miller) Schinz & Thellung, Blue Pimpernel. Cp (DE), Pd (DE): disturbed areas; rare, native of Europe. Also reported as introduced in PA, KY, OH, and other scattered states north and west of our area (Kartesz 1999). [= K; = Anagallis arvensis Linnaeus var. caerulea (Schreber) Grenier & Godron – C, G; < A. arvensis – RAB, F, FNA, GW, W; = A. arvensis ssp. coerulea Hartman – S]


* *Anagallis monelli* Linnaeus, Blue Pimpernel. Cp (VA): along intermittent stream in suburban woodlands; rare, probably only a waif, native of sw. Europe. Reported for Fairfax County, VA by Harvill et al. (1992) and Shetler & Orli (2000). [= FNA, K]

**PRIMULACEAE**
7. Trientalis Linnaeus 1753 (Starflower)


Identification notes: Trientalis can be recognized by its terminal whorl of leaves (4-10 cm long), the one to several white flowers borne on terminal, slender pedicels, each flower typically with 7 petals (inconspicuously united at the bases), each petal acuminate. The plant is reminiscent of a white-flowered Lysimachia with only one whorl of leaves.

Trientalis borealis Rafinesque, Northern Starflower, Maystar. M1 (GA, NC, VA, WV), C1 (DE): northern hardwood forests, rich slope forests, often in second-growth areas; uncommon (rare in DE, GA, and NC). May-June. This northern species, widespread in the mountains of VA, and known from a few locations in n. GA and ne. TN (Chester, Wofford, & Kral 1997), was first located in NC only in 1988 (Dellinger 1989). "The attractive white corollas, usually with 7 petals united only at the very base, are open in the late spring and they drop intact – like fallen stars" (Voss 1996). [= FNA; = Trientalis borealis Rafinesque ssp. borealis – K; < T. borealis – C, F, G, W, WV]

8. Lysimachia Linnaeus 1753 (Loosestrife)

A genus of about 150 species, herbs (rarely shrubs), cosmopolitan. Hao et al. (2004) showed that the traditional subgeneric classification of Lysimachia is highly artificial, and that Glauca is embedded within Lysimachia. References: Cholewa in FNA (2009); Coffey & Jones (1980)=Z; Hao et al. (2004); Ståhl & Anderberg in Kubitzki (2004). Key partly adapted from Z.

1 Petals present. .............................................................................................................................................................................................. L. maritima

1 Petals lacking.......................................................................................................................................................................................... L. terrestris

2 Leaves opposite or whorled; flowers yellow, borne variously. .................................................................................................................................. L. neglecta

2 Leaves opposite, or some leaves in whorls; flowers yellow, borne variously. ................................................................. L. punctata

3 Leaf blades linear-elliptic, lanceolate or narrowly ovate .............................................................................................................. L. nummularia

3 Leaf blades broadly elliptic, broadly lanceolate, or broadly ovate .................................................................................................. L. ciliata

4 Leaves nearly round; plant erect (or trailing and rooting at the nodes in L. radiicans, which has lanceolate leaves). ........................................................................................................................................ L. terrestris

4 Leaves linear, lanceolate, elliptic, or ovate; plant erect (or trailing and rooting at the nodes in L. radiicans, which has lanceolate leaves). ........................................................................................................................................ L. terrestris

5 Flowers 5-7 mm across; sepals about 1× as long as the petals ........................................................................................................ L. virginica

5 Flowers 16-24 mm across; sepals about ½× as long as the petals ......................................................................................... L. ×producta

6 Flowers in a terminal raceme or panicle, subtended by bracts much smaller than the stem leaves. ..................................................... L. ×producta

6 Flowers in a terminal raceme or panicle, subtended by bracts much smaller than the stem leaves. ..................................................... L. ×producta

7 Inflorescence a terminal panicle. .................................................................................................................................................. L. fraseri

7 Inflorescence a terminal raceme. .................................................................................................................................................. L. fraseri

8 Leaves linear to lanceolate, broadest near the base, with 3 prominent veins........................................................................... L. ×producta

8 Leaves linear to lanceolate, broadest near the middle, with 1 prominent vein. .................................................................................. L. ×producta

9 Leaves linear to narrowly lanceolate, (1-)-2-4-8 mm wide; sepals stipitate-glandular ........................................................................ L. ×producta

9 Leaves lanceolate to elliptic, 7-20 mm wide; sepals glabrous. ........................................................................................................ L. ×producta

10 Flowers in part (the lower) in the axils of well-developed leaves .............................................................................................. L. ×producta

10 Flowers in the axils of much reduced linear bracts ..................................................................................................................... L. ×producta

11 Flowers in peduncled axillary racemes in the axils of midstem leaves; petals linear to lanceolate, ca. 5 mm long and ca. 1 mm wide, much surpassed by the stamens; [Naumbergia]................................................................................................................ L. thyrsiflora

11 Flowers solitary, or most of them subtended by leaves similar in shape to (though often somewhat smaller than) stem leaves not subtending flowers (or with flowers in axillary, peduncled, densely-flowered racemes in L. thyrsiflora).

12 Petals yellow, marked with black lines; sepals 2.5-4.5 mm (L. vulgaris) or 5.5-9 mm long (L. punctata); stem hairy; [alien]. ................................................................. L. punctata

12 Petals yellow, marked with black lines; sepals 2.5-4.5 mm (L. vulgaris) or 5.5-9 mm long (L. punctata); stem hairy; [alien]. ................................................................. L. punctata

13 Petals plain yellow, not marked with black lines; sepals 2.5-4.5 mm (L. vulgaris) or 5.5-9 mm long (L. punctata); stem hairy; [alien]. ................................................................. L. punctata

13 Petals plain yellow, not marked with black lines; sepals 2.5-4.5 mm (L. vulgaris) or 5.5-9 mm long (L. punctata); stem hairy; [alien]. ................................................................. L. punctata

14 Calyx lobes 3-5 mm long, with red margins; corolla lobes 8-12 mm long, entire ................................................................. L. ×producta

14 Calyx lobes 3-5 mm long, with red margins; corolla lobes 8-12 mm long, entire ................................................................. L. ×producta

15 Mid-cauline leaves with petioles ciliate their entire length. ........................................................................................................... L. punctata

15 Mid-cauline leaves with petioles ciliate their entire length. ........................................................................................................... L. punctata

16 Mid-cauline leaves 1-2 mm wide; flowers 7-14 mm across; [of ne. AL]......................................................................................... L. punctata

16 Mid-cauline leaves 1-2 mm wide; flowers 7-14 mm across; [of ne. AL]......................................................................................... L. punctata

17 Mid-cauline leaves ovate to lanceolate, 17-60 mm wide; sepals with 3 (or 6) usually reddish-brown veins .... L. ciliata

17 Mid-cauline leaves lanceolate to linear, 4-23 mm wide; sepals without reddish-brown veins.

18 Cilia of the petiole not extending onto the leaf blade; leaf blade lanceolate to ovate, typically 2-4× as long as wide, rounded to cuneate at the base; sepal venation conspicuous; capsules 4-6.5 mm in diameter ............................. L. ×producta

18 Cilia of the petiole not extending onto the leaf blade; leaf blade lanceolate to ovate, typically 2-4× as long as wide, rounded to cuneate at the base; sepal venation conspicuous; capsules 4-6.5 mm in diameter ............................. L. ×producta

19 Rhizomes absent, new shoots arising from crown of rootstock ................................................................................................. L. ×producta

19 Rhizomes present, new shoots arising from the rhizome.
Lysimachia asperulifolia

Poiret, Pocsin Loosestrife, "Roughleaf Loosestrife". Cp (NC, SC): low pocosins, high pocosins, streamhead pocosins, savanna-pocosin ecotones, sandhill-pocosin ecotones; rare. May-June; August-October. Endemic to the Coastal Plain of NC and SC. L. asperulifolia is a very distinctive species, easily recognized vegetatively by its whorls of sessile, rounded-based, acuminate, bluish-green (to yellowish-green when shaded or otherwise stressed) leaves. The leaves of L. asperulifolia are not rough; the common name "roughleaf loosestrife" is a misnomer, based on a mistranslation of the specific epithet, the translator assuming that "asperulifolia" meant "rough-leaved." The epithet actually refers to the perceived similarity of the leaves to those of the European Asperula odorata (treated in this work as Galium odoratum), Sweet Woodruff, a plant with which Poiret would have been very familiar. The leaves of G. odoratum are similar to those of L. asperulifolia in their whorled disposition. Franklin (2001) studied the biology of this rare species. [= FNA; K; = L. asperulaefolia – RAB, GW, S (orthographic variant)]

* Lysimachia barystachys

Bunge, Manchurian Loosestrife. Pd (GA): disturbed areas; rare, native of Manchuria. Reported from a single county in nc. GA (Jones & Colle 1988) [further investigate]. [= FNA, K]

* Lysimachia ciliata


* Lysimachia clethroides

Duby, Gooseneck Loosestrife. Mt (NC, WV): roadsides (cultivated and rarely persistent or escaped); rare, native of Japan. July-August. Collected in the Mountains of NC (Macon County), escaped from cultivation; it is also reported as naturalized in Grundy County, TN (Chester, Wofford, & Kral 1997, Kral 1981). It and L. barystachys differ from our other species in their white flowers in a dense terminal spike (with secund tip) and alternate leaves. [= C, FNA, G, K]

* Lysimachia fraseri

Duby, Fraser's Loosestrife. Mt (GA, NC, SC): hardwood forests, forest edges and roadbanks, thin soils around rock outcrops, usually flowering only when exposed to extra sunlight by a tree-fall light gap or other canopy opening; rare. June-August; September-October. W. NC and e. TN south to n. SC, n. GA, and AL; disjunct in s. IL and nw. TN (Stewart County) (Chester, Wofford, & Kral 1997). This rare species is limited in NC to the mountains south of the Asheville Basin, especially in the escarpment gorges of Macon and Jackson counties. Potentially the largest and coarsest of our Lysimachia (up to 2 meters tall), L. fraseri usually occurs as much smaller seedlings and non-flowering individuals. When a tree-fall light gap occurs, individuals flower and fruit. Even seedlings can be separated from the more common and widespread L. quadrifolia by the following characteristics (all best observed at 10×): leaves with a narrow, translucent red border, upper internodes of the stem glandular-puberulent, and backlit leaf without sinus, translucent lineations (L. quadrifolia: leaves without red border, upper internodes sparsely pubescent with longer, nonglandular hairs, or rarely a few of the hairs with slightly bulbous tips, and backlit leaf with numerous sinusuous, translucent lineations). [= RAB, FNA, GW, K, S, W]

* Lysimachia hybrida

Michaux, Lowland Loosestrife. Cp (DE, FL, NC, SC, VA), Mt (NC, VA, WV), Pd (NC, VA): mesic hardwood forests, wet areas; rare. June-August; September-October. ME and s. QC west to AB and WA, south irregularly to ne. FL, Panhandle FL, AR, NE, and AZ. [= C, F, FNA, K, W, WV, Z; = L. lanceolata var. hybrida (Michaux) A. Gray – RAB, GW, WH; = Steironema hybridum (Michaux) Rafinesque ex B.D. Jackson – G, S]

* Lysimachia japonica


* Lysimachia lanceolata


* Lysimachia loomisi

Torrey, Carolina Loosestrife. Cp (GA, NC, SC): moist to wet savannas, pocosin ecotones; uncommon (rare in GA). May-June; August-October. Endemic to the outer and middle Coastal Plain of NC, SC, and e. GA. L. × radfordii = hybrid of L. loomisi × quadrifolia, is intermediate between its parents. [= RAB, FNA, GW, K, S]

* Lysimachia maritima

(Linnaeus) Galasso, Banfi, & Soldano, Sea-milkwort. Cp (MD, NJ, VA?): saline coastal habitats; rare. June-July. The species is interruptedly circumboreal, in North America from QC south to VA on the east coast, and from BC south to OR on the west coast, also inland in w. North America, from SK south to NM. G suggests that L. maritima is introduced near its southern limit in the east. [= FNA; = Glaux maritima Linnaeus – C; K; > G. maritima var. maritima – F, G]

* Lysimachia nummularia

Linnaeus, Creeping Charlie, Creeping Jenny, Moneywort. Pd (DE, GA, NC, SC, VA), Mt (NC, SC, VA, WV), Cp (DE, NC, SC, VA): lawns, pastures, seepages, other moist, disturbed places; common (uncommon in GA, NC, SC), native of Europe. May-July; August-September. The leaves have many minute, maroon dots. [= RAB, C, F, FNA, G, GW, K, S, W]
**PRIMULACEAE**

**Lysimachia × producta** (A. Gray) Fernald (pro sp.). Mt (NC, VA), Pd (VA), Cps (NC): moist areas; rare. May-July; August-October. This is a fertile hybrid of *L. quadrifolia* and *L. terrestris*, sometimes occurring in the apparent absence of one or both parents. [= RAB, C, FNA, K; *L. producta* (A. Gray) Fernald – G, S]  


* Lysimachia quadriflora *Sims, Smooth Loosestrife, Four-flowered Loosestrife. Mt (GA, VA, WV): wet meadows and calcareous fens, stream banks; rare. July-September. MA, s. ON, MI, and ND south to w. VA, WV, nw. GA, AL, and AR; mainly north and west of the Ohio River, very rare and scattered in or east of the Appalachians. Reported for c. NC by Coffey & Jones (1980), the record seems very unlikely and is rejected unless documentation is found. [= F, FNA, K, W, WV, Z; = Steironema quadriflora (Sims) Hitchcock – G]  

* Lysimachia quadrifolia *Linnaeus, Whorled Loosestrife. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cps (DE, NC, SC, VA): a wide variety of forests and openings, including pine savannas of the outer Coastal Plain, ranging from moist to very dry; common (uncommon in Coastal Plain south of VA). May-August; August-October. ME west to WI and MN, south to SC, c. GA, AL, and TN. Although the species normally has whorled leaves, immature and small plants often have opposite leaves only. See *L. fraseri* for discussion of vegetative features useful in distinguishing the two species. *L. × radfordii* Ahles, a hybrid of *L. loomisii × quadriflora*, is intermediate between its parents. [= RAB, C, F, FNA, G, GW, K, S, W, WV]  

* Lysimachia radicans *Hooker, Trailing Loosestrife. Mt (VA), Cps (VA): moist forests, swamps; rare. June-August. The main distribution of this species is in the Mississippi Embayment, from MO and w. TN south to s. AL, MS, AR, LA, and e. TX; disjunct occurrences in VA and (allegedly) e. NC are curious. The report for NC is from a species list for Nags Head Woods, Dare County; it is unpublished, apparently not documented by an herbarium specimen, and rejected unless documentation is found. [= C, F, FNA, K, W, Z; = Steironema radicans (Hooker) A. Gray – G, S]  


* Lysimachia thyrsiflora *Linnaeus, Tufted Loosestrife. Mt (WV): bogs, swamps, marshes; rare. May-July. Circumboreal, south in North America to NJ, PA, OH, and MO (Kartesz 1999), WV (FNA), and MD (from Big Marsh, Kent County) (Steury, Tyndall, & Cooley (1996), NE, CO, UT, and CA. [= C, F, K; = Naumburgia thyrsiflora (Linnaeus) Duby – G]  

* Lysimachia tonsa *(Wood) ex Pax & R. Knuth, Southern Loosestrife, Appalachian Loosestrife. Pd (GA, NC, SC, VA), Mt (GA, VA, WV): upland forests, especially over calcareous or mafic rocks; rare. May-July; August-October. Sc. VA, sw. VA, and KY south to SC, wca. GA, and e. TN. The range is centered on the Southern Appalachians, but the species is essentially absent from the higher mountains – a "doughnut range." [= RAB, C, F, FNA, K, W, WV, Z; = Steironema intermedium (Kearney – G) Ahles, a hybrid of *L. loomisii × quadriflora*, is intermediate between its parents. [= RAB, C, F, FNA, G, GW, K, S, W, WV, Z; = Steironema radicans (Hooker) A. Gray – G, S]  

* Lysimachia vulgaris *Linnaeus, Garden Loosestrife. Mt (WV): disturbed bottomlands, marshes, disturbed areas; rare, native of Europe. Introduced and naturalized south at least to se. and sc. PA (Rhoads & Klein 1993), WV, KY, MD, and NJ (Kartesz 1999) and now reported for all of WV (Steury, Fleming, & Strong 2008). [= C, F, FNA, G, K]  

* Lysimachia graminea *(Greene) Handel-Mazzetti, Grassleaf Yellow-loosestrife. Endemic to ne. AL (Little River Canyon area). [= FNA, K, Z; = Steironema gramineum Greene – S]  

**334. THEACEAE** D. Don 1825 (Tea Family) [in ERICALES]  

With a more circumscribed definition (excluding Pentaphylacaceae), a family of about 9 genera and 450 species, trees and shrubs, of primarily tropical and subtropical regions of the Old and New Worlds. References: Prince in FNA (2009); Prince & Parks (2001); Stevens, Dressler, & Weitzman in Kubitzki (2004).  

1 Leaves deciduous, medium green above, herbaceous in texture.  
2 Leaves broader toward the tip, 2-2.5× as long as wide; [tribe Gordonieae] ................................................................. Frankinia  
2 Leaves broadest near or below the middle, 1-1.8× as long as wide; [tribe Stewartieae] ................................................................. Stewartia  
1 Leaves evergreen, dark green above, coriaceous in texture.  
3 Leaves ovate to elliptic (broadest at or below the middle), 1-3× as long as wide, slightly to strongly acuminate, 5-10 (<15) cm long; [introduced shrub, planted in upland soils]; [tribe Theaceae] ................................................................. Camellia  
3 Leaves oblanceolate to narrowly elliptic (broadest at or above the middle), 2.5-4× as long as wide, acute to obtuse (rarely slightly acuminate), 8-30 cm long; [small to large tree, native in acidic Coastal Plain wetlands]; [tribe Gordonieae] ................................................................. Gordonia  

**Camellia** Linnaeus 1753 (Camellia, Tea)  


1 Sepals deciduous; flowers sessile; leaves mostly ovate, acuminate, > 4 cm wide ................................................................. C. japonica  
1 Sepals persistent; flowers on pedicels; leaves mostly elliptic, only slightly acuminate, < 4 cm wide ................................................................. C. sinensis
Camellia japonica Linnaeus, Camellia. Frequently cultivated, sometimes persistent around old home sites; native of China and Japan. [= K]

Camellia sasanqua Thunberg, Sasanqua Camellia, is reported as introduced in NC, SC, GA, and FL (Kartesz 1999). [= K] [not yet keyed]

Camellia sinensis (Linnaeus) Kuntze, Tea. Cultivated in plantations and as a horticultural novelty, rarely escaped; native to China. [= K; = Thea sinensis Linnaeus]

Franklinia Bartram ex Marshall 1785 (Franklinia)

A monotypic genus, apparently endemic to e. GA (now presumably extinct in the wild). Franklinia is actually most closely related to the Asian genus Schima (Prince & Parks 2001); its closest relative in North America is Gordonia, from which it differs in its deciduous leaves (vs. evergreen) and globose fruits (vs. pointed). References: Prince in FNA (2009); Bozeman & Rogers (1986); Stevens, Dressler, & Weitzman in Kubitzki (2004).

Franklinia alatamaha Bartram ex Marshall, Franklinia. Habitat speculative, probably dry sandy ridges, near the mouth of the Altamaha River; believed to be extinct in the wild. It was native to the Coastal Plain of GA, where it was found by William Bartram near the mouth of the Altamaha River. It has not been seen in the wild since 1803 and is now considered to be extinct in the wild. It is sometimes cultivated in our area. Bozeman & Rogers (1986) discuss the history of this tree. [= FNA, K, S; = Gordonia alatamaha (Bartram ex Marshall) Sargent]

Gordonia Ellis 1771 (Loblolly Bay, Gordonia)

As recircumscribed, a genus of 2 species, trees, of se. North America and Central America (Gordonia brandegeei H. Keng). The other 20-70 species, trees and shrubs, of se. Asia, previously assigned to Gordonia are actually in a different tribe and should be reassigned to Polyspora (Yang et al. 2004). References: Prince in FNA (2009); Yang et al. (2004); Stevens, Dressler, & Weitzman in Kubitzki (2004).

Identification notes: Gordonia is one of the "bay trees" so typical of acid Coastal Plain wetlands of our area – the other two being Sweet Bay (Magnolia virginiana of the Magnoliaceae) and Swamp Red Bay (Persea palustris of the Lauraceae). Gordonia can be distinguished from the other two species by its smooth leaves, serrate toward the tip, odorless when crushed (vs. pubescent leaves, entire-margined, aromatic when crushed). Gordonia is also distinctive in its narrow, conical crown, resembling Liriodendron or Chamaecyparis, and its medium-gray, deeply furrowed bark. Most individuals of Gordonia have at least a few orange-red leaves visible, at any season.

Gordonia lasianthus (Linnaeus) Ellis, Loblolly Bay, Gordonia. Pocosins, bayheads, acidic, organic-rich swamp forests, wet pine savannas, bay forests. July-September; September-October. Ne. NC south to s. peninsular FL, west to s. MS (Sorrie & Leonard 1999), a Southeastern Coastal Plain endemic. Peat-filled Carolina bays and large peat dome pocosins typically have Gordonia as an important tree, surpassed in abundance and importance only by Pinus serotina. On deep peats, Gordonia individuals are stunted and rarely reach sizes larger than pocosin shrubs. [= RAB, FNA, GW, K, S, WH]

Stewartia Linnaeus 1753 (Stewartia, Wild Camellia)

A genus of about 20 species, trees and shrubs, of temperate e. Asia and e. North America. Both our species of Stewartia are very attractive shrubs. The other species of the genus are Asian. Li et al. (2002) demonstrate that our 2 species form a clade together, separate from and basal to the Asian species; Prince (2002) shows a different tree topology. References: Prince in FNA (2009); Spongberg (1974)=Z; Li et al. (2002); Prince (2002); Stevens, Dressler, & Weitzman in Kubitzki (2004).

Identification notes: The leaves are borne in horizontal planes, reminiscent of Cornus florida and Cornus alternifolia. The leaves of both species are obsequiously serrate or crenate, and also conspicuously and copiously ciliate-margined.

1 Style 1, with a 5-lobed stigma; seeds 5-7 mm long, shiny, plump, angled; fruit lobes rounded; leaves mostly 4-10 cm long, with 7-8 pairs of lateral veins; petioles narrowly winged (0.1-1 mm wide), not enclosing and concealing the terminal and lateral buds; calyx subtended by 2 persistent bracts, each 2-4 mm long; seeds shiny.................................................................S. malacodendron

1 Styles 5, separate; seeds 8-10 mm long, dull, flat, thin (to slightly winged); fruit lobes angled; leaves mostly 7-15 cm long, with 5-7 pairs of lateral veins; petioles widely winged (1-2 mm wide), enclosing and concealing the terminal and lateral buds; calyx subtended by 1 persistent bract, 11-14 mm long; seeds dull...........................................................................................................................................S. ovata
Stewartia malacodendron Linnaeus, Silky Camellia, Virginia Stewartia. Mesic forests, especially on beech-dominated bluffs or "islands" in Coastal Plain swamps. May-June; September-October. Primarily Coastal Plain, se. VA south to FL, west to se. TX, but extending inland to the Piedmont of GA, NC, and SC and the Mountains of NC. [= RAB, FNA, K, W, WH, Z; = Stewartia malacodendron – C, F, G (orthographic variant); = Stauria malachodendron – S (orthographic variant)]

Stewartia ovata (Cavanilles) Weatherby, Mountain Camellia, Mountain Stewartia. Mesic forests, especially acidic bluffs, often in openings in rhododendron thickets ("hells"), in the Coastal Plain of VA restricted to ravines. Late June-July; August-September. Primarily Appalachian: e. KY, sc. VA, e. VA south to c. NC, w. SC, e. and c. TN to n. GA and n. AL, avoiding, however, the higher mountains, and extending into the Coastal Plain in e. VA. The species is most abundant in the Cumberland Plateau of KY and TN. [= RAB, C, F, FNA, G, K, W, Z; = Malachodendron pentagynum (L'Héritier) Small – S]

335. SYMPLOCACEAE Desfontaines 1820 (Sweetleaf Family) [in ERICALES]

A family of 1 genus and about 250-300 species, trees and shrubs, of tropical and warm temperate America and Asia. References: Nooteboom in Kubitzki (2004).

Symplocos Jacquin 1760 (Sweetleaf)

A genus of about 300 species, trees and shrubs, of tropical and warm temperate America and Asia. Wang et al. (2004) found that the affinities of S. tinctoria are with South American species of subgenus Epigenia, rather than with east Asian species of subgenus Hopea, section Palaeosymplocos. References: Wang et al. (2004); Nooteboom in Kubitzki (2004).

Identification notes: The foliage of S. tinctoria has a sweet taste, and an odor and taste similar to green apples. Sometimes the leaves are glossy and appear subcoriaceous, somewhat resembling Kalmia latifolia.

1 Leaf margins sharply and finely glandular-dentate; inflorescence a terminal panicle; drupes blue (white); [alien, rarely cultivated and escaped]; [subgenus Palauros].........................................................................................................................S. paniculata

1 Leaf margins entire to coarsely serrate-crenate; inflorescence an axillary fascicle; drupes green; [native, common in parts of our area]; [subgenus Symplocos; section Barberina].......................................................................................................................................S. tinctoria

* Symplocos paniculata (Thunberg) Miq., Sapphire-berry, Asiatic Sweetleaf. Suburban woodlands; native of e. Asia. Spreading from plantings at scattered locations in the ne. United States, such as DE and District of Columbia (Whittemore 2003).

Symplocos tinctoria (Linnaeus) L'Heritier, Sweetleaf, Horsesugar. Moist bottomland forests, pocosin edges, mesic forests, ridgeline forests. March-May; August-September. DE south to n. FL and west to e. TX and se. OK. The range in our area is discontinuous and interesting, the species rather abundant in the Coastal Plain throughout our area, and in the Mountains of NC and SC (absent from the VA mountains!), but present in the Piedmont only near its borders with the other provinces and in scattered sites in the central Piedmont. The leaves have a subcoriaceous and rather evergreen appearance, but are (in our area) only semi-evergreen. As the name implies, the leaves are somewhat sweet, but the sweetness seems variable from plant to plant, season to season, and taster to taster. Whether sweet or not, the taste is distinctive and is helpful (once learned) in distinguishing this rather nondescript shrub or small tree. Where protected from fire, S. tinctoria can reach considerable size, up to 20 cm in diameter and 10 m tall, with longitudinally striped bark. [= RAB, C, GW, K, S, W, WH; > S. tinctoria var. tinctoria – F, G; > S. tinctoria var. pygmaea Fernald – F, G (probably based on fire sprouts); > S. tinctoria var. ashei Harbison]

336. DIAPENSIACEAE (Link) Lindley 1836 (Diapensia Family) [in ERICALES]


1 Leaves cauline, generally < 10 mm long and < 3 mm wide; [of Coastal Plain pinelands]................................................................. Puxidanthanthera

1 Leaves basal (or on a short caudex), generally > 50 mm long and > 30 mm wide; [throughout our area, more common in the Piedmont and Mountains].

2 Leaves orbicular, rounded or with a slight point at the apex, finely serrate (4-8 teeth per cm), the teeth not prominently mucronate; flowers in racemes; [widespread]............................................................................................................................................... Galax
2 Leaves broadly elliptic, generally emarginate (slightly notched) at the apex, coarsely serrate (1–4 teeth per cm), the teeth prominently mucronate; flowers solitary; [native to humid gorges along the escarpment between the Mountains and Piedmont, sometimes cultivated and becoming established elsewhere].................................................................................................................................Shortia

**Galax** Sims 1804 (Galax)


**Galax urceolata** (Poiret) Brummitt, Galax. Mountain forests, rock outcrops, nearly ubiquitous in the Mountains, more restricted in habitat elsewhere, moist to dry slopes in the Piedmont and Coastal Plain, often associated with *Kalmia latifolia* or *Rhododendron maximum*. May–July; August–October. The genus consists of this single species, with a range centered in the Southern Appalachians, occurring in NC, SC, GA, AL, e. TN, KY, VA, WV, and MD. Diploid and tetraploid races exist, and both are present in our area (Nesom 1983). In NC, diploids are the predominant race in the Mountains, the s. Piedmont, and the s. and c. Coastal Plain; tetraploids predominate along the Blue Ridge Escarpment, the n. Piedmont, and the n. Coastal Plain. In SC, diploids occur in the Coastal Plain and Piedmont, tetraploids in the mountains and escarpment. In GA, the pattern is similar, with diploids extending further into the Piedmont and tetraploids restricted to the Mountains and upper Piedmont. In AL, only diploids are known. In VA, however, tetraploids occupy the Coastal Plain and e. Piedmont, diploids in the upper Piedmont and Mountains. A study of the flavonoids supported the idea that the tetraploid is an autopolyploid derivative of the diploid. Because of the close morphologic similarity, substantially sympatric distributions, and apparent general absence of demonstrable ecologic differentiation between the two races, it seems best not to attempt to taxonomically distinguish them (Nesom 1983; Soltis, Bohm, & Nesom 1983). "Galax-pulling" (the gathering of the often bronze-colored evergreen leaves for the florist trade) is an important folk industry in the mountains. [= FNA, K, W, X; = *G. aphylla* Linnaeus – RAB, C, F, G, S, WV, misapplied]

*Pyxidanthera* Michaux 1803 (Pyxie-moss, Pyxie)


1 Leaves (3.3) 4–10 mm long; leaves lanceolate, averaging > 1.0 mm wide (oblanceolate and up to 2.5 mm wide if etiolated under leaf litter); leaves (in fresh material) herbaceous in texture, < 0.1 mm thick; leaves of sterile shoots ciliate along the margins at the base, usually also pubescent on the upper surface near the base, but the pubescence rarely extending > 1/3 of the way from the base to the tip; internodes usually > 1 mm long; [of moist sites in the outer and inner Coastal Plain, including the Sandhills]............................................................. *P. barbulata*

1 Leaves 1–5 mm long (to 7 mm long if etiolated under leaf litter); leaves ovate, averaging < 1.2 mm wide (lanceolate and up to 1.5 mm wide if etiolated under leaf litter); leaves (in fresh material) succulent in texture, up to 0.5 mm thick; leaves of sterile shoots ciliate along the margins; internodes usually < 1 mm long; [in extremely xeric sites over coarse deep sand or clay in the Sandhills region or se. NC and se. SC] ......................................................................................... *P. brevifolia*

*Pyxidanthera barbulata* Michaux, Common Pyxie-moss, Big Pyxie. Pine savannas, pine flatwoods, pocosin margins, edges of sandhill seepage bogs, primarily in mesic to hydric sites, in wet sands and peaty sands, occasionally extending to submesic sands, but generally with a permanently or seasonally high water table, often with *Sphagnum*. March–April; May–June. NY (Long Island) south to NJ, and from se. VA south to n. SC. In the Sandhills, where its range overlaps *P. brevifolia*, *P. barbulata* is limited to seepage areas or pocosin ecotones, while *P. brevifolia* occurs in xeric situations far upslope. [= F, FNA, G, GW, K, S; = *P. barbulata* var. barbulata – RAB, < *P. barbulata* – X, Z]

*Pyxidanthera brevifolia* B.W. Wells, Sandhills Pyxie-moss, Wells’s Pyxie-moss, Little Pyxie. On xeric sandhills, generally over deep sand or sand-clay mixtures near the summits or on the upper slopes of sandhills, restricted to the Sandhills region. December–March; February–May. This species is endemic to a six-county area of the Sandhills of NC and SC. In NC, it is nearly limited to Fort Bragg, and is puzzlingly absent from seemingly suitable habitat on the Sandhills Game Land to the west. The taxonomic status of this entity has been controversial, with different authors considering it a species, a variety, or an ecotype not worthy of taxonomic status. A combination of morphologic, embryologic, phytogeographic, ecological, and phenologic evidence favors the recognition of two taxa in *Pyxidanthera*. Recent surveys of *Pyxidanthera* in the Sandhills of NC have shown that it is ecologically distributed in a strongly bimodal manner. While ecologically intermediate situations predominate in the Sandhills, this habitat is rarely occupied by *Pyxidanthera*. Instead, *Pyxidanthera* is usually found either in very dry (hill-top) or moist (pocosin ecotones) situations. A few morphologically intermediate populations are occasionally found, in ecologically intermediate situations, but the vast majority of populations are readily assigned to one taxon or the other. Godt & Hamrick (1995) showed low levels of allozyme differentiation between the two taxa and supported varietal status. [= FNA, K, S; = *P. barbulata* var. brevifolia (B.W. Wells) Ahles – RAB, < *P. barbulata* – X, Z]

*Shortia* Torrey & Gray 1842 (Shortia, Ocone Bells)
A genus of 5-6 species, perennial herbs, of e. Asia and the Southern Appalachians. The Asian species are: *S. uniflora* (Maximowicz) Maximowicz of montane Japan (with 3 varieties), *S. rotundifolia* (Maximowicz) Makino of Japan, *S. exappendiculata* Hayata, of montane Taiwan, *S. soldanelloides* (Siebold & Zuccarini) Makino, of montane Japan (with as many as 5 varieties recognized), and *S. sinensis* Hemsley of montane Yunnan Province, China. References: Nesom in FNA (2009); Davies (1952)=Z; Hatley (1977)=Y; Barnes (1990); Scott in Kubitzki (2004).

1 Style 6-10 (-12) mm long; filaments generally 5-7 mm long; corolla lobes 14-17 mm long; [native of McDowell County, NC] ..................................................

1 Style (10-) 12-18 mm long; filaments generally 6-9 mm long; corolla lobes 16-25 mm long; [native to Transylvania and Jackson counties, NC, Oconee and Pickens counties, SC, and Rabun County, GA; introduced elsewhere] ...........................................

*Shortia galacifolia* Torrey & A. Gray var. *brevistyla* Davies, Northern Shortia. On moist slopes, creekbanks, and rock outcrops in humid escarpment gorges with high rainfall, generally in deep shade under *Rhododendron maximum*, at elevations of 350-550m. March–April; July–August. This variety is known only from McDowell County, NC, where it occurs on several tributaries of the Catawba River and North Fork Catawba River. It has also been reported from the gorge of the Linville River, Burke County, but this locality is questionable and has not been relocated. This area is disjunct about 100 kilometers to the northeast along the Blue Ridge Escarpment from the range of the typic variety. In addition to the characters used in the key, var. *brevistyla* differs in a variety of characters of the flowers and leaves, as discussed in Davies (1952) and Hatley (1977). Whether the recognition of infraspecific taxa is warranted is not clear; Davies argued for and Hatley against. Though the morphological characters are relatively minor and partially overlapping, their correlation with disjunct ranges and their likely influence on pollination and reproduction influence me to provisionally accept varietal status, pending further research. [= FNA, K, Z; < *Sherwoodia galacifolia* (Torrey & A. Gray) House – S]

*Shortia galacifolia* var. *galacifolia*, Southern Shortia, Oconee Bells. On moist slopes, creekbanks, and rock outcrops in humid escarpment gorges with high rainfall, generally in deep shade under *Rhododendron maximum and R. minus*, at elevations (in NC) of 350-650m. March–April; July–August. This variety occurs in Transylvania and Jackson counties, NC, Oconee and Pickens counties, SC, and Rabun County, GA, where it occurs in the remarkable escarpment gorges region, at elevations from 200-650m (formerly at lower elevations, now submerged under Lake Jocassee). Most of the population of this species, including the type locality, was destroyed in the early 1960’s by the construction of Lake Jocassee (Zahner & Jones 1983). In the gorge tributaries of the Eastatoe, Toxaway, Horsepasture, and Thompson rivers, *Shortia* can sometimes form a dense groundcover covering acres. Various outlying locations, such as in NC (Swain and Macon counties), VA (Amherst County), and TN (Blount, Monroe, and McMinn counties) are not considered native, and are adventive or the result of persistence after cultivation. The species is prized by gardeners, and survives well outside its natural range. [= FNA, K, Z; < *Sherwoodia galacifolia* – RAB, C, G, W, X, Y; < Sherwoodia galacifolia (Torrey & A. Gray) House – S]

337. STYRACACEAE Dumortier 1829 (Storax Family) [in ERICALES]


1 Corolla lobes 4; fruit elongate, winged, 2.5-5 cm long; petioles 15-25 mm long.......................................................... *Halesia*

1 Corolla lobes 5; fruit globose, not winged, 0.5-0.9 cm in diameter; petioles 2-10 mm long.......................................................... *Styrax*

1 Petals united only basally, the lobes longer than the tube; fruits broadly 2-winged; leaves broadly obovate to suborbicular, 1-2× as long as wide.

2 Corolla 10-15 mm long.................................................................................................................................................. *H. diptera var. diptera*

2 Corolla 20-30 mm long.................................................................................................................................................. *H. diptera var. magniflora*

*Halesia* J. Ellis ex Linnaeus 1759 (Silverbell, Snowdrop Tree)

A genus of about 4 species, trees and shrubs, of e. North America and e. Asia. The genus was named to honor Stephen Hales; it therefore seems more appropriate to pronounce the genus with three syllables (the accent on the first) than the commonly heard four, which thoroughly distorts the honoree’s name. The number of taxa in our area and their appropriate taxonomic level are in dispute; recent analyses vary from 2-5, with specific or varietal status. References: Fritsch in FNA (2009); Fritsch & Lucas (2000)=X; Reveil & Seldin (1976)=Y; Sargent (1921); Godfrey (1988)=Z.

1 Petals united only basally, the lobes longer than the tube; fruits broadly 2-winged; leaves broadly obovate to suborbicular, 1-2× as long as wide.

2 Corolla 10-15 mm long.................................................................................................................................................. *H. diptera var. magniflora*

2 Corolla 20-30 mm long.................................................................................................................................................. *H. diptera var. diptera*
STYRACACEAE

1 Petals united for most of their length, the tube longer than the lobes; fruits narrowly or broadly 4-winged; leaves elliptic-oblong, ca. 2× as long as wide.

2 Leaves generally broadly obovate, sometimes broadly ovate, 5-14 cm long, 4-10 cm wide, the apices acute to short-acuminate, densely and finely pubescent beneath, giving the underside of the leaf a pale color; inflorescence usually of 5-20 flowers .............................................. S. japonicus

3 Leaves narrowly elliptic to ovate or obovate, usually 2-8 cm long, 1-4 cm wide, the apices short- to long-acuminate, glabrous or sparsely pubescent beneath (to densely pubescent and then giving the underside of the leaf a rusty color in var. pulverulentus); inflorescence usually of 1-7 flowers.

4 Leaves oblong-elliptic, glabrous or sparsely pubescent on the undersurfaces and petioles, the margins usually distantly toothed toward the apices; pedicels 10-14 mm long; calyces essentially glabrous; new growth glabrous to sparsely pubescent ................................................................. S. americanus var. americanus

5 Leaves elliptic to ovate or oblanceolate or obovate, sparsely to densely scurfy-hairy on the undersurfaces and petioles, margins entire to serrate; pedicels 4-6 mm long; calyces and pedicels densely scurfy-hairy; new growth densely matted pubescent .............................................. S. americanus var. pulverulentus

Styrax Linnaeus 1753 (Snowbell, Storax)

A genus of about 120-130 species, trees and shrubs, of s. Europe, Malesia, se. Asia, se. North America, and tropical America. References: Gonsoulin (1974)=Z. Nicolson & Steyskal (1976) discuss at length the grammatical gender of the genus, and conclude that it should be treated as masculine.

1 Pedicels 15-50 mm long ................................................................................................................................................ S. japonicus

2 Pedicels 4-10 (-14) mm long

3 Leaves oblong-elliptic, glabrous or sparsely pubescent on the undersurfaces and petioles, the margins usually distantly toothed toward the apices; pedicels 10-14 mm long; calyces essentially glabrous; new growth glabrous to sparsely pubescent ................................................................. S. americanus var. americanus

4 Leaves elliptic to ovate or oblanceolate or obovate, sparsely to densely scurfy-hairy on the undersurfaces and petioles, margins entire to serrate; pedicels 4-6 mm long; calyces and pedicels densely scurfy-hairy; new growth densely matted pubescent .............................................. S. americanus var. pulverulentus

Styrax americanus Lamarck var. americanus, American Snowbell, American Storax. Swamp forests, pocosin edges, other moist to wet habitats. April-June; July-September. Var. americanus ranges from ne. WV, OH, s. IN, s. IL, s. MO, south to s. FL and e. TX. See discussion below on var. pulverulentus and the presence in our area of transitional plants. [= C; < S. americana – RAB, G, GW, W; < S. americana var. americana – F; Z; = S. americana – Y]

Styrax grandifolius Aiton, Bigleaf Snowbell, Bigleaf Storax. Upland forests, bluffs. April-May; August-September. Se. VA south to ne. FL and Panhandle FL, west to e. TX, north to se. MO. [= C, FNA, K, WH; = S. grandifolia – RAB, F, G, S, W, Z]

Styrax japonicus Siebold & Zuccarini, Japanese Snowbell. Suburban woodlands; native of e. Asia. [= FNA, K]
A family of 3 genera and about 22 species, perennial insectivorous herbs, of e. North America (Sarracenia), w. North America (Darlingtonia), and ne. South America (Heliamphora). References: Mellichamp in FNA (2009); Neyland & Merchant (2006); Kubitzki in Kubitzki (2004).

**Sarracenia** Linnaeus 1753 (Pitcherplant)


**Identification notes:** Hybrids between the various species of pitcher-plants are relatively frequent; see Bell (1952), Bell & Case (1956), Mellichamp (2008), and Mellichamp in FNA (2009) for further discussion. They are usually rather easy to determine, since they show intermediacy in characters, and usually are found in close proximity to both parents.

1. Pitchers mostly decumbent; lateral wing of the pitcher very prominent; petals maroon to pink; **[section Erectae]**

2. Pitchers prominently marked with white on the hood; hood of the pitcher globose; orifice formed by the fusion of the hood margins ...

3. Petals pale pink; lip of pitcher 2.6-7.5 mm thick at thickest point; scape 16.3-35.1 cm high; style arm 2.6-4.1 cm long; [of the Gulf Coastal Plain, from sw. GA westward] ........................................................................................................... S. purpurea var. purpurea

4. Pitchers > 3× as long as broad; pitchers glabrous on the outer surface; petals dark maroon (occasionally red); rhizomes generally vertical, and with relatively many pitchers per crown (often 6-10); [of Ya. VA northward] ........................................... S. purpurea var. purpurea

5. Hood lobes closely incurved, touching each other or nearly so, obscuring the hood opening; hairs lining the hood averaging 0.8-1.0 mm long; [of the Mountains of sw. NC, nw. SC, and ne. GA] ................................................................. S. purpurea var. montana

6. Areas of white tissue all around the summit of the pitcher and throughout the hood, the areas of bright white tissue surrounded by a conspicuous network of reddish venation; hood erect or ascending; petals maroon .............................................. S. leucophylla

7. Areas of white tissue all around the summit of the pitcher and throughout the hood, the areas of bright white tissue surrounded by a conspicuous network of reddish venation; hood arching horizontally over the orifice; petals pale lemon yellow

8. Pitchers with white (or whitish and translucent) patches toward the summit and behind the orifice and/or on the hood.

9. Petals yellow; pitcher hood 4-10 (-14) cm wide.

10. Phyllodia (nonpitcher leaves) many per plant and forming a rosette, 5-18 cm long, strongly curved, usually curving 45-90 degrees; scapes taller than the pitchers; [inland, from sw. NC and e. TN south and west to n. and wc. GA and e. AL] ................................................. S. oreophila

Phyllodia (nonpitcher leaves) rare, only a few per plant (if present at all), 12-30 cm long, straight to slightly curved; scapes shorter than the pitchers; [of the Coastal Plain and rarely Piedmont, from se. VA southward to n. FL and west to e. TX].

11. Narrowed base of the hood not purple-spotted, its sides revolute but not rolled backwards and nearly touching; blade of the hood ovate, slightly cordate basally; [of the Coastal Plain, from s. AL west to e. TX] .................................................................................. S. alata

12. Narrowed base of the hood usually purple-spotted, its sides strongly rolled backwards (away from the orifice) such that they nearly touch; blade of the hood broadly reniform to orbicular-reniform, broadly cordate basally; [of the Coastal Plain and rarely Piedmont, from se. VA southward to n. FL and west to se. MS] ........................................................................... S. flavus

**STYRACACEAE** Dumortier 1829 (Pitcherplant Family) [in ERICALES]

A family of 3 genera and about 22 species, perennial insectivorous herbs, of e. North America (Sarracenia), w. North America (Darlingtonia), and ne. South America (Heliamphora). References: Mellichamp in FNA (2009); Neyland & Merchant (2006); Kubitzki in Kubitzki (2004).
SARRACENIACEAE

9 Petals maroon; pitcher hood < 4 cm wide (except S. alabamensis ssp. alabamensis, which can be up to 8.8 cm wide).

12 Orifice wing loosely rolled, with a pronounced “spout” over the wing; summer pitchers ca. 10× as long as the width of the pitcher mouth; orifice yellow-green; [of the Coastal Plain of c. and s. AL and s. MS]

13 Pitcher background color yellow, the upper pitcher weakly or not veined on the outer surface; [of c. AL (Autauga, Chilton, and Elmore counties)] S. alabamensis ssp. alabamensis

13 Pitchers background color tan, the upper pitcher strongly reticulately veined on the outer surface; [of s. AL, s. MS, and w. FL]......

12 Orifice rim tightly rolled, with a very slight “spout” over the wing; summer pitchers narrow and elongate, ca. 20× as long as the width of the pitcher mouth; [of the Coastal Plain of NC, SC, GA, and Panhandle FL, and the Mountains of sw. NC and nw. SC].

14 Pitchers (25-) avg. 40-50 (-75) cm tall; scapes about the same height as the pitchers; hood ascending, leaving the orifice exposed, 1.5-6.5 cm long, 2.0-5.4 cm wide; orifice 2.8-4.2 cm wide; [of the Mountains of NC and SC]...

14 Pitchers (7-) avg. 15-60 cm tall (-35) cm tall; scapes 1.5-2× the height of the leaves (pitchers); hood horizontal, held closely over the orifice, 0.7-4.5 cm long, 0.7-3.9 cm wide; orifice 1.5-3.5 cm wide; [of the Coastal Plain of NC, SC, and GA].

15 Pitchers (7-) 15-43 cm tall; orifice 1.5-2.3 cm wide; [se. and sc. NC south through SC to sc. GA]...

15 Pitchers 47-61 cm tall; orifice 2.4-3.5 cm wide; [sw. GA west to FL Panhandle]...


Sarracenia flava Linnaeus, Yellow Pitcherplant, Trumpetsavannas, seepage bogs, pocosins. March-April; May-June. Se. VA south to n. FL and west to s. AL and se. MS. In the centers of peat domes and large peat-filled Carolina bays, S. flava is sometimes very abundant, occasionally the dominant plant over areas exceeding several square kilometers. [= RAB, C, F, FNA, G, GW, K, Q, U, W, Z; < S. flava – S (also see S. oreophila); > S. flava var. flava – X; > S. flava var. atropurpurea (Bull) C.R. Bell – X; > S. flava var. maximula Bull ex Masters – X; > S. flava var. ornata Bull ex Masters – X; > S. flava var. cuprea Schnell – X; > S. flava var. rugelii (Shuttleworth ex de Candolle) Masters – X; > S. flava var. rubricorpora Schnell – X]

Sarracenia jonesii Wherry, Mountain Sweet Pitcherplant. Bogs, cataract seeps. May; July. Endemic to a small area in sw. NC and nw. SC. There has been a great deal of disagreement over the taxonomic treatment of this taxon, a montane sibling of S. rubra. See Wherry (1929), Bell (1949), McDaniel (1971), Wherry (1972), Case and Case (1976), Schnell (1977), Massey et al. (1983), and McDaniel (1986) for further discussion. [= FNA, V, W; < S. rubra – RAB, GW, Q, U, Z; = S. rubra ssp. jonesii (Wherry) Wherry – K, X]

Sarracenia leucophylla Rafinesque, Whitetop Pitcherplant, Crimson Pitcherplant. Wet pine savannas. Sw. GA, w. FL, s. AL, and se. MS, a Gulf Coastal Plain endemic; introduced in eastern NC. The NC population (on Croatan National Forest, Carteret Co.) was apparently introduced in the 1980s; it is not known whether this species will spread in NC, but it is persisting and has been independently “discovered” several times. [= FNA, GW, K, U, X, Z; = S. drummondii Croom – Q, S]


Sarracenia minor Walter var. okefenokeensis Schnell, Okeefenokee Hooded Pitcherplant. On floating vegetation mats, ditches, and other very wet sites. Endemic to Okeefenokee Swamp, se. GA. See Schnell (2002a) for additional information. < S. minor – FNA, GW, K, Q, S, U, X, Z]


Sarracenia psittacina Michaux, Parrot Pitcherplant. Savannas. This distinctive species is distributed primarily in the East Gulf Coastal Plain, but ranges east to the Atlantic Coastal Plain of e. GA (Bullock County), in close proximity to the SC border. [= FNA, GW, K, Q, S, U, X, Z]
**SARRACENIACEAE**


*Sarracenia purpurea* Linnaeus var. *purpurea*, Northern Purple Pitcherplant. Bogs. April–May; June–July. The species as a whole is widespread in e. North America, the only *Sarracenia* to extend north of se. VA. Var. *purpurea* ranges from NL (Labrador) to NT and BC, south to NJ, DE, e. MD, w. MD (where not native), ne. VA, e. WV (where not native), OH, IN, IL, MN, and WA. A nomenclatural battle about the application of the typic variety has been resolved, with *purpurea* applying to the northern variety (Reveal 1993, Cheek 1994, Kartesz & Gandhi 1995, Cheek 2001). [= C, F, G, Z; < *S. purpurea* – RAB, GW, Q, S, U, W, WV; = *S. purpurea* ssp. *gibbosa* (Rafinesque) Wherry – K; = *S. purpurea* var. *terrae-novae* de la Pylaie – Reveal (1993); < *S. purpurea* ssp. *purpurea* – FNA; = *S. purpurea* ssp. *purpurea* – X]

*Sarracenia purpurea* Linnaeus var. *venosa* (Rafinesque) Fernald, Southern Purple Pitcherplant. Wet savannas, sandhill seepage bogs, hillside seepage bogs. April–May; June–July. Var. *venosa* is restricted to the Atlantic Coastal Plain of the southeastern United States, ranging from se. VA south to se. SC and e. GA; perhaps disjunct in e. LA. See MacRoberts & MacRoberts (2004) for a detailed discussion about old LA collections of *S. purpurea* or *S. rosea*. For those tolerant of quadrinomial taxonomy, plants in our area may be considered *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *venosa*. It is notable, though, that the findings of Godt & Hamrick (1999) and Ellison et al. (2004) do not support the greater relationship of the southern taxa to one another and their divergence from the northern taxon, and thus do not support the quadrinomial taxonomy. [= C, F, G, Z; < *S. purpurea* – RAB, GW, Q, S, U, W; = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald – FNA; = *S. purpurea* Linnaeus var. *purpurea* var. *purpurea* – K; = *S. purpurea* var. *purpurea* – Reveal (1993); = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *venosa* – X, Y]

*Sarracenia rosea* Naczi, F.W. Case, & R.B. Case, Rose Pitcherplant. Wet pine savannas and seepage bogs. Sw. GA and Panhandle FL west to s. MS and (?) e. LA. Schnell (1993) distinguished the distinctive East Gulf Coastal Plain population (with short peduncles, white stigmas, and pale pink petals) as *S. purpurea* ssp. *burkii* Schnell; Naczi et al. (1999) elevated this to species rank, as *S. rosea*. See Naczi et al. (1999) and Schnell (1993) for more detailed information and color photographs. Naczi et al.’s (1999) treatment of this taxon at specific rank is supported by the greater genetic distance found by Godt and Hamrick (1999) and morphologic and genetic analyses (Ellison et al. 2004). See MacRoberts & MacRoberts (2004) for a detailed discussion about old LA collections of *S. purpurea* or *S. rosea*. [= FNA, WH; < *S. purpurea* – GW, Q, S, U, Z; = *S. purpurea* Linnaeus var. *purpurea* var. *burkii* Schnell – K; < *S. purpurea* var. *purpurea* – Reveal (1993); = *S. purpurea* ssp. *venosa* (Rafinesque) Fernald var. *burkii* Schnell – X, Y]

*Sarracenia rubra* Walter ssp. *gulfinensis* Schnell, Gulf Pitcherplant. Seepage bogs and savannas. April–May. Sw. GA to Panhandle FL. Schnell (2002b) considers the populations of the "*rubra complex" in Taylor County, GA (the western Coastal Plain of GA, near the AL line) to be best assigned to "*gulfinensis*." [= FNA, K, WH, X; < *S. rubra* – GW, S, U, V, Z]

*Sarracenia rubra* Walter ssp. *rubra*, Sweet Pitcherplant, Redflower Pitcherplant. Sandhill seepage bogs, pocosins, wet savannas. April–May; June–July. Se. and sc. NC south to sc. GA. The *S. rubra* complex consists of five geographically isolated entities, variously treated as species, subspecies, or geographic races (see *S. jonesii* for some of the pertinent references). [= FNA, K, X; < *S. rubra* – RAB, GW, Q, S, U, V, Z]

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340. **ACTINIDIACEAE** Hutchinson 1926 (Kiwi-fruit Family) [in ERICALES]
ACTINIDIACEAE


Actinidia Lindley (Kiwi-fruit)

A genus of 40-60 species, lianas, of e. and se. Asia. In addition to *A. chinensis*, various other species in the genus *Actinidia* are in limited or novelty cultivation in our area; some show potential to escape and naturalize. References: Dressler & Bayer in Kubitzki (2004).

* Actinidia chinensis Planchon, Kiwi-fruit, Chinese Gooseberry. Pd (NC, VA), Mt (VA): suburban woodlands; rare, native of e. Asia. Also naturalized in nc. TN.

341. CLETHRACEAE Klotzsch 1851 (Clethra Family) [in ERICALES]

A monogeneric family of 65-95 species, shrubs and trees, primarily of tropical America and Asia. Sometimes combined into the Cyrillaceae. References: Tucker & Jones in FNA (2009); Sleumer (1967b); Anderberg & Zhang (2002); Schneider & Bayer in Kubitzki (2004).

Clethra Linnaeus (Sweet Pepperbush, White-alder, Clethra)

A genus of 65-95 species, shrubs and trees, primarily of tropical America and Asia. References: Tucker & Jones in FNA (2009); Sleumer (1967b)=Z ; Schneider & Bayer in Kubitzki (2004). Key based on FNA.

1 Leaves oblong or elliptic, averaging 11-13 cm long and 5-7 cm wide; distance up leaf margin from the leaf base to the first tooth avg. 2.4 cm; leaf margins leaf apex acuminate; inflorescence bracts exceeding the flowers; [of the Mountains]...............................

Clethra acuminata

1 Leaves obovate or oblong, averaging 5-9 cm long and 2-4 cm wide cm wide; distance up leaf margin from the leaf base to the first tooth avg. 3.4 cm; leaf apex obtuse to acute; inflorescence bracts shorter than the flowers; [of the Coastal Plain and rarely lower Piedmont].

2 Lower leaf surface sparsely hairy; petioles 2.5-3.5 (-6) cm long; styles 6-7 mm long, hairy at the base with straight hairs; filaments 0.2-0.3 (-0.4) mm in diameter........................................................................................................................................................................

C. alnifolia

2 Lower leaf surface wooly-tomentose; petioles 0.5-1 (-1.5) cm long; styles 3.5-5 mm long, downy throughout; filaments 0.4-0.5 (-0.7) mm in diameter........................................................................................................................................................................................

C. tomentosa


342. CYRILLACEAE Endlicher 1841 (Ti-ti Family) [in ERICALES]

A family of 2 genera and 3 or more species, ranging from se. North America to the West Indies and n. South America (following the removal of *Purdiaea* to the Clethraceae (Anderberg & Zhang 2002). References: Lemke in FNA (2009); Godfrey (1988); Anderberg & Zhang (2002); Thomas (1960)=Y; Kubitzki in Kubitzki (2004). Key adapted from Godfrey (1988).

1 Lateral veins of the leaf blades scarcely or not at all apparent on either surface; flowers in terminal and axillary racemes, the racemes solitary or several at a node, not markedly radiating; fruit 5-7 mm long, 2-5 winged................................................................. Cliftonia

1 Lateral veins of the leaf blades readily apparent on both surfaces, the main laterals neatly pinnate, the smaller veins forming a fine reticulum; flowers in lateral racemes, the racemes clustered together at the summit of the previous year's growth and radiating outward or reflected; fruit 2-2.5 mm long, not winged........................................................................................................................................................................... Cyrilla

Cliftonia Banks ex C.F. Gaertner 1807 (Black Ti-ti, Buckwheat-tree)

**Cliftonia monophylla** (Lamarck) Britton ex Sargent, Black Ti-ti, Buckwheat-tree. Acid bogs, bayheads, swamps, and streambanks. Se. SC south to n. FL, west to se. LA. [= FNA, GW, K, S, WH, Y]

**Cyrilla** Garden ex Linnaeus 1767 (Ti-ti)


1 Leaves mostly 1-4 cm long, mostly 0.5-1 cm wide; inflorescences mostly 4-9 cm long; petals < 3 mm long; [mostly of flatwoods ponds, in s. GA southward] ...................................................... C. parvifolia

1 Leaves mostly 5-10 cm long, mostly 1-2 cm wide; inflorescences mostly 10-18 cm long; petals > 3 mm long; [of various wetland habitats, throughout our area and widely distributed beyond] ...................................................... C. racemiflora

**Cyrilla parvifolia** Rafinesque, Littleleaf Ti-ti. Flatwood pond margins and along drains through savannas. S. GA south into Panhandle FL. Its taxonomy is problematic; while very distinctive in some places (such as Apalachicola National Forest, FL), apparent intermediates are seen elsewhere. [= K, S, Z; < C. racemiflora – FNA, GW, Y]

**Cyrilla racemiflora** Linnaeus, Ti-ti. Pocosins, swamps, lake and flatwood pond margins, streambanks, pine flatwoods. May-July; September-October. E. VA (Accomack County) south to FL, west to TX, and south into the West Indies, Belize, Mexico, and n. South America (Thomas 1960). The leaves are quite variable in shape and size; the venation and glossy smoothness, however, are distinctive once learned. Under various ecological conditions, titi can be anything from a small shrub to a medium tree (or large tree in the West Indies). [= RAB, C, G, K, S, Z; < C. racemiflora – FNA, GW, Y; > C. racemiflora var. racemiflora – F; > C. racemiflora var. subglobosa Fernald – F]

### 344. ERICACEAE

A.L. de Jussieu 1789 (Heath Family) [in ERICALES]

A family of about 107-124 genera and 3400-4100 species, primarily shrubs, small trees, and subshrubs, nearly cosmopolitan. The Ericaceae is very important in our area, with a great diversity of genera and species, many of them rather narrowly endemic. Our area is one of the north temperate centers of diversity for the Ericaceae. Along with *Quercus* and *Pinus*, various members of this family are dominant in much of our landscape. References: Tucker in FNA (2009); Gillespie & Kron (2010); Kron et al. (2002); Wood (1961); Judd & Kron (1993); Kron & Chase (1993); Luteyn et al. (1996)=L; Dorr & Barrie (1993); Cullings & Hileman (1997); Stevens et al. in Kubitzki (2004).

Main Key, for use with flowering or fruiting material

1 Plant an herb, subshrub, or sprawling shrub, not clonal by underground rhizomes (except *Gaultheria procumbens* and *Epigaea repens*), rarely > 3 dm tall; plants mycotrophic or hemi-mycotrophic (except *Epigaea, Gaultheria,* and *Arctostaphylos*).

2 Plants without chlorophyll (fully mycotrophic); stems fleshy; leaves represented by bract-like scales, white or variously colored, but not green; pollen grains single; [subfamily *Monotropoideae*; tribe Monotropeae].

3 Petals united; fruit nodding, a berry; flower and fruit several per stem ............................................................. 6. Monotropis

3 Petals separate; fruit erect, a capsule; flower and fruit 1-several per stem.

4 Flowers few to many, racemose; stem pubescent, at least in the inflorescence; plant yellow, orange, or red when fresh, aging or drying dark brown ................................................................................................................................. 5. Hypopitys

4 Flowers solitary; stem glabrous; plant white (rarely pink) when fresh, aging or drying black ................................................. 4. Monotropa
Plants with chlorophyll (hemi-mycotropic or autotrophic); stems woody; leaves present and well-developed, green; pollen grains in tetrads (single in Orthilia).

Herb with a rosette of ascending basal leaves; flowers scapose; [subfamily Monotropoideae; tribe Pyroloideae].

Style and filaments straight; filaments straight, the anthers closely surrounding the style; inflorescence distinctly secund (1-sided) ...

Style and filaments strongly declined; filaments curved, the anthers not closely surrounding the style; inflorescence slightly or not at all secund (1-sided) .......................................................... 3. Orthilia

Subshrub or sprawling shrub with cauline leaves; flowers axillary (except scapose in Chimaphila).

Plant erect, the leaves clustered near the apex of the single stem.

Leaves lanceolate or oblanceolate, normally 2-4× as long as wide (sometimes proportionately less narrow in stunted individuals; fruit a capsule, borne 1-several on an erect scape above the leaves [subfamily Monotropoideae; tribe Pyroloideae] .... 2. Chimaphila

Leaves obovate, 1-2× as long as wide; fruit a red berry, borne on nodding axillary pedicels beneath the leaves; [subfamily Vaccinioideae; tribe Gaultherieae] .............................................................. 27. Gaultheria

Plant creeping or sprawling, leaves scattered along the stems.

Leaves solitary and axillary; fruit a white berry; [subfamily Vaccinioideae; tribe Gaultherieae] ........................................... 27. Gaultheria

Leaves in axillary or terminal spikes or racemes; fruit a fleshy loculicidal capsule or red drupe.

Leaves glabrous, 1-3 cm long, tapered to the base; corolla urceolate; calyx not subtended by large bracts; [subfamily Arbutioideae] ........................................................................................................ 7. Arctostaphylos

Leaves pilose (glabrate in age), 2-10 cm long, rounded or subcordate at the base; corolla salverform, the lobes spreading; calyx subtended by 2 large bracts; [subfamily Ericoideae; tribe Phyllodoceae] ................................................ 12. Epigaea

Plant a shrub, > 3 dm tall, or 1-3 dm tall and definitely and obviously clonal by underground rhizomes; plants not mycotrophic or hemi-mycotropic.

Leaves ca. 1 mm wide, 3-12 mm long, appearing opposite, alternate, or whorled (the internodes very short, thus the leaves generally appearing whorled); petals absent; fruit a subglobe, 2-stoned drupe, 1-3 mm in diameter; branches often appearing in whorls of 3-7; [subfamily Ericoideae; tribe Empetreae]

Leaves 5-15 mm long; shrubs 2-25 dm tall; drupes red, 1.5-3 mm in diameter; [of SC southwards] ........................................ 15. Ceratola

Leaves 3-6 mm long; shrubs 1.5-6 dm tall; drupes gray, 1-1.5 mm in diameter; [of NJ northwards] ........................................ 14. Corema

Leaves either > 2 mm wide or < 5 mm long, mostly alternate or whorled; petals present; fruit not as above, mostly either a capsule or 10- or many-seeded berry; branches appearing alternate or whorled; [subfamily Vaccinioideae; tribe Vaccinieae] ........................................... 12. Epigaea

Ovary inferior; fruit indehiscent, a fleshy berry.

Ovary 10 locular; seeds 10; leaves glandular-punctate, at least on the lower surface (except G. brachycera) ................. 29. Gaylussacia

Ovary 4-5 locular; seeds numerous; leaves not glandular-punctate .......................................................... 28. Vaccinium

Ovary inferior; fruit dehiscence, a dry capsule.

Petals separate; fruit 2-7-locular; either a shrub to 1 m tall with ovate to oblong, evergreen leaves, 0.6-1.2 cm long, or a shrub to small tree 2-6 (-9) m tall with elliptic, deciduous leaves, 4-12 cm long, or a shrub 1-2.5 m tall, with elliptic to ovate, evergreen leaves 2-4 cm long; [subfamily Ericoideae; tribe Phyllodoceae].

Fruit 2-3 (5)-locular; shrub to 1 m tall; leaves, 0.4-1.2 cm long; petals 2-4 mm long ........................................ 13. Kalmia buxifolia

Fruit 4-7-locular; shrub to small tree 1-6 (-9) m tall; leaves 2-12 cm long; petals 12-30 mm long.

Fruit 7-locular; leaves evergreen 2-4 cm long; petals 20-30 mm long; shrub 1-2.5 m tall ........................................... 8. Bejaria

Fruit 4-5-locular; leaves deciduous, 4-12 cm long; petals 12-14 mm long; shrub to small tree 2-6 (-9) m tall ............. 11. Elliotia

Petals fused for part or all their lengths; fruit 4-5-locular; shrub or tree with leaves of various shape, evergreen or deciduous, these either < 6 mm long, linear and whorled, or > 12 mm long.

Leaves whorled, < 5 mm long, linear; [subfamily Ericoideae, tribe Ericeae].

Leaves opposite, sessile, clasping at the base .......................................................... 16. Calluna

Leaves whorled (in 4s), petiolate ................................................................................................. 17. Erica

Leaves alternate or whorled, > 20 mm long.

Flowers 4-merous; fruits 4-locular; leaves with a series of fascicles of trichomes on the midrib below; [subfamily Ericoideae, tribe Rhodoreae] ................................................ 9. Menziesia

Flowers 5-merous; fruits 5-locular; leaves not as above.

Leaves coriaceous, evergreen, shiny and dark green above.

Leaves sharply and distinctly serrate.

Petioles slender, 7-10 mm long; filaments strongly curved just below the anthers; pith transversely diaphragmed; [subfamily Vaccinioideae; tribe Lyoneae] ......................................................... 20. Agarista

Petioles stout, 2-6 mm long; filaments straight; pith solid; [subfamily Vaccinioideae; tribe Gaultherieae] .......................... 25. Leucothoe

Leaves entire, or obscurely and finely crenulate-serrulate.

Capsules elongate, > 2× as long as broad, 8-18 mm long; [subfamily Ericoideae; tribe Rhodoreae] .......................................... 10. Rhododendron

Capsules ovoid to globose or subglobose, about as long as broad, 5-8 mm long.

Leaves with a prominent vein running parallel to (and about 1 mm in from) the margin; [subfamily Vaccinioideae; tribe Lyoneae] .......................................................... 21. Lyonia

Leaves without a prominent marginal vein.

Corolla saucer-shaped, 10-30 mm across; leaves entire; [subfamily Ericoideae; tribe Phyllodoceae] .... 13. Kalmia

Corolla narrowly urceolate, 4-6 mm across; leaves finely crenulate-serrulate; [subfamily Vaccinioideae; tribe Lyoneae] .......................................................... 19. Pieris

Leaves membranaceous or subcoriaceous, deciduous or evergreen, if subcoriaceous and evergreen, then not shiny and dark green above.

Capsules elongate, > 2× as long as broad, 7-23 mm long; [subfamily Ericoideae; tribe Rhodoreae] .... 10. Rhododendron

Capsules ovoid to globose or subglobose, about as long as broad, or broader than long, 2-7 mm long.

Leaves (at least the larger) > 2.5 cm wide.

Pedicels with 2 bracteoles.
Alternate Key to Ericaceae (including some relatives), emphasizing vegetative characters
[This key includes some related shrubs, of the Diapensiaceae, Clethraceae, and Cyrillaceae]

Key A – Achlorophylllose plants

1 Leaves and stems lacking chlorophyll (either white or variously tinted with colors such as pink, tan, red, or violet).

   a. Leaves and stems white or pink when fresh, aging or drying black ................................. Monotropa uniflora
   b. Leaves membranaceous or subcoriaceous, deciduous or tardily deciduous, usually not particularly glossy (except in new foliage of some species) ................................................................. Monotropa uniflora

   2 Leaves coriaceous, more or less stiff, evergreen, usually glossy and often dark green.

   3 Subshrub or sprawling shrub, 0-1 (-2) dm tall, not clonal by underground rhizomes (except Gaultheria procumbens), though often clonal by creeping stems, or sprawling and patch-forming (many of these species are only ambiguously shrublike and are considered herbs by the casual observer) ......................................................................................................... Key C

   4 Shrub, > 3 dm tall, or 1-3 dm tall and definitely and obviously clonal by underground rhizomes .................................................................................................................. Key D

Key B – Deciduous ericaceous shrubs and trees

Gaylussacia spp., Vaccinium spp., Elliottia racemosa, Menziesia pilosa, Rhododendron spp., Kalmia cuneata, Chamaedaphne calyculata, Lyonia mariana, Lyonia ligustrina var. ligustrina, Lyonia ligustrina var. foliosaflora, Eubotrys racemosa, Eubotrys recurva, Oxydendrum arboreum, Zenobia pulverulenta, Clethra acuminata, Clethra alnifolia, Cyrilla racemiflora

Key C – Evergreen subshrubs and sprawling shrubs

1 Plant erect, the leaves few (< 10), clustered near the apex of the single stem.

2 Leaves obovate, 1-2× as long as wide; fruit a red berry, borne on nodding axillary pedicels beneath the leaves........ Gaultheria procumbens

3 Leaves lanceolate or oblong lanceolate, normally 2-4× as long as wide (sometimes proportionately less narrow in stunted individuals; fruit a capsule, borne I-several on an erect scape above the leaves.

   a. Leaves lanceolate (broadest below the middle), base rounded, striped with white or paler green along the major veins........ Gaultheria procumbens

   b. Leaves oblong lanceolate (broadest above the middle), base cuneate, solid dark green throughout ................................................................. Chimaphila umbellata ssp. cisatlantica

   c. Leaves obovate, 1-2× as long as wide; fruit a red berry, borne on nodding axillary pedicels beneath the leaves........ Gaultheria procumbens

4 Leaves 2-15 cm wide; leaves (2-) 3.5-15 cm long, rounded or suborbate at the base.

5 Leaves dull green, with a pebbled texture, pilose (glabrate in age) .................................................................................................................. Epigaea repens

6 Leaves bright shiny green (or pruple), with a smooth texture, glabrous.

   a. Leaves orbicular, rounded or with a slight point at the apex, finely serrate (4-8 teeth per cm), the teeth not prominently mucronate; flowers in racemes; [widespread in distribution] .................................................................................................................. Galax urceolata [DIAPENSIACEAE]
Leaves broadly elliptic, generally emarginate (slightly notched) at the apex, coarsely serrate (1–4 teeth per cm), the teeth prominently mucronate; flowers solitary; [native to humid gorges along the escarpment between the Mountains and Piedmont, sometimes cultivated and becoming established elsewhere].

Leaves linear, needle-like, 

**ERICACEAE**

Leaves 0.1–1.5 cm wide; leaves 0.5–3 cm long, cuneate at the base (at least widely so), glabrous (or bristly beneath in

Leaves opposite, sessile and clasping; [exotic, rarely naturalized] ...........................................................................................

Leaves whorled (at least in part), petiolate; [.................................................................]

5 Leaves (at least the larger) > 3 cm long.

5 Leaves (all of them) < 2 cm long.

7 Leaves broader, > 2 mm wide.

9 Leaves serrate or serrulate (sometimes inconspicuously so); [of pinelands of the Coastal Plain and (very rarely) lower Piedmont of se. VA southward].

10 Leaves 2.5–15 mm long, generally elliptic (less commonly ovate or obovate); angle of leaf base typically > 90 degrees; margins finely glandular mucronulate-crenulate, the teeth tightly appressed and therefore often obscure, the margin superficially entire; stems mostly prostrate (ascending in areas that have been long fire-suppressed); [widespread in NC and SC, rare in se. VA and e. GA] .............................................................................................

10 Leaves (4-) 7-35 (-63) mm long, elliptic to obovate (less commonly elliptic-ovate); angle of leaf base typically < 90 degrees; margins glandular mucronulate-serrulate to serrulate-crenulate, the teeth apparent, especially toward the apex; stems often ascending to upright; [of Lexington County, SC] ........................................................................................................

9 Leaves entire; [of the Mountains of VA northward, except Vaccinium macrocarpon of bogs, as far south as se. se. and sw. NC].

11 Leaves 10-30 mm long; leaves obovulate to obovate, the widest point past the middle; primary stems 1-3 mm in diameter; [of relatively dry, rocky habitats].

11 Leaves (3-) 5-10 (-18) mm long; leaves ovate or elliptic, the widest point below or at the middle; primary stems delicate; [of moist to distinctly boggy habitats].

12 Leaf undersurface green, sparsely bristly; [of moist habitats] ..................................................................................

12 Leaf undersurface whitened, glabrous; [of saturated wetlands].

13 Leaves elliptic, broadest near middle, (5-) 7-10 (-18) mm long, (2-) 3-4 (-5) mm wide; leaves blunt-rounded and non-involute; pedicels with 2 green, leaf-like bracts 1-2 mm wide; berry 8-15 mm in diameter ...............[Vaccinium macrocarpon]

13 Leaves ovate, broadest toward base, (3-) 5-6 (-9) mm long, (1-) 2-3 (-5) mm wide; leaves involute at least along the margins, thus making the leaf tip acute; pedicels with (0-) 2 (-5) reddish, scale-like bracts < 1 mm wide; berry 6-12 mm in diameter ...

[Arctostaphylos uva-ursi]

13 Leaves elliptic, broadest near middle, (5-) 7-10 (-18) mm long, (2-) 3-4 (-5) mm wide; leaves blunt-rounded and non-

13 Inflorescence a 3-9 flowered raceme, borne in the axils of upper leaves; seeds ca. 1 mm long; [of wetlands of the Coastal Plain, often associated with Taxodium ascendens] .................................................................

13 Inflorescence a 3-9 flowered raceme, borne in the axis of upper leaves; seeds ca. 1 mm long; [of wetlands of the Coastal Plain, often associated with Taxodium ascendens] .................................................................

Key D – Evergreen ericaceous shrubs (either tall or obviously clonal) and trees

1 Leaves linear, needle-like, either appearing whorled (at least in part, sometimes also with nodes appearing opposite or alternate) or opposite (Calluna).

2 Leaves opposite, sessile and clasping; [exotic, rarely naturalized] .................................................................

2 Leaves whorled (at least in part), petiolate; [either native or exotic and rarely naturalized]

3 Leaves densely puberulent and ciliate with gland-tipped hairs; leaves 1.5-5 mm long; [exotic, rarely naturalized] ...............[Erica vulgaris]

4 Leaves glabrous; leaves 3-15 mm long; [native].

4 Leaves 5-15 mm long; shrubs 5-25 dm tall; drupes red, 1.5-2 mm in diameter; [of SC southwards] ...............[Ceratiola ericoides]

4 Leaves 3-6 mm long; shrubs 1.5-6 dm tall; drupes gray, 1-1.5 mm in diameter; [of NJ northwards] ..........[Corema conradi]

5 Leaves (all of them) < 2 cm long.

6 [Either of the Mountains, the Piedmont, or the Coastal Plain of ne. SC and se. NC].

7 Leaves alternate, glabrous, finely serrulate ..........[Gaylussacia brachyptera]

7 Leaves alternate or opposite, stipitate-glandular or glabrous, entire, or with a few obscure teeth ..........[Kalmia buxifolia]

6 [Of the Coastal Plain, from se. SC southward].

8 Twigs densely hispid; leaves hispid on both surfaces ..........[Kalmia hirsuta]

8 Twigs glabrous to puberulent; leaves glabrous or with scattered inconspicuous hairs.

9 Plant glaucous and bluish-green throughout; leaf undersurface lacking scattered glandular hairs; [of s. GA south to s. peninsular FL, west to e. TX] .................................................................

9 Plant glaucous and bluish-green throughout; leaf undersurface lacking scattered glandular hairs; [of s. GA south to s. peninsular FL, west to e. TX] .................................................................

9 Plant dark green throughout, generally exceeding 20 mm in length; leaf undersurface with scattered glandular hairs, these sometimes very few yet late in the season (best seen in the field by folding a leaf, holding the fold up to the light, and using a 10× lens); [of se. SC southward to n. FL, west to s. AL] .................................................................

9 Plant dark green throughout, generally exceeding 20 mm in length; leaf undersurface with scattered glandular hairs, these sometimes very few yet late in the season (best seen in the field by folding a leaf, holding the fold up to the light, and using a 10× lens); [of se. SC southward to n. FL, west to s. AL] .................................................................

[Vaccinium myrsinoides]

5 Leaves (at least the larger) > 3 cm long.

10 Leaves toothed, at least toward the tip of the leaf (note that fine serrations or crenations can be obscured by revolute margins).

11 Leaves elliptic to obovate, widest near or above the middle, obtuse, acute, or short-acuminate, 1.5-7 cm long, 0.5-2.5 cm wide; leaf serrations fine and obscure; leaf surfaces with small stipitate glands (Piers) or lepidote with scales (Chamaedaphne).

11 Leaves lepidote with scales; leaves obovulate, widest above the middle

12 Leaves with small stipitate glands, otherwise appearing glabrous; leaves elliptic, widest near the middle.

13 Inflorescence a many-flowered panicle of racemes, borne terminally; seeds 2.5-3.3 mm long; [of slopes and ridges of the Mountains and upper Piedmont] .................................................................

13 Inflorescence a 3-9 flowered raceme, borne in the axis of upper leaves; seeds ca. 1 mm long; [of wetlands of the Coastal Plain, often associated with Taxodium ascendens] .................................................................

13 Inflorescence a 3-9 flowered raceme, borne in the axis of upper leaves; seeds ca. 1 mm long; [of wetlands of the Coastal Plain, often associated with Taxodium ascendens] .................................................................
11 Leaves lanceolate or ovate, widest below the middle, short-acuminate to acuminate, 4-15 cm long, 1-5 cm wide; leaf serrations generally obvious (at least toward the acuminate leaf tip); leaf surfaces glabrous, or with non-stipitate hairs on the lower surface.

14 Pith transversely diaphragmed; [pedicels slender, 7-10 mm long]; [filaments strongly curved just below the anthers] ..........................Agarista populifolia

15 Leaves with an acute or short-acuminate apex; racemes 2-4 (5) cm long; sepals ovate, with an obtuse or rounded apex; longest petioles 3-8 mm long .................................................................Leucothoe axillaris

15 Leaves with a long-acuminate apex; racemes 4-10 cm long; sepals lanceolate-ovate, with an acute (or subacute) apex; longest petioles 8-15 mm long .................................................................................................................Leucothoe fontanesiana

10 Leaves entire.

16 Leaves whitened beneath by a dense mat of white hairs; leaves linear and strongly revolute ............................................................Andromeda

16 Leaves green or brown beneath, glabrous, glabrescent, or lepidote with scales.

17 Leaves densely lepidote on the under surface with brown scales.

18 Leaves planar, not revolute; petioles 7-20 mm long; twigs more-or-less terete in cross-section; [of the Mountains, Piedmont, and upper Coastal Plain].

19 Corolla mostly 15-20 mm long, the corolla tube (9-13 mm long) shorter than to as long as the corolla lobes (12-18 mm long); plant flowering early relative to R. minus, despite occurring at higher elevations and more northern latitudes; seeds ovoid, < 1.0 mm long, < 2.5× as long as wide (reminiscent of tiny watermelon seeds), coarsely textured, unornamented at the ends; calyx lobes deltoid; [of mountain ridges, heath balds, and rocky summits, mostly either away from the Blue Ridge Escarpment or north of the Asheville Basin] ...............................................................Rhododendron carolinianum

19 Corolla mostly 25-37 mm long, the corolla tube (13-22 mm long) longer than the corolla lobes (8-12 mm long); plant flowering late relative to R. carolinianum; seeds usually > 1.0 mm long, usually > 3× as long as wide, ornamented at one or both ends; calyx lobes ovate; [of the Coastal Plain, Piedmont, and Mountains, in the Mountains mostly of the Blue Ridge Escarpment of sw. NC and nw. SC, ranging in elevation up to the higher granitic domes in Macon and Jackson counties, NC].

20 Leaf apices mostly obtuse to rounded; petioles 2-6 (-7) mm long; branches erect and rigid; seeds moderately to elaborately ornamented with flared protrusions at both ends; [of n. FL] .................................................................Rhododendron chapmanii

20 Leaf apices mostly acute to acuminate; petioles (5-) 6-20 mm long; branches spreading, not notably erect and rigid; seeds somewhat ornamented at one end; [of c. GA northward] .........................................................................................Rhododendron minus

18 Leaves slightly to strongly revolute (or nearly planar in Lyonia fruticosa); petioles 1-7 mm long; twigs angled in cross-section; [of the lower Coastal Plain, from se. SC southward].

21 Ultimate branches not rigidly ascending, flowers nearly always restricted to branches of the previous year, the leaves not conspicuously reduced toward the branch tips; leaves with distal margin usually revolute, sometimes strongly so; major veins usually depressed; lower leaf surface with some scales often large and with irregular margins, others smaller and more nearly entire, at least the smaller scales more-or-less persistent; [shrub or small tree to 6 (-10) m tall] Lyonia ferruginea

21 Ultimate branches rigidly ascending, flowers frequent on branches of the current year (though also on older growth), the leaves conspicuously reduced toward the branch tips; leaves with distal margin at most slightly revolute; major veins not depressed; lower leaf surface with scales usually all large and with irregular margins, the scales often deciduous; [shrub to 1.5 (-3) m tall] .................................................................Lyonia fruticosa

17 Leaves not lepidote beneath (Lyonia lucida with scattered minute scales on young leaves).

22 Leaves whorled or rarely opposite.

23 Calyx lobes glandular-canescence and with marginal stipitate glands; leaves glabrous beneath; bracts and bracteoles densely glandular; stomates 18 μ long and 13 μ wide, 15-24 per 0.2 square millimeter; shrub to 1 (-1.2) m tall; [of ne. NC northward] .................................................Kalma angustifolia

23 Calyx lobes canescent but lacking glands; leaves short puberulent beneath; bracts and bracteoles nearly glandless; stomates 13 μ long and 9 μ wide, 35-51 per 0.2 square millimeter; shrub to 2 m tall (though often much shorter); [of se. and sw. VA southward] ........................................................ Kalma carolina

22 Leaves alternate.

24 Leaf blades (8-) 10-30 cm long, 3-9 cm wide, rounded to obtuse at the tip.

25 Leaves rounded at base (rarely broadly cuneate or slightly cordate), obtuse at apex; leaf generally 1.5-2.5× as long as wide; [corolla usually deep pink to purple]; [sepals 0.5-1 mm long] .................................................................Rhododendron catawbiense

25 Leaves cuneate at base, acute at apex; leaf generally 3-5× as long as wide; [corolla usually white to pale pink]; [sepals 4-6 mm long] .............................................................................................Rhododendron maximum

24 Leaf blades 2-10 (-12) cm long, 1-5 cm wide, acute, short-acuminate (or obtuse or rounded in Cyrilla) at the tip.

26 Leaf with a prominent vein running the length of the margin, about 1 mm in; [shrub to 4 m tall] .........................................................................................................................Lyonia lucida

26 Leaf venation not as above; [shrub to small tree] ..........................................................................................................................Kalma latifolia, Cyrilla racemiflora, Cliftonia racemosa, Bejaria racemosa

I. Pyrola Linnaeus 1753 (Shinleaf, Pyrola)

A genus of 30-35 species, subshrubs, circumboreal and also in Sumatra and Guatemala. The inclusion of this group of species in the Ericaceae or its recognition as a separate family has been controversial. Recent studies (Judd & Kron 1993, Kron & Chase 1993) suggest that it is best resubmerged in the Ericaceae. References: Freeman in FNA (2009); Liu et al. (2010); Stevens et al. in Kubitzki (2004).

1 Calyx lobes distinctly longer than broad, 3-4 mm long; leaves coriaceous, more or less glossy; [section Pyrola; series Pyrola] .................................................................P. americana

1 Calyx lobes about as broad as long, 1.5-2 mm long; leaves not coriaceous, dull.
2. Pyrola Pursh 1814 (Shinleaf, Pipsissewa)

A genus of 4-5 species, subshrubs, of temperate and tropical America, and Eurasia. References: Freeman in FNA (2009); Stevens et al. in Kubitzki (2004).

1 Leaves lanceolate (broadest below the middle), base rounded, striped with white or paler green along the major veins ..............C. maculata
1 Leaves oblanceolate (broadest above the middle), base cuneate, solid dark green throughout .................................C. umbellata ssp. cisatlantica

Chimaphila maculata (Linnaeus) Pursh, Pipsissewa, Striped Wintergreen. Forests and woodlands, mostly rather xeric and acid. May-June; July-October. ME west to MI, south to GA, FL Panhandle, and AL; disjunct in mountains of AZ, Mexico, and Central America south to Panama. [= RAB, C, F, G, K, L, S, WH]


3. Orthilia Rafinesque 1840 (Sidebells, One-sided Shinleaf, One-sided Wintergreen)

A monotypic genus, a subshrub, circumboreal in distribution. The recognition of Orthilia as separate from Pyrola is supported by molecular data (Freudenstein 1999a). References: Freeman in FNA (2009); Stevens et al. in Kubitzki (2004).

Orthilia secunda (Linnaeus) House, Sidebells, One-sided Shinleaf, One-sided Pyrola. Forests under Pinus virginiana, other forests? June-July; July-September. Circumboreal, in North America south to VA, IN, IA, NE, NM, AZ, and CA; disjunct in Mexico and Guatemala. [= FNA, K, L; = Pyrola secunda Linnaeus – C, G, W; > P. secunda var. secunda – F]

4. Monotropa Linnaeus 1753 (Indian Pipes, Pinesap)

A monotypic genus, an herb, of North America, Central America, South America, and e. Asia. The segregation of Monotropa, Hypopitys, and Monotropsis into the Monotropaceae or their inclusion in the Ericaceae has been controversial. Recent studies suggest that their inclusion in the Ericaceae is warranted (Kron & Chase 1993, Judd & Kron 1993). References: Wallace in FNA (2009); Wallace (1975)=Z; Stevens et al. in Kubitzki (2004). [also see Hypopitys]

1 Flowers few to many, racemose; stem pubescent, at least in the inflorescence; plant yellow, orange, or red when fresh, aging or drying dark brown .................................................................[Hypopitys monotropa]
1 Flower solitary; stem glabrous; plant white (rarely pink) when fresh, aging or drying black .................................Monotropa uniflora

Monotropa uniflora Linnaeus, Indian Pipes. In a wide variety of forests. June-October; August-November. NL (Labrador) and AK south to s. FL, TX, CA; disjunct in s. Mexico, Central America, South America (Colombia), and e. Asia. A preliminary
molecular study suggests that splitting of worldwide *Monotropa uniflora* into several geographic species or varieties may be warranted (Neyland & Hennigan 2004). [= RAB, C, F, FNA, G, K, L, W, WH, WV, Z; > *M. uniflora* – S; > *M. brittonii* Small – S]

5. *Hypopitys* Crantz 1766 (Pinesap)

A genus of 1–several species, herbs, of circumboreal distribution. Recent molecular evidence supports its separation as a genus distinct from *Monotropa* (as has often been done in the past) (Neyland & Hennigan 2004). References: Wallace in FNA (2009); Wallace (1975)=Z; Stevens et al. in Kubitzki (2004).

**Hypopitys monotropa** Crantz, Pinesap. Forests. May-October; July-November. Circumboreal, south nearly throughout North America, to c. peninsular and Panhandle FL, TX, NM, AZ, CA, and Mexico; disjunct in Guatemala; Europe; c. and e. Asia. Recent studies suggest that several cryptic to semi-cryptic species or infraspecific taxa should be recognized (M. Klooster, pers. comm., 2009). [= *Monotropa hypopithys* Linnaeus – RAB, C, F, G, K, L, W, WH, WV, Z; > *Hypopitys americana* (A.P. de Candolle) Small – S; > *Hypopitys lanuginosa* (Michaux) Nuttall – S; > *H. insignata* Bicknell; > *Monotropa lanuginosa* Michaux]


A genus of probably 2 species, mycotrophic herbs, of se. North America. Often treated as monotypic, but there appears to be more to at least of the “lumped” taxa than has usually been credited; the genus warrants additional study. *Monotropis* is mycotrophic, receiving its nutrition by association with a mycorrhizal fungus, the intertwined root mass and fungal mantle about 1–2 cm in diameter. References: Wallace in FNA (2009); Wallace (1975)=Z; Chafin (2000)=Y; Wolf (1922); Stevens et al. in Kubitzki (2004).

1 Sepals about 0.75–1.25× as long as the corolla, ovate; corolla pink, lavender, purple, or purplish-red, the corolla lobes in the plane of the corolla tube or curved inwards from that plane; either flowering prematurely in September-November and the flowers not fragrant, or flowering February-April and the flowers strongly and spicily fragrant; [of AL and GA northwards] .................................................. *M. odorata*  
1 Sepals about 0.5× as long as the corolla, lanceolate; corolla white or pale lavender, the corolla lobes spreading or reflexed; flowering January-February, the flowers slightly fragrant; [of FL] .................................................. *M. reynoldsiae*

**Monotropis odorata** Schweinitz ex Elliott, Spring Pigmy Pipes. Dry to mesic upland woods under oaks and/or pines (*Pinus virginiana* or *P. echinata*), especially slopes or bluffs with abundant heaths, often including *Kalmia latifolia* and/or *Rhododendron maximum*. February-April (and sometimes September-November); May-June (and sometimes October-November). Centered in the Appalachians: DE, MD, and WV south to GA and AL. The flowers are very fragrant, the odor variously compared to cloves, nutmeg, cinnamon, and violets. Since the diminutive plants (3–10 cm tall) are often covered by leaf litter, fragrance is often the key to finding this species. The fall flowering form, entity “lehnmaniae” (see synonymy), appears to represent the early development of *M. odorata* which will typically then overwinter in “suspended animation” and flower in the early spring. [< *M. odorata* – C, F, FNA, G, K, L, W, WV, Z; > *M. odorata var. odorata* – RAB; > *M. odorata var. lehmaniae* (Burnham) Ahles – RAB; > *M. odorata* – S; > *M. lehmaniae* Burnham – S]

**Monotropis reynoldsiae** (A. Gray) A. Heller, Florida Pigmy Pipes. Upland mixed hardwood forests, mesic hammocks, xeric hammocks, scrub. January-February. Endemic to nc. peninsular FL, in St. Johns, Marion, Citrus, Hernando, Pasco, and Volusia counties. See Chafin (2000) for additional information; there seems little question that this is specifically distinct from *M. odorata*. [= S, Y; < *M. odorata* – FNA, K, L, W, WH, Z]

7. *Arctostaphylos* Adanson 1760 (Bearberry)

A genus of 60–70 species, shrubs, woody vines, or small trees, mostly in w. North America, but with 2 circumboreal species. References: Parker, Vasey, & Keeley in FNA (2009); Rosatti (1987b)=Z; Stevens et al. in Kubitzki (2004).

**Arctostaphylos uva-ursi** (Linnaeus) Sprengel, Bearberry, Kinnikinick. High elevation granitic outcrop (VA); Coastal Plain pitch pine woodlands (DE). May-June. Circumboreal, ranging in North America from NL (Labrador) west to AK, south to DE, n. VA, n. IN, IL, IA, SD, NM, AZ, and CA; disjunct in Guatemala. Following Rosatti (1987), *A. uva-ursi* is here treated inclusively, as a complex species not readily divisible into infraspecific taxa. [= C, FNA, K, L, W, Z; > *A. uva-ursi* var. coaetilis Fernald & J.F. Macbride – F, G; > *A. uva-ursi* ssp. coaetilis (Fernald & J.F. Macbride) A. & D. Löve & Kapoor]

8. *Bejaria* Mutis in Linnaeus 1771 (Tarflower)

A genus of 15 species, shrubs and trees, of se. United States to Cuba, and from Mexico south into Bolivia. The spelling of the generic name has been controversial; it was originally published as ‘Bejaria,’ because of Linnaeus's misreading of Mutis's handwriting, but was intended to commemorate José Béjar. The spelling has now been conserved as ‘Bejaria’ (Greuter et al. 2000). References: Clemants in FNA (2009); Stevens et al. in Kubitzki (2004).
**ERICACEAE**

**Befaria racemosa** Ventenat, Tarflower, Flycatcher. Pine flatwoods. E. GA (adjacent to se. SC) south to s. peninsular FL, west to AL. [= FNA, L, WH; = Befaria racemosa – GW, K, S, orthographic variant]

1 Leaves evergreen, coriaceous, entire; stamens 10; [subgenus *Hymenanthes*, section *Ponticum*, subsection *Pontica*].
2 Leaves rounded at base (rarely broadly cuneate or slightly cordate), obtuse at apex; leaf generally 1.5-2.5× as long as wide; corolla usually deep pink to purple; sepals 0.5-1 mm long ........................................................................................................
3 Leaves cuneate at base, acute at apex; leaf generally 3-5× as long as wide; corolla white or pale pink; sepals 4-6 mm long ........................................................................................................

2 Lower surface of leaves not punctate with brown scales; larger leaves 10-30 cm long; [subgenus *Hymenanthes*, section *Ponticum*, subsection *Pontica*].
6 Corolla tube 2-5 mm long, much shorter than the corolla lobes; leaves generally oblanceolate to narrowly elliptic, generally < 3 cm wide, acute to obtuse, mucronate; capsule cylindrical-ellipsoid, 10-25 mm long; [subgenus *Hymenanthes*, section *Pontica*].
7 Corolla yellow, orange, or red.
8 Flowers appearing after the leaves have expanded.

9. *Menziesia* J.E. Smith 1791 (Minniebush)

A genus of about 7-10 species, shrubs, of e. Asia (mostly), w. North America (1 species), and se. North America (1 species). *M. ferruginea* J.E. Smith of w. North America is closely related to *M. pilosa*; the e. Asian species of the genus are more distantly related. Molecular evidence suggests that *Menziesia* should be included in *Rhododendron*, and is actually closely related within *Rhododendron* to *R. vaseyi* (Goetsch, Eckert, & Hall 2005; Kurashige et al. 2001). References: Fabian in FNA (2009); Stevens et al. in Kubitzki (2004).

*Menziesia pilosa* (Michaux ex Lamarck) Antoine Laurent de Jussieu ex Persoon, Minniebush. Heath balds, bogs, rocky summits, and rocky woodlands, mostly at high elevations. May-July; August-October. A Southern and Central Appalachian endemic: sc. PA, sw. PA, e. WV, w. VA, e. TN, w. NC, and ne. GA. The very prominent macro on the leaves and the series of fascicles of trichomes along the leaf midrib below readily distinguish the species in sterile condition from similar deciduous *Rhododendron*. [= RAB, C, F, FNA, G, K, L, S, W, WV; = *Rhododendron species 1*]

10. *Rhododendron* Linnaeus 1753 (Rhododendron, Azalea)


1 Leaves deciduous, membranaceous, ciliate or serrulate; stamens 5-7; [subgenus *Azaleastrum*, section *Sciadorhodion*].
2 Lower surface of leaves punctate with brown scales; larger leaves 6-12 cm long; [subgenus *Rhododendron*, section *Rhododendron*, subsection *Caroliniana*].
4 Corolla mostly 15-20 mm long, the corolla tube (9-13 mm long) longer than as long as the corolla lobes (12-18 mm long); plant flowering early relative to *R. minus*, despite occurring at higher elevations and more northern latitudes; seeds ovoid, < 1.0 mm long, < 2.5× as long as wide (reminiscent of tiny watermelon seeds), coarsely textured, unornamented at the ends; calyx lobes deltoid; [of mountain ridges, heath balds, and rocky summits, mostly either away from the Blue Ridge Escarpment or north of the Asheville Basin].
5 Leaf apices mostly acute to acuminate; petioles (5-) 6-20 mm long; branches erect and rigid; seeds moderately to elaborately ornamented with flared protrusions at both ends; [of n. FL] .................................................................................................................................
6 Corolla mostly 25-37 mm long, the corolla tube (13-22 mm long) longer than the corolla lobes (8-12 mm long); plant flowering later relative to *R. carolinianum*; seeds usually > 1.0 mm long, usually > 3× as long as wide, ornamented at one or both ends; calyx lobes ovate; [of the Coastal Plain, Piedmont, and Mountains, in the Mountains mostly of the Blue Ridge Escarpment of sw. NC and nw. SC, ranging up to the higher granitic domes in Macon and Jackson counties, NC].
7 Leaf apices mostly acute to acuminate; petioles (5-) 6-20 mm long; branches spreading, not notably erect and rigid; seeds somewhat ornamented at one end; [of e. GA northward] .....................................................................................................................
8 Flowers appearing after the leaves have expanded.
Alternate Key to Azaleas

Identification notes: this key makes as much use as possible of vegetative characters, geography, and capsule characters; capsules are generally available for longer during the year than flowers, and even when plants are in flower, last year's capsules can often be found.

1 Corolla tube 2-5 mm long, much shorter than the corolla lobes; pedicels strigose to puberulent, not stipitate-glandular; flowers appearing before or with the leaves. ..................... R. viscosum var. serrulatum
1 Corolla tube 13-25 mm long, equal to or longer than the corolla lobes; stamens 5; leaves generally oblanceolate to narrowly elliptic, generally available for longer during the year than flowers, and even when plants are in flower, last year's capsules can often be found. .................................................... R. austrinum
11 Floral bud-scales with glandular margins, the outer surface glabrous; corolla tube glandular-pubescent on its outer surface; sepal 2.0-3.0 mm long. ........................................ R. calendulaceum
11 Floral bud-scales with ciliate margins, the outer surface glabrous; corolla tube pubescent (not glandular or rarely very weakly so) on the outer surface; sepal 0.5-3.0 mm long. ........................................ R. flammeum
7 Corolla white or pink (white marked with yellow in R. eastmani and R. abalamanse).
12 Sepals 1.5-5 mm long. 
13 Young stems glabrous (rarely very sparsely pubescent); nonclonal shrub or small tree, to 7 m tall. ..................... R. arborescens
13 Young stems densely pubescent, generally with a mixture of glandular and nonglandular hairs; clonal shrub, the upright stems up to 1.5 m tall. ................................................................. R. atlanticum
720
Rhododendron abalamanse

Rehder, Alabama Azalea. Moist slopes, bluffs, streambanks. March-April. W. GA and Panhandle FL west through AL to e. MS. R. abalamanse is reported for Calhoun County, SC (RAB), but this record actually represents the more recently described R. eastmani. (= FNA, K, L, WH, Z; = Azalea abalamanensis (Rehder) Small – S)

Rhododendron arborescens

(Pursh) Torrey, Sweet Azalea, Smooth Azalea. Rocky riversides, wooded stream banks, swamps, high elevation forests, shrub balds. Late May-July; July-October. Primarily Appalachian: ne. PA and se. KY south to se. NC, w. SC, c. GA, and c. AL. (= RAB, C, F, FNA, G, K, L, W, WV, Z; = Azalea arborescens Pursh – S)

Rhododendron atlanticum

(Ashe) Rehder, Dwarf Azalea. Pocosins, savannas, pine flatwoods, sandhill-pocosin ecotones. April-May (sporadically later, particularly in response to fire); August-October. An Atlantic Coastal Plain endemic: s. NJ and se. PA south to sc. GA. (= RAB, C, F, FNA, G, GW, K, L, Z; = Azalea atlantica Ashe – S)

Rhododendron austrinum

(Small) Rehder, Florida Flame Azalea. Hammocks, bluffs, floodplain forests. Sc. GA and ne. FL west to s. AL and se. MS (Kron 1993); also reported for e. GA (Jones & Coile 1988). (= FNA, K, L, WH, Z; = Azalea austrina Small – S)

Rhododendron calendulaceum

(Michaux) Torrey, Flame Azalea. Deciduous forests, particularly on mountain slopes, grassy balds. May-June; June-September. Largely Appalachian: s. PA and s. OH to e. GA and e. TN. This is a tetraploid species; various theories have been advanced about the origin of this polyploid chromosome complement. Kron (1993) argues that the evidence best fits an allopolyploid derivation of R. calendulaceum, involving hybridization between ancestors of R. cumberlandense and R. prinophyllum. (= RAB, C, F, FNA, G, K, L, W, WV, Z; = Azalea calendulacea Michaux – S)

Rhododendron canescens

(Michaux) Sweet, Piedmont Azalea, Southern Pinxterbloom Azalea, Wild Azalea. Swamps, pocosins, and savannas. March-early May; September-October. Se. and sc. NC, n. TN, se. KY, s. IL, and e. OK, south to n. peninsular FL and se. TX. (= RAB, C, F, FNA, G, GW, L, W, WH, Z; = R. canescens var. canescens – K; = R. canescens var. candidum (Small) Rehder – K; = R. canescens var. subglabrum Rehder – K; = Azalea candida Small – S; = Azalea canescens Michaux – S)

Rhododendron carolinianum

Rehder, Carolina Rhododendron, Punctatum. Rocky summits, heath balds, high elevation forests, moist slopes. Late April-May; September-October. A Southern Appalachian endemic: w. NC, e. TN, ne. GA, and nw. SC, from the Linville Gorge area south and west to the Great Smoky Mountains; its precise southern limit uncertain. R. carolinianum is phenologically separated from R. minus, flowering earlier than R. minus, despite its occurrence at higher elevations and with a more northerly distribution. Morphological distinctions between the two taxa are subtle and inconsistent, as discussed by Duncan & Pullen (1962). From a horticultural perspective, Davidian (1982) supports recognition of R. carolinianum and R. minus as distinct. Gensel (1988, and pers.comm.) did detailed studies of the complex and supported the recognition of 3 taxa (R. carolinianum, R. minus, and R. chapmanii). (= D, K, S; < R. minus – RAB, W; < R. minus var. minus – FNA, L, Q, V)

Rhododendron catawbiense

Michaux, Pink Laurel, Catawba Rhododendron, Mountain Rosebay. Rocky summits, shrub balds, acid ridges and slopes (mostly at high elevations), north-facing bluffs in the Piedmont. April (in the Piedmont and Coastal Plain)-June; July-October. A Southern Appalachian endemic: VA and KY south to GA and AL, with scattered disjunct populations in the Piedmont and extreme upper Coastal Plain. The disjunct populations in central NC are discussed by Coker (1919), who named them forma insularis on the basis of "the larger and broader leaves and ... the longer flowers." R. catawbiense is apparently most closely related to R. macrophyllum D. Don ex G. Don of nw. North America (Milne 2004). (= RAB, C, F, FNA, G, K, L, S, W, WV, X)

Rhododendron chapmanii


Rhododendron colemanii


**Rhododendron eastmani** Kron & Creel, May White Azalea, Eastman's Azalea. Rich slopes. Early-mid May. This species is endemic to the Piedmont of South Carolina. It is locally fairly common, in the Broad River drainage (C. Horn, pers. comm. 2000). It should be sought in NC and GA, approaching with 4 miles of the NC border in Cherokee County, SC (M. Creel, pers. comm., 2007). Previous reports of *R. alabamense* in SC (RAB) are based on this species. [= FNA; < *Rhododendron alabamense* Rehder – RAB, misapplied]

**Rhododendron flammeum** (Michaux) Sargent, Oconee Azalea. Sandhills, upland forests on slopes, ridges, stream bluffs. April. W. SC west to w. GA. [= FNA, K, L, Z; = *Azalea speciosa* Wildenow – S; = *Rhododendron speciosum* (Wildenow) Sweet]


**Rhododendron minus** Michaux, Gorge Rhododendron, Punctatum. Rocky slopes, escarpment gorges, rocky areas in the Piedmont, sandhill bluffs in the Coastal Plain. Late April (in the Piedmont and Coastal Plain)-June (at the higher elevations along the Blue Ridge escarpment); September-October. GA and AL north to the Blue Ridge escarpment of n. GA, nw. SC, and sw. NC, and the Piedmont and inner Coastal Plain (fall-line sandhills) of sc. NC. This species ranges up to granite domes along the Blue Ridge Escarpment (such as Whiteside Mountain, Macon and Jackson counties, NC). [= D, K, S; < *R. minus* – RAB, W (also see *R. carolinianum*); < *R. minus var. minus* – FNA, L, Q, V]

**Rhododendron periclymenoides** (Michaux) Shinners, Wild Azalea, Pinxterflower, Pinxterbloom Azalea, Election Pink. Moist to dry slopes and streambanks. Late March-May; September-October. Fairly widespread in e. United States, ranging from MA, NY, and s. OH, south to GA and AL. See Shinners (1962) for explanation of the change from the name *R. nudiflorum*. [= C, FNA, K, L, W, Z; = *Azalea nudiflora* Linnaeus – S]

**Rhododendron prinophyllum** (Small) Millais, Election Pink, Early Azalea, Roseshell Azalea. Upland forests (especially under *Quercus montana* and *Quercus rubra*), xeric pine and oak woodlands. May-June; August-October. NH, NY, and ne. OH, south to w. NC, nc. KY, and s. OH; disjunct in ne. AL and c. TN; also disjunct from s. IL and s. MO south to AR and e. OK. The only known location in NC is on Bluff Mountain, Ashe County (on a rocky plateau over amphibolite at about 1300m elevation); Kron (1993) also cites a collection from Transylvania County. See Shinners (1962) for explanation of the change from the name *R. roseum*. [= C, FNA, K, L, W, Z; = *R. roseum* (Loiseleur) Rehder – RAB, F, G, GW, WV; = *Azalea prinophylla* Linnaeus – S]

**Rhododendron prunifolium** (Small) Millais, Plumleaf Azalea. Mesic ravine forests and streambanks. Endemic to a small area along the AL-GA border, in se. AL (Kron 1993) and sw. and wc. GA (Jones & Coile 1988). [= FNA, K, L, Z; = *Azalea prunifolia* Small – S]

**Rhododendron vaseyi** A. Gray, Pinkshell Azalea. Moist slopes, bogs, high elevation rocky summits, cliffs, high elevation heath balds. May-June; August-October. Endemic to the mountains of NC, though approaching very close to SC and GA in the vicinity of Cashiers and Highlands, NC and reported for Rabun Bald (Rabun Co. GA) without definite documentation; *R. vaseyi* occurs primarily southwest of the Asheville Basin, but is found at scattered locations farther north and is locally abundant on Grandfather Mountain (at the junction of Avery, Watauga, and Caldwell counties, NC), its northernmost outpost. Judd & Kron (1995) treat *R. vaseyi* and *R. canadense* (Linnaeus) Torrey (of ne. North America) as the only two members of section *Rhodora*. When not in flower, *R. vaseyi* is readily distinguished from our other azaleas by its distinctive foliage (see key). [= RAB, F, FNA, K, L, W, Y; = *Biltia vaseyi* (A. Gray) Small – S]
**ERICACEAE**


11. _Elliottia_ Muhlenberg ex Elliott 1817 (Elliottia, Southern-plume)

A genus of 4 species (as here circumscribed), shrubs to small trees, of se. North America, nw. North America, and Japan. As discussed by Wood (1961), the generic limits of _Elliottia_ have been controversial. The closest relatives of _E. racemosa_ are _E. paniculata_ (Siebold & Zuccarini) Bentham & Hooker and _E. bracteata_ (Maximowicz) Bentham & Hooker, both of Japan, and _E. pyroliflorus_ (Bong.) S.W. Brim & P.F. Stevens [= _Cladothamnus pyroliflorus_ Bong.], of AK, British Colombia, WA, and OR; these have sometimes been placed in other genera. References: Tucker in FNA (2009); Stevens et al. in Kubitzki (2004).

_**Elliottia racemosa**_ Muhlenberg ex Elliott, Elliottia, Southern-plume, Georgia-plume. Xeric sandy ridges, sandhills, river bluffs; serpentine woodlands. June-August. Endemic to e. GA and s. SC (Aiken County, where considered to have been extirpated). _Elliottia_ extends barely into the Piedmont in Georgia, occurring on Burks Mountain on serpentine in a _Pinus palustris_ woodland. [= FNA, K, L, S]

12. _Epigaea_ Linnaeus 1753 (Trailing Arbutus)

A genus of 3 species, subshrubs, in e. North America and Eurasia; the other 2 species of the genus occur in the Caucasus and Asia Minor, and in Japan. References: Judd & Kron in FNA (2009); Stevens et al. in Kubitzki (2004).

_**Epigaea repens**_ Linnaeus, Traileing Arbutus, Mayflower, Ground Laurel. In a wide variety of acidic forests, xeric to mesic, sandy, rocky, and loamy. Late February-early May; April-June. NL (Newfoundland) and QC west to MB, south to FL Panhandle, MS, and IA. At maturity, the fruits split along the sutures, exposing tiny brown seeds embedded in "sticky, white, placental tissue" which is "distinctly sweet to the taste;" ants are strongly attracted to the placental tissue, and in carrying it away disperse the seeds (Clay 1983). [= RAB, C, FNA, G, K, L, S, WH, WV; > _E. repens_ var. _glabrifolia_ Fernald – F; > _E. repens_ var. _repens_ – F]

13. _Kalmia_ Linnaeus 1753 (Wicky, Sheepkill, Mountain Laurel, Ivy, Sand-myrtle)

A genus of 9-11 species, shrubs, of North America and Cuba, except the circumboreal _K. procumbens_ (formerly _Loiseleuria_). _Leiophyllum_, traditionally treated as a monotypic or small genus of se. United States, is better treated as a part of _Kalmia_ along with the northern _Loiseleuria_, based on molecular and morphological studies (Kron & King 1996, Kron et al. 2002). While this idea may initially seem outlandish (particularly to those whose concept of _Kalmia_ is based only on _Kalmia latifolia_), the morphological and habitat similarities of _Leiophyllum to Kalmia_ are striking. The foliage and wood of all species (and the smoke from burning them) are poisonous. References: Liu, Denford, Ebinger, Packer, & Tucker in FNA (2009); Southall & Hardin (1974)=Z; Ebinger (1974)=Y; Strand & Wyatt (1991)=Q; Wilbur & Racine (1971)=R; Camp (1938)=P; Kron & King (1996); Kron et al. (2002)=V; Haines (2010)=U; Stevens et al. in Kubitzki (2004).

1. Petals separate; fruit 2-3 (-7)-locular .................................................................................................................................................... _K. buxifolia_
2. Petals fused; fruit 5-locular.
3. Leaves whorled or opposite; inflorescence either an axillary raceme or a terminal corymbiform raceme.
4. Calyx lobes glandular-canescent and with marginal stipitate glands; leaves glabrous beneath; bracts and bracteoles densely glandular; stomates 18 μ long and 13 μ wide, 15-24 per 0.2 square millimeter; shrub to 1 (-1.2) m tall; [of ne. NC northward]..... _K. angustifolia_
**Kalmia angustifolia** Linnaeus, Northern Sheepkill. Sandy, xeric to mesic hillsides and moist areas, rocky areas. April-May; September-October. NL (Labrador) west to MN, south to se. VA and extreme ne. NC, WV, s. ON, and MI, reaching its southern limit in the Coastal Plain of extreme ne. NC (Sorrie & LeBlond 2008). See *Kalmia carolina* for discussion of the taxonomy of these two taxa. [= K, S, Z; = *K. angustifolia* var. *angustifolia* – C, F, FNA, G, L, Y; = *K. angustifolia* ssp. *angustifolia* – U]

**Kalmia buxifolia** (P.J. Bergius) Gift, Kron, & Stevens, Sand-myrtle. Locally abundant but very restricted in wet (spodosol) pinelands of the outer Coastal Plain (in Brunswick and Carteret counties, NC), locally common in relatively dry sandhills in a few locations in the Sandhills, disjunct in the Piedmont on a few quartzite monadnocks, fairly common in the mountains on rock outcrops at high to moderate elevations (on a wide variety of rock types). Late March-June (sporadically to October); September-October. The species is curiously distributed, both in its overall range and within NC. *Kalmia buxifolia* is found in the Pine Barrens of NJ, the outer Coastal Plain of se. NC, the inner Coastal Plain (fall-line sandhills) of sc. NC and ne. SC, monadnocks of the upper Piedmont of NC, mountain peaks of NC and immediately adjacent nw. SC, ne. GA, and e. TN, and isolated in extreme e. PA (Monroe County) and in se. KY (on sandstone in Whitley County, in the Cumberland Plateau). Populations in the high mountains consist of very old, prostrate krummholz, the stems to 6 cm in diameter at the base, the branches spreading to cover at least a square meter. The disjunct distribution, various habitats, and subtle morphological variation between populations has led to periodic attempts to divide the species into two or more varieties or species, but the variability apparently cannot be successfully described taxonomically; it is here treated as a single species. See X, Y, and Q for detailed discussion of the various taxa recognized by various authors (within the genus *Leiothyrium*). Strand & Wyatt (1991) found a population from Hanging Rock, Stokes County, NC to be the most distinctive, but did not choose to give it formal taxonomic status. [= FNA, V; = *Leiothyrium buxifolium* (P.J. Bergius) Elliott – C, K, L, Q, R, W; > *Leiothyrium buxifolium* var. *buxifolium* – RAB; > *Leiothyrium buxifolium* var. *prostratum* (Loudon) Gray – RAB; > *Leiothyrium buxifolium* var. *hugeri* (Small) Schneider – F, G, P; > *Leiothyrium lyoni* Sweet – S, P; > *Leiothyrium hugeri* (Small) K. Schumann – S; = *Dendrium buxifolium* (Bergius) Desvauex]

**Kalmia carolina** Small, Southern Sheepkill, Carolina Wicky, Carolina Bog Myrtle. Moist to wet pinelands of the Coastal Plain, pocosin margins (or seemingly in pocosins or swamps because of fire suppression), mountain bogs and fens (and less commonly in rocky areas at high elevations) in the Mountains. April-May (sporadically to September, especially in response to fire); September-October. This species, a close relative of the more widespread and northern *K. angustifolia*, occurs in two disjunct areas: the Coastal Plain, from se. VA south through NC to wc. GA (Taylor County), and the Southern Appalachians from sw. VA south through w. NC and ne. TN to ne. GA. Southall & Hardin (1974) favored species status for *K. carolina* because of its essentially allopatric distribution relative to *K. angustifolia* (the 2 meet in Southampton County, VA), the near absence of intermediates or hybrids in this range, and because "significant morphological and anatomical differences have developed and remain constant between these two species when grown together." [= GW, K, S, W, Z; = *K. angustifolia* Linnaeus var. *caroliniana* (Small) Fernald – RAB (an orthographic error); = *K. angustifolia* var. *carolina* (Small) Fernald – C, F, FNA, G, L, Y; = *K. angustifolia* ssp. *carolina* (Small) A. Haines – U]

**Kalmia cuneata** Michaux, White Wicky. Pocosins and pocosin-savanna or pocosin-sandhill ecotones. Late May-June; September-October. This species is a narrow endemic of the Coastal Plain of se. NC and e. SC. It is not closely related to other species in the genus. It is most easily distinguished from other pocosin shrubs by the combination of the following characters: leaves deciduous, dull, and subcordate, 1.5-3 cm wide; inflorescence a fascicle of 1-3 flowers, axillary to leaf scars near the tips of the previous year's growth; petiole 1-4 mm long; [of the Coastal Plain of NC and SC] ......................................................


**Kalmia latifolia** Linnaeus, Mountain Laurel, Ivy, Calico-bush. Acidic forests, bluffs, bogs, along sandhill steams, and in a wide range of other habitats, nearly ubiquitous in the mountains, up to at least 1600m, more restricted in habitat in the lower

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**ERICACEAE**

4 Calyx lobes canescent but lacking glands; leaves short puberulent beneath; bracts and bracteoles nearly glandless; stamens 13 μ long and 9 μ wide, 35-51 per 0.2 square millimeter; shrub to 2 m tall (though often much shorter when growing in burned situations); [of se. and sw. VA southward].................................................................

2 Leaves alternate; inflorescence an axillary fascicle or a terminal panicle.

5 Leaves 0.5-1.5 cm long, 2-8 mm wide; twigs densely persistently hispid; [of the Coastal Plain of s. SC southward] ...............

6 Leaves deciduous, dull, and subcordate, 1.5-3 cm wide; inflorescence a fascicle of 1-3 flowers, axillary to leaf scars near the tips of the previous year's growth; petiole 1-4 mm long; [of the Coastal Plain of NC and SC] ......................................................

6 Leaves evergreen, glossy, and coriaceous, (1) 3-5 cm wide; inflorescence a terminal panicle; petiole 7-45 mm long; [widespread].....

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Piedmont and Coastal Plain.  April-July; September-October.  ME, OH, and IN south to Panhandle FL and extreme e. LA.  Unlike our other species, which are strictly shrubs, K. latifolia reaches the stature and diameter of a small tree.  [= RAB, C, FNA, K, L, S, W, WH, WV, Y, Z; > K. latifolia var. laevipes Fernald – F, G; > K. latifolia var. latifolia – F, G]


14. Corema D. Don 1826

A genus of 2 species, shrubs, one of ne. North America and one of Spain and the Azores.  References:  Elisens in FNA (2009); Stevens et al. in Kubitzki (2004).


15. Ceratiola Michaux 1803 (Florida Rosemary)

A monotypic genus, a shrub, of se. North America.  Ceratiola has been traditionally placed in the Empetraceae.  Many workers have expressed doubt about the naturalness of the Empetraceae and its distinction from the Ericaceae.  Molecular data have corroborated that concern, and shown Ceratiola and the rest of the Empetraceae to be better included in a broader Ericaceae (Kron & Chase 1993); the affinities of Ceratiola may actually be with other southeastern United States genera, Kalmia, Elliottia, and Bejaria (Kron & Chase 1993).  References:  Kron & Chase (1993); Judd & Kron (1993); Johnson (1982); Stevens et al. in Kubitzki (2004).

Ceratiola ericoides Michaux, Rosemary, Florida Rosemary, Sandhill Rosemary, Sand Heath.  Xeric sandhills, usually in white "sugar sand."  October-November.  Ne. SC south to s. FL and west to s. MS.  Its content of aromatic compounds makes it very flammable.  [= RAB, K, L, S, WH]

16. Calluna R.A. Salisbury 1802 (Heather)


17. Erica Linnaeus 1753 (Heath)


18. Oxydendrum A.P. de Candolle 1839 (Sourwood)

A monotypic genus, a tree, of se. North America.  The genus Oxydendrum is "isolated ... among the Ericaceae, apparently with no close relatives" (Wood 1961):  the only member of tribe Oxydendreae (Judd in FNA, in press).  References:  Judd in FNA (2009); Stevens et al. in Kubitzki (2004).

Oxydendrum arboreum (Linnaeus) A.P. de Candolle, Sourwood, Sorrel-tree.  Mesic to xeric deciduous forests, especially dry-mesic to xeric oak-hickory and oak-pine forests, also in the fall line sandhills in sandhill/pocosin ecotones.  Se. and sw. PA
west to IL, south to n. FL and se. and c. LA. It is an especially characteristic understory tree of upland forests of the Piedmont and lower Mountains. The bark is dark grayish-brown and fairly deeply furrowed; the tree nearly always has a characteristic lean (toward a former canopy light-gap). The finely serrate, elliptic leaves are distinctive, with the sour taste of garden sorrel (*Rumex acetosa*), sheep sorrel (*Rumex acetosella*), or wood sorrel (*Oxalis*). [= RAB, C, F, FNA, G, K, L, S, W, WH, WV]

19. *Pieris* D. Don 1834 (Evergreen Fetterbush)


1 Inflorescence a many-flowered panicule of racemes, borne terminally; seeds 2.5-3 mm long; [of slopes and ridges of the Mountains and upper Piedmont]; [subgenus *Pieris*, section *Pieris*].............................................................................................................. *P. floribunda*

1 Inflorescence a 3-9 flowered raceme, borne in the axils of upper leaves; seeds ca. 1 mm long; [of wetlands of the Coastal Plain, often associated with *Taxodium ascendens*]; [subgenus *Pieris*, section *Phillyreoides*].............................................................................................................. *P. phillyreoides*

**Pieris floribunda** (Pursh) Bentham & Hooker f., Mountain Andromeda, Evergreen Mountain Fetterbush. Acid wooded slopes, heath balds at high elevations, summits of Piedmont monadnocks, sometimes escaped from cultivation. May-June; August-October. A Southern Appalachian endemic: e. WV, w. VA, w. NC, e. TN, and n. GA. The type locality is supposedly in n. GA. The range in NC is peculiar, the species occurring at high elevations southwest of Asheville, absent from apparently suitable habitats to the northeast (such as the Craggies, Blacks, Roan Mountain, and Grandfather Mountain), yet reappearing in a few disjunct populations at low elevations in the upper Piedmont. In w. VA (and adjacent e. WV), *P. floribunda* occurs on rather dry sandstone ridges and upper slopes, often under an oak canopy, especially in the front ranges of the Cumberland Mountains. *P. floribunda* is placed in subgenus *Pieris*, section *Pieris*, along with *P. japonica* (see below) and another Asian species. [= RAB, C, F, FNA, G, K, L, S, W, WV, Z]

*Pieris japonica* (Thunberg) D. Don ex G. Don, Japanese Andromeda or Lily-of-the-valley Bush, rather closely related to our *P. floribunda*, is frequently grown as an ornamental. [= FNA, Z] [not keyed]

**Pieris phillyreoides** (Hooker) A.P. de Candolle, Vine-wicky, Climbing Fetterbush. Swamp forests. E. SC south to c. peninsular FL west to s. AL. This southeastern species has the remarkable habit of often growing as a creeping vine under the bark of *Taxodium ascendens*, the branches exserted through the cypress bark, sometimes ascending into the upper canopy with the main stem never visible except at the very base of the tree; it also sometimes grows as a low shrub. Godfrey (1969) documents the occurrence of this species in our area. See GW and Godfrey (1989) for excellent descriptions and illustrations of this curious "shrub-vine." It is apparently most closely related to the other two members of subgenus *Pieris*, section *Phillyreoides*, *P. cubensis* (Grisebach) Small, endemic to w. Cuba, and *P. swinhoei* Hemsley, of se. China, neither of which shares its unusual habit. [= FNA, GW, K, L, WH, Z; = Ampelothamnus phillyreoides (Hooker) Small – S]

20. *Agarista* D. Don ex G. Don 1834 (Agarista)


**Agarista populifolia** (Lamarck) Judd, Agarista, Pipe-plant. Blackwater swamps, hydric hammocks, marly spring runs. April-May; September-October. E. SC (or se. NC?) south to ne. and c. peninsular FL. Reported for several locations in s. AL, likely escaped (Diamond & Woods 2009). A specimen at the University of North Carolina at Chapel Hill is labeled as coming from a nursery, originally taken from plants in a swamp in Columbus County, NC. The record is plausible and would add the species to the state's flora. [= FNA, K, L, WH, Z; = Leucothoe populifolia (Lamarck) Dippel – RAB, GW; = Leucothoe acuminata (Aiton) G. Don – S; = Andromeda populifolia Lamarck]

21. *Lyonia* Nuttall 1818 (Staggerbush, Maleberry, Fetterbush)

1 Lower leaf surfaces stipitate-peltate with rusty scales; [of s. SC southward].
2 Ultimate branches not rigidly ascending, flowers nearly always restricted to branches of the previous year, the leaves not conspicuously reduced toward the branch tips; leaves with distal margin usually revolute, sometimes strongly so; major veins usually depressed; lower leaf surface with some scales often large and with irregular margins, others smaller and more nearly entire, at least the smaller scales more-or-less persistent; [shrub to 6 (-12) m tall] .................................................. L. ferruginea

2 Ultimate branches rigidly ascending, flowers frequent on branches of the current year (though also on older growth), the leaves conspicuously reduced toward the branch tips; leaves with distal margin at most slightly revolute; major veins not depressed; lower leaf surface with scales usually all large and with irregular margins, the scales often deciduous; [shrub to 1.5 (-3) m tall] .............. L. fruticosa

1 Lower leaf surfaces glabrous or pubescent; [collectively widespread].
2 Leaves evergreen (some leaves present on wood of the previous year), coriaceous, and shining .................................................. L. lucida
3 Leaves deciduous (no leaves present on wood of the previous year), subcoriaceous, and dull. .............................................................. L. mariana
4 Young twigs terete; leaf margin minutely serrulate; corolla 3-5 mm long; inflorescence a terminal panicle; capsule 2.5-3 mm long; leaf surfaces with appressed, strigillose hairs, pale with a red base.
5 Inflorescences (at least the lower) with conspicuous bracts; [of the Coastal Plain and lower Piedmont] ...L. ligustrina var. foliosiflora

Lyonia ferruginea (Walter) Nuttall, Crookedwood, Dragonwood, Staggerbush. Dry oak and pine woodlands, scrub, rarely pocosins, spodosotic flatwoods. February-May; April-October. Se. SC south to se. peninsular FL, west to Panhandle FL. See discussion under L. fruticosa. [= FNA, GW, K, L, WH, Z; < Lyonia ferruginea – RAB (also see L. fruticosa); = Xolisma ferruginea (Walter) Heller – S]

Lyonia fruticosa (Michaux) G.S. Torrey, Staggerbush, Poor-grub. Pocosins. March-July; May-October. Se. SC (at least formerly) south to s. peninsular FL, west to e. Panhandle FL. Though not included in RAB for our area, Judd (1981) cites several old specimens from SC. The species is definitely known from immediately adjacent GA, and there seems no reason to doubt its (at least historical) occurrence in SC. This species is difficult to distinguish from L. ferruginea, with which it often co-occurs. [= FNA, GW, K, L, WH, Z; < L. ferruginea – RAB; = Xolisma fruticosa (Michaux) Nash – S]

Lyonia ligustrina (Linnaeus) A.P. de Candolle var. foliosiflora (Michaux) Fernald, Southern Maleberry, He-huckleberry. Pocosins, seepage bogs, and other wet habitats. Late April-June; September-October. Se. VA south to s. FL, west to e. TX and e. OK, and (west of the mountains) north to TN and AR. Rather nondescript when sterile, the gray-green hue of the leaves is a useful character. Var. foliosiflora is the usual variety on the Coastal Plain (including the fall-line sandhills). [= FNA, GW, K, L, W, Z; < L. ligustrina – RAB, C, G; > L. ligustrina var. capreaefolia (Watson) A.P. de Candolle – F; > L. ligustrina var. foliosiflora – F; > L. ligustrina var. salicifolia (Watson) A.P. de Candolle – F; = Arsenococcus frondosus (Pursh) Small – S; = Xolisma foliosiflora (Michaux) Small]

Lyonia ligustrina (Linnaeus) A.P. de Candolle var. ligustrina, Northern Maleberry, He-huckleberry. Mountain bogs, shrub balds, bottomlands, other moist to wet habitats, "dry" ridges at high elevations. May-July; September-October. S. ME, s. NH, s. VT, s. and e. NY, s. OH, WV, and KY south to w. and e. SC, n. GA, and ne. AL, primarily in the mountains and adjacent provinces. Var. ligustrina is the usual variety in the Mountains and Piedmont, but extends as well into the Coastal Plain in NC and SC. This variety is very variable in leaf shape and size, some populations having leaves about 3 cm long and 1.3 cm wide, others with leaves as long as 8 cm long and 5 cm wide. The plants with smaller leaves occur in bogs and other distinctly wet habitats, while plants with large leaves occur in thin soils in high elevation heath balds and thin soils around rock outcrops (as, for instance, on Grandfather Mountain, NC). [= F, FNA, GW, K, L, W, Z; < L. ligustrina – RAB, C, G, WV; = Arsenococcus ligustrinus (Linnaeus) Small – S; = Xolisma ligustrina (Linnaeus) Britton]

Lyonia lucida (Lamarck) K. Koch, Shining Fetterbush. Pocosins, wet woodlands, blackwater swamp forests, other acidic habitats especially if peaty. April-early June; September-October. Se. VA south to s. FL and west to e. and c. LA; also in w. Cuba. Readily distinguished by the glossy, coriaceous leaves with a prominent vein running along the margins. When in flower in large numbers, the odor is cloyingly sweet. [= RAB, C, F, FNA, G, GW, K, L, WH, Z; = Desmothenus lucidus (Lamarck) Small – S; = Neopieris nitida (Bartram ex Marshall) Britton]

Lyonia mariana (Linnaeus) D. Don, Staggerbush. Pine flatwoods, savannas, pocosin-sandhill ecotones, dry rocky woodlands in the lower Piedmont (especially with chestnut oak). April-May; September-October. RI (formerly) and NY (Long Island) south to e. peninsular and e. Panhandle FL; disjunct west of the Mississippi River in sc. MO, c. AR, nw. LA, se. OK, and e. TX. Readily distinguished by the broadly elliptic leaves borne at an ascending 45 degree angle, with bright pink axillary buds. [= RAB, C, F, FNA, G, GW, K, L, WH, Z; = Neopieris mariana (Linnaeus) Britton – S]

**Andromeda polifolia** Linnaeus var. *latifolia* Aiton, Bog-rosemary. Bogs. May-July; June-September. Circumboreal, in North America from NL (Newfoundland) and NL (Labrador) west to SK, south to NJ, ne. PA (Rhoads & Klein 1993), e. WV (at Cranberry Glades, Pocahontas County), IN, IL, and MN. Var. *polifolia* is also circumboreal, overall more northern. [= FNA; = *A. glaucophylla* Link – C, F, G, L; = *A. polifolia* var. *glaucophylla* (Link) A.P. de Candolle – K; = *A. polifolia* ssp. *glaucophylla* (Link) Hultén]

23. **Zenobia** D. Don 1834 (Zenobia, Honey-cups)


**Zenobia pulverulenta** (Bartram ex Willdenow) Pollard, Zenobia, Honey-cups. Pocosins, margins of pineland ponds. April-June; September-October. This monotypic genus is a narrow endemic of the Coastal Plain of se. VA, NC, SC, and e. GA (Bryan Co.). It was considered by Wood (1961) to have "no close relatives," but molecular phylogeny suggests that it is sister to *Andromeda*. The crenate leaves help distinguish *Zenobia* from other pocosin shrubs. The flowers are extremely fragrant. The species is remarkably variable in leaf glaucescence. Many plants in the fall-line sandhills and upper Coastal Plain have the lower leaf surface, pedicels, and capsules covered in wax to the point that they are bright white; outer Coastal Plain plants generally lack any glaucescence. The division into two species listed below in synonymy was based largely on this character; further study appears warranted. In the centers of major peat domes in the Outer Coastal Plain and in large Carolina bays in the Bladen Lakes region, where peat depths reach 3-5 meters, occur areas of up to 25 square kilometers dominated by *Zenobia* (sometimes codominant with *Chamaedaphne* or *Sarracenia flava*). This community has been referred to as "deciduous low pocosin," to distinguish it from the dominance of evergreen shrubs found in most pocosins. [= RAB, C, F, FNA, G, GW, K, L; > *Z. pulverulenta* – S; > *Z. cassinefolia* (Ventenat) Pollard – S]

24. **Chamaedaphne** Moench 1794 (Leatherleaf, Cassandra)


**Chamaedaphne calyculata** (Linnaeus) Moench, Leatherleaf, Cassandra. Pocosins in the Coastal Plain, bogs in the Mountains, *Chamaecyparis* bogs. March-April; June-October. Circumboreal; in North America from NL (Newfoundland) to AB, south to WV (Tucker County) (T.F. Wieboldt, pers.comm., 2007), MD, OH, n. IL, WI, n. IA, AB, and BC; disjunct to the mountains of NC (where now nearly extirpated, known only from a single bog of less than 1 hectare) and to the Coastal Plain of NC and ne. SC. The Coastal Plain occurrences in our area are mainly in the centers of large peat dome or Carolina Bay pocosins, the insufficiently famous southern blanket bogs or "southern muskeg." In these areas, *Chamaedaphne* is sometimes dominant (or codominant with *Zenobia pulverulenta* or *Sarracenia flava*) over expanses of 25 square kilometers. The southern occurrences of *Chamaedaphne* are certainly the result of Pleistocene distributions. A number of varieties have been named: (the Eurasion var. *calyculata*, var. *latifolia* in Maritime Canada, south to n. New England, and var. *angustifolia*, to which our material would presumably be referred). The validity of the varieties is doubtful. [= C, FNA, G, K, L, S, W; = *Cassine* calyculata (Linnaeus) D. Don – RAB, GW; > *Chamaedaphne* calyculata var. *angustifolia* (Aiton) Rehder – F]

25. **Leucothoe** D. Don 1834 (Fetterbush, Leucothoe)

A genus of 5-6 species, shrubs, of Japan, Himalayan Asia, and e. North America. References: Tucker in FNA (2009); Stevens et al. in Kubitzki (2004). [also see *Agarista* and *Eubotrys*]

1 Leaves deciduous, dull, membranaceous [. . .]. [see *Eubotrys*]

2 Leaves evergreen, glossy, coriaceous. [. . .]

2 Leaves with an acute or short-acuminate apex; racemes 2-4 (5) cm long; sepals ovate, with an obtuse or rounded apex; longest petioles 3-8 mm long. [. . .] = *L. axillaris* [. . .]

2 Leaves with a long-acuminate apex; racemes 4-10 cm long; sepals lanceolate-ovate, with an acute (or subacute) apex; longest petioles 8-15 mm long. [. . .] = *L. fontanesiana*

**Leucothoe axillaris** (Lamarck) D. Don, Coastal Doghobble. Pocosins, blackwater swamp forests, and moist and acid slopes. Late March-May; September-October. A Southeastern Coastal Plain endemic: sw. VA south to FL and west to extreme e. LA. [= C, FNA, G, GW, K, L, S, WH; = *L. axillaris* var. *axillaris* – RAB; > *L. axillaris* var. *axillaris* – F; > *L. axillaris* var. *ambigens* Fernald – F]

**Leucothoe fontanesiana** (Steudel) Sleumer, Mountain Doghobble, Switch-ivy. Moist slopes, streambanks, ravines, often associated with *Rhododendron maximum* thickets. April-May; September-October. A Southern Appalachian endemic: sw. VA
A genus of 2 species, shrubs to small trees, of e. North America. Recent molecular evidence supports the recognition of *Eubotrys* as a genus separate from *Leucothoe*, and more closely related to *Chamaedaphne*, supporting the views, based on morphological grounds, of many earlier authors (Kron et al. 2002). References: Tucker in FNA (2009); Kron et al. (2002); Stevens et al. in Kubitzki (2004).

1 Anthers with 4 awns; capsule rounded on the sutures; sepals broadly lanceolate; racemes 3-5 cm long; seeds not winged, shaped like a section of an orange ................................................. *E. racemosa*

1 Anthers with 2 awns; capsule angled on the sutures; sepals ovate; racemes 5-12 cm long; seeds winged, oblanceolate, flat ............... *E. recurva*

**Eubotrys racemosa** (Linnaeus) Nuttall, Coastal Fetterbush. Swamps, pocosins, streambanks, and other wet places. Late March-early June; September-October. E. MA south to c. peninsular FL and west to LA, primarily on the Coastal Plain; disjunct inland, as in e. TN (Chester, Wofford, & Kral 1997). [= C, FNA, G; L. racemosa var. projecta Fernald – F; > L. racemosa var. racemosa – F; > Eubotrys racemosa – S; > Eubotrys elongata Small – S]

**Eubotrys recurva** (Buckley) Britton, Mountain Fetterbush. Heath balds, high elevation ridges and granitic domes, bogs. April-early June (rarely sporadically in the fall); August-October. A Southern Appalachian endemic: sw. VA, s. WV, and se. KY south through w. NC and ne. TN to ne. GA (Rabun County) and nw. SC. [= C, FNA, G, S; > Leucothoe recurva (Buckley) A. Gray – RAB, F, K, L, W, WV]

**27. Gaultheria** Kalm ex Linnaeus 1754 (Wintergreen, Teaberry)

A genus of 115-135 species, shrubs and subshrubs, of Asia, Australia and New Zealand, South America, West Indies, Central America, and North America (primarily Asian). References: Trock in FNA (2009); Stevens et al. in Kubitzki (2004).

1 Stems creeping, the leaves 3-10 mm long, well-distributed along the stem; berries white; flowers 4-merous............................... *G. hispidula*

1 Stems erect, the leaves 15-50 mm long, clustered at the tip of the stem; berries red; flowers 5-merous............................... *G. procumbens*

**Gaultheria hispidula** (Linnaeus) Muhlenberg ex Bigelow, Creeping Snowberry, Moxie. Spruce-fir forests, northern hardwoods forests, bogs at high elevations. May. NL (Newfoundlnd) and NL (Labrador) west to BC, south to NJ, MD, WV, OH, MN, ID, and WA; there is no known documentation for the attribution (by C, F, G, and S) of this species as occurring in NC. [= C, F, FNA, G, K, WV; > Chiogenes hispidula (Linnaeus) Torrey & A. Gray – S]

**Gaultheria procumbens** Linnaeus, Wintergreen, Teaberry, Checkerberry. Heath balds, woodlands, and openings, usually acidic and xeric. June-August; September-November. NL (Newfoundlnd) west to MB, south to e. NC, ne. GA, AL, c. TN, KY, n. IN, and MN. [= RAB, C, F, FNA, G, K, L, S, WV]

**28. Vaccinium** Linnaeus 1753 (Blueberry)

A genus of 140 species, shrubs, lianes, and small trees, semicosmopolitan. *Vaccinium* in our area is divided into 6 strongly differentiated sections, sometimes, as by Small, treated as separate genera. The taxonomy of *Vaccinium* remains unclear – past divergence of opinion is obvious in the synonymy. For instance, Small (1933) recognizes 6 genera and 25 species for our area, Ahles in RAB (1968) recognizes 1 genus and 14 species (one with 2 varieties) (not including VA), and Vander Kloet (1988) recognizes 1 genus and 9 species. The highbush blueberries of section Cyanococcus are particularly difficult. Vander Kloet's extremely broad concept of the highbush blueberries as consisting of a single species, *V. corymbosum*, including *V. fuscatum* (*V. atroococcum* – RAB), *V. simulatum* ("V. constablaei" – RAB), *V. virgatum* (*V. amoenum* – RAB, *V. elliottii*, *V. formosum* (*V. australae), and *V. caesariense* (and many other named taxa not recognized here) has been adopted by some recent authors, at least partly for its ease of application. I agree with Godfrey (1988), though, that *V. elliottii* has "such distinctiveness as to be recognizable in the field at a glance."

The other taxa are less easily recognizable, but seem to have substantial morphological and phytogeographic integrity. The fairly frequent presence of hybrid individuals and populations can make identification frustrating, but I agree with Ward (1974) that "the genus *Vaccinium* ... is difficult but not in any way an irresolvable tangle of intergrading
populations. The vast bulk of individuals encountered in the field may be assigned, as with any non-apomictic genus, to a relatively few, discrete, and wholly recognizable species". Many of the taxa included in *V. corymbosum* by Vander Kloet (1988) and Luteyn et al. (1996) occur together in combinations of two to four, are immediately recognizable in the field, bloom at different times, and have different flower, fruit, and leaf morphology. Failure to recognize multiple entities within the highbush blueberries results in the taxonomic homogenization of the diversity of the group and obscures important phytogeographic patterns. Our area, with 20 species (24 taxa) in 6 sections, has a greater diversity of *Vaccinium* than any other comparably sized area in North America. References: Vander Kloet (1988)=Z; Uttal (1987)=Y; Camp (1945)=X; Ashe (1931)=V; Ward (1974)=Q; Luteyn et al. (1996)=L; Vander Kloet in FNA (2009); Vander Kloet & Hall (1981); Vander Kloet (1977, 1978a, 1978b, 1980, 1982, 1983a, 1983b); Uttal (1986a, 1986b); Stevens et al. in Kubitzki (2004). Key based in part on Uttal (1987).

1 Trailing vines, erect shoots (if present) borne on horizontal stems; leaves evergreen, glossy and dark green above, rarely exceeding 20 mm in length.

2 Leaves narrowly elliptic, glabrous above, glaucous-white below; leaf margin entire and eglandular; berry red when ripe, 8-15 mm long; [cranberries, section Oxycoccus]........................... Key A

3 Twigs of the season not verrucose.

4 Corolla lobes 4, strongly recurved, 7-10 mm long; calyx lobes 4 (also visible on the berry); leaves lanceolate to ovate, the apex acuminate, the margin regularly and finely serrate with glandular teeth; [of high elevations in the Mountains]; [mountain cranberry, section Oxycoccusoides].................................................................................................................................................. Key D

5 Mature leaves green (or glaucous), glandular beneath, mostly elliptic to round, generally 1.5-4.5 cm long; corolla broad-urceolate to narrow-campanulate, the stamens included; berry black, lustrous, 5-9 mm long; [farkeberry, section Batodendron].......................... Key E

6 Mature leaves pale and glaucous, eglandular beneath, mostly elliptic, 3-10 cm long; corolla campanulate, the stamens long-exserted; berry green, yellow, pink, or purple, usually glaucous, 7-18 mm long; [deerberries, section Polycodium].......................... Key F

**Key A – cranberries, section Oxycoccus**

1 Leaves elliptic, broadest near middle, (5-) 7-10 (-18) mm long, (2-) 3-4 (-5) mm wide; leaves blunt-rounded and non-involute; pedicels with 2 green, leaf-like bracts 1-2 mm wide; berry 8-15 mm in diameter.............................................................................. V. macrocarpon

1 Leaves ovate, broadest toward base, (3-) 5-6 (-9) mm long, (1-) 2-3 (-5) mm wide; leaves involute at least along the margins, thus making the leaf tip acute; pedicels with (0-) 2 (-5) reddish, scale-like bracts < 1 mm wide; berry 6-12 mm in diameter................................. V. oxycoccus

**Key B – creeping blueberries, section Herpothamnus**

1 Leaves (2-) 3-18 (-25) mm long, generally elliptic (less commonly ovate or obovate); angle of leaf base typically >90 degrees; margins finely glandular mucronulate-crenulate, the teeth tightly appressed and therefore often obscure, the margin superficially entire; stems mostly prostrate (ascending in areas that have been long fire-suppressed); [widespread in NC and SC, rare in se. VA and e. GA]....... V. crustisfolium

1 Leaves (4-) 7-35 (-63) mm long, elliptic to obovate (less commonly elliptic-ovate); angle of leaf base typically <90 degrees; margins glandular mucronulate-serrulate to serrulate-crenulate, the teeth apparent, especially toward the apex; [of Lexington County, SC]................................................................................................................................. V. sempervirens

**Key C – blueberries, section Cyanococcus**

Note: Hybrids and apparent local races in this section are frequent, and will key poorly. Hybrids are particularly frequent among the taxa of the highbush blueberries, somewhat less so among lowbush blueberries and between lowbush and highbush. In the Coastal Plain, *V. marianum* (*formosum* × *fasciculatum*) is the most common, and will be responsible for most difficulties encountered in the key from lead 10 on. Uttal (1987) presents a complicated key with *V. marianum* (but not other hybrids) included.

1 Shrubs rhizomatous, forming clonal colonies, the upright stems < 1 m tall (and often < 0.5 m tall); ["lowbush blueberries"].

2 Leaves evergreen, 5-15 mm long (rarely to 30 mm long on fire sprouts), subcoriaceous, glossy dark-green or dull blue-green; [restricted in our area to the Coastal Plain of se. SC southward].

3 Plant glaucous and bluish-green throughout; leaf undersurface lacking scattered glandular hairs; [of s. GA south to s. peninsular FL, west to e. TX].................................................................................................................................................. V. darrowii

3 Plant dark green throughout; leaf undersurface with scattered glandular hairs, these sometimes very few by late in the season (best seen in the field by folding a leaf, holding the fold up to the light, and using a 10× lens); [of se. SC southward to n. FL, west to s. AL]......... V. myrsinites

2 Leaves deciduous to semi-evergreen, herbaceous, generally > 20 mm in length, dull to somewhat glossy and medium green; [collectively widespread in our area].
3 Lower surfaces of the leaves with red stipitate glands (sometimes pubescent as well when young), berry usually black and lustrous; [of the Coastal Plain and lower Piedmont] ........................................................... V. tenellum

3 Lower surfaces of the leaves eglantriform, pubescent or glabrous; berry either blue and glaucous, or black and glandular-hirsute; [collectively widespread in our area].

4 Leaves entire or obscurely serrulate (if obscurely serrulate then 30-50 mm long and 13-25 mm wide), either glaucous and glabrous (or nearly so) beneath, or green and densely pubescent beneath.

5 Leaves pale and glaucous, glabrous on both sides or pubescent on the underside only; berry blue and glaucous; [plants collectively widespread].

6 Plants mostly 0.5-1.0 (-1.4) m tall, stems brown for much of their length; leaves entire; fruit 7-12 mm in diameter; [of moderate to high elevations of the Mountains] ........................................................... V. aldomontanum

6 Plants mostly 0.2-0.6 (-1.0) m tall, stems green to the base (or brown at the very base); leaves serrulate (rarely entire); fruit 4-7 (-8) mm in diameter; [widespread, at low to moderate elevations] ........................................................... V. pallidum

5 Leaves green, pilose on both sides; berry either blue and glaucous, or black and glandular-hirsute; [of the Mountains].

7 Berry black and glandular-hirsute; calyx and corolla hirsute and stipitate-glandular; leaves mostly > 3 cm long; [of the mountains of sw. NC and adjacent TN and GA] ........................................................... V. formosum

7 Berry blue and glaucous; calyx and corolla glabrous; leaves mostly < 3.5 cm long; [of the mountains of n. NC and north] ..........

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Key D – mountain cranberry, section Oxycoccoides

One species in our area ........................................................... V. erythrocarpum

Key E – farkleberry, section Batodendron

One species in our area ........................................................... V. arboreum

Key F – deerberries, section Polycopodium

[This key and treatment provisional]

1 Leaves strongly white-glaucous beneath; stamens 4-6 mm long.

2 Bracts of the inflorescence nearly as large as normal foliage leaves; [of the Coastal Plain from se. NC southward] ...........................................................
**Ericaceae**

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Vaccinium alnorum W.W. Ashe, Blue Ridge Blueberry. Mt (GA, NC, SC, VA): grassy balds, heath balds, high elevation forests and woodlands; uncommon. May-June; July-September. The tetraploid *V. alnorum* occurs primarily in the Mountains at moderate to high elevations (the type collection is from the Fodderstacks, Macon County, NC); it differs from the diploid *V. pallidum* in forming tighter (often circular) clones, with taller plants (to 1 m tall), the leaves thick in texture, often revolute, strictly glaucous and glabrous, and with excellent berries. [v. *corymbosum* – RAB; = *V. alto-montanum* – G, X, orthographic variant; < *V. pallidum* – FNA, K; > Cyanococcus subcordatus Small – S; > Cyanococcus liparis Small – S, as to type]

Vaccinium angustifolium Aiton, Northern Lowbush Blueberry, Sugarberry, Low Sweet Blueberry. Mt (NC, VA, WV), Pd (DE): acidic forests and woodlands, cliffs and talus (especially sandstone and quartzite), usually at high elevations; common (uncommon in WV, rare in DE and NC). NL (Labrador) and NL (Newfoundland) west to MB, south to NJ, PA, sw. VA, IL, and MN. Recently reported for the Great Smoky Mountains National Park (J. Rock, pers. comm. 2009) and from Cheoah Bald, Graham County (E. Schwartzman, pers. comm. 2010 and NCU specimen). [= C, FNA, K, W, Y, Z; > *V. angustifolium* var. angustifolium – F, WV; > *V. angustifolium* var. laevifolium House – F, WV; > *V. angustifolium* var. hypolasium Fernald – F; > *V. angustifolium* var. nigrum (Wood) Dole – F, WV; > *V. angustifolium* – G, X; > *V. latissimum* Camp – G, X; > *V. brittonii* Porter ex Bicknell – X]

Vaccinium darrowii Marshall, Dark Blueberry. Savannas, pine flatwoods, pocosin-sandhill ecotones, upland sandhills over clay pans. April-May; June-July. This species is nearly endemic to the Carolinas, barely extending into immediately adjacent VA and GA. See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for discussion of the systematics and ecology of this species and the closely related *V. sempervirens*. [= RAB, C, F, G, GW, Y; > *V. darrowii* ssp. crassifolium (Andrews) Small – S; < *V. crassifolium* – FNA, L, Z]

Vaccinium formosum L., Blueberry. Coastal Plain pinelands, coastal plain swamps, coastal dunes. [= *Cyanococcus formosus* – S]

Vaccinium corymbosum var. caesium (Hooker) Fernald – F, orthographic variant; = *Cyanococcus myrsinites* (Lamarck) Small var. glaucum A. Gray – S

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1 Leaves green beneath (often slightly paler but not at all glaucous); stamens 5-8 mm long.
2 Bracts of the inflorescence much smaller than normal foliage leaves; plants short, 0.2-0.5 (-1.0) m tall, distinctly clonal; [primarily of Coastal Plain pinelands].
3 Bracts of the inflorescence nearly as large as normal foliage leaves; plants short, 0.2-0.5 (-1.0) m tall, distinctly clonal; [primarily of Coastal Plain pinelands].
4 Hypanthium and fruit glabrous
5 Hypanthium and fruit pubescent

Vaccinium alnorum

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Vaccinium crassifolium

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Vaccinium angustifolium

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Vaccinium darrowii

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Vaccinium formosum

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Vaccinium corymbosum

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Vaccinium alnorum

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Vaccinium crassifolium

**Vaccinium erythrocarpum** Michaux, Bearberry, Highbush Cranberry, Mountain Cranberry. Rocky ridges, shrub or grassy balds, bogs, spruce-fir forests, usually at high elevations. Late May-July; August-September. A Southern and Central Appalachian endemic, *V. erythrocarpum* ranges from WV through VA to w. NC, e. TN, and ne. GA. The only other member of Section Oxycoccoides is *V. japonicum* Miguel of montane Japan, so similar as to be sometimes regarded as only a subspecies or variety of our species. [= RAB, C, F, K, L, W, WH, Y, Z; = *V. corymbosum* – FNA; = Hugeria erythrocarpa (Michaux) Small – S]

**Vaccinium formosum** H.C. Andrews, Southern Highbush Blueberry, Swamp Highbush Blueberry. Bogs, swamps (especially blackwater, or at least where away from strong alluvial influence), seepages, depression ponds (dolines), other moist ground. Late February-May; June-August. Apparently ranging from NJ south to n. FL and s. AL, primarily on the Coastal Plain. This species is the primary source of the cultivated highbush blueberries. It has the largest and arguably the highest quality fruit of the native highbush blueberries. [= K, Y; < *V. corymbosum* – RAB, C, FNA, L, WH, Z; = *V. australis* Small – G, GW, X; = Cyanococcus virgatus (Aiton) Small – S, misapplied]


**Vaccinium hirsutum** Buckley, Woollyberry, Hairy Blueberry. Mountain slopes and ridges, primarily in pine-oak and oak forests. April-May; June-July. *V. hirsutum* is a narrow Southern Appalachian endemic, occurring only in a few counties of sw. NC, se. TN, and n. GA. It is the only species in our area with pubescent fruit. [= RAB, FNA, K, L, W, X, Z; = *Cyanococcus hirsutus* (Buckley) Small – S]

**Vaccinium macrocarpon** Aiton, Cranberry, Large Cranberry. Mountain bogs, low pocosins with deep peat, interdunal swales. May-July; August-November. Unlike the circumboreal *V. oxycoccus* Linnaeus, *V. macrocarpon* is limited to North America. This is the familiar edible cranberry, raised commercially in artificial bogs, primarily in MA, WI, and NJ. It ranges as a native plant from NL (Newfoundland) west to s. ON, MN, ne. IL, n. IN, n. and c. OH, PA, and NJ, extending south along the Appalachians as a disjunct rarity through WV, w. VA, and ne. and se. TN to w. NC, and south along the outer Coastal Plain as a disjunct rarity in e. MD, se. VA, and ne. and se. NC. The occurrence in the inner Coastal Plain (fall-line sandhills) along the Little River in Cumberland County, NC is questionably native. [= RAB, FNA, G, K, L, W, WH, Y, Z; = *Oxycoccus macrocarpus* (Aiton) Persoon – S]

**Vaccinium myrsinites** Lamarck, Southern Evergreen Blueberry. Pine flatwoods. March-April; May-June. Se. SC south to s. peninsular FL, west to s. AL. *V. myrsinites* is readily distinguished from all our species by the following combination of characteristics: clonal shrub with upright stems usually < 50 cm tall, the young twigs verrucose, leaves evergreen, mostly 5-15 mm long and 2-10 mm wide, lower surface of young leaves with stout glandular hairs. Further south, it can be difficult to distinguish from the closely related *V. darrowii* Camp (see key), with which it often co-occurs in their area of overlap. [= RAB, FNA, GW, K, L, WH, X, Z; = *Cyanococcus myrsinites* (Lamarck) Small var. myrsinites – S]

**Vaccinium myrtilloides** Michaux, Velvetleaf Blueberry, Sourtop, Canada Blueberry. Acidic, high elevation slopes and cliffs. May-July. NL (Labrador) west to BC, south to PA, VA, w. NC, WV, IN, and MN. Reported for the NC side of Great Smoky Mountains National Park (Haywood County) (K. Langdon, pers. comm. 2009). The possible occurrence of this species on Grandfather Mountain is based on somewhat ambiguous specimens and needs additional confirmation. See Vander Kloet & Hall (1981) for a summary of information on this diploid species. [= C, F, FNA, G, K, W, WV, X, Y, Z]

**Vaccinium oxyccoccus** Linnaeus, Small Cranberry. Bogs. Circumboreal, south in North America to NJ, PA, WV (Grant, Mineral, Pendleton, Pocahontas, Preston, Randolph, and Tucker counties), IN, and MN. This species has been reported for NC,
by Fernald (1950) as *V. oxyccocos var. ovalifolium* Michaux, by Scoggan (1979) as *Oxycoccus ovalifolius* (Michaux) Persold, and by Kartesz (1999). Most likely, ambiguous collections of *V. macrocarpon* are the basis for these reports.  [= C, FNA, G, K; > *V. oxyccocos* Linneaus var. *ovalifolium* – F; > *Oxycoccus palustris* Persoon; > *Oxycoccus palustris* Persoon var. *ovalifolius* (Michaux) Seymour; > *Oxycoccus ovalifolius* (Michaux) Persold]

### Vaccinium pallidium


### Vaccinium semprevirens

Rayner & Henderson, Rayner's Blueberry.  Seeepage bogs in the fall-line Sandhills, longleaf pine woodlands over sandstone and gravel outcrops.  Endemic to Lexington County, SC, known from only a few sites.  This species is clearly closely allied to *V. crassifolium*.  Kirkman & Ballington (1990) reduce it to a subspecies.  Because it is allopatric and relatively discrete morphologically, despite occurring in similar habitats, I prefer to retain it as a species.  See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for further discussion of the systematics and ecology of this species and *V. crassifolium*.  [= *V. crassifolium* Andrews ssp. *sempervirens* (Rayner & Henderson) Kirkman & Ballington – K; < *V. crassifolium* – FNA, L, Z]

### Vaccinium simulatum

Small, Mountain Highbush Blueberry.  Forested slopes (northern hardwoods, spruce-fir forests), ridges, and shrub balds, at moderate and high elevations.  Late April-early June; July-August.  A Southern and Central Appalachian endemic, *V. simulatum* ranges from e. KY and sw. VA south through w. NC and e. TN to n. GA and n. AL.  The name *V. constablaei* has been misapplied to this species, as by RAB; see *V. corymbosum* for a discussion of the correct application of *V. constablaei*.  [= G, K, X, Y; = *V. constablaei* Gray – RAB, G, misapplied; < *V. corymbosum* – C, FNA, L, W, Z; = *Cyanococcus simulatus* (Small) Small – S]

### Vaccinium stamineum

Linnaeus var. *I*, Dwarf Deerberry.  Pinelands.  April-June; August-October.  This dwarf taxon is characteristic of Coastal Plain pinelands; its stature is not the result of fire; it never achieves greater height, even following decades of fire suppression.  Se. NC south to GA.  < *V. stamineum* var. *stamineum* – RAB; < *Vaccinium stamineum* – C, FNA, K, L, W, Y, Z; = *Polycodium arenicola* (W.W. Ashe) V; > *Polycodium floridanum* var. *caesium* (Greene) D.B. Ward – V]

### Vaccinium vaccillans

Linneaus var. *2*, Appalachian Deerberry.  Xeric to submesic woodlands and forests, including pine-oak/heath and shrub balds.  April-June; August-October.  PA south to GA, in the Appalachians and adjacent provinces.  [= *V. stamineum* var. *stamineum* – RAB, F, WV; < *V. stamineum* – C, FNA, K, L, W, Y, Z; = *Polycodium candicans* Small – S, V; = *V. corymbosum* – C, FNA, L, W, Z; = *Cyanococcus simulatus* (Small) Small – S]

### Vaccinium vacillans

Linneaus var. *interius*, Southern Deerberry.  Xeric woodlands.  April-June; August-October.  This dwarf taxon is clearly closely allied to *V. crassifolium*.  Kirkman & Ballington (1990) reduce it to a subspecies.  Because it is allopatric and relatively discrete morphologically, despite occurring in similar habitats, I prefer to retain it as a species.  See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for further discussion of the systematics and ecology of this species and *V. crassifolium*.  [= *V. crassifolium* Andrews ssp. *sempervirens* (Rayner & Henderson) Kirkman & Ballington – K; < *V. crassifolium* – FNA, L, Z]

### Vaccinium vaccillans

Linneaus var. *interius*, Southern Deerberry.  Xeric woodlands.  April-June; August-October.  This dwarf taxon is clearly closely allied to *V. crassifolium*.  Kirkman & Ballington (1990) reduce it to a subspecies.  Because it is allopatric and relatively discrete morphologically, despite occurring in similar habitats, I prefer to retain it as a species.  See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for further discussion of the systematics and ecology of this species and *V. crassifolium*.  [= *V. crassifolium* Andrews ssp. *sempervirens* (Rayner & Henderson) Kirkman & Ballington – K; < *V. crassifolium* – FNA, L, Z]

### Vaccinium vaccillans

Linneaus var. *interius*, Southern Deerberry.  Xeric woodlands.  April-June; August-October.  This dwarf taxon is clearly closely allied to *V. crassifolium*.  Kirkman & Ballington (1990) reduce it to a subspecies.  Because it is allopatric and relatively discrete morphologically, despite occurring in similar habitats, I prefer to retain it as a species.  See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for further discussion of the systematics and ecology of this species and *V. crassifolium*.  [= *V. crassifolium* Andrews ssp. *sempervirens* (Rayner & Henderson) Kirkman & Ballington – K; < *V. crassifolium* – FNA, L, Z]

### Vaccinium vaccillans

Linneaus var. *interius*, Southern Deerberry.  Xeric woodlands.  April-June; August-October.  This dwarf taxon is clearly closely allied to *V. crassifolium*.  Kirkman & Ballington (1990) reduce it to a subspecies.  Because it is allopatric and relatively discrete morphologically, despite occurring in similar habitats, I prefer to retain it as a species.  See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for further discussion of the systematics and ecology of this species and *V. crassifolium*.  [= *V. crassifolium* Andrews ssp. *sempervirens* (Rayner & Henderson) Kirkman & Ballington – K; < *V. crassifolium* – FNA, L, Z]

### Vaccinium vaccillans

Linneaus var. *interius*, Southern Deerberry.  Xeric woodlands.  April-June; August-October.  This dwarf taxon is clearly closely allied to *V. crassifolium*.  Kirkman & Ballington (1990) reduce it to a subspecies.  Because it is allopatric and relatively discrete morphologically, despite occurring in similar habitats, I prefer to retain it as a species.  See Kirkman, Wentworth, & Ballington (1989) and Kirkman & Ballington (1990) for further discussion of the systematics and ecology of this species and *V. crassifolium*.  [= *V. crassifolium* Andrews ssp. *sempervirens* (Rayner & Henderson) Kirkman & Ballington – K; < *V. crassifolium* – FNA, L, Z]
**Vaccinium tenellum** Aiton, Southern Blueberry, Small Cluster Blueberry. Sandhills, pine flatwoods, other xeric woodlands. Late March-early May; June-July. Though abundant in the Carolinas, *V. tenellum* is rather restricted, occurring as a common species from se. VA to c. GA, with a range extension (where it is scattered and rare) south and west to n. FL, s. AL, and se. MS. [= RAB, C, F, FNA, G, K, L, X, Y, Z; = *Cyanococcus tenellus* (Aiton) Small – S]

**Vaccinium virgatum** Aiton, Swamp Blueberry, Rabbiteye Blueberry. Pocosins and *Chamaecyparis* swamps, also in various drier habitats, including turkey oak sandhills. March-April; May-June. A Southeastern Coastal Plain species, *V. virgatum* occurs from se. NC south to FL and west to e. TX. [= GW, K; = *V. amoenum* Aiton – RAB; = *Cyanococcus amoenus* (Aiton) Small – S; < *V. corymbosum* – L, WH, Z; > *V. virgatum* – X; > *V. amoenum* – X; > *F. ashei* Reade – X]

29. **Gaylussacia** Kunth 1819 (Huckleberry)

A genus of ca. 50 species, shrubs, of North and South America (centered in South America). The sections and subsections follow Sleumer (1967a). A study of the phylogeny of the genus *Gaylussacia* provided some evidence for the treatment of *Gaylussacia brachytera* as a monotypic genus or within *Vaccinium*; additional study is needed. References: Sorrie, Weakley, & Tucker in FNA (2009); Sleumer (1967a) = Z; Camp (1935) = Y; Godfrey (1988) = X; Duncan & Brittain (1966) = V; Sorrie & Weakley (2007a) = U; Gajdeczka et al. (2010) = Q; Pernald (1911); Stevens et al. in Kubitzki (2004).

1 Leaves 0.7-2.2 cm long, serrulate, leathery, evergreen, lacking punctate glands; [section *Vitis-idaea*] .............................................. **G. brachytera**

1 Leaves 1.5-10 cm long, entire (or minutely glandular-crenate), membranaceous to subcoriaceous, deciduous, with punctate glands.

2 Leaves subcoriaceous, upper surface shining, dark green, 1.5-4 cm long; bracts of the inflorescence equal to or longer than the pedicels (5-12 mm long), persistent; sepals, pedicels, bracts, and leaves stipitate-glandular and pubescent; [section *Gaylussacia*].

3 Plant < 3 dm high.

4 Corollas averaging 1.0 mm long; anthers averaging 0.8 mm long; glandular hairs on hypanthium dense, < 0.5 mm long; plants of open bogs, sedge and sedge-glandular swamps; [northeastern, south to DE, NC, SC, and WV] ................................................................. **G. dumerosa**

3 Plant 4-10 (-15 dm) tall.

5 Sessile glands on upper leaf surface absent; glandular hairs on hypanthium 0.3-1.5 mm long; [East Gulf Coastal Plain endemic, sw. GA, n. FL, s. AL, s. MS, and se. LA] ............................................................ **G. mosieri**

5 Sessile glands on upper leaf surface numerous; glandular hairs on hypanthium 0.3-0.5 mm long; ranging from SC northward.

6 Corollas averaging 7.0 mm long; anthers averaging 3.7 mm long; plants of peat bogs, raised bogs, peat-based pocosins, and Atlantic white cedar-red maple swamps; [from NL (Newfoundland) to DE, and as a rare disjunct in the Coastal Plain of NC and SC] ................................................................. **G. biligeviana**

6 Corollas averaging 6.0 mm long; anthers averaging 2.9 mm long; plants of montane bogs, seepage over rock, and possibly drier forests; [rare endemic of southern Appalachian swamps of w. NC] ................................................................. **G. orocola**

2 Leaves membranaceous to subcoriaceous, upper surface dull, yellow-green to medium-green, 10-15 cm long; bracts of the inflorescence shorter than the pedicels, early deciduous; sepals, pedicels, bracts, and leaves with sessile glands, pubescent or not pubescent; [section *Decamerium*].

7 Leaves glandular on both surfaces; racemes 0.5-1.5 cm long; [section *Decamerium, subsection Baccatae*] ............................................. **G. baccata**

7 Leaves glandular on the lower surface only; racemes 1-5 cm long.

8 Leaves membranaceous, medium-green, with acuminate apices; [section *Decamerium, subsection Ursinae*] .................................. **G. urseta**

8 Leaves subcoriaceous, yellow-green to glaucous, with obtuse to emarginate apices; [section *Decamerium, subsection Frondosae*].

9 Young twigs glabrous; leaves glabrous or pubescent beneath, often glaucous; shrub to 20 dm tall; [widespread in our area] ................................................................. **G. frondosa**

9 Young twigs densely pubescent with short, curled hairs; leaves sparsely to densely pubescent beneath, glaucous or not; shrub to 10 dm tall; [of se. NC and southward in the Coastal Plain].

10 Larger leaves mostly 2-4 cm long and 1-2 cm wide; lower leaf surface usually strongly glaucous, sparsely pubescent, with the longest nonglandular hairs < 0.27 mm long; floral tube and calyx glaucous; shrub 2-6 (-10) dm tall ............................................. **G. nana**

10 Larger leaves mostly 3-6 cm long and 2-3.5 cm wide; lower leaf surface not glaucous, sparsely to densely pubescent, with the longest nonglandular hairs 0.46-0.64 mm long; floral tube and calyx not glaucous; shrub to 10 dm tall ............................................. **G. tomentosa**

**Gaylussacia baccata** (Wangenheim) K. Koch, Black Huckleberry, Cracklberry. Xeric, acidic forests and woodlands, rock outcrops, to 1600m elevation. April-June; July-August. NL (Newfoundland) and QC west to ON and MB, south to ne. NC, nw. SC, n. GA, AL, and MO; in GA, NC, and SC it is primarily montane in distribution, but in VA it occurs throughout the state. [= C, F, FNA, G, K, L, Q, RAB, V, W, WV, Y, Z; = Decachaena baccata (Wangenheim) Small – S]
Gaylussacia bigeloviana (Fernald) Sorrie & Weakley, Northern Dwarf Huckleberry. Peat dome pocosins (in NC and VA), sandhill seepage bogs (SC), Chamaecyparis bogs (DE), generally growing in peat, forms transitional to var. dumosa in wet pinelands and disturbed pocosins. April-June; June-October. Var. bigeloviana ranges from NL (Newfoundland) south to NJ, with forms transitional to var. dumosa as far south as VA, and disjunct in Carteret, Dare, and Pender counties, NC (in low pocosins of large peat domes with Chamaedaphne and Zenobia), in a Sandhill seepage bog in Lexington County, SC. [= FNA, Q, U; = G. dumosa (Andrews) Torrey var. bigeloviana Fernald – C, F, G, Y; < G. dumosa – GW, K, L, RAB, V, W, X, Z]

Gaylussacia brachycera (Michaux) A. Gray, Box Huckleberry. Dry, acidic ridgetops and upper slopes, locally forming large clones. May-June. Sc. PA and DE south to e. KY and ec. TN, primarily on the Cumberland and Alleghany Plateaus; also disjunct on a steep, xeric, west-facing bluff in Durham Co. NC, where evidently native. Treatment of this species in a monotypic genus may be warranted, but the genus name Buxella (as used by Small) is unavailable, as it had already been used prior to Small in a different application (Wilbur & Bloodworth 2004). [= C, F, FNA, G, K, L, Q, W, WV, Y, Z; = Buxella brachycera (Michaux) Small – S (but Buxella is preoccupied); = Vaccinium brachycera Michaux; note that the report in RAB is based on a misidentification]

Gaylussacia dumosa (Andrews) Torrey & A. Gray, Southern Dwarf Huckleberry. Xeric to mesic, acidic forests and woodlands. March-June; June-September. Se. SC (spodosolic flatwoods in Beaufort County) south to c. peninsular FL, west to s. GA (n=12) (Luteyn et al. 1996). [= FNA, K, L, Q, V, Y; narrow Southern Appalachian endemic: sw. NC, nw. SC, ne. GA, and se. TN; disjunct at Cumberland Gap National Historic Park, Bell County, KY. On mountain slopes and summits in that area it is often the dominant shrub, forming large clonal patches. [= FNA, K, L, Q, RAB, V, W, Y, Z; = Decachaena nana (A. Gray) Small – S]

Gaylussacia frondosa (Linnaeus) Torrey & A. Gray ex Torrey, Dangleberry. Mesic, acidic woodlands, especially in sandhill-pocosin and savanna-pocosin ecotones, also in xeric chestnut oak forests in the lower Piedmont. Late March-May; June-August. Primarily a Southeastern Coastal Plain species: s. NH south to s. SC, less commonly inland to w. NY, c. and w. PA, w. VA, and w. SC. [= C, F, FNA, G, K, L, Q, W, V; = G. frondosa var. frondosa – GW, RAB, X, Y, Z; = Decachaena frondosa (Linnaeus) Torrey & Gray – S]

Gaylussacia mosieri Small, Mosier's Huckleberry, Hirsute Huckleberry. Savannas and seepages. S. GA and Panhandle FL and west to e. LA. Material from Lexington County, SC originally identified as this taxon has been reassigned to G. bigeloviana. [= FNA, GW, K, L, Q, U, V, X, Y, Z; = Lasiococcus mosieri (Small) Small – S]

Gaylussacia nana (A. Gray) Small, Dwarf Dangleberry. Xeric sandhills. Se. SC (Beaufort County) south to n. and c. FL peninsula, FL Panhandle, and west to e. LA (Florida prishes); disjunct in se. NC (New Hanover County) (Sorrie & LeBlond 2008). This species is disjunct at several sites in xeric sandhills of se. NC (on the Carolina Beach peninsula and the 421 Sandhills nw. of Wilmington). G. nana has a diploid chromosome complement (n=12), compared to tetraploid for G. tomentosa (n=12) (Luteyn et al. 1996). [= FNA, K, L, Q, V, Y; = G. frondosa (Linnaeus) Torrey & A. Gray ex Torrey var. nana A. Gray – GW, X, Y; = Decachaena nana (A. Gray) Small – S; < G. frondosa (Linnaeus) Torrey & A. Gray ex Torrey var. tomentosa A. Gray – WH]

Gaylussacia orocola (Small) Camp, Blue Ridge Bog Huckleberry. Bogs, seepages over granite. Endemic to the sw. NC mountains. The montane plants named Lasiococcus orocola by Small are probably most closely allied to northern G bigeloviana, and occur with other notable northern disjuncts, such as Myrica gale and Chamaedaphne calyculata (often associated with var. G. bigeloviana in northern peat bogs); they differ in several respects, however, and are here given taxonomic standing (Sorrie & Weakley 2007a). [= FNA, Q, U, Y, Z; < G. dumosa – RAB, GW, K, L, W, X; = Lasiococcus orocola (Small) Small – S]

Gaylussacia tomentosa (A. Gray) Pursh ex Small, Hairy Dangleberry. Pine flatwoods, sandhills, xeric coastal fringe sandhills. March-May; June-August. Se. SC (spodosolic flatwoods in Beaufort County) south to e. peninsular FL, west to s. GA and sw. AL. As discussed by Godfrey (1988) and Duncan & Brittain (1966), probably better treated as a species than as a variety of G. frondosa. G. tomentosa has a tetraploid chromosome complement (n=24), compared to diploid for G. nana and G. frondosa (n=12) (Luteyn et al. 1996). [= FNA, K, L, Q, V, Y; = G. frondosa (Linnaeus) Torrey & A. Gray ex Torrey var. tomentosa A. Gray – GW, RAB, X, Z; = Decachaena tomentosa (Pursh ex Small) Small – S; < G. frondosa (Linnaeus) Torrey & A. Gray ex Torrey var. tomentosa A. Gray – WH]

Gaylussacia ursina (M.A. Curtis) Torrey & A. Gray ex A. Gray, Bear Huckleberry, Mountain Huckleberry. Mesic to xeric forests, frequently dominant, but limited to areas southwest of the Asheville Basin; common. May-June; July-September. A narrow Southern Appalachian endemic: sw. NC, nw. SC, ne. GA, and se. TN; disjunct at Cumberland Gap National Historic Park, Bell County, KY. On mountain slopes and summits in that area it is often the dominant shrub, forming large clonal patches. [= FNA, K, L, Q, RAB, V, W, Y, Z; = Decachaena ursina (M.A. Curtis) Small – S]
**349. GARRYACEAE** Lindley 1834 (Garrya Family) [in GARRYALES]

Garryaceae is here circumscribed to include *Aucuba* (Bremer et al. 2002). References: Bremer et al. (2002)

* **Aucuba** Thunberg (Aucuba, Japanese-laurel)

* **Aucuba japonica** Thunberg, Aucuba, Japanese-laurel, Spotted-laurel. Pd (NC): commonly planted throughout our area, rarely escaping and naturalizing in suburban woodlands; rare, native of Japan and se. Asia. The most frequently planted cultivars have the dark green leaves prominently speckled with yellow. [= K]

**350. RUBIACEAE** A.L. de Jussieu 1789 (Madder Family) [in GENTIANALES]

A family of about 630-650 genera and 10,200-13,000 species, trees, shrubs, vines, and rarely herbs, cosmopolitan, but especially diverse in tropical and subtropical areas. References: Rogers (1987, 2005).

1 Trees, shrubs, or woody vines.
2 Woody vine; corolla lilac; [alien]; [subfamily *Rubioideae*; tribe *Paederiaceae*]........................................................................................................... *Paederia*
2 Shrub or tree; corolla white, green, or maroon; [native].
3 Inflorescence spherical; [widespread in our area]; [subfamily *Cinchonoideae*; tribe *Naucleaceae*] .............................................. *Cephalanthus*
3 Inflorescence cymose or thyrsoid; [in the Coastal Plain, from s. SC southward].
4 Inflorescence cymose; some calyx lobes expanded into pink or reddish “flags”; leaves deciduous; domatia not present; [of s. SC southward]................................................................. *Pinckneya*
4 Inflorescences thyrsoid; calyx lobes inconspicuous; leaves evergreen; domatia present in secondary vein axils; [of ne. FL southward]
5 Lateral veins 3-6 on either side of the midvein; fruit red; flowers white, <5 mm long; [subfamily *Cinchonoideae*; tribe *Chiococca*] ................................................................................................. *Chiococca*
5 Lateral veins 8-14 on either side of the midvein; fruit red; flowers white; >6 mm long; [subfamily *Rubioideae*; tribe *Psychotria*] ........................................................................................................... *Psychotria*

1 Herbs (or creeping subshrubs in *Mitchella*).
6 Leaves opposite
6 Leaves whorled; [subfamily *Rubioideae*; tribe *Rubiaceae*]........................................................................................................... *Galium*
10 Flowers single or in inflorescences with multiple flowers, the fruits either dry or fleshy and yellowish or black; leaves various; [subfamily *Rubioideae*; tribe *Spermacoceae*].
10 Carpels with few to many seeds.
12 Corolla 5-lobed................................................................................................................................. *Pentodon*
12 Corolla 4-lobed.
13 Capsule longer than the calyx tube; flowers blue, pink, or white.......................................................................................... *Houstonia*
13 Capsule not longer than the calyx tube; flowers white .............................................................................. *Oldenlandia*
11 Carpels 1-seeded.
14 Flowers in dense, terminal, involucre heads; flowers 4- or 6-lobed; styles 3................................................................. *Richardia*
14 Flowers in axillary or terminal clusters, or in single, not involucrate; flowers 4-lobed; styles 2.
15 Flowers usually solitary in leaf axils; fruit separating into 2 parts ........................................................................ *Diodia*
15 Flowers in terminal and axillary clusters; fruits not separating into 2 parts.
16 Carpels opening transversely .............................................................................................................. *Mitracarpus*
16 Carpels opening longitudinally ........................................................................................................... *Spermacarpus*

**Cephalanthus** Linnaeus (Buttonbush)


**Cephalanthus occidentalis** Linnaeus, Buttonbush. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): streambanks, riverbanks, depressional wetlands, lakes, often in standing water; common. June-July. Widespread
in North America, and south into Mexico, Guatemala, and Honduras. \(= \text{RAB, K, W, S, Y, Z; } > \text{C. occidentalis var. occidentalis – C, F, G; } > \text{C. occidentalis var. pubescens – C, F, G; } = \text{C. occidentalis var. occidentalis – GW (including var. pubescens)}\)

**Chiococca** P. Browne 1759

A genus of about 30 species, of FL and the West Indies south to s. South America. References: Rogers (2005).

**Chiococca alba** (Linnaeus) A.S. Hitchcock, Snowberry, Milkberry. Cp (FL): coastal hammocks, shell middens; rare. N. FL (St. Johns and Dixie counties) south to s. FL. \(= \text{K, S, WH}\)

**Diodia** Linnaeus


1 Sepals 4 and similar in size; style entire; \([\text{of dry habitats}]\) ................................................................. *D. teres*

1 Sepals 2 (or 4, and then markedly dimorphic); style cleft; \([\text{of moist to wet habitats}]\) ........................................................................

**Diodia teres** Walter, Poorjoe. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): dunes, sandy road-sides, glades, other dry habitats; common. June-December. MA, NY and WI, south to FL, TX, and CA, south through Mexico and Central America. \(= \text{RAB, C, GW, W, WV; } > \text{Diodia teres var. hirsutior Fernald & Griscom – F, K; } > \text{Diodia teres var. hystricina Fernald & Griscom – F, G, K; } > \text{Diodia teres var. oblongifolia Fernald – F, K; } > \text{Diodia teres var. teres – F, G, K; } = \text{Diodella teres (Walter) Small – Z}\)

**Diodia virginiana** Linnaeus. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): pondshores, ditches, other moist to wet habitats; common. June-December. CT, PA, IL, and KS south to FL and TX. \(= \text{RAB, C, G, GW, W, WV; } > \text{D. virginiana var. attenuata Fernald – F, K; } > \text{D. virginiana var. latifolia Torrey & A. Gray – K; } > \text{D. virginiana var. virginiana – F, K; } > \text{D. harperi Walter – S; } > \text{D. hirsuta Pursh – S; } > \text{D. harperi Small – S}\)

**Galium** Linnaeus 1753 (Bedstraws, Cleavers, Woodruff)

A genus of ca. 500 species, herbs, cosmopolitan. Here circumscribed to include *Asperula*, *Cruciata*, and *Sherardia*, following an analysis by Soza & Olmstead (2010) that shows the genera *Galium*, *Cruciata*, and *Sherardia* each to be paraphyletic relative to one another, if circumscribed as traditionally. Other solutions are possible, including the dispersal of *Galium* into two or more genera. Interestingly, the number of leaves per whorl appears to be a more fundamental character than those (such as tubular corollas) used to separate genera in the past. References: Soza & Olmstead (2010); Puff (1976, 1977)=Z; Lipscomb & Nesom (2007)=Y; Rogers (2005); Dempster (1978, 1981).

1 Leaves mostly in whorls of 4 (rarely a few in whorls of 5-6) at the primary nodes ................................................................. **Key A**
1 Leaves mostly in whorls of 5-8 or more at the primary nodes.

2 Leaves mostly 6 per node (ranging from 5-8) at the primary nodes .................................................................................. **Key B**
2 Leaves mostly 8 or more per node at the primary nodes ........................................................................................................**Key C**

**Key A** – Bedstraws with leaves mostly in whorls of 4 (rarely a few in whorls of 5-6)

1 Flowers yellow; plant an annual, 0.5-3 dm tall .......................................................................................................................... *G. pedemontanum*
1 Flowers white, creamy, greenish-purple, maroon, or purple; plant a perennial, 1-8 dm tall.

2 Flowers solitary, sessile or subsessile in the leaf axils; leaves 4-10 mm long ........................................................................... *G. virgatum*
2 Flowers on pedicels, usually in complex inflorescences; leaves >10 mm long.

3 Larger leaves 6-25 mm wide, mostly 1.5-4× as long as wide; fruits uncinate-hispid (except smooth in *G. latifolium*); flowers greenish or purplish.
4 Larger leaves 4-8 cm long, 1-2 cm wide, widest below the middle, tapering to a long-acuminate apex, averaging about 3-4× as long as wide.
5 Fruits uncinate-hispid; flowers yellowish, turning maroon ......................................................................................... *G. lanceolatum*
5 Fruits smooth; flowers purple ........................................................................................................................................... *G. latifolium*
4 Larger leaves 1.5-5 cm long, 0.6-2.5 cm wide, widest at about the middle, tapering to an obtuse (or broadly acute) apex, averaging about 2× as long as wide.
6 Flowers (some of them) sessile or subsessile along the inflorescence branches; leaves 1.5-5 cm long, the larger usually > 2.5 cm long, not punctate.
7 Lower leaf surface glabrous or sparsely short-hispid on the veins; larger leaves 1.5-2.5 (-4.0) cm long and 0.7-1.4 (-1.8) cm wide; [more southern] ......................................................................................... *G. circæanz var. circæanzs*
7 Lower leaf surface appressed-pilose, long-hisrate on the veins; larger leaves 2-5 cm long, 1-2.5 cm wide; [more northern] .......................... *G. circæanz var. hypomalacum
6 Flowers all distinctly pedicelled; leaves 1-2.5 cm long, glandular-punctate beneath.
8 Stem glabrous .......................................................... G. orizabense ssp. laeuricaule
8 Stem pubescent.
9 Stem and leaves pubescent with spreading, straight hairs; [more northern] ................. G. pilosum var. pilosum
3 Larger leaves 1-6 mm wide, mostly 4-20× as long as wide; fruits smooth or pubescent (if pubescent, the hairs not hooked at the end, though they may curve through their length), either fleshy or dry; flowers white or creamy.
10 Fruits fleshy, blue-black; leaves firm, more-or-less evergreen, glandular-punctate beneath.
11 Leaves elliptic, 7-18 mm long, 3-6 mm wide; 2.3-3.5× as long as wide ................................................. G. hispidulum
11 Leaves linear, 15-25 mm long, 2-4 mm wide; 5-10× as long as wide ....................................................... G. uniflorum
10 Fruits dry, black; leaves herbaceous, deciduous, not glandular-punctate beneath.
12 Stems erect or nearly so; leaves 15-45 mm long, 2-6 mm wide. ................................................................. G. boreale
12 Stems sprawling, matted; leaves 6-30 mm long, 0.5-5 (-6) mm wide.
13 Corollas 4-lobed, the lobes longer than wide.
14 Leaves (8-) 10-20 (-25) mm long, (0.5-) 0.8-2 mm wide, margin usually smooth, with strongly down-rolled margins; corolla (1.8-) 2-2.5 (-3) mm across; pedicels filiform; stems 15-50 (-60) cm long, delicate....................... G. obtusum var. filifolium
14 Leaves (10-) 15-25 (-30) mm long, (2-) 3-5 (-6) mm wide, margin scabrous, not down-rolled; corolla (2-) 2.5-3.5 (-4) mm across; pedicels thicker; stems (15-) 25-60 (-80) cm long, firm .................. G. obtusum var. obtusum
15 Corollas 3(-4)-lobed, the lobes about as wide as long, or wider than long.
15 Flowers and fruits borne on axillary pedicels, (5-) 7-15 (-20) mm long and densely retrorsely scabrous, .................. [G. triflorum var. triflorum]
15 Flowers and fruits borne on straightforward pedicels, these (2-) 2.5-8 (-12) mm long and smooth.
16 Fruiting pedicels (4-) 5-8 (-12) mm long; pairs of fruits (3-) 3.5-5 mm across at maturity; leaves 2-3 (-4) mm wide........ 
.......................................................................................................... G. uniflorum var. floridanum
16 Fruiting pedicels (2-) 2.5-5 (-6) mm long; pairs of fruits 2-3 mm across at maturity; leaves (1.5-) 2-2.5 (-2.8) mm wide......
.......................................................................................................... G. uniflorum var. boreale

Key B – Bedstraws with leaves mostly 6 per node (ranging from 4-8)

1 Flowers in terminal heads, subtended by an involucre of leaves fused at the base; stem rough-hairy, but not retrorsely-scabrid; [clade IV] ..........
2 Largest leaves < 10 mm long; fruits 0.7-1 mm across; annual; [alien]; [clade III].
3 Inflorescence relatively diffuse, branches divaricate; ultimate fruits (2-) 3-6 (-7) nodes beyond primary stem axis (with largest leaves); first inflorescence internode (beyond primary stem axis) 15-50 mm long; fruit surface glabrous (without hairs).............. G. divaricatum
3 Inflorescence relatively strict, branches ascending; ultimate fruits 2-3 (-4) nodes beyond primary stem axis (with largest leaves); first inflorescence internode (beyond primary stem axis) 3-12 (-20) mm long; fruit surface glabrous or bristly-hispid.
4 Fruit surface without hairs, smooth to shallowly papillate ................................................................. G. anglicum
4 Fruit surface bristly-hispid with uncinate-tipped hairs, distinctly papillate ........................................ G. parisienne
2 Largest leaves > 10 mm long; fruits 1-2.5 mm across; perennial; [native].
5 Fruits and ovaries uncinate-hispid; leaves 15-50 mm long, 7-10 mm wide; [clade III] .............................................. G. triflorum
5 Fruits and ovaries glabrous or papillose; leaves 5-25 mm long, 1-6 mm wide.
6 Corolla 1.5-2.5 mm across, 3-lobed; [collectively widespread in our area]; [clade V].
7 Fruiting pedicels (4-) 5-8 (-12) mm long; pairs of fruits (3-) 3.5-5 mm across at maturity; leaves 2-3 (-4) mm wide........ 
.......................................................................................................... G. unpiorium var. floridanum
7 Fruiting pedicels (2-) 2.5-5 (-6) mm long; pairs of fruits (2-) 2.5-3 mm across at maturity; leaves (1.5-) 2-2.5 (-2.8) mm wide ......
.......................................................................................................... G. triflorum var. triflorum
6 Corolla 2.5-4.5 mm across, 4-lobed; [mostly of the Mountains in our area, extending into the Piedmont or even Coastal Plain in n. VA and northward].
8 Leaf margins retrorsely ciliate-scabrid; leaves 3-5× as long as wide; [plants of bogs and moist thickets]. G. asprellum
8 Leaf margins antrorsely ciliate-scabrid; leaves 4-8× as long as wide; [plants of dry forests and woodlands].
9 Leaves sharply acute or cuspidate; corolla 2.5-3 mm across.......................... G. concinnum
9 Leaves rounded, obtuse, or barely acute; corolla ca. 4 mm across.......................... G. palustre

Key C – Bedstraws with leaves mostly 8 or more per node (ranging from 5-12)

1 Leaves 8-12 per whorl (many whorls with > 8 leaves); flowers bright yellow, in a large showy terminal compound inflorescence; fruits glabrous; perennial.
2 Stems golden-yellow, fragrant; inflorescence dense, usually not interrupted .................................................. G. verum
3 Flowers lemon-yellow, odorless; inflorescence interrupted .......................................................... G. wirtgenii

1 Leaves (5-) 8 (-10) per whorl (few if any whorls with > 8 leaves); flowers white or greenish, in a terminal compound inflorescence or in small axillary inflorescences; fruits glabrous, papillose, or uncinate-hispid; annual or perennial.
3 Stems glabrous; annual.
4 Fruits and ovaries uncinate-hispid; flowers and fruits mainly in clusters of 2-5 ............................................. G. aparine
4 Fruits and ovaries sharply papillose; flowers and fruits mainly in clusters of 3 ............................................. G. tri tradingatum
3 Stems glabrous or pubescent, but not scabrous; perennial.
5 Fruits and ovaries uncinate-hispid; nodes bearded, the stem otherwise glabrous........................................ G. odoratum
5 Fruits and ovaries glabrous; nodes not bearded, the stem either glabrous or pubescent toward the base of the plant.
6 Corolla 3-5 mm across, the pedicels usually shorter than the width of the corolla; inflorescence branches ascending, mostly at < 45 degrees ............................................................... \textit{G. mollugo} \textit{var. erectum}

6 Corolla 2-3 mm across, the pedicels usually longer than the width of the corolla; inflorescence branches spreading, mostly at > 45 degrees ............................................................... \textit{G. mollugo} \textit{var. mollugo}


\textit{Galium aparine} Linnaeus, Cleavers. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): meadows, thickets, disturbed areas, forests; common. April-June. Nearly cosmopolitan, from n. North America south through Central and South America. Apparently represented in North America (including our area) by both native and introduced genotypes. [= RAB, F, G, GK, SW, WV; > \textit{G. aparine} \textit{var. aparine} – C; > \textit{G. aparine} \textit{var. echinospermum} (Wallroth) Farwell – C]

\textit{Galium asprellum} Michaux, Rough Bedstraw. Mt (NC, VA, WV), Pd (DE, VA), Cp (VA): bogs, streambanks, wet meadows; uncommon (rare in DE). June-September. NL (Newfoundland) west to MN, south to n. VA, w. NC, ne. TN (Chester, Wofford, & Kral 1997), and MO. The report for sc. TN is an error (D. Estes, pers. comm. 2005). [= RAB, C, F, G, GK, SW, WV]


\textit{Galium circaezans} Michaux \textit{var. hypomalacum} Fernald, Northern Forest Bedstraw. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE), {GA?, SC?): moist forests; common. April-July. QC west to MN and NE, south to VA, w. NC, KY, MO, and TX (?). The varieties need additional study. [= C, F, G, GK, SW; < \textit{G. circaezans} – RAB, S, W]


* \textit{Galium divaricatum} Pourret ex Lamarck. Disturbed areas; native of s. Europe. June-July. [= Y; < \textit{G. parisiense} \textit{var. leiocarpum} Tausch – C; < \textit{G. parisiense} Linnaeus – F, G, S; < \textit{G. divaricatum} – K; = \textit{G. parisiense} \textit{var. divaricatum} (Pourret ex Lamarck) Koch; = \textit{G. anglicum} \textit{var. divaricatum} (Pourret ex Lamarck) Reichenbach; = \textit{G. parisiense} \textit{ssp. divaricatum} (Pourret ex Lamarck) Rouy] [add to synonymy]

\textit{Galium hispidulum} Michaux. Cp (DE, GA, NC, SC, VA), Mt (NC): maritime forests, sandhills, dry sandy forests; common (rare in Mountains, rare in DE and VA). June-August; August-September. S. NJ south to FL, west to LA, primarily on the Coastal Plain. [= RAB, C, F, G, GK, SW; = \textit{G. bermudense} Linnaeus – S, misapplied]

\textit{Galium lanceolatum} Torrey, Wild-licorice. Mt (NC, SC, VA, WV), Pd (DE, VA), Cp (VA): moist hardwood forests; uncommon (rare in VA Coastal Plain, rare in Piedmont). June-July. QC west to MN and NE, south to VA, w. NC, KY, MO, and TX (?). [= RAB, C, F, G, GK, SW, WV]

\textit{Galium latifolium} Michaux, Wideleaf Bedstraw. Mt (GA, NC, SC, VA, WV), Pd (NC, VA): moist hardwood forests; common (uncommon in Piedmont). May-August. C. PA and KY south to n. GA and n. AL, a Southern and Central Appalachian endemic. The closely related \textit{G. arkansanum} A. Gray is the Ozarkian sibling of the Appalachian \textit{G. latifolium}. Var. \textit{hispidulum}, named from VA, needs additional study. [= RAB, C, GK, SW; > \textit{G. latifolium} \textit{var. latifolium} – F, G; > \textit{G. latifolium} \textit{var. hispidulum} Small – F, G]


Galium odoratum (Scopoli) Sweet Woodruff, Waldmeister. Mt (NC, VA), Pd (DE, NC, VA): commonly cultivated, rarely escaped or persistent, native of Europe. May. Used fresh as a flavoring for May-wine. [= C, K; = Asperula odorata Linnaeus – F, G]


Galium palustre Linnaeus. Marsh Bedstraw, Ditch Bedstraw. Mt (WV): marshes, wet soil; rare. June-August. NL (Labrador) and ON south to MD, s. PA (Rhoads & Klein 1993), MD, WV, OH, IN, and IL; also in Europe and nw. North America. [= C, F, G, K]

Galium parisiense Linnaeus. Disturbed areas; native of s., w., and c. Europe. June-July. [= K, Y; = G. parisiense ssp. parisiense] [add to synonymy]

Galium parisiense

Europe


Galium pilosum Aiton var. pilosum. Mt (NC, SC?, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, NC, SC, VA), {GA}: forests, woodland borders, clearings; common. May–August. S. NH west to MI, south to NC, TN, MO, and TX. The varieties need additional study. [= C, F, G, K; < G. pilosum – RAB, S, W, WV]


Galium tinctorium (Linnaeus) Scopoli var. floridanum Wiegand, Florida Three-lobed Bedstraw. Cp (GA, NC, SC, VA), Mt (NC, SC, VA), Pd (NC, SC): swamps, marshes, and ditches; common (VA Watch List). April–June. MA south to FL, west to e. TX, mostly on the Coastal Plain, but extending inland to w. VA, w. NC, se. KY, s. IL, and se. MO. See Puff (1976) for additional information. [= F, < G. tinctorium – RAB, C, K, W; = G. obtusum var. floridanum (Wiegand) Fernald – G; < G. claytonii Michaux – S; = G. tinctorium ssp. floridanum (Wiegand) Puff – Z]


Galium tricornutum Dandy, Small Bedstraw. Pd (GA, SC): disturbed areas; rare, introduced. This species has been reported from Cherokee and Greenwood counties, near GA, and se. PA (Rhoads & Klein 1993). [= K; < G. tricorne Stokes – F]


* Galium verum Linnaeus, Yellow Bedstraw, Our Lady’s Bedstraw. Mt (NC, VA, WV), Pd (DE, VA): meadows, pastures, roadsides; uncommon (rare in DE and NC), native of Europe. May-September. [= C, F, G, K1; = G. verum var. verum – K2; < G. verum – RAB, W, WH (also see G. wirtgenii)]

**Galium virgatum** Nuttall, Ozark Bedstraw. Cp (GA, SC*): (in GA) open blackland prairies, (in SC) waif around wool-combing mill; rare. Native from TN, e. GA (Houston County), and AL west to KS, OK, and TX. [= C, F, G, K; > G. virgatum var. leioarpum Terrey & A. Gray – S; > G. virgatum var. virginatum – S]

* Galium arvense (Linnaeus) F. Hermann, Blue Woodruff. Pd (DE), Mt (WV): disturbed areas, rare, native of Europe. Naturalized south to WV, MD, DE (USDA NRCS 2007), and se. PA (Rhoads & Klein 1993). [= Asperula arvensis Linnaeus C, G, K, WV] [not yet keyed]

**Galium trifidum** Linnaeus var. trifidum, Northern Three-lobed Bedstraw. Mois places, bogs, and swamps. Circumboreal, south in North America to MD, DE, PA, and NJ. [= C, F, G; = G. trifidum ssp. trifidum – K, Z]

* Galium wirtgenii F.W. Schultz, Yellow Bedstraw. Not definitely known from our area, but likely to be present. [= C, F, G, K1; = G. verum var. wirtgenii (F.W. Schultz) Oborny – K2; < G. verum – W]

### Houstonia Linnaeus 1753 (Bluet)


#### Identification notes:
In the key below, all leaf measurements and length/width ratios are based on median cauline leaves.

1 Flowers solitary on terminal (rarely axillary) pedicels (2-) 6-50 (-70) mm long; corolla salverform; leaves 2-15 mm long; [subgenus *Houstonia*].

2 Stems prostrate and creeping.

3 Corolla white (rarely pale lavender); capsule (2.3-) 3.0-6.3 mm across; leaves 2-13 mm wide; pedicels usually single, 2-25 mm long; flowers chasmogamous and cleistogamous (the cleistogamous borne underground); [of the outer Coastal Plain]; [section Mullera] .................. ............................................................................

4 Corolla blue (rarely white); capsule 2.5-5.0 mm across; leaves 0.5-7 mm wide; pedicels single or paired, to 60 mm long; flowers all chasmogamous and aerial; [of the Mountains]; [section Houstonia] ............................................................... H. serpyllifolia

5 Plants erect or spreading.

4 Stems 1-4 (-7) cm tall; leaves mostly oblanceolate, 0.3-3.0 mm wide; corolla 5-12 mm long, white to pale pink; seeds with a hilar ridge in an elliptical depression; [section Mullera] ......................................................................... H. rosea

6 Stems 1-26 cm tall; leaves elliptic, ovate or spatulate, 0.3-9.0 mm wide (at least some on a plant generally > 3 mm wide); corolla 2-21 mm long, purple, pale blue, pink, or white; seeds subglobe with a ventral cavity; [section Houstonia].

5 Plants perennial, with a well-developed, persistent basal rosette; corolla 5.8-16 (-21) mm long, the tube (2-) 4-11 (-12) mm long; ............................................................................ H. serpyllifolia

6 Plants annual, with at most a few short-lived basal leaves; corolla 2-10 (-12) mm long, the tube 0.8-5.5 mm long.

6 Calyx lobes slightly shorter than to slightly longer than the corolla tube; corollas white, 2.0-5.5 mm long, the tube 0.8-2.5 mm long .......................................................... H. procumbens

7 Calyx lobes 1/5 as long as to slightly longer than the corolla tube; corollas purple or violet (rarely white), 3.5-10 (-12.5) mm long, the tube 2.0-4.5 mm long ................................................................................................. H. pusilla

8 Plants with a well-developed, persistent basal rosette; corolla 5.8-16 (-21) mm long, the tube (2-) 4-11 (-12) mm long; ............................................................................ H. caerulea

8 Stems erect or spreading.

9 Flowers several to many, in terminal cymes; corolla funnelliform; leaves (8-) 10-60 mm long; [subgenus Chamisme, section Amphiothis].

7 Capsule obovoid-cylindric, longer than wide, the free calyx lobes distinctly shorter than the capsule; stipules of mid-cauline leaves ciliate or fringed, and also often bristle-tipped; leaves 1-3 mm wide; [of calcareous glades and barrens] ................. H. nigricans var. nigricans

7 Capsule as long as wide or wider, depressed globose, the free calyx lobes about as long as the capsule; stipules of mid-cauline leaves not ciliate, fringed, or bristle-tipped; leaves 0.5-34 mm wide; [of various habitats, including calcareous glades and barrens]

8 Basal leaves absent at the onset of flowering; leaves smooth-margined or ciliate.

9 Leaves ovate or lanceolate, 1-6× as long as wide, 4-34 mm wide, widest toward the base or at the middle; calyx lobes 1-7 mm long.

10 Calyx lobes 4-7 mm long; leaves mostly lanceolate (varying from narrowly lanceolate to broadly ovate), 17-33 mm long, 4-10 mm wide, 3.3-6× as long as wide ................................................................. H. purpurea var. calycosa

10 Calyx lobes 1-4 mm long; leaves mostly ovate (varying from broadly ovate to ovate-lanceolate), 8-63 mm long, 6-34 mm wide, 1-3.2× as long as wide.

11 Corollas light purple to white, (4-) 5-8 (-10) mm long; leaves (10-) 25-50 (-60) mm long, (6-) 12-30 (-34) mm wide; stems sparsely to densely pubescent; median internodes 2-9 cm long; leaves with pubescence ciliate on the leaf margin, on the midrib, and scattered on the surface; [of various habitats, widely distributed] ......................................................... H. purpurea var. purpurea

11 Corollas deep purple, 8-12 mm long; leaves 8-20 (-30) mm long, 3-8 (-13) mm wide; stems glabrous (or slightly short-pubescent on the lower nodes only); median internodes 0.5-4.5 cm long; leaves entirely glabrous or with pubescence ciliate on the leaf margin, on the midrib, but lacking from the leaf surface; [of high elevation rocky summits and adjacent grassy balds in w. NC and e. TN] ........................................................................................................................................ H. montana

9 Leaves linear to narrowly elliptic, 4-20× as long as wide, 0.5-6 mm wide, widest at the middle or near the apex or nearly equally wide for most of their lengths; calyx lobes 0.5-3 mm long.
12 Leaves 1.3-4.7 cm long, 0.5-4.0 mm wide (mostly < 2.5 mm wide), 7-20× as long as wide; inflorescence very diffuse and open, to 20 cm long, the branches ascending, spreading, or deflexed, slender and often ultimately filiform, with 1-4 remote nodes bearing reduced leaves, the pedicels to 14 mm long; internodes mostly 4-9; mature capsules mostly 1.5-2.5 mm long and wide; stem densely cirenoso-puberulent, especially at the nodes. 

12 Leaves 1.6-4.0 cm long, > 2.5 mm wide, 4-11× as long as wide; inflorescence rather open to rather compact, < 12 cm long, the branches ascending or spreading, slender, pedicels to 8 mm long; internodes mostly 7-11; mature capsules mostly 1.8-3.0 mm long and wide; stem densely cirenoso-puberulent, glabrate, or glabrous.

13 Stems glabrate or glabrous (sometimes puberulent on the nodes only); internodes 7-10, the median internodes (1.1-) 2.0-4.5 (-6.0) cm long; [of seasonally wet soil mats on moderate to high elevation granitic domes in sw. NC, nw. SC, and ne. GA]. 

13 Stems densely cirenoso-puberulent; internodes (6-) 7-11 (-13), the median internodes (1.0-) 1.5-3.5 (-4.4) cm long; [of dry sandy, shaley, gravelly, or rocky soil, widely distributed]. 

12 Houstonia caerulea Linnaeus, Quaker Ladies, Innocence, Common Bluet. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): forests, woodlands, openings, lawns, a wide variety of disturbed sites; common. April-July. This species is widespread in e. North America. The flowers of this species and H. serpyllifolia are very similar; H. caerulea is a somewhat duller blue. [= RAB, G, K, S, W, WV, X, Y; = Houstonia caerulea var. caerulea – F; = Hedyotis caerulea (Linnaeus) Hooker – C, GW; < Hedyotis caerulea – Q]

12 Houstonia canadensis Willdenow ex Roemer & J.A. Schultes, Canada Bluet. Mt (GA, VA, WV): dry limestone barrens, locally abundant in shallow soils on limestone; rare (VA Rare). April-August. ME and s. ON west to MN, south to sw. VA, se. and c. TN, nw. GA, and AR. Terrell (1959) determined that Houstonia setiscapha (allegedly a narrow endemic of sw. VA) fell within the range of variation of southern populations of H. canadensis. Further study is perhaps warranted. [= G, K, W, WV, X, Y, Z; = Hedyotis canadensis (Willdenow ex Roemer & J.A. Schultes) Fosberg – C, Q; > Houstonia longifolia var. longifolia – Y; > Houstonia canadensis var. setiscapha (L.G. Carr) C.F. Reed]

12 Houstonia longifolia Gaertner var. compacta Terrell, Eastern Longleaf Bluet. Mt (GA, NC, VA, WV), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): dry rock outcrops and adjacent open woodlands, dry sandy woodlands, dry roadbanks, glades and barrens; uncommon. Early June-August; September-October. Var. compacta is centered in the central Appalachians of VA, WV, e. KY, and se. OH, with extensions north to VT, west into n. IL, and south in the Piedmont and adjacent Coastal Plain to SC, GA, and Panhandle FL. The typical variety is more northern, apparently reaching its southern limit in IN, not reaching our area. [= WV, Z; < Houstonia longifolia – RAB, C, F, G, S, W; < Houstonia setiscaphia (allegedly a narrow endemic of sw. VA)]

12 Houstonia longifolia Gaertner var. glabra Terrell, Granite Dome Bluet. Mt (GA, NC, VA, WV): seasonally and periodically wet soils of shallow soil mats and crevices of granitic domes; rare. June-August; September-October. Var. glabra is endemic to the granitic dome district centered around Highlands, NC, occurring in sw. NC, nw. SC, and ne. GA. Terrell (1959) says "the lower internodes [are often] so smooth they appear to have been polished," and gives an altitudinal range of 850-1750 m. Although the morphological differences between var. glabra and var. compacta are not great, the combination of distinctive morphology correlated with a disjunct habitat and a disjunct range seem to warrant recognition at the varietal level. [= Z; < Houstonia longifolia – RAB, S, W; < Houstonia longifolia (Gaertner) Hooker – C, Q, WH; > Houstonia longifolia var. longifolia – Y; > Houstonia longifolia var. setiscapha (L.G. Carr) C.F. Reed]

12 Houstonia micrantha (Shinners) Terrell. Cp (FL, GA, CA): dunes, sandy soils, granitic flatrocks; uncommon (rare in FL and GA). February-April. E. and c. GA west to sw. TN, nw. AR, south to w. FL Panhandle, s. MS, s. LA, and e. TX. [= K, X; = Hedyotis australis W.H. Lewis & D.M. Moore – Q; = Houstonia pusilla – S, misapplied]

12 Houstonia montana Small, Roan Mountain Bluet. Mt (NC): in crevices of rock outcrops at the summits of high elevation peaks of the Southern Blue Ridge, also in thin, frost-heaved, gravelly soils of grassy balds near summit outcrops, from 1250-1950 m in elevation; rare. June-July; July-August. This species is endemic to the high Blue Ridge of nw. NC and ne. TN, most notably occurring on Roan Mountain, Grandfather Mountain, Bluff Mountain, and Three Top Mountain. It was first noted by Asa Gray in 1841, who described it as "a remarkable dwarfy form." There has been debate over whether it is not indeed merely a weather-induced form, but recent studies show that it is distinct. In addition to the characters given above in the key, H. montana also differs from H. purpurea in having larger calyx lobes, corolla, capsules, and seeds. See Terrell (1959), Yelton (1974), and Terrell (1978) for further discussion. [= S, W; < Houstonia purpurea – RAB; = Houstonia purpurea Linnaeus var. montana (Small) Terrell – K, X, Y, Z; < Houstonia setiscaphia – Q; = Hedyotis purpurea (Linnaeus) Torrey & A. Gray var. montana (Small) Fosberg]

12 Houstonia nigricans (Lamarck) Fernald var. nigricans, Diamond-flower. Mt (VA), Cp (GA): limestone barrens dominated by Andropogon gerardii, blackland prairies; rare. Sw. VA (Ludwig 1999), s. MI, IA, NE, and e. CO, south to s. FL, TX, e. NM, and along the Sierra Madre Oriental to Hidalgo, Mexico. This species has been variously placed in Houstonia, Hedyotis, and Stenaria. Based primarily on seed characters and chromosome numbers, Terrell (2001) has concluded that this taxon is not congeneric with the Sri Lankan type of the genus Hedyotis, and is also not a Houstonia, so has published the new genus Stenaria for Houstonia nigricans and its close relatives. Church (2003) considers Stenaria congenic with Houstonia, based on molecular phylogeny. The resolution of generic limits in this group is still unresolved. As interpreted by Terrell (1991, and Turner (1995b), Houstonia nigricans is a polymorphic species, with Houstonia nigricans var. nigricans as a widespread "matrix variety," and other, much more local varieties warranting recognition. Turner (1995b) reports Houstonia nigricans var. nigricans (as Hedyotis nigricans var. nigricans) from Pickens County, SC; the documentation is not known to me, and suitable habitats there are unlikely. [= Hedyotis nigricans (Lamarck) Fosberg var. nigricans – K, U, Y; = Stenaria nigricans (Lamarck) Terrell var. nigricans – M; < Houstonia nigricans – C, Q; < Houstonia nigricans (Lamarck) Fernald – F, G; > Houstonia angustifolia Michaux – S; > Houstonia filifolia (Chapman) Small – S; < Stenaria nigricans (Lamarck) Terrell var. nigricans – WH]

12 Houstonia procumbens (Walter ex J.F. Gmelin) Standley, Creeping Bluet, Fairy-footprints, Roundleaf Bluet. Cp (FL, GA, SC): beach dunes, moist to wet sandy pinelands; common. October-April. Se. SC south to s. FL, west to se. L.A. Gaddy &
Rayner (1980) note that this plant is fairly common on SC barrier islands, but flowers in the winter and is easily overlooked in other seasons (when botanists are more likely to be afield). See Wilbur (1968) and Ward (2004c) for differing opinions about the merits of the taxonomic recognition of the glabrous and pubescent plants. [= RAB, K, S, WH, X, Y; = Hedyotis procumbens (Walter ex J.F. Gmelin) Fosberg – Q; = Houtonia rotundifolia Michaux; > Houtonia procumbens var. procumbens – V; > Houtonia procumbens var. hirsuta (W.H. Lewis) D. B. Ward – V]

Houtonia purpurea Linnaeus var. calycosa Shuttleworth ex A. Gray, Midwestern Summer Bluet. Mt (GA, NC, WV): dry woodlands, banks, rock outcrops, shallow soils around mafic and calcareous rock outcrops; rare. May-July; July-August. The distribution and ecology of var. calycosa in our area are poorly known; it apparently occupies drier and typically more circumneutral sites than var. purpurea. Var. calycosa ranges from s. ME and w. NY west to s. OH, and sw. MO, south to w. NC, n. GA, AL, MS, AR, and e. OK. [= G, K, WV, X, Y, Z; = Houtonia purpurea – RAB, W; = Houtonia purpurea (Linnaeus) Torrey & A. Gray – C, Q; = Houtonia lanceolata (Poir.) Britton – F, S; = Houtonia purpurea (Linnaeus) Torrey & A. Gray var. calycosa (Shuttleworth ex A. Gray) Fosberg]

Houtonia purpurea Linnaeus var. purpurea, Summer Bluet. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): moist and dry woodlands and forests, roadbanks, thinner soils around rock outcrops, a variety of disturbed sites; common (rare in Coastal Plain, rare in DE Piedmont). May-July; July-August. Var. purpurea ranges from DE, MD, and s. PA west to s. OH, s. IL, and sw. MO south to SC, sw. GA, Panhandle FL, MS, s. LA, e. TX, and e. OK. Plants growing in high elevation and exposed sites are sometimes dwarfed, and in that respect only, superficially resemble H. montana. [= G, K, WV, X, Y, Z; = Houtonia purpurea – RAB, W, WH; = Houtonia purpurea – F, S; = Houtonia purpurea (Linnaeus) Torrey & A. Gray – C, Q; = Houtonia purpurea (Linnaeus) Torrey & A. Gray var. purpurea]


Oldenlandia serpyllifolia Michaux, Appalachian Bluet, Thyme-leaf Bluet. Mt (GA, NC, SC, VA, WV): streambanks, grassy balds, moist forests, seepy rock outcrops, spray cliffs, and moist disturbed areas; common (uncommon in GA, VA, and WV). (March-) May-June. A Southern and Central Appalachian endemic: PA south to nw. SC and ne. GA. The flowers are very similar to, but usually a brighter blue than, the more widespread H. caerulea. [= RAB, F, G, K, S, W, WV, X, Y; = Houtotis michauxii Fosberg – C, GW, Q]

Oldenlandia tenuifolia Nuttall, Diffuse-branched Bluet. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (NC, SC, VA): usually in dry woodlands, often rocky (especially mafic rocks) or sandy; uncommon (rare in Coastal Plain). May-July; July-October. This species is centered in the Southern Appalachians and the Ozarks, extending into provinces adjacent to both areas of concentration, ranging overall from PA west to MO and OK, south to SC, GA, and TX. [= RAB, F, G, S, W, WV, X, Y; = Houtotis nuttalliana Fosberg – C; = Houtotis longifolia (Gaertner) Hooker – Q; = Houtonia longifolia var. tenuifolia (Nuttall) Wood; = Houtotis longifolia, "Tenuifolia Group" – X; = Houtonia longifolia – K]

Mitchella Linnaeus (Partridge-berry)

A genus of 2 species, perennials, ours and 1 in e. Asia. References: Rogers (2005)=Z.

Mitchella repens Linnaeus, Partridge-berry. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): deciduous and coniferous forests, stream-banks, heath balds, maritime forests, on rotten logs; common. May-June; June-July. NS west to MN, south to c. peninsular FL and TX; disjunct in Guatemala. Plants in maritime forests are more robust than others and often have an ascending habit, the stems sometimes 20-30 cm tall. [= RAB, C, F, G, GW, K, S, W, WH, ZWV, ]

Mitracarpus Zuccarini (Girdle-pod)


Oldenlandia Linnaeus (Oldenlandia)


Paederia Linnaeus (Skunk-vine)


Pentodon Hochstetter in Krauss 1844


Pinckneya Michaux (Pinckneya, Fever-tree)


Identification notes: Pinckneya is showy when in flower because of the development of 1 of the 5 calyx lobes of some of the flowers of the inflorescence into a large (to 7 cm by 5 cm), petaloid (pink or cream) appendage.


Psychotria Linnaeus 1759 (Wild Coffee)


* Psychotria nervosa* Swartz, Wild Coffee. Cp (FL): hammocks; rare. Ne. FL (Duval County) south to s. FL, West Indies, Central America, and South America. [= K, S, WH, Z]

Richardia Linnaeus (Richardia)

1 Mericarps smooth; corolla 4-lobed; [section Asterophyton]................................................................. R. humistrata
2 Mericarps either conspicuously and densely hispidulous to strigose or papillose to tuberculate; corolla 6-lobed; [section Richardia].


* Richardia humistrata* (Chamisso & Schlechtendahl) J.A. & J.H. Schultes. Cp (FL) {AL, MS}: disturbed areas, savannas, pine flatwoods; rare, native of South America. Also collected in 1886 as a ballast waif in Camden County, NJ; first noted on the Gulf Coast only in 1941, but perhaps early introduced there on ballast as well, such as at Pensacola. [=K, WH, Z]

* Richardia scabra* Linnaeus. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): roadsides, fields, vacant lots, urban areas, disturbed areas; common, native of South America. June-December. Lewis & Oliver (1974) consider this species to be native from our area south through Central America into northern South America, based on the semi-contiguous distribution, but occurrences in our region seem to be in altered habitats. [= RAB, C, F, G, K, S, WH, Z]

Richardia grandiflora (Chamisso & Schlechtendahl) J.A. & J.H. Schultes, Largeflower Richardia. Cp (FL): disturbed areas; rare, native of South America (mainly Brazil). Reported for Alachua County, immediately south of our area (Kunzer et al. 2009), and “rapidly spreading.” [= K, WH, Z]

*Spermacoce* Linnaeus (Buttonweed)

A genus of about 50 species, herbs, of tropical and warm-temperate Old and New World. References: Rogers (2005).

1 Calyx with 2 long lobes, the other 2 absent or vestigial............................................................... S. densiflora
2 Calyx with 4 lobes of nearly equal length.
3 Calyx lobes with a conspicuous white margin ................................................................................. S. prostrata
4 Calyx lobes green throughout.
5 Fruit pubescent ................................................................................................................................ S. assurgens
6 Fruit glabrous .................................................................................................................................. S. glabra


* Spermacoce densiflora* (deCandolle) Alain. Cp (FL): disturbed areas; rare, native of the Neotropics. [= K, WH; = *Borreria densiflora* deCandolle] [add to synonymy]

*Spermacoce glabra* Michaux, Smooth Buttonweed. Mt (VA, WV), Cp (FL, GA, SC*, VA*): rocky riversides in the mountains, disturbed areas in the Coastal Plain; rare (GA Rare). Perhaps only introduced in at least some parts of our area; see Wieboldt et al. (1998) for discussion. [=RAB, C, F, G, GW, K, S, WH]

*Spermacoce prostrata* Aublet. Cp (FL): wet pine flatwoods, floodplain forests; uncommon. FL, AL, MS, south through the New World tropics. July-September. [= K, WH; = *Borreria ocimoides* (Burnmann) e de Candolle – S, misapplied] [add to synonymy]

*Spermacoce tenuior* Linnaeus, reported from sw. GA (Kartesz 1999). [ID needs checking] [= K; S. riparia* Chamisso & Schlechtendahl] [not yet keyed; add to synonymy]

351. GENTIANACEAE A.L. de Jussieu 1789 (Gentian Family) [in GENTIANALES]

A family of about 87 genera and over 1600 species, herbs, shrubs, and trees, cosmopolitan (Struwe & Albert 2002). References: Wood & Weaver (1982), Struwe & Albert (2002). [also see MENTHACEAE]

1 Leaves all scale-like, 1-3 (-5) mm long, appressed to the stem; [tribe Gentianeae, subtribe Swertiniae]............................................ Bartonia
2 Leaves larger, spreading or ascending.
3 Stem leaves whorled; plants robust, 1-3 m tall; [tribe Gentianeae, subtribe Swertiniae]..................................................................... Frasera
GENTIANACEAE

Centaurium Hill (Centaury)

A genus of about 20 species, herbs, mainly north temperate.

1 Flowers pedicellate, the pedicels 3-5 mm long. .......................................................... C. pulchellum
1 Flowers sessile or nearly so (sometimes appearing stalked but with bracteal leaves immediately below the calyx).
2 Inflorescence a corymbiform cyme (about as broad as long, the central axis poorly developed). .......................................................... C. erythraea
2 Inflorescence a spike-like cyme (distinctly elongate, the central axis straight). .......................................................... C. spicatum

* Centaurium pulchellum (Swartz) Druce, Lesser Centaury, Branching Centaury. Disturbed areas; native of Europe. June-September. [= C. F, G, K, S]
* Centaurium spicatum (Linnaeus) Fritsch, Spiked Centaury. Disturbed areas; native of s. Europe. July-August. [= C, F, G, K]

Bartonia Muhlenberg ex Willdenow (Bartonia)

A genus of 3 species, herbs, of e. North America. The genus has coralloid mycorrhizae and lacks root hairs, and is thus presumably partially mycotrophic. References: Mathews et al. (2009)=Y; Gillett (1959)=Z.

1 Corolla lobes white, 4-9 mm long, spreading, spatulate to obovate, rounded at the apex; flowering in early spring (rarely to early summer) ....... B. virginica
1 Corolla lobes green to creamy white, 2-3 (-5.2) mm long, ascending or erect, oblong to ovate or lance-ovate, acuminate or rounded-mucronate at the apex; flowering in summer or fall (July-October).
2 Mid-cauline scale leaves alternate; corolla lobes acuminate at the apex, their margins entire; anthers 0.3-0.5 mm long .......................................................... B. paniculata ssp. paniculata
2 Mid-cauline scale leaves opposite; corolla lobes rounded at the apex, abruptly narrowed to a mucro, their margins erose (uncommonly entire); anthers 0.5-1.1 mm long.......................................................... B. virginica

Bartonia paniculata (Michaux) Muhlenberg ssp. paniculata, Screwstem Bartonia. Swamps, bogs, pocosins, pocosin ectones, sphagnum seepages, sinkhole ponds. August-October; September-October. Ssp. paniculata ranges from MA south to c. peninsular FL and west to e. TX, chiefly on the Coastal Plain, but with scattered occurrences inland (to c. VA, w. NC, KY, and AR). Ssp. iodandra (B.L. Robinson) J. Gillett is more northern, ranging from NL (Newfoundland) south to MA. Ssp. texana (Corell) K. Mathews, Dunne, E. York, & Struwe is endemic to the West Gulf Coastal Plain of w. LA and e. TX, where it is more-or-less sympatric with ssp. paniculata (Mathews et al. 2009). [= K, Y, Z; < B. paniculata – RAB, GW, WH; = B. paniculata – G; = B. paniculata var. paniculata – C, F; = B. lanceolata Small – S]

Bartonia verna (Michaux) Rafinesque ex Barton, Spring Bartonia, White Bartonia. Wet pine savannas, shores of Coastal Plain depression ponds, other moist sands. (November-)February-April (-June); April-June. VA (one site known from City of Virginia Beach) (Belden et al. 2004) and se. NC (Carteret County) south to s. FL, west to se. TX. Wood & Weaver’s (1982) speculation that B. verna is an outlier relative to the other species appears not to be true, with the true division being between B. verna/virginica on one hand and B. paniculata and its infrataxa on the other (Mathews et al. 2009). [= RAB, GW, K, S, WH, Y, Z]

Eustoma Salisbury ex G. Don (Prairie-gentian)


Eustoma exaltatum (Linnaeus) Salisbury ex G. Don, Prairie-gentian. Cp (FL): alkaline prairies, saline coastal areas; rare. AL and peninsular FL west to TX, south to Mexico and Belize; West Indies. June-November. [= GW, S, WH, Y, Z; = Eu. exaltatum ssp. exaltatum – K] (not yet keyed in generic key)

Frasera Walter (Columbo)


Frasera caroliniensis Walter, American Columbo. Mt (GA, NC), Pd (GA, SC): rich forests over mafic rocks, upper slopes of cove forests, floodplain forests; rare. Late May-June; September-October. W. NY, nw. PA, and s. ON west to IL, MI, MO, and e. OK, south to w. SC, n. GA, and LA, primarily west of the Blue Ridge. Horn (1997) studied the ecology of this species in the Piedmont of SC. [= C, K, S, W, Z; = Svertia caroliniensis (Walter) Kunze – RAB, F, G]

Gentiana Linnaeus 1753 (Gentian)

A genus of about 350-400 species, herbs, primarily temperate and arctic. Even following the removal of Gentianopsis and Gentianella, Gentiana is a large and apparently heterogeneous group, perhaps not monophyletic. No satisfactory comprehensive treatment is available, however. All of the species treated here as Gentiana are in the distinctive group often treated as section, subgenus, or genus Pneumonanthe. References: Pringle (1967)=Z; Halda (1996)=Y; Ho & Liu (2001)=X; Pringle & Weakley (2009)=Q; Ho & Liu (1990); Yuan, Küpfer, & Doyle (1996); Pringle (1977). Key adapted from Z.

Identification Notes: In some species it may be somewhat difficult to interpret the corolla lobes and the corolla appendages. The filaments are alternate to the corolla lobes, and are therefore attached to the lower portion of the corolla appendages.

1 Flower solitary (rarely 2 or 3); corolla spotted within; leaves twisted, oblanceolate to oblinear; [subgenus Pneumonanthe, series Angustifoliae].
2 Calyx lobes widest at base, the sides then parallel upwards for a distance; corolla exterior intensely indigo blue; [of s. NJ and adjacent DE, and from se. VA south through e. NC to ne. SC].**********************************G. autumnalis
3 Calyx lobes widest above the base, narrowing upwards and downwards from that point; corolla exterior dull purplish-green; [of FL Panhandle].-----------------------------------------------G. pennelliana
4 Corolla blue, purplish, pale blue, or nearly white; seed winged; lower leaves linear, lanceolate, acuminate..........................................................G. puberulenta
5 Margins of leaves and calyx lobes conspicuously ciliate (as seen at 10×); corolla appendages with 2 teeth, as long as broad or longer (sometimes with a deflexed segment)..................................................G. linearis
6 Anthers separate at anthesis; outer surfaces of petals suffused with green; calyx lobes linear-subulate, about as long as the tube; corolla lobes 6-14 mm long, about 2× as long as the the free portions of the corolla appendages ..................................................G. decora
7 Calyx lobes lanceolate, oblanceolate, ovate, or orbicular, 1-5× as long as broad, longer or shorter than the glabrous or puberulent calyx tube; stems glabrous or puberulent; corolla appendages subequally bifid, both segments erect.

Gentianopsis

is a large and apparently heterogeneous group, perhaps not monophyletic. No satisfactory comprehensive treatment is available, however. All of the species treated here as Gentiana are in the distinctive group often treated as section, subgenus, or genus Pneumonanthe. References: Pringle (1967)=Z; Halda (1996)=Y; Ho & Liu (2001)=X; Pringle & Weakley (2009)=Q; Ho & Liu (1990); Yuan, Küpfer, & Doyle (1996); Pringle (1977). Key adapted from Z.
GENTIANACEAE

749

Gentiana alba Muhlenberg ex Nuttall, Pale Gentian. Moist meadows. August-October. MI west to MN, south to n. AR; with scattered disjunctions eastward to PA, OH, WV, KY, and w. NC. G. alba has nomenclatural over G. flavida as the older name; there is controversy, however, over whether it was validly published and applies clearly to the species at hand (see Wilbur 1988c for discussion). [= RAB, K, W, WV, X, Y, Z; = Pneumonanthe flavida (A. Gray) Britton – S; = Pneumonanthe alba (A. Gray) Greene]

Gentiana andrewsii Grisebach var. andrewsii. Prairie Closed Gentian. Meadows, seeps, forest edges. NH, s. QC, MN, and s. MB, south to s. MD, WV, MO and WV; earlier reports of it as far south as GA or NC (as by F and G) are apparently based on misidentifications. An additional variety, var. dakotica A. Nelson, occurs from MB and SK south in the Great Plains to MO and IL. [= C, K, X, Y, Z; < G. andrewsii – F, G, WV; < Dasystephana andrewsii (Grisebach) Small – S; = Pneumonanthe andrewsii (Grisebach) W.A. Weber var. andrewsii]

Gentiana austromontana J.S. Pringle & Sharp, Blue Ridge Gentian. Mountain forests and grassy balds, especially at medium to high elevations, but descending to ca. 600 m (2200 feet). August-October. A Southern Appalachian endemic: s. WV and sw. VA south to w. NC and ne. TN. The flowers of G. austromontana are usually a deeper and more intense blue-violet than the similar G. clausa and G. decorata. See Pringle & Sharp (1964) for additional discussion. [= C, K, Q, W, WV, X, Y, Z; < G. clausa Rafinesque – RAB, F, G, GW; < Dasystephana decorata (Pollard) Small – S]

Gentiana autumnalis Linnaeus, Pinebarren Gentian. Savannas, pine flatwoods, sandhills, in a variety of sites varying from moist to very xeric, nearly always associated with Pinus palustris and/or Aristida stricta (in se. VA, NC, and SC). Late September-mid January (rarely at other times of the year, such as spring, in response to fire). This species is a "bimodal endemic," occurring in s. NJ and adjacent DE (at least formerly), and from se. VA south through e. NC to sc. This is endemic to the FL Panhandle; other siblings, G. bicuspidata (G. Don) Briq., G. hooperi Pringle, and G. longicollis Nesom, occur in Mexico. G. autumnalis is often overlooked, since it is very inconspicuous except when in flower, it usually flowers at a season when few botanists are about, and sterile plants greatly outnumber fertile ones. Vegetatively it is extremely distinctive once learned; the leaves are glossy, dark-green, opposite, oblong and twisted and curved in a manner reminiscent of an airplane propellor. [= RAB, C, F, GW, K, X, Z; < Gentiana porphyrio (F.J. Gmelin – G; = Dasystephana porphyrio (J.F. Gmelin) Small – S; = Gentiana autumnalis ssp. autumnalis – Y; = Pneumonanthe porphyrio (Linnaeus) Greene]


Gentiana clausa Rafinesque Closed Gentian, Meadow Bottle Gentian. Forests. September-October. Mostly Appalachian: ME south to w. NC and ne. TN, extending east and west to adjacent physiographic provinces. [= C, Q, WV; < G. clausa – C, K, W, X, Y, Z (also see G. latidens); < G. clausa – RAB, F, G, GW (also see G. austromontana and G. latidens); < Dasystephana decorata (Pollard) Small – S; < Pneumonanthe clausa (Rafinesque) Greene]


Gentiana latidens (House) J.S. Pringle & Weakley, Balsam Mountain Gentian. Moist, often seeping, more or less open sites on rocky slopes. September-October. Restricted to the higher mountains sof NC south of Asheville, NC (Haywood,
1 Calyx 4-5 mm long; calyx tube 1.5-2.0 mm long; calyx lobes 2.0-2.5 mm long, narrowly triangular with hyaline margins and very prominent occidentalis west to n. KY and w. TN, south to Panhandle FL and e. LA. [= RAB, C, F, G, K, W, WV, X, Y, Z, Fernald – F, G; = Pneumonanthe linearis (Linnaeus) Small – S, misapplied; = Dasystephana puberula (Michaux) Small – S, misapplied]

**Gentiana lineari** Frölich, Narrowleaf Gentian. Openings in spruce-fir forests, bogs, at high elevations. September-October. Mainly occurring in ne. United States and e. Canada, west to Lake Superior, and south (scattered) in the Appalachians to sw. VA (in openings in spruce-fir forest near summit of Whittetop Mountain) and e. TN (Chester, Wofford, & Kral 1997). On Mount LeConte (Sevier County, TN), G. lineari occurs in thin soils around high elevation outcrops of Anakeesta Slate. See Pringle (1977) for extensive discussion of actual and putative southern occurrences of this species. [= C, F, G, K, W, WV, X, Y, Z, = Gentiana lineari (Frölich) Greene]

**Gentiana pennellina** Fernald, Wiregrass Gentian. Pine flatwoods. December-March. Endemic to Panhandle FL. [= GW, WH; = Dasystephana tenuefolia (Linnaeus) Pennell – S] [add to synonymy X, Y, Z]

**Gentiana puberulenta** J.S. Pringle, Prairie Gentian. [habitats]. W. NY west to ND, south to KY, sc. TN (Coffee County) (Chester, Wofford, & Kral 1997), LA, n. AR, and KS. Reports for WV are unconfirmed (Harmon, Ford-Werntz, & Grafton 2006). [= C, K, X, Y, Z; = G. puberula – F, G, misapplied; = Dasystephana puberula (Michaux) Small – S, misapplied]

**Gentiana saponaria** Linnaeus, Soapwort Gentian. Bogs, marshes, wet hardwood forests, other moist to wet habitats. Late September-November. NY west to n. IL, south to Panhandle FL and e. TX. A peculiar form with very narrow leaves has been found at several localities in Ashe and Watauga counties, NC, and in the South Mountains, NC; it may warrant taxonomic recognition after further study. [= RAB, C, GW, K, W, WH, X, Y, Z; > G. saponaria – F, G, WV; > G. cherokeensis (W.P. Lemmon) Fernald – F, G; = G. saponaria var. saponaria – K; = Dasystephana saponaria (Linnaeus) Small – S; = Pneumonanthe saponaria (Linnaeus) F.W. Schmidt]

**Gentiana villosa** Linnaeus, Striped Gentian. Upland forests, sandhill/pocosin ecotones. Late August-November. Se. PA west to n. KY and w. TN, south to Panhandle FL and e. LA. [= RAB, C, F, G, K, W, WH, X, Y, Z; = Dasystephana villosa (Linnaeus) Small – S; = Pneumonanthe villosa (Linnaeus) F.W. Schmidt]

**Gentianella Moench (Agueweed)**

A genus of about 125-250 species, herbs, temperate. The separation of Gentianella from Gentiana appears to be well warranted; some characters suggest that Gentianella is more closely allied to Swertia, Halemia, and Lomatogonium than to Gentiana (Wood & Weaver 1982). A molecular analysis has confirmed this (Yuan & Küpfer 1995). References: Gillett (1957)=Z. Key based on Gillett (1957).

1 Calyx 8-10 mm long; calyx tube 3.0-3.5 mm long; calyx lobes 5-6 mm long, elliptic-lanceolate to oblanceolate with thickened margins, and with broadly flattened, frequently nerve-like keels; corolla ca. 20 mm long .......................................................... G. quinquefolia var. occidentalis

2 Calyx 4-5 mm long; calyx tube 1.5-2.0 mm long; calyx lobes 2.0-2.5 mm long, narrowly triangular with hyaline margins and very prominent keels; corolla 16-18 mm long ............................................................................................................................ G. quinquefolia var. quinquefolia

**Gentianella quinquefolia** (Linnaeus) Small var. occidentalis A. Gray, Western Agueweed. Calcareous barrens, dry and dry-mesic limestone woodlands. Late August-October. Var. occidentalis A. Gray is more widespread, from OH and s. ON west to MN, east and south to w. VA, sc. KY, AR, and se. KS. [= C, G; < Gentiana quinquefolia Linnaeus – RAB, GW, W; = Gentiana quinquefolia var. occidentalis (A. Gray) Hitchcock – F; = Gentianella quinquefolia ssp. occidentalis (A. Gray) J. Gillett – K, Z; = Gentianella occidentalis (A. Gray) Small – S]

**Gentianella quinquefolia** (Linnaeus) Small var. quinquefolia, Eastern Agueweed. Forests, grassy balds. Late August-October. Var. quinquefolia is primarily Appalachian, from ME west to w. NY and s. ON, south to n. GA and sc. TN. [= C, G; < Gentiana quinquefolia Linnaeus – RAB, GW, W, WV; = Gentianella quinquefolia var. quinquefolia – F; = Gentianella quinquefolia ssp. quinquefolia – K, Z; = Gentianella quinquefolia – S]

**Gentianopsis Ma 1951 (Fringed-gentian)**

A genus of about 20 species, herbs, of north temperate Asia and North America. The reasons for the recognition of Gentianopsis are enumerated by Ma (1951), Ilitis (1965), and Wood & Weaver (1982). References: Gillett (1957)=Z; Ilitis (1965); Ma (1951).
Anthopogon crinitum (Frölich) Rafinesque – S;
1. Flowers with 5-6 (-7) corolla lobes. Inconspicuous, often nearly hidden under fallen leaves. To OH, s. IN, and s. IL, south to Panhandle FL and se. LA (reported from TX). The small purplish-green plants are a monotypic genus, herb, of e. North America. References: Wilbur (1955) = Z.

Obolaria Linnaeus (Pennywort)


Obolaria virginica Linnaeus, Pennywort. Nutrient-rich, moist forests, mesic hammocks. March-May; May-June. NJ west to OH, s. IN, and s. IL, south to Panhandle FL and se. LA (reported from TX). The small purplish-green plants are inconspicuous, often nearly hidden under fallen leaves. Obolaria has well-developed mycorrhizae and may be substantially mycotrophic. [= RAB, C, F, G, K, S, W, WH, WV, Z]

Sabatia Adanson 1763 (Sabatia, Rose-gentian, Rose-pink, Marsh-pink, Sea-pink)

(Contributed by B.A. Sorrie and A.S. Weakley)

A genus of about 20 species, of North America and the West Indies. References: Wilbur (1955) = Z.

1. Flowers with (7-) 8-12 (-14) corolla lobes.
2. Pedicels > 10 mm long; calyx subtended by long bracts; terminal flower single.
3. Upper branches of main stem opposite.
4. Upper stem leaves about as wide as the diameter of the stem, or narrower; calyx lobes terete or semi-terete; stems 6-12 dm tall; [of Taxodium ascendens-Nyssa biflora depressions and wet pine flatwoods in se. SC] ...................................................... S. bartramii
5. Upper stem leaves much wider than the diameter of the stem; calyx lobes flat, linear to narrowly oblanceolate; stems 3-12 dm tall; [of various habitats, primarily along the shores of blackwater rivers or ponds, or in tidal marshes].
6. Primary branches opposite; terminal flower short-stalked (much shorter than the first internode of the adjacent branch); stems 5-12 dm tall; [of Taxodium ascendens-Nyssa biflora depressions and wet pine flatwoods in se. SC] ...................................................... S. bartramii
7. Primary branches usually alternate; terminal flower long-stalked (usually longer than the first internode of the adjacent branch); stems 3-7 dm tall; [of brackish marshes or openings along blackwater streams].
8. Surficial stolons usually present and well-developed, elongate; internodes shorter than to equaling the leaves; [of openings of blackwater streams] ...................................................... S. dodecandra
9. Surficial stolons usually absent or poorly developed; internodes commonly much longer than leaves; [of tidal brackish or freshwater marshes] ...................................................... S. dodecandra
10. Calyx lobes foliaceous, 5-8 mm wide, oblong to oblanceolate, mostly exceeding the corolla lobes ........................................... S. calycina
11. Calyx lobes linear-setaceous, 0.5-2 mm wide, if equalling the corolla lobes then very narrow and not foliaceous. 
12. Plants perennial, often with several stems from a caudex; calyx lobes > 3/4× as long as the corolla lobes, and sometimes exceeding them; [of saturated soils from Coastal Plain savannas to Mountain bogs] ...................................................... S. campanulata
13. Plants annual, solitary; calyx lobes up to 3/4× as long as the corolla lobes 
14. Corolla lobes pink (rarely white in individual plants). 
15. Lower half of stem winged; leaves ovate, clasping, < 2× as long as wide; [widely distributed in our area] ...................................................... S. angularis
15 Lower half of stem not winged; leaves elliptic to lanceolate, more or less tapered to the base, mostly > 3× as long as wide; [of the Coastal Plain or very rarely Piedmont] ...........................................................S. brachiata
14 Corolla lobes white or creamy white; pedicels (above the uppermost bracts or branches) ca. 1-2 (-5) mm long.
16 Lower portion of stem quadrangular, narrowly winged, plants annual or biennial, with 1 (-several) stems arising from a taproot...........
16 Lower portion of stem terete, not winged (though the upper stem is quadrangular or angled in S. difformis); plants perennial, with several stems arising from a short rhizome; [section Eusabatia, subsection Difformes].
17 Leaves and upper stem not glaucous; stem terete below, becoming quadrangular or quadrangular-angled above; corolla lobes (5-)
7-15 (-21) mm long; [widespread in our area]............................................................S. difformis
17 Leaves and upper stem glaucous; stem terete throughout; corolla lobes (4-) 5-7 (-8) mm long; [of GA southward and westward].
18 Calyx-lobes erect, (0.1-) 0.2-1.5 (-2.0) mm long, as long as or shorter than the calyx-tube; [of e. and sc. GA south to ne. FL]..............
18 Calyx lobes strongly recurved, (1.0-) 1.5-3 mm long, longer than the calyx-tube; [of e. and sc. GA south to ne. FL] ..............

Sabatia angularis (Linnaeus) Pursh, Bitter-bloom, Common Marsh-pink. Forests, woodlands, marshes, fields, calcareous hammocks (in FL). July-August; September-October. NY west to s. MI, IL, and e. KS, south to Panhandle FL and e. TX. [= RAB, C, F, GW, K, WH, WV, Z; = Sabatia angularis – S]

Sabatia arenicola Greenman, Sand Rose-gentian. Interdune depressions, wet savannas, saline flats. April-July. Se. LA west through TX to ne. MX. [= GW, K, Z]


Sabatia brachiata Elliott, Narrowleaf Rose-pink. Mesic pinelands, sandhills, pine savannas, pine flatwoods. Late May-July; August-September. Se. VA south to s. GA, west to LA, north in the interior to c. TN and se. MO. [= RAB, C, F, GW, K, W, Z; = Sabatia brachiata – S]

Sabatia brevifolia Rafinesque. Pine savannas. September-October; October-November. E. SC south to peninsular FL, west to s. AL. [= RAB, GW, K, WH, Z; = Sabatia elliotii Steudel – S]

Sabatia calycina (Lamarck) Heller, Coastal Rose-pink. Swamp forests, river banks. June-October; July-October. Se. VA south to s. FL, west to se. TX; e. Cuba and Hispaniola. [= RAB, C, F, GW, K, WH, Z; = Sabatia calycina – S]

Sabatia campanulata (Linnaeus) Torrey, Slender Marsh-pink. Pine savannas, bogs. June-August; September-October. MA south to ne. FL, oanhandle FL, west to LA and AR; scattered inland as in w. VA, w. NC, c. TN, and KY. [= RAB, C, GW, K, W, WH, Z; > S. campanulata var. campanulata – F; > S. campanulata var. gracilis (Michaux) Fernald – F; < Sabatia campanulata – S]

* Sabatia campestris Nuttall, Western Marsh-pink, Prairie Rose-gentian, Prairie Sabatia. Roadsides and woodland edges; native of c. United States. July-August; September-October. [= RAB, C, F, GW, K, Z]

Sabatia capitata (Rafinesque) Blake, Cumberland Rose-gentian. Sloping woodlands and meadows, over sandstone or shale. July-August; September-October. Sw. NC and se. TN south to nw. GA and e. AL. Apparently present in NC, at least formerly, based on a specimen collected "from Cherokee", probably Cherokee County, NC, a remarkably poorly botanized area. [= K, Z; = Lapithea capitata (Rafinesque) Small – S]


Sabatia dodecandra (Linnaeus) Britton, Sterns, & Poggenburg, Perennial Sea-pink, Large Marsh Rose-pink. Tidal brackish and freshwater marshes. June-August; August-October. CT south to e. SC and e. GA (Sorrie 1998b). [= F; < S. dodecandra var. dodecandra – RAB (also see S. foliosa); = S. dodecandra var. dodecandra – C, GW, K, Z; = Sabatia dodecandra – S]
**GENTIANACEAE**

*Sabatia foliosa* Fernald. Openings along blackwater rivers, cypress ponds. June-August; August-October. E. SC south to ne. FL and Panhandle FL, west to se. TX. [<*S. dodecandra* var. *dodecandra* – RAB; = *S. dodecandra* (Linnaeus) Britton, Stems, & Poggenburg var. *foliosa* (Fernald) Wilbur – GW, K, Z; > *Sabatia foliosa* – S; > *Sabattia harperi* Small – S; = *S. dodecandra* – WH]

*Sabatia gentianoides* Elliott. Pine savannas, bogs. July-August; September-October. NC south to ne. FL and Panhandle FL, west to se. TX. [= RAB, GW, K, WH, Z; = *Lapithea gentianoides* (Elliott) Grisebach – S]

*Sabatia grandiflora* (Gray) Small. Largeflower Rose-gentian. Cp (FL): wet flatwoods, marshes, cypress-gum depressions, limesink ponds, borrow pits; common. Ne. FL, Panhandle FL, s. AL, south to s. FL. [= RAB, GW, K, WH, Z; = *Lapithea grandiflora* (Elliott) Grisebach – S]

*Sabatia kennedyana* Fernald, Plymouth Gentian. Seasonally exposed drawdown banks of the Waccamaw River, in adjacent ditches and disturbed flats (in se. NC and ne. SC), and very rarely on shores of beaver ponds (in e. VA, by introduction). June-August; August-October. This species has a strange, disjunct range, likely related to Pleistocene refugia on the (now) Continental shelf, present in s. NS, e. MA and RI; se. NC and ne. SC. The record of the species in e. VA (Caroline County) reported by Fleming & Ludwig (1996) has now been determined to be a deliberate introduction. Studies underway suggest that the Carolina plants may differ varietally from those in New England (Sorrie, pers. comm.). [= C, F, GW, K, Z; = *S. dodecandra* var. *kennedyana* (Fernald) Ahles – RAB]

*Sabatia macrophylla* Hooker var. *macrophylla*, Large-leaf Rose-gentian. Wet savannas. Sw. GA west to e. LA. [= K, Z; < *S. macrophylla* – GW, WH; = *Sabbatia macrophylla* Hooker – S]

*Sabatia macrophylla* Hooker var. *recurvans* (Small) Wilbur, Small’s Rose-gentian. Wet savannas. E. and c. GA south to ne. FL; it may occur in se. SC. [= K, Z; < *S. macrophylla* – GW, WH; = *Sabbatia recurvans* Small – S]

*Sabatia quadrangularis* Wilbur, Four-angle Sabatia. Sandhills, moist forests, pocosin ecotones. June-September; August-November. E. VA south to n. peninsular FL, west to s. AL. [= RAB, C, GW, K, WH, Z; = *S. paniculata* Michaux – F, misapplied; = *Sabatia paniculata* – S]

*Sabatia stellaris* Pursh, Annual Sea-pink. Brackish marshes. July-October; August-November. S. MA south to s. FL, west to LA; Bahama Islands, Cuba, c. Mexico. [= RAB, C, F, GW, K, WH, Z; = *S. campanulata* var. *paniculata* – S]

**LOGANIACEAE** R. Brown ex Martius 1827 (Logania Family) [in GENTIANALES]

As here rather narrowly interpreted, Loganiaceae consists of 12 genera and about 420 species, herbs and subshrubs, of tropical, subtropical, and warm temperate areas of the Old and New Worlds. Other genera in our area which have traditionally been considered components of the Loganiaceae now are clearly better placed in the small families Tetrachondraceae (*Polypremum*), Gelsemiaceae (*Gelsemium*), and Scrophulariaceae (*Buddleja*), more closely related to other families (such as Rubiaceae) than to Loganiaceae sensu stricto (Struwe, Albert, & Bremer 1994). The affinities of *Spigelia* appear to be with a small group of tropical and subtropical genera, the largest of which is *Strychnos*. Struwe, Albert, & Bremer (1994) treated this group as the family Strychnaceae, based on a cladistic analysis of data. A later, more thorough analysis suggested that Strychnaceae is best recombined with Loganiaceae (Backlund, Oxelman, & Bremer 2000). References: Rogers (1986). [also see GELSEMIACEAE, SCROPHULARIACEAE, and TETRACHONDRACEAE]

1 Woody vine ......................................................................................................................................................*Gelsemium* [see GELSEMIACEAE]
1 Herb.
2 Corolla funnelform, 0.1-0.2 cm long, white ......................................................................................................................*Mitreola*
2 Corolla tubular, 3-6 cm long, red and yellow...............................................................................................................*Spigelia*

**Mitreola** Linnaeus 1758 (Miterwort)

**LOGANIACEAE**

1 Leaves 2-8 cm long petiolate or sessile and tapering to a cuneate base .................................................. *M. petiolata*

1 Leaves 1-4 cm long, sessile, the base rounded.

2 Mature seed reticulate; mature capsule smooth to slightly and finely tuberculate; larger leaves ca. 4× as long as wide.............. *M. angustifolia*

2 Mature seed smooth; mature capsule markedly papillose-warty; larger leaves 1.5-2× as long as wide................................. *M. sessilifolia*


*Mitreola petiolata* (J.F. Gmelin) Torrey & A. Gray, Caribbean Miterwort. Swamps, marshes, ditches, other wet habitats. July-September; September-November. Se. VA south to FL and west to AR and c. TX, north in the interior to nw. GA and c. and se. TN; Mexico, the West Indies, and n. South America. [= GW, K, WH, Y; = *Cynoctonum mitreola* (Linnaeus) Britton – RAB, C, F, G, S]

*Mitreola sessilifolia* (J.F. Gmelin) G. Don, Small-leaved Miterwort. Wet savannas, pocosins, ditches, margins of limesink depressions (dolines). Late June-August; September-October. Se. VA south to FL, west to e. TX, and in the Bahama Islands. [= GW, WH, Y; = *Cynoctonum sessilifolium* J.F. Gmelin – RAB, C, F, G, S; < *M. sessilifolia* – K, Z (also see *M. angustifolia*)]

**Spigelia** Linnaeus 1753 (Pinkroot)


1 Corolla scarlet on the outer surface, yellow on the inner surface.......................................................................................... *S. marilandica*

1 Corolla light pink to white on the outer and inner surfaces.

2 Corolla 36-50 mm long; pistil 24-27 mm long; sepals 8-11 mm long; inflorescence with 2-4 flowers; [of dolomitic glades in Bibb Co. AL] ..........................................................................................................................................................................

2 Corolla 25-30 mm long; pistil 17-19 mm long; sepals 4-6 mm long; inflorescence with 3-8 flowers; [of pine savannas of Panhandle FL].............................................................................................................................................................................................................

*S. gentianoides* var. *gentianoides*


*S. marilandica* (Linnaeus) Linnaeus, Pinkroot, Wormgrass. Woodlands and forests, usually on circumneutral soils. May-June; late June-July. SC, sw. NC (Cherokee Co. and Macon Co.), and TN west to s. IN and OK, south to Panhandle FL and TX; some floras allege its occurrence north to VA, MD, NJ, and PA. *S. marilandica* will likely be found in sw. VA. [= RAB, C, F, G, K, S, W, WH]

**353. GELSEMIACEAE** (G. Don) Struwe & V. Albert 1995 (Jessamine Family) [in GENTIANALES]

A family of 2 genera and about 10 species, shrubs and vines, of tropical and warm temperate America, Africa, and Asia. There is persuasive evidence that *Gelsemium* and *Mostuea* Didr., traditionally treated as part of a heterogeneous Loganiaceae, should be accorded family status as Gelsemiaceae (Backlund, Oxelman, & Bremer 2000; Struwe, Albert, & Bremer 1994; Sennblad & Bremer 1996). The Gelsemiaceae form a clade most closely related to the Apocynaceae (Backlund, Oxelman, & Bremer 2000).


**Gelsemium** Antoine Laurent de Jussieu (Yellow Jessamine)

A genus of 3 species, vines, our 2 species in se. North America (and also Central America) and 1 species in e. Asia. References: Wyatt et al. (1993); Duncan & Dejong (1964); Godfrey (1988); Rogers (1986)=Z; GW.

1 Sepals acuminate apically, persistent on the fruit; capsule elliptical, 1.0-1.6 cm long, 6-8 mm broad, the tapering tip bearing a definite beak about 3 mm long; seeds wingless; flowers odorless (rarely fragrant), usually golden-yellow .......................................................... *G. rankinii*
1. Sepals obtuse to broadly acute, not persistent on the fruit; capsule oblong, 1.5-2.5 cm long, 8-12 mm broad, very abruptly narrowed to a beak 1.5-2 mm long; seeds with a prominent membranous wing sharply differentiated from the body of the seed; flowers fragrant, usually lemon-yellow ................................................................. G. sempervirens

**Gelsemium rankinii** Small, Swamp Jessamine. Swamps of blackwater rivers, restricted in NC to the se. corner of the state, most notably the swamps of the Waccamaw and Black rivers. March-April; September-October. Se. NC south through SC and trees, also commonly planted as an ornamental. March–early May; September–November. VA, se. TN, and AR south to e. peninsular FL and e. TX; disjunct in Guatemala and Mexico (Chiapas, Oaxaca, Puebla, and Veracruz). Jessamine climbs to the tops of trees. (= RAB, F, GW, K, S, W, WH, Z)

**Gelsemium sempervirens** (Linnaeus) St. Hilaire, Carolina Jessamine. In a wide range of habitats, from swamp forests to dry uplands and thickets, also commonly planted as an ornamental. March–early May; September–November. VA, se. TN, and AR south to e. peninsular FL and e. TX; disjunct in Guatemala and Mexico (Chiapas, Oaxaca, Puebla, and Veracruz). Jessamine climbs to the tops of trees. (= RAB, F, GW, K, S, W, WH, Z)

### 354. **APOCYNACEAE** A.L. de Jussieu 1789 (Dogbane Family) [in GENTIANALES]

As here circumscribed including the Asclepiadaceae, a family of about 480 genera and about 4800 species, lianas, shrubs, herbs, and trees, widespread in tropical and temperate areas. There appears to be overwhelming evidence favoring the combination of the Asclepiadaceae into the Apocynaceae; see, for instance, Rosatti (1989), Sennblad & Bremer (1996), and many others.

References: Rosatti (1989); Lieder (1997a).

1. Plant a twining herbaceous or woody vine.

2. Leaves ovate, cordate at the base, < 2.5× as long as wide.

3. Plants in flower.

4. Petals white; gynostegial corona nearly as long to longer than the corolla lobes ................................................................. **Cynanchum laeve**

5. Petals brown, yellow, yellow-green, cream, or maroon (white in **Matelea baldwyniana**); gynostegial corona < half the length of the corolla lobes.

6. Corolla lobes glabrous on the outer surface, very stiff in texture; dorsal anther appendages laminar; carpels smooth and angled ...... ................................................................. **Gonolobus**

7. Corolla lobes glandular-puberulent on the outer surface, herbaceous in texture; dorsal anther appendages absent; carpels muricate. ................................................................. **Gelsemium**

3. Plants in fruit.

6. Follicles muricate ........................................................................................................................................................................**Matelea**

7. Follicles smooth and angled. .................................................................................................................................................. **Cynanchum laeve**

7. Leaves cordate, broadly rounded to an acuminate apex .............................................................................................................. **Gonolobus**

2. Leaves ovate, lanceolate, or linear, not cordate at the base, > 1.5× as long as wide

8. Leaves linear, the margins parallel

9. Leaves petiolate; calyx lobes deltoid, obtuse, ca. 1 mm long; leaves petiolate, not reflexed, often caducous; follicle 1-3 mm in diameter; [of se. SC and south] ................................................................. **Cynanchum scoparium**

10. Leaves sessile; calyx lobes lanceolate, acute, (1.3-) 1.5-2.5 mm long; leaves sessile, reflexed, persistent; follicle 6-7 mm in diameter; [of ne. NC and south] ................................................................. **Seutera angustifolia**

8. Leaves ovate to lanceolate.

10. Flowers brownish-purple, with a corona of narrow segments; fruit 10-15 cm long, > 5 mm in diameter; leaves obtuse to acute at the tip (rarely slightly acuminate) ........................................................................... **Periplocoa**

11. Flowers white to creamy yellow, lacking a corona; fruit 10-25 cm long, 1-2 mm in diameter; leaves acuminate at the tip ................. ................................................................................................................................. **Trachelospermum**

1. Plant an erect or trailing herb or shrub.

11. Plant a woody shrub.

12. Plant rhizomatous, suffrutescent, < 4 dm tall; leaves narrowly to broadly ovate; flowers blue, lavender, or white ............................................ **Vinca**

12. Plant erect, > 4 dm tall; leaves either lanceolate or elliptic; flowers yellow, white, pink, or red.

13. Flowers yellow; shrub 4-12 dm tall, with only a few wand-like branches; [very rare waif in our area] ...................................................... **Angadenia**

14. Flowers white, pink, or red; shrub 10-40 dm tall, much branched from the base; [commonly cultivated in our area (and sometimes persistent), particularly near the coast] .......................................................................... **Nerium**

11. Plant an herb.

14. Flowers with conspicuous corona; follicles not paired; seeds with coma present ............................................................................. **Asclepias**

15. Leaves alternate (rarely a few on a plant subopposite) ................................................................................................................. **Amsonia**

15. Leaves opposite.

16. Flower < 8 mm across; paired follicles pendent, 10-22 cm long; seeds with coma; mature plants normally > 7 dm tall ... **Apocynum**

16. Flower > 20 mm across; paired follicles erect, 1.5-2.5 cm long; seeds lacking coma; mature plants 2-6 dm tall ........ **Catharanthus**

**Amsonia** Walter 1788 (Blue-stars)

A genus of about 20 species, herbs, of temperate North America and Japan. References: Woodson (1928)=Z.
A genus of 2 species, of Florida and the West Indies.

*Angadenia berteroi* (Alphonse de Candolle) Miers, Pineland Golden-trumpet, Pineland Allamanda. Lice-root. Cp (NC): disturbed, acid, peaty soil; rare, native of s. FL, the Bahamas, Cuba, and Hispaniola. The only record in our area is from an agricultural experiment station near Wenona, Washington County, NC (Hayes 1946), where presumably introduced via cattle; the species has probably not persisted in our area. [= K; > Rhadadenia coralliflora Small – S]

**Apocynum** Linnaeus 1753 (Dogbane, Indian-hemp)

A genus of about 12 species, herbs, of temperate e. and c. Asia and North America. References: Woodson (1930)=Z.

1 Corolla 5-10 mm long, pink or white with pink veins, the lobes spreading or recurved.

2 Leaves drooping; corolla ca. 3× as long as the calyx lobes. .................................................................A. androsaemifolium
**APOCYNACEAE**

1. Leaves spreading; corolla ca. 2× as long as the calyx lobes..........................Key A
2. Sap clear; leaves alternate; corolla orange to yellow.............................. **Key B**
3. Leaves lanceolate, ovate, or elliptic, < 1-5 (-10)× as long as wide.
4. Plants in flower ..................................................................................... **Key C**
5. Plants in fruit (or sterile) ......................................................................... **Key D**
6. Plants in flower ..................................................................................... **Key E**

**Key A** – milkweeds with clear sap and alternate leaves

1. Leaves cuneate at the base; leaves usually obovate to oblanceolate (widest beyond the middle); [s. NH west to OH, south to Panhandle FL and e. TX widespread eastward] ........................................................................................................................................... **A. tuberosa var. tuberosa**
2. Leaf margins flat; leaves widest towards the base; [PA, WV, KY, TN, MS westward] ................................................................. **A. tuberosa var. interior**
3. Leaf margins usually crisped; leaves widest near the middle; [of se. Coastal Plain, se. VA south to s. FL, west to s. MS] .......................................................................................................................... **A. tuberosa var. rolfsii**

**Key B** – milkweeds with milky sap, with linear leaves opposite, subopposite, or whorled

1. Leaves either mostly in whorls of 3-6 (sometimes some nodes with merely opposite leaves), or subopposite (the leaves more-or-less paired but separated by 0.5-3 mm); corolla whitish or greenish, usually suffused with rose-purple (especially at the tips of the corolla lobes).
2. Leaves mostly in whorls of 3-6 (sometimes some nodes with merely opposite leaves); leaves 1.5-7 cm long, 1-2 mm wide; seeds ca. 5 mm long, the coma ca. 2.5 cm long; milky sap often difficult to show .......................................................................................................................... **A. verticillata**
3. Leaves subopposite (the leaves more-or-less paired but separated by 0.5-3 mm); leaves (3-) 5-18 cm long, (1-) 2-10 mm wide; seeds ca. 7-11 mm long, the coma 3-5 cm long; milky sap obvious and profuse.


**A. ×floribundum** Greene (pro sp.) [A. androsaemifolium × cannabinum]. Forests, woodlands, roadsides, pastures. June-July; September-October. Sometimes occurring in populations seemingly lacking one or both parents. [= C, K; = A. medium Greene – RAB, F, S, W; > A. medium var. medium – Z]

**A. sibiricum** Jacquin. Forests, woodlands, riverside scour areas, roadsides, pastures. July-September; September-October. NL (Newfoundland and BC south to e. VA, w. VA, WV, and MO. A. sibiricum var. cordigerum has been found in Kent County, MD (Steyr, Tyndall, & Cooley 1996). [= C, W; > A. sibiricum var. sibiricum – F, G; > A. sibiricum var. cordigerum (Greene) Fernald – F, G; < A. cannabinum var. interior] (Greene) Baptista & Belosersky – Z; < A. cannabinum – K]

**Asclepias** Linnaeus 1753 (Milkweed)

3 Umbels 1-4, terminal and from upper nodes; corona 2-3 mm in diameter; horns absent; hoods ca. 2 mm long, surpassed by the anther heads; [either wet pinelands of the Coastal Plain or dry glades or woodlands] .......................................................... A. michauxii

4 Pedicels with spreading hairs; umbels 2-10, each with up to 30-100 flowers; leaves minutely scabrous; [dry glades or woodlands, known from the Mountains of nw. GA, e. TN, w. WV westward] .................................................................................................. A. hirtella

5 Leaves 2.5-4.5 cm long, puberulent beneath, sessile; corolla lobes erect, creamy yellow to dull or greenish white, 7-10 mm long; plant 1-4 dm tall; [dry pinelands of the Coastal Plain] .................................................................................................. A. pedicellata

5 Umbels 5-20 cm long, glabrous or glabrate beneath (rarely puberulent), sessile to petiolate; corolla lobes reflexed, either orange-red or usually with at least some purple (rarely merely whitish or greenish), 3-7 mm long (except 8-11 mm long in the orange-red A. lanceolata); plant 1-15 dm tall; [collectively of various habitats].

5 Leaves with pedioles 0-1 mm long; leaves 1-7 mm wide; plants 1-7 dm tall.

6 Leaves 1-2 mm wide; each hood with 2 erect, acuminate, marginal teeth on the inner side (adjoining the anther heads) ........ A. cinerea

6 Umbel 1, terminal; corona 5-7 mm in diameter; hoods present, about as long as the hood; hoods ca. 2-4 mm long, surpassing the anther heads; [dry pinelands] .......................................................... A. michauxii

9 Umbels 1-4, terminal and from upper nodes; corona 2-3 mm in diameter; horns absent; hoods ca. 2 mm long, surpassed by the anther heads; [either of wet pinelands of the Coastal Plain or dry glades or woodlands] .......................................................... A. incarnata var. incarnata

9 Pedicels with spreading hairs; umbels 2-10, each with up to 30-100 flowers; leaves minutely scabrous; [dry glades or woodlands, east to nw. GA, TN, and WV] ...................................................................................... A. hirtella

9 Pedicels with incurved hairs; umbels 1-6, each with 10-30 flowers; leaves glabrous or nearly so; [wet pinelands of the Coastal Plain] .................................................................................................. A. pedicellata

Key C – milkweeds with milky sap, with sessile, nonlinear leaves

1 Leaves 2-5 cm long, 0.3-1.0 cm wide; corolla lobes erect, creamy yellow to greenish white, 7-10 mm long; plant 1-4 dm tall; [of dry pinelands of the Coastal Plain of NC and SC] .................................................................................................. A. pedicellata

1 Leaves 3-30 cm long, 0.5-11 cm wide (not simultaneously < 5 cm long and < 1 cm wide); corolla lobes reflexed, either orange-red, purple, pink, or green, 5-15 mm long; plant 2-10 dm tall; [collectively of various habitats, including dryish pinelands of the Coastal Plain].

2 Leaves cordate-clasping at base, 3-10 cm wide, 1-2× as long as wide; stem and leaves glabrous and usually also glaucous.

3 Plant erect, the stems 4-10 dm long, the leaves perpendicular to the stem thus in a plane parallel to the ground; corolla lobes 7-11 mm long; inflorescence solitary, terminal (rarely a second from an upper node); corona 5-8 mm across; [widespread].............. A. amplexicaulis

3 Plant prostrate or decumbent, the stems 2-7 dm long, the leaves perpendicular to the stem and thus perpendicular to the ground as well; corolla lobes 5-6.5 mm long; inflorescences 2-6 from upper nodes; corona 3-5 mm across; [of dry pinelands of the Coastal Plain].............. A. hirtella

4 Pedicels with incurved hairs; umbels 1-6, each with 10-30 flowers; leaves glabrous or nearly so; [wet pinelands of the Coastal Plain] .................................................................................................. A. pedicellata

Key D – milkweeds with milky sap, with petiolate, nonlinear leaves, in flower

1 Corolla greenish, either pale green or yellowish green.

2 Leaves subopposite; corolla lobes 13-15 mm long. .......................................................... A. viridis

3 Leaves opposite; corolla lobes 6-10 mm long.

3 Corona 2-3 mm across; corolla lobes pale green, 6-7 mm long; [of various provinces, primarily of the Piedmont] .............. A. viridis

3 Corona 5-9 mm across; corolla lobes yellowish green, 9-10 mm long; [strictly of the Coastal Plain, of NC and SC, and southward].

4 Hoods ca. 6 mm long, about 2× as long as the anther heads; stem and leaves densely tomentulose ...................... A. obovata

4 Hoods ca. 4 mm long, scarcely exceeding the anther heads; stem and leaves softly puberulent ...................... A. tomentosa

1 Corolla pink, purple, or white.

5 Hoods about as long as the anther heads; hoods 1.5-2× as long as the hood, exerted well beyond the hood.

6 Hood opening truncate, the hood therefore beaker-shaped; corolla lobes 8-12 mm long; [primarily of mesic forests of the Mountains] .... A. exaltata

6 Hood opening very oblique, the hood therefore scoop-shaped; corolla lobes 2.5-6 mm long; [primarily of wetlands of various provinces].

7 Plants 3-5 dm tall; corolla lobes usually white (rarely slightly pink); leaves glabrous beneath; [of the Coastal Plain of SC] .............. A. perennis

7 Plants 5-15 dm tall; corolla lobes rose to purple (rarely white); leaves pubescent to glabrate beneath; [collectively widespread].
Oxypteryx curtissii (A. Gray) Small – S [not yet keyed]

- Slightly persistent. Kartesz (1999) reports it for TN. [= K, WH, Z] [not yet keyed]


- And s. ON west to MN and IA, south to n. GA, n. AL (Schotz 2009). e. and c. TN (Chester, Wofford, & Kral 1997), KY, and IL.

Asclepias curtissii

**Asclepias feayi** Chapman ex A. Gray, Feay’s Milkweed. Sandhills, scrubby pine flatwoods. Endemic to FL, from Clay County south to s. peninsular FL. [= K, WH, Z; = Asclepiodella feayi (Chapman ex A. Gray) Small – S] {not yet keyed}

**Asclepias hirtella** (Pennell) Woodson, Barrens Milkweed. Limestone glades, prairies. MI, WI, and MN south to w. WV (Mason County), KY, e. TN (Bradley County) (Chester, Wofford, & Kral 1997), nw. GA (Jones & Coile 1988), AR, w. LA, and e. TX. This species of midwestern prairies and barrens that closely resembles *A. longifolia*. The two taxa have sometimes been treated as distinct only at the rank of subspecies (see synonymy) or as “very distinct varieties” (Turner 2009). [= C, F, K, Z; = Acerates hirtella Pennell – S; = Asclepias longifolia Michaux ssp. hirtella (Pennell) J. Farmer & C.R. Bell – X; = Asclepias longifolia var. hirtella (Pennell) B.L. Turner – Y]

**Asclepias humistrata** Walter, Fleshy Milkweed. Sandhills. May-June; June-July. E. NC south to s. FL, west to e. LA. [= RAB, K, S, WH, Z]

**Asclepias incarnata** Linnaeus var. incarnata, Western Swamp Milkweed. Swamps, marshes, especially over limestone or calcareous shale. July-September; August-October. ME and s. QC west to MB, south to VA, s. TN (Chester, Wofford, & Kral 1997), AR, TX, and CO; disjunct from n. FL south to s. FL; disjunct in TX, NM, and UT. The distribution is peculiar. [= C, F, G, GW; = Asclepias incarnata ssp. incarnata – RAB, K, W, Z; = Asclepias incarnata – S; < Asclepias incarnata – WH]

**Asclepias lanceolata** Walter, Few-flower Milkweed. Swamps, fresh to slightly brackish marshes, wet pine savannas. June-August; August-September. NJ south to s. FL, west to e. TX. [= RAB, C, GW, K, S, WH, Z; > Asclepias lanceolata var. lanceolata – F, G; > Asclepias lanceolata var. paupercula (Michaux) Fernald – F, G]

**Asclepias longifolia** Michaux, Longleaf Milkweed, Savanna Milkweed. Wet pine savannas. May-June; June-July. DE (formerly) south to s. FL, west to e. TX. *A. longifolia* and *A. hirtella* are closely related; the two taxa have sometimes been treated as distinct only at the rank of subspecies (see synonymy) or as “very distinct varieties” (Turner 2009). [= RAB, C, F, GW, K, WH, Z; = Acerates longifolia (Michaux) Elliott – G; ? Acerates floridana (Lamarck) A.S. Hitchcock – S; = Asclepias longifolia var. longifolia – Y; = Asclepias longifolia ssp. longifolia – X]

**Asclepias michauxii** Decaisne, Michaux's Milkweed. Pine savannas. May. S. SC south to peninsular FL, west to e. LA. [= RAB, K, S, WH, Z]

**Asclepias obovata** Elliott, Pineland Milkweed. Sandhills. June-September. Se. SC south to Panhandle FL, west to AR and TX. [= RAB, K, S, WH, Z]

**Asclepias pedicellata** Walter, Stalked Milkweed, Savanna Milkweed. Dry pine savannas. July-August. Se. NC south to s. FL and Panhandle FL. This species generally occurs in small populations of widely scattered individuals; populations of more than 50 individuals are rare. [= RAB, GW, K, WH, Z; = Podostigma pedicellata (Walter) Vail – S]

**Asclepias perennis** Walter, Smoothseed Milkweed, Swampforest Milkweed. Swamp forests. June-August; August-September. E. SC south to c. peninsular FL, west to e. TX, north in the interior to s. IN and s. IL. [= RAB, C, F, GW, K, S, WH, Z] [Asclepias perennis (Michaux) Elliott – G; ? Acerates floridana (Lamarck) A.S. Hitchcock – S; = Asclepias longifolia var. longifolia – Y; = Asclepias longifolia ssp. longifolia – X]

**Asclepias rubra** Linnaeus, Purple Milkweed. Openings in moist bottomlands and swamp forests, perhaps mostly on soils derived from mafic or calcareous rocks. June. NH and s. ON west to WI, IA, and KS, south to NC, nw. TN (Chester, Wofford, & Kral 1997), KY, AR, and OK. [= RAB, C, F, G, K, S, WH, Z]

**Asclepias quadrijolia** Jacquin, Fourleaf Milkweed. Moist to dryish forests and forest margins, most common on mafic and calcareous substrates; common (rare in DE). May-June; August-September. NH and NY west to IN, south to NC, n. GA, n. AL, and e. TN; also from w. IL west to MO, south to AR and OK. [= RAB, C, F, G, K, S, WH, Z]

**Asclepias rubra** Linnaeus, Purple Savanna Milkweed, “Red Milkweed.” Pocosin ecotones, wet pine savannas, sandhill seeps, seepage swamps. June-July; September. Se. NY (Long Island), se. PA, and NJ south to wc. GA and w. Panhandle FL, west to e. TX. *A. laurifolia* is alleged to differ in sessile, cordate-clasping leaf bases (vs. petioled and rounded), and other
Asclepias syriaca Linnaeus, Common Milkweed. Pastures, roadsidess, disturbed areas. June-August; July-September. NB and ME west to s. MB and ND, south to SC, GA, c. TN (Chester, Wofford, & Kral 1997), AR, OK, and KS. This species is apparently expanding its range southward; see Wyatt et al. (1993) and Wyatt (1996) for discussion. [= RAB, C, K, S, W, Z; > Asclepias syriaca var. syriaca – F, G]


Asclepias viridis Walter, Green Antelope-horn. Prairies, dry woodlands, calcareous hammocks. S. SC south to s. FL, west to TX; and from OH, w. WV, and KY west to NE, south to se. TN, c. TN (Chester, Wofford, & Kral 1997), nw. GA, c. AL, c. MS, AR, TX, and OK. [= K, WH, Z; = Asclepiadorea viridis (Walter) A. Gray – S]


Catharanthus G. Don 1836 (Rosy-periwinkle)

A genus of about 8 species, herbs, 7 endemic to Madagascar and 1 endemic to India. References: van Bergen (1996)=Z; Snoeijer (1996). *

* Catharanthus roseus (Linnaeus) G. Don, Rosy-periwinkle, Madagascar Periwinkle, Cayenne Jasmine. Disturbed areas, persistent after cultivation or as a waif or "throwout" after cultivation; native of Madagascar, now a pantropical weed. May-October. C. roseus is the source of a powerful anti-leukemia drug. [= K, S, WH, Z; = Vinca rosea Linnaeus – RAB]
**Cynanchum** Linnaeus 1753 (Swallow-wort)

A genus of about 400 species, vines and lianas, primarily of tropical and warm temperate portions of the New World and Old World. *Ampelamus* was retained as a genus by Liede (1997a), but later results suggest that it is not distinct from some other portions of *Cynanchum* (Liede & Tauber 2002). However, *Cynanchum* itself is strongly polyphyletic and will be broken up; further taxonomic and nomenclatural changes are likely. *C. laeve* will probably remain in *Cynanchum* s.s. (which is primarily Old World in distribution), while *C. scoparium* will likely shift to *Orthosia*. References: Liede (1997b); Liede & Meve (1997); Liede (1997a); Krings (2001)=Z; Liede & Tauber (2002).

1. Leaves oblong or ovate.
2. Leaves broadly cordate, deeply cordate at base; corona of 5 erect, petaloid segments, each divided into 2 slender lobes...............*C. laeve*
3. Leaves oblong or obovate, rounded or subcordate at base; corona a fleshy, lobed cup ..................*C. louiseae*

1. Leaves linear.
2. Calyx lobes lanceolate, acute, (1.3-) 1.5-2.5 mm long; leaves sessile, reflexed, persistent; follicle 6-7 mm in diameter; [of se. NC and south]..........................[see *Seutera angustifolia]*
3. Calyx lobes deltoid, obtuse, ca. 1 mm long; leaves petiolate, not reflexed, often caducous; follicle 1-3 mm in diameter; [of se. SC and south]..........................*C. scoparium*


* Cynanchum louiseae Teijsm. & Binn. Black Swallow-wort. Disturbed areas; native of Mediterranean Europe. Reported for many states in ne. United States, south to MD, KY, TN. [= K; = *Vincetoxicum nigrum* (Linnaeus) Moench – C; = *Cynanchum nigrum* (Linnaeus) Persoon – F, G]

**Cynanchum scoparium** Nuttall, Leafless Swallow-wort. Coastal hammocks. Se. SC south to s. FL, west to s. MS. Liede (1997b) indicates that this species will likely be transferred to *Orthosia* DeCandolle in de Candolle, a large group primarily of the Caribbean, Central America and n. South America, but she refrain from the new combination pending further studies. [= RAB, K, WH; = *Amphistelma scoparia* (Nuttall) Small – S; *Orthosia sp.*]

**Gonolobus** Michaux 1803 (Anglepod)


1. Upper surface of corolla lobes uniformly colored, olive green on anthesis, glabrous; laminar dorsal anther appendage yellow, apex rounded or truncate; [of c. KY, e. TN, nw. AL westward] ..........................................................*[G. suberosus var. granulatus]*
2. Upper surface of corolla lobes multi-colored, generally dark maroon to brownish near the base and green to yellowish near the tips on anthesis (or uniformly yellowish-green to neon green in rare mutants), pubescent or glabrous; laminar dorsal anther appendage darkly purplish or maroonish tinted, apex bilobed to emarginate; [of se. VA south to c. peninsular FL, west to s. MS and inland to nw. GA] ...............


**Gonolobus suberosus** (Linnaeus) R. Brown var. *suberosus*, Eastern Anglepod. Mesic to wet forests and thickets. June-August; September-November. Se. VA south to s. peninsular FL, west to s. MS, inland to nw. GA and c. KY. Rosatti (1989) and Drapalik (1969) have expressed considerable doubt about whether two species should be recognized; their view, supporting the recognition of a single species in our area, is followed here for now. However, studies by Krings & Xiang (2004, 2005) suggest that 2 entities should be circumscribed at the varietal level. Drapalik (1969) considered the basionym "suberosa" as not applicable to *Matelea* of North America; Reveal & Barrie (1992) lectotypified the name, resulting in it applying to our material. It has priority over "gonocarpus." [= U, V; > *Matelea gonocarpa* (Walter) Shinners – RAB, C, W; > *Matelea suberosa* (Linnaeus) Shinners – RAB, C, W; > *Gonolobus gonocarpus* (Walter) Perry – F, G; > *Gonolobus suberosus* (Linnaeus) R. Brown – F, Y; < *Matelea gonocarpos* (Walter) Shinners – K, WH; < *Vincetoxicum gonocarpos* Walter – S; > *Vincetoxicum suberosum* (Linnaeus) Britton – S; = *Matelea gonocarpa* – X; = *Gonolobus gonocarpus* – Z]

**Ampelamus** – S; > *Vincetoxicum suberosum* (Linnaeus) Britton – S; = *Matelea gonocarpa* – X; = *Gonolobus gonocarpus* – Z]
Matelea Aublet 1775 (Spinypod)

A genus of about 180 species, vines, primarily tropical and restricted to the New World. References: Drapalik (1969)=Z.

1 Plant a prostrate herb, usually not twining, with stems 0.2-0.6 (-1.1) m long at maturity; leaf blades 2-4 (-6) cm long; cymes sessile; flowers (2-) 3-4 (-5) per inflorescence; upper (inner) surface of the petals pubescent; [of xeric sandhills, from e. GA southward] .................. M. pubiflora

2 Inflorescence with 1-12 flowers, averaging 4-5; corolla light green, reticulated with darker green; corona disc-shaped, lacking 5 pairs of appendages; [of mesic slopes of s. GA southward and westward] .................................................................................. M. alabamensis

3 [collectively widespread].

4 Corolla lobes in a horizontal plane or slightly reflexed; flower buds ovoid, < 1.5× as long as wide; corolla lobes 1.5-2.6× as long as wide.

5 Corolla dark maroon (rarely maroon-yellow or yellow), not reticulated with darker veins; paired corona appendages always higher than the alternating corona lobes .................................................. M. carolinensis

6 Corolla green, green-yellow, or yellow (rarely rosy or olive-maroon), reticulated with darker green veins; paired corona appendages about as high as the alternating corona lobes .................................................................................. M. floridana

7 Corolla lobes 2.4-3.6 (-4.0)× as long as wide, the widest part above the sinus; corolla dark maroon.......................... M. decipiens

8 Corolla lobes (3.2-) 4.0-6.2× as long as wide, the widest part at the sinus; corolla rose to light maroon (rarely dark maroon, green, or cream) ................................................................................................................. M. obliqua


Matelea baldwyniana (Sweet) Woodson, White Spinypod. Dry to mesic bluffs over calcareous rocks. Panhandle FL and sw. GA west to MO, AR, and OK. Drapalik (1969) discusses the probability that the name M. baldwyniana is based on material of M. floridana. [= K, WH, Z; = Odontostephana baldwyniana (Sweet) Alexander – S]

Matelea carolinensis (Jacquin) Woodson, Carolina Spinypod. Moist to dry, nutrient-rich forests. April-June; July-October. DE, MD, KY, and s. MO south to GA and MS. [= RAB, C, K, W; = Gonolobus carolinensis (Jacquin) R. Brown ex J.A. Schultes – F, G; = Odontostephana carolinensis (Jacquin) Alexander – S]

Matelea decipiens (Alexander) Woodson, Deceptive Spinypod. Woodlands and thickets, generally over mafic (in the Piedmont) or calcareous rocks (in the Coastal Plain). April-June; August-October. VA south to nc. GA, AL, and e. TX, north in the interior to s. IL and MO. [= RAB, C, K; = Gonolobus decipiens (Alexander) Perry – F, G; = Odontostephana decipiens Alexander – S]

Matelea flavidula (Chapman) Woodson, Yellow Spinypod. Moist, nutrient-rich forests. May-June; August-October. E. NC (?) and e. SC south to Panhandle FL, apparently rare throughout its range. [= RAB, K, WH, Z; = Odontostephana flavidula (Chapman) Alexander – S]


Matelea obliqua (Jacquin) Woodson, Northern Spinypod, Limeroak Milkvine. In forests, woodlands, or thickets over calcareous rocks. June-July; August-November. PA west to OH, IN, and MO, south to w. NC, nw. GA (Jones & Coile 1988), and TN. [= RAB, C, K, W; = Gonolobus obliquus (Jacquin) R. Brown ex J.A. Schultes – G; > G. obliquus – F; > G. shortii A. Gray – F; > Odontostephana obliqua (Jacquin) Alexander – S; > O. shortii (A. Gray) Alexander – S; = Matelea carolinensis – WV, misapplied]


Nerium Linnaeus 1753 (Oleander)
A monotypic genus, a shrub, of Mediterranean Europe.

* **Nerium oleander** Linnaeus, Oleander. Frequently cultivated, especially on barrier islands (because of its salt resistance), sometimes persistent; native of Mediterranean Europe. [= K, S, WH]

**Periploca** Linnaeus 1753 (Silkvine)

* **Periploca graeca** Linnaeus, Silkvine. Disturbed areas; native of Mediterranean Europe. July-August. Sometimes cultivated and escaped or persistent; it is reported for various states in e. North America, as in Knox County, TN (Chester, Wofford, & Kral 1997). [= RAB, C, K]

**Seutera** Reichenbach 1828 (Swallow-wort)


* **Seutera angustifolia** (Persoon) Fishbein & W.D. Stevens, Swallow-wort. Coastal hammocks, edges of marshes, generally or always on barrier islands. June-July; July-October. E. NC (Dare County) south to s. FL, west to TX; Bahamas and West Indies. See Krings (2005) for a discussion of typification. [= Y; = Cynanchum angustifolium Persoon – GW, K, WH; = C. palustre (Pursh) Heller – RAB; = Lyonia palustris (Pursh) Small – S; = Funastrum angustifolium (Persoon) Liede & Meve – Z]

**Trachelospermum** Lemaire 1851 (Climbing Dogbane)

A genus of about 20 species, vines, of se. Asia (India to Japan), except the single species of se. United States.

**Identification notes:** Trachelospermum difforme is sometimes mistaken at a glance for Gelsemium (both woody vines with opposite lanceolate leaves), but in the field the milky sap of Trachelospermum provides an immediate identifying characteristic.

1 Corolla lobes 3-4 mm long, acute, reflexed, pale yellow; leaves subcoriaceous; [native, common] .................................................... T. difforme
1 Corolla lobes 8-12 mm long, rounded, spreading, white; leaves coriaceous; [alien, commonly planted, rarely persistent or spreading] ............ T. jasminoides

**Trachelospermum difforme** (Walter) A. Gray, Climbing Dogbane. Bottomlands, swamp forests, marshes. May-July; July-September. DE south to n. peninsular FL, west to e. TX, north in the interior to MO and IN. See Krings (2003) for a discussion of nomenclature. [= RAB, C, F, G, GW, K, S, WH]

* **Trachelospermum jasminoides** (Lindley) Lemaire, Confederate Jasmine, Star Jasmine. Disturbed areas; native of se. Asia. April-May. Cultivated and sometimes persistent or spreading. Also reported for e. LA and to be expected along the Gulf coast in AL and MS. [= K, WH]

**Vinca** Linnaeus 1753 (Vinca, Periwinkle)


1 Leaves ovate, broadest near the base, cordate or subcordate-rounded at the base, 2-4 cm wide, thin in texture and deciduous to semi-evergreen; leaf margins ciliate; flowers 3-5 cm across.............................................................. V. major
1 Leaves lanceolate or elliptic, broadest near the middle, rounded to cuneate at the base, 1-1.5 cm wide, thick in texture and evergreen; leaf margins not ciliate; flowers 2-3 cm across.............................................................. V. minor

* **Vinca major** Linnaeus, Greater Periwinkle. Disturbed areas, suburban woodlands, around old house sites, persistent and spreading from cultivation; native of Europe. Late February-May; June-July. [= RAB, C, F, G, K, S, W]
APOCYNACEAE

* Vinca minor * Linnaeus, Common Periwinkle, Myrtle. Disturbed areas, around old house sites and especially old cemeteries, persistent and spreading from cultivation; native of Europe. April-May; June-July. [= RAB, C, F, G, K, S, W, WH, WV]

356. BORAGINACEAE A.L. de Jussieu 1789 (Borage Family) [order assignment uncertain]

A family of about 155 genera and ca. 3200 species, herbs, shrubs, and trees, nearly cosmopolitan (Al-Shehbaz 1991).


1 Leaves dissected, lobed, or toothed (sometimes the basalmost leaves simple); style fused for a portion of its length, 2-cleft toward the tip; ovary with 1 locule; [subfamily Hydrophilioideae].
2 Flowers solitary opposite the leaves on the upper portion of the stem (sometimes also terminal in a lax, (1-) 2-6-flowered cyme).
3 Flowers opposite below, alternate above; petals 5-8 mm long; leaves elliptical in outline, pinnatifid into 7-13 lanceolate segments; calyx lobes to 10 mm long in fruit; capsule 4-seeded ............................................................................................ 16. Ellisia
4 Flowers all terminal in 3-many-flowered cymes.
5 Styles absent (the stigma sessile and terminal), single, or with 2 branches.
6 Flowers in axillary cymes; capsule subglobose; leaves 2-12 cm long ................................................... 17. Nemophila
7 Ovary deeply 4-parted; style gynobasic; [subfamily Boragineae]
8 Ovary slightly 2-4-lobed, or not at all lobed; style terminal or reduced to a sessile terminal stigma; [subfamily Heliotropioideae]......
9 Mericarps spreading or divergent, attached to the gynobase on the upper third of the mericarp; [tribe Cynoglossae]..................
10 Fruiting pedicels deflexed; plant perennial or biennial .................................................................................. 2. Hackelia
11 Corolla pink to blue (rarely white), 18-25 mm long; leaves elliptic or ovate; [plant a native, of moist, nutrient-rich habitats, and sometimes grown as an ornamental] ............................................................................................ 6. Borago
12 Corolla lobes distinctly unequal, pink to blue.
13 Stamens unequal in length, the longer conspicuously exserted ........................................................................... 8. Echium
14 Plant a scrambling climber with retrorsely prickly-hispid stems ........................................................................ 20. Asperugo
15 Corolla yellow, the tube 4-5 mm long; corolla throat lacking appendages............................................................. 4. Amsinckia
16 Corolla white (with a yellow eye), or pink to blue, the tube 6-20 mm long; corolla throat with appendages.
17 Corolla pink to blue (rarely white), 18-25 mm long; leaves elliptic or ovate; [plant a native, of moist, nutrient-rich habitats, and sometimes grown as an ornamental] ........................................................................... 10. Mertensia
18 Corolla white with a yellow eye; leaves linear; [plant a rare alien, of disturbed habitats] .................. 13. Plagiobothrys
19 Mericarps smooth, rugose, or pitted, lacking glocidiate prickles.
20 Mericarps attached laterally to a flat or broadly convex gynobase.
21 Mericarps compressed laterally, with an evident raised margin .............................................................. 11. Myosotis
22 Mericarps neither laterally compressed nor with an evident thickened margin.
23 Mericarps with a prominent, toothed, basal rim ................................................................. 14. Symphytum
24 Mericarps lacking a prominent, toothed, basal rim.
25 Corolla lobes erect or slightly spreading, acute to acuminate; style exerted.......................... 12. Onosmodium
26 Corolla lobes spreading, rounded; style included.
BORAGINACEAE

21 Corolla whitish or bluish white; plant annual from a slender taproot; leaves without evident lateral veins; 
mericarps brown, dull, wrinkled and pitted; [plant a weedy alien] ................................. 7. Buglossoides
21 Corolla bright yellow-orange, or greenish-white; plant perennial from a thickened, woody rhizome; 
mericarps white, shining, smooth or pitted; [plant a native] .............................................. 9. Lithospermum

1. Cynoglossum Linnaeus (Comfrey)

1 Flowering stem with leaves above the first inflorescence branch; corolla reddish-purple; [plant a biennial alien, weedy] .......... C. officinale
1 Flowering stem leafless above the first branch; corolla blue or white; [plant a perennial native, not weedy] 
2 Nutlets 3.5-5 mm; calyx at anthesis 2-2.5 mm long; corolla 6-8 mm wide, the lobes oblong and not overlapping ........................ [C. virginianum var. boreale]
2 Nutlets 5.5-9 mm; calyx at anthesis (3.0-) 3.5-4.5 mm long; corolla (8-) 10-12 mm wide, the lobes broadly rounded and more or less 

* Cynoglossum officinale Linnaeus, Garden Comfrey, Hound's-tongue. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE): disturbed areas, roadsides, pastures, calcareous shale barrens; common (uncommon in DE and WV, rare in NC), native of 


Cynoglossum virginianum Linnaeus var. boreale (Fernald) Cooperrider, Northern Hound's-tongue, ranges from NB west to BC, south to 
CT, NY, c. PA, n. OH, MI, and MN. Cooperrider (1995) prefers varietal status for this taxon, stating that in OH there are numerous 
intermediates, while Voss (1996) and Rhoads & Klein (1993) maintain C. boreale at the species level. [= C, K; = C. boreale – F, G, Z; = C. virginianum ssp. boreale (Fernald) A. Haines – Y]

2. Hackelia Opiz (Stickseed)


3. Lappula Moench (Sheepbur)

1 Nutlets with 1 row of marginal prickles...................................................................... L. occidentalis var. occidentalis
1 Nutlets with 2-3 rows of marginal prickles....................................................... L. squarrosa

* Lappula occidentalis (S. Watson) Greene var. occidentalis. Cp (SC): waste areas near wool-combing mill; rare, perhaps 
only a waif, native of w. North America. April-June. [= K; = L. redowskii var. redowskii – C, Z; = L. redowskii (Hornemann) Greene var. 
occidentalis (S. Watson) Rydberg – F, G] 
* Lappula squarrosa (Retzius) Dumortier. Mt (WV): disturbed areas; rare, native of Europe. May-September. Introduced 
south to MD, WV, KY, and TN. [= C, Z; = L. echinata Gilibert – F, G, WV; = L. lappula (Linnaeus) Karst. – S]

4. Amsinckia Lehmann (Fiddleneck)

* Amsinckia menziesii (Lehmann) A. Nelson & Macbride. Pd (NC), Cp (SC): disturbed areas, waste areas near wool-
combing mill; rare, native of w. United States. May-September. [= Z; <$> A. hispida (Ruiz & Pavón) I.M. Johnston – RAB, 
misidentification; <$> A. menziesii var. menziesii – K; <$> A. parviflora Heller – S, misidentification; <$> Amsinckia lycopsoides Lehmann, 
misidentification]

5. Anchusa Linnaeus (Bugloss, Alkanet)
**BORAGINACEAE**

* Anchusa arvensis (Linnaeus) M. Bieberstein, Small Bugloss, Alkanet. Pd (NC, VA), Mt (WV): disturbed areas, rare, native of Europe. [= C, K; = Lycoptis arvensis Linnaeus – F, G, S]

6. *Borago* Linnaeus (Borage)


* Borago officinalis Linnaeus, Borage. Pd (VA), Mt (WV): disturbed areas; rare, native of s. Europe. [= C, F, G, K, Z]

7. *Buglossoides* Moench (Corn-gromwell)

A genus of about 7 species, herbs or shrubs, of temperate Eurasia. References: Al-Shehbaz (1991) = Z.


8. *Echium* Linnaeus (Viper's-bugloss, Blueweed)

A genus of about 60 species, herbs, widespread in the Old World. The common name is pronounced "bew-gloss," not "bug-loss," as it refers to an ox's tongue rather than to the departure of insects. References: Al-Shehbaz (1991) = Z.

1 Hairs of the stem pstural-based ........................................................................................................................................................ [E. pustulatum]
1 Hairs of the stem not pstural-based ............................................................................................................................................. E. vulgare


* Echium pustulatum* Sibthorp & Smith, Blue-devil, is reported by F for "N.J. to W.Va.," and by G and K as south to VA. It differs in having pustular-based hairs on the foliage. [= K; = E. vulgare var. pustulatum (Sibthorp & Smith) Coincy – F, G, < E. vulgare – Z]

9. *Lithospermum* Linnaeus (Gromwell, Puccoon, Stoneseed)


1 Corolla white or yellowish-white, the tube 4-8 mm long.
2 Plant with basal rosette; lower cauline leaves about equal in size to the upper cauline leaves; leaves acute to obtuse ................. *L. tuberosum*
2 Plant lacking basal rosette; lower cauline leaves smaller than the upper cauline leaves; leaves acuminate or acute.
3 Upper stem internodes mostly 1-2 cm long; leaves mostly <2 cm wide, acute ........................................................................... [L. officinale]
3 Upper stem internodes mostly 3-6 cm long; leaves mostly >2 cm wide, acuminate ................................................................. [L. incisum]
1 Corolla tube 7-30 mm long; [mostly of rocky or clayey circumneutral soils of the Piedmont and Mountains] ......................... [L. canescens]
6 Pubescence with slender bases; mature lobes flat; plants with 15-25 well-developed leaves below the inflorescence; [of sandy Coastal Plain habitats from se. VA southward] .............................................................. *L. carolinense*
6 Pubescence with pustular bases; mature lobes strongly keeled; plants with (30-) 35-45 well-developed leaves below the inflorescence; [inland, known from west and north of our area] ................................................................. [L. crocium]

*Lithospermum canescens* (Michaux) Lehmann, Hoary Puccoon, Indian-paint. Pd (NC, SC, VA), Mt (GA, VA, WV), Cp? (VA): dry woodlands and glades over calcareous rocks (such as limestone, dolostone), mafic rocks (such as diabase); uncommon (rare in NC). April-May. ON west to SK, south to c. NC, nw. GA, AL, and TX. [= RAB, C, F, G, K, W, WV, Y, Z; = Batschia canescens Michaux – S]

*Lithospermum carolinense* (Walter ex J.F. Gmelin) MacMillan, Coastal Plain Puccoon. Cp (FL, GA, SC, VA): sandhills, dry sandy soils; common (rare north of s. SC). April-June. A Southeastern Coastal Plain endemic: se. SC south to Panhandle FL, and west to TX. The disjunction from SC to se. VA, skipping over large amounts of apparently suitable sandhill habitat in
BORAGINACEAE

NC, is surprising. The sibling taxa *L. caroliniense* and *L. croceum* have been variously treated as distinct species, subspecies, or varieties, or as mere forms (see synonymy). They appear to be as clearly separable as *L. caroliniense* is from *L. canescens*; I regard them as allopatic species. [= F; < *L. caroliniense* – RAB, G, WH, Z; = *L. caroliniense var. caroliniense* – C, K; = *Batschia caroliniensis* Walter ex J.F. Gmelin – S; = *L. caroliniense ssp. caroliniense* – Y]

**Lithospermum incisum** Lehmann, Narrowleaf Gromwell. Cp (FL): disturbed areas; rare. April-July. S. ON west to BC, south to IN, LA, TX, and CA; disjunct from FL Panhandle south to c. peninsular FL. [= F, C, G, K, WH; = *Batschia linearifolia* (Goldie) Small – S]


**Lithospermum croceum** Fernald. ON west to MT, south to w. PA, n. OH, AR, OK, and CO. Reports by Kartesz (1999) for WV, KY, and TN have not been verified. [= F; = *L. caroliniense* (Walter ex J.F. Gmelin) MacMillan var. croceum (Fernald) Cronquist – C, K; < *L. caroliniense* – G, Z; = *L. caroliniense ssp. croceum* A.W. Cusick – Y]


10. Mertensia Roth (Bluebell)


11. *Myosotis* Linnaeus (Forget-me-not, Scorpion-grass)

A genus of about 100 species, temperate and montane tropical. References: Al-Shehbaz (1991)=Z. Key based closely on RAB and C.

1 Calyx strigose, the hairs neither spreading nor uncinate; [mostly of moist to wet habitats].
2 Corolla limb 2-5 mm wide; mericarps distinctly surpassing the style................................................................. *M. laxa* ssp. laxa
2 Corolla limb 5-10 mm wide; mericarps not surpassing the style................................................................................................................. *M. scorpionoides*
1 Calyx with some loose or spreading, uncinate hairs; [of various habitats, mostly dry].
3 Corolla limb 5-8 mm wide; perennial................................................................. *M. sylvatica*
3 Corolla limb 1-4 mm wide; annual or biennial.
4 Calyx lobes unequal, 3 lobes shorter than the other 2; corolla white; [native, of dry or moist habitats].
5 Fruiting pedicels divergent; fruiting calyx deciduous, 3-10 mm long; inflorescence internodes usually longer than 10 mm; mericarps 1.4-2.2 mm long .................................................................................................................................................................................. *M. macrocarpa*
5 Fruiting pedicels more-or-less erect; fruiting calyx persistent, 3-5.5 mm long; inflorescence internodes usually shorter than 10 mm; mericarps 1.2-1.5 mm long .................................................................................................................................................................................. *M. verna*
4 Calyx lobes equal, all 5 the same size; corolla blue (occasionally yellow or white); [alien, mostly of dry disturbed habitats].
6 Fruiting pedicels equalizing or generally longer than the calyx .......................................................................................................................................................... *M. arvensis*
6 Fruiting pedicels distinctly shorter than the calyx.
7 Plants floriferous from about the middle upward; style surpassing the mericarps ................................................................................................................. *M. discolor*
7 Plants floriferous nearly to the base; style shorter than the mericarps ................................................................................................................. *M. stricta*


**Myosotis macrocarpa** Engelmann, Bigseed Forget-me-not. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), [DE]: bottomland forests and alluvial fields, probably associated with nutrient-rich soils; uncommon. April-May. MD west to MO, south to FL and TX. [= RAB, C, F, G, GW, K, S, W, WV, Z]
12. *Onosmodium* Linnaeus (Marbleseed, False-gromwell)

A genus of about 7 species (or fewer species and the same number of taxa in some interpretations), perennial herbs, of North America. Recent studies strongly suggest that *Onosmodium* is better included in a broadened *Lithospermum* (Cohen & Davis 2009; Weigend et al. 2009). References: Cohen & Davis (2009); Cochrane (1976)=X; Turner (1995a)=Y; Al-Shehbaz (1991)=Z. Key based in part on X and Y.

1. Corolla lobes yellow to orange; nutlet 2.0-2.8 mm long; corolla lobes either 2.5-4× as long as wide and acuminate (*O. virginianum*) or 1.5-2× as long as wide, acute (*O. decipiens*).
   - Stems hairs 2.5-5.0 mm long; corolla lobes 1.5-2× as long as wide, acute; tips of the anthers reaching the base of the corolla sinuses; endemic to Ketona dolomite glades, Bibb County, c. AL.
   - Stems persistently and obviously pubescent below the inflorescence branches.
   - Upper leaf surface with hairs of similar length, these appressed to ascending; corolla 11-20 mm long; nutlets tapered to the base, longest stem hairs near midstem > 2.3 mm long.
   - Leaf vestiture at least in part of spreading or ascending hairs.

2. Upper leaf surface with hairs of two lengths, these spreading; corolla 6-10 mm long; nutlets flared at the base, forming a collar; longest stem hairs near midstem > 2.3 mm long.
   - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).  
   - Stems mostly glabrous below the inflorescence branches.
   - Leaf at least in part of spreading or ascending hairs.

3. Leaf at least in part of spreading or ascending hairs.
   - Neutral soils derived from mafic rocks (Piedmont).
   - Stems lacking a collar; longest stem hairs near midstem < 2.2 mm long.
   - Stems persistently and obviously pubescent below the inflorescence branches.

4. Corolla lobes dull greenish-white; nutlet 2.5-3.0 mm long; corolla lobes 1.5-2× as long as wide, acute.
   - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).
   - Corolla 11-20 mm long; nutlets tapered to the base, longest stem hairs near midstem < 2.2 mm long.

5. Corolla lobes 1.5-2× as long as wide, acute.
   - Leaf at least in part of spreading or ascending hairs.
   - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).

6. Corolla lobes 1.5-2× as long as wide, acute.
   - Leaf at least in part of spreading or ascending hairs.
   - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).

7. Corolla lobes 1.5-2× as long as wide, acute.
   - Leaf at least in part of spreading or ascending hairs.
   - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).

8. Corolla lobes 1.5-2× as long as wide, acute.
   - Leaf at least in part of spreading or ascending hairs.
   - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).

9. Corolla lobes 1.5-2× as long as wide, acute.
   - Leaf at least in part of spreading or ascending hairs.
   - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).

10. Corolla lobes 1.5-2× as long as wide, acute.
    - Leaf at least in part of spreading or ascending hairs.
    - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).

11. Corolla lobes 1.5-2× as long as wide, acute.
    - Leaf at least in part of spreading or ascending hairs.
    - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).

12. Corolla lobes 1.5-2× as long as wide, acute.
    - Leaf at least in part of spreading or ascending hairs.
    - Leaf vestiture solely of dense appressed hairs on both surfaces (the plant appearing ashy-white).

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13. **Plagiobothrys** Fischer & C.A. Meyer (Popcorn-flower)


14. **Symphytum** Linnaeus (Comfrey)


1 Upper leaves not decurrent, or decurrent < 1 cm below the leaf attachment; pubescence of stem in part of strong, recurved prickles (resembling miniature rose thorns) .................................................................[S. asperum]

1 Upper leaves decurrent on the stem; pubescence of the stem not of prickles .................................................................S. officinale

*Symphytum officinale* Linnaeus, Common Comfrey. Mt (GA, VA, WV), Pd (DE, VA), Cp (DE): disturbed areas; uncommon, native of Europe. *Symphytum* is a traditional "medicinal herb," but recent evidence suggests that it can cause dangerous (even fatal) liver damage. [= C, F, G, K, S, WV, Z]

*Symphytum asperum* Lepechin, Prickly Comfrey, another Eurasian species, is reported by F as occurring south to MD. It may occur in our area. [= C, F, G, K, Z]

15. **Nama** Linnaeus 1753 (Fiddleleaf)

A genus of about 45 species, herbs, of sw. North America, tropical America, and Hawaii. [also see *Hydrolea* in HYDROLEACEAE]

*Nama jamaicense* Linnaeus, Jamaica Weed. Cp (FL, SC): lawns; rare, native of tropical America (including s. FL and TX). May. [= K; = N. jamaicensis – RAB, WH, orthographic variant; = Marilaunidium jamaicense (Linnaeus) Kuntze – S]

16. **Ellisia** Linnaeus 1763 (Waterpod)

*Ellisia* is considered to be a monotypic genus, an herb of c. and e. North America, but generic limits in the Hydrophyllaceae are badly in need of critical reassessment. References: Constance (1940)=Z.

**Ellisia nyctelea** (Linnaeus) Linnaeus, Waterpod, Aunt Lucy. Pd (VA), Mt (VA, WV): moist shaded forests, especially bottomlands; uncommon (rare in WV). April-July. IN and MI west to AR, south to AR and OK; disjunct in e. North America from s. NY and NJ south to sc. VA. Likely to occur in nc. NC. [= C, F, G, KW, K, W, WV, Z; = Nyctelea nyctelea (Linnaeus) Britton – S]

17. **Nemophila** Nuttall 1822 (Baby Blue-eyes)


**Identification notes**: *Nemophila* is superficially similar to *Phacelia covillei* and *P. ranunculacea*, with which it often co-occurs. They can be distinguished with the following key.

1 Flowers solitary, on pedicels opposite the leaves, the pedicels mostly > 12 mm long; corolla white (sometimes aging to pale lavender), 2.5-3.5 mm long; fruits ovoid, longer than thick, turning purple at maturity, exceeding the 2-4 mm long calyx lobes .............. *Nemophila aphylla*

1 Flowers borne in 2-6-flowered terminal cymes, the pedicels mostly < 12 mm long; corolla pale blue or lavender, 4-5 mm long; fruits depressed globose and weakly 4-lobed, the apex depressed, remaining green at maturity, shorter than the calyx, the lobes of which expand to 5-8 mm long.

2 Pubescence of the middle stem (from 2nd to 5th node from the base) consisting of appressed to ascending, stiff, pointed hairs, sometimes also with a few gland-tipped hairs < 2 mm long; terminal leaflet of leaves directly subtending an inflorescence with acute to cuneate bases; [of rivers in the Atlantic drainage, very rarely disjunct west of the Appalachians] .......................................................... *Phacelia covillei*

2 Pubescence of the middle stem spreading or even retrorse, most of the hairs weak and twisted, and many of them glandular-tipped and > 2 mm long; terminal leaflet of leaves directly subtending an inflorescence with obtuse to rounded or truncate bases; [of rivers in the Mississippi drainage] .............................................................................................................. *Phacelia ranunculacea*

*Nemophila aphylla* (Linnaeus) Brummitt. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): moist, nutrient-rich floodplain forests; uncommon, though often locally abundant (rare in FL). March-April. MD south to Panhandle FL and west to
BORAGINACEAE

TX, north in the interior to e. TN, w. KY, and se. MO. [= GW, K; = N. microcalyx (Nuttall) Fischer & Meyer – RAB, F, G, S; = N. triloba (Rafinesque) Thieret – C]

18. Hydrophyllum Linnaeus 1753 (Waterleaf)

A genus of 8 species, herbs, of e. and w. North America. References: Constance (1942)=Z; Beckmann (1979)=Y; Alexander (1941)=X.

1 Principal cauline leaves palmately lobed, maple-like, differing from the pinnately divided basal leaves.
2 Sepals with small reflexed appendages exerted at each sinus of the calyx; plant biennial from a taproot; stamens exerted 1-3 mm beyond the corolla; leaf lobing relatively shallow and irregular .......................................................... H. appendiculatum
3 Sepals with appendages absent or rudimentary; plant perennial from fibrous roots; stamens exerted 3-6 mm beyond the corolla; leaf lobing relatively deep and regular .......................................................... H. canadense
4 Corolla deep purple to maroon; lower stem glabrous to slightly (rarely moderately) pubescent with retrorse hairs; [of low to high elevations in the Mountains] .................................................................................................................................................. H. virginianum var. atranthum
5 Corolla white to lavender or pale purple; lower stem slightly to densely pubescent with retrorse to spreading hairs; [of low elevations of the Piedmont, Mountains, and Coastal Plain] ........................................................................................................................................ H. virginianum var. virginianum

Hydrophyllum appendiculatum Michaux, Biennial Waterleaf. Mt (WV): rich forests; rare. May-June. S. ON and MN, south to sw. PA, a. and sc. WV, e. TN, n. AL (Jackson Co.), MO, and e. KS. It was attributed to NC by Small (1933) on unknown grounds. [= C, F, G, K, WV, Y, Z; = Decemium appendiculatum (Michaux) Small – S]

Hydrophyllum canadense Linnaeus, Mapleleaf Waterleaf, Canada Waterleaf, Broadleaf Waterleaf. Mt (GA, NC, SC, VA, WV), Pd (NC, VA), Cp (VA): cove forests, rocky streambanks, other moist and nutrient-rich forests; common (rare in VA Coastal Plain, rare in NC Piedmont, rare in sc. NC Mountains). May-August; August-September. VT and s. ON west to MI and WI, south to n. GA, AL, AR, and MO. [= RAB, C, F, G, K, S, W, WV, Y, Z]


Hydrophyllum virginianum Linnaeus var. atranthum (E.J. Alexander) Constance, Appalachian Waterleaf. Mt (NC, VA): cove forests and other moist rocky forests; common (uncommon in WV). May-June; July-August. N. WV south through w. and sw. VA and e. KY to w. NC and e. TN. Since its naming as a species (Alexander 1941) and subsequent reduction to a variety (Constance 1942) there has been little consensus about this taxon, some regarding it as merely a color form. Alexander lists numerous characters additional to that of flower color; they need further investigation. "H. atranthum differs from H. virginianum in the dark-violet flowers, the brown hairs on the appendages, brown filaments, corolla-lobes longer than the tube, stamens shorter [11.5 mm] and more slender, and the more numerous leaf-lobes. H. virginianum has flowers white to pale lavender or pinkish, white hairs on the appendages, white filaments, corolla-lobes and tube equal in length, filaments longer (13.5 mm) and stouter, and 5-7 leaf-segments." Beckmann (1979) did not accept the variety, stating that "this pigment combination appears sporadically in other sectors of the species range." Based on herbarium material, I have seen darker than usual flowers that are found outside of the Southern Appalachians; they do not, however, approach in darkness the flowers of Southern Appalachians; they incline me to accept it provisionally as a variety. It is not, however, limited to high elevations, as stated or implied by some authors. The two varieties provisionally accepted here need more careful study, including either statistical studies of morphology, or electrophoretic or molecular studies. [= C, F, G, WV, Z; < H. virginianum – RAB, K, W, Y; < H. virginicum – S, orthographic error; = H. atranthum E.J. Alexander – X]

Hydrophyllum virginianum Linnaeus var. virginianum, Eastern Waterleaf, Virginia Waterleaf. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA): cove forests, moist rocky forests, alluvial forests; common (rare in DE Coastal Plain). April-June; July-August. NH and QC west to ND, south to e. VA, c. NC, KY, s. IN, s. IL, nc. AR, and ne. OK. As discussed by Beckmann (1979) and Constance (1941), H. virginianum is a closely related vicariant of H. tenutipes Heller of BC south to CA. See Phacelia bipinnatifida for additional suggestions on distinguishing it from this species. [= C, F, G, WV, Z; < H. virginianum – RAB, K, W, Y; < H. virginicum – S, orthographic error; = H. virginianum – X]

19. Phacelia A.L. de Jussieu 1789 (Phacelia)

Identification notes: 1. Phacelia bipinnatifida and Hydrophyllum virginianum are sometimes confused. P. bipinnatifida has the larger and more basal leaves distinctly bipinnatifid, the lower pinnae often stalked (vs. pinnatifid, the basal or terminal pinnae sometimes 2-lobed, all the pinnae more or less sessile), pubescence of the upper stem and inflorescence in part glandular (pubescence nonglandular), and seeds 4 per capsule, black (vs. 2 per capsule, light brown). 2. Phacelia covillei and P. ranunculacea are superficially similar to and sometimes confused with Nemophila aphylla, which see for discussion.

1 Corolla lobes fimbriate; seeds 4 per capsule.
2 Corolla white (rarely slightly lavender); pubescence of the stem spreading; lobes of cauline leaves mostly obtuse; seeds 3.0-3.5 mm long.................P. fimbriata
3 Corolla lobes entire; seeds 4-15 per capsule.
4 Pubescence of the middle stem (from 2nd to 5th node from the base) consisting of appressed to ascending, stiff, pointed hairs, sometimes also with a few gland-tipped hairs < 2 mm long; terminal leaflet of leaves directly subtending an inflorescence with acute to cuneate bases; [of rivers in the Atlantic drainage, very rarely disjunct west of the Appalachians] ..................................................P. covillei
5 Pubescence of the middle stem spreading or even retrorse, most of the hairs weak and twisted, and many of them glandular-tipped and > 2 mm long; terminal leaflet of leaves directly subtending an inflorescence with obtuse to rounded or truncate bases; [of rivers in the Mississippi drainage] ........................................................................................................................................P. ranunculacea

Phacelia bipinnatifida Michaux, Fernleaf Phacelia, Forest Phacelia. Mt (GA, NC, SC, VA, WV): cove forests, especially where rocky; common (uncommon in VA and WV, rare in SC). April-May; June. WV. WA west to s. OH, n. IN, n. IL, and c. MO, south to w. NC, nw. SC, n. GA, c. AL, and n. AR. P. bipinnatifida var. plummeri (= P. brevistyla) is "based on a variation with sparser pubescence, larger and less divided leaf segments, smaller flowers, and sub-included stamens and style. These variations are not concomitant, and the distribution of forms showing a complete or partial combination of them is sporadic" (Constance 1949). The matter deserves additional study. [= RAB, C, G, X; S. Watson ex A. Gray, Eastern Buttercup Phacelia. Pd (NC, VA), Mt? (WV?): rich soils of floodplains, and contiguous terraces and slopes; rare. April; May. Ranging in three disjunct areas – c. NC and sc. VA (in the drainages of the Cape Fear, Tar, and Roanoke rivers), DC, n. VA, and sc. MD (in the drainage of the Potomac River), and disjunct in Texas County, MO. Most recent authors have included this taxon within the closely similar P. ranunculacea; as thus broadly defined, P. ranunculacea was considered to occur in three peculiarly disjunct areas; one centered around St. Louis, MO (w. KY, w. TN, e. MO, ne. AR, se. MO, s. IL, and s. IN), one near Washington, DC (DC, n. VA, and sc. MD), and a third in c. NC and sc. VA. Sewell & Vincent (2006) have clarified the status of P. covillei and P. ranunculacea. Chuang & Constance (1977) felt that P. covillei and P. ranunculacea (sensu stricto) have numerous characteristics that rendered their inclusion in Phacelia uncomfortable (also see discussion in Constance 1949 and Gillett 1968), but Sewell & Vincent (2006) countered this idea. See Nemophila aphylla for suggestions on distinguishing these two superficially similar species. [= K, X, < P. ranunculacea (Nuttall) Constance – RAB, C, F, G, Z] Phacelia dubia (Linnaeus) Trelease var. dubia. Appalachian Phacelia. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), C (DE, NC, SC, VA): floodplain forests, rocky forests, fields, roadsides, granitic flatrocks; common (rare in DE). April-May; June. var. dubia ranges from NY and PA west to WV, south to nc. SC, sw. NC, and se. TN. The Phacelia dubia complex has been under detailed biosystematic study by Foster Levy and associates (Levy 1991a, 199b, 1997; Levy et al. 1996; Levy & Malone 2001; Levy & Neal 2001; Taylor & Levy 2002; del Castillo 1994, 1998). Male sterile cytotypic variants are common in some populations but formal taxonomic recognition ius not warranted (Levy 1991a, 1991b; del Castillo 1994, 1998). Additionally, an incipient variety, informally termed "imitator", occurs in s. SC (Levy 1991a; Levy & Malone 2001). These populations are morphologically variable, some more similar to var. georgiana, others more similar to var. dubia; see Levy (1991a) for further discussion. They may warrant taxonomic recognition, as they are allopatric from each of the 3 named varieties, and show degrees of sterility when bred with each of the three, but morphologic differences have not evolved (Levy & Malone 2001). [= K, Y, < P. dubia – RAB, C, F, S, W, WV; > P. dubia var. dubia – G; > P. dubia var. fallax (Fernald) Gleason – G; > P. dubia var. dubia – Z (also including var. interior)] Phacelia dubia (Linnaeus) Trelease var. georgiana McVaugh, Georgia Phacelia. Pd (GA): granitic flatrocks; rare. April-May; June. var. georgiana ranges from GA west to ec. AL, in the Piedmont. It has sometimes been attributed to SC, and Levy
found plants in SC which morphologically resemble var. *georgiana*, but he concluded that this "imitator" genotype was largely sterile when bred with var. *georgiana*. See var. *dubia* for additional discussion. [= K, Y, Z; < *P. dubia* – RAB, C, F, S, W; ? *P. dubia* var. *dubia* – G]


**Phacelia purshii** Buckley, Miami-mist. Mt (GA, NC, SC, VA, WV), Pd (VA): moist forests on floodplains and slopes; uncommon (rare in NC, GA, SC, and VA). May-June. S. PA west to s. ON, OH and MO, south to mw. SC, nw. GA, and e. AL. Plants "with smaller flowers, shorter pedicels, and smaller capsules and seeds" are the basis of *P. boykinii* and *P. bicknellii* (Constance 1949). A study of the matter was initiated and specimens annotated as "*P. purshii* ssp. *boykinii*," but the research was not completed and the name was never published; further study is warranted. [= RAB, C, F, G, K, W, WV, Z; > *P. purshii* – S; > *P. boykinii* (A. Gray) Small – S; > *P. bicknellii* Small – S]

**Phacelia dubia** (Linnaeus) Trelease var. *interior* Fernald, endemic in c. TN. [= K; < *P. dubia* – C, F, G, S; < *P. dubia* var. *dubia* – Z] (not yet keyed)

**Phacelia ranunculacea** (Nuttall) Constance, Western Buttercup Phacelia. In the Mississippi and Ohio river drainages, centered around St. Louis, MO (w. KY, w. TN, e. MO, ne. AR, sc. MO, s. IL, and s. IN). See Sewell & Vincent (2006). [= K, X; < *P. ranunculacea* – RAB, C, F, G, Z; see also]

**Phacelia strictiflora** (Engelmann & Gray) Gray var. *robbinsi* Constance. East to AL. [= K, Z] (not yet keyed)

20. **Asperugo Linnaeus** (Madwort, Catchweed)

A monotypic genus, an annual scrambling herb, of Eurasia.

* **Asperugo procumbens** Linnaeus, Madwort, Catchweed. Cp (DE), Pd (DE): disturbed areas; rare, native of Eurasia. [= C, F, G, K] [not yet keyed]

21. **Heliotropium** Linnaeus (Heliotrope, Turnsole)

A genus of ca. 250 species, widespread in tropical and temperate regions. Either treated as part of a broadly defined Boraginaceae, or else better placed in the family Heliotropiaceae, as it is apparently more closely related to Hydrangeaceae than to Boraginaceae. Currently under study and additional taxonomic changes may be forthcoming (Hilger & Diane 2003).


1 Flowers solitary at the ends of short branches; [of limestone habitats from nw. GA westward]; [section Orthostachys, subsection Bracteata]............................ *H. tenellum*

2 Leaves glabrous, succulent, < 7 mm wide; [of saline coastal situations]; [section Halymyrhina]............................ *H. curassavicam var. curassavicam*

2 Leaves pubescent, not succulent, > 10 mm wide; [of a variety of mostly disturbed, inland situations].

3 Mericarps separating at maturity; fruit 4-lobed prior to maturation; leaves petiolate, ca. 2× as long as wide; [section Heliotropium]...........

3 Mericarps cohering in pairs at maturity; fruit 2-lobed prior to maturation; leaves petiolate or sessile to subsessile, ca. 2-5× as long as wide.

4 Fruit tuberculate, 4-seeded; leaves sessile to subsessile, ca. 4-5× as long as wide; corolla throat and tube densely villous within; [section Tiaridiurn]................................................................. *H. amplexicaule*

4 Fruit longitudinally ribbed, 2-seeded; leaves petiolate, ca. 2× as long as wide; corolla throat and tube glabrous within; [section Tiaridiurn]................................................................. *H. indicum*


**Heliotropium curassavicam** Linnaeus var. *curassavicam*, Seaside Heliotrope. Cp (DE, FL, GA, NC, SC, VA): edges of brackish and salt marshes, estuarine shores; rare. June-September. Var. *curassavicam* ranges from DE (and farther north as an introduction) south to the New World tropics. Considered by some authors to be introduced and naturalized in our area. Other varieties occur inland in the mw. and w. United States. [= C, K, Z; < *H. curassavicam* – RAB, GW; = *H. curassavicam* – F, G; = Heliotropium curassavicam ssp. curassavicam] *


**Heliotropium tenellum** (Nuttall) Torrey, Delicate Heliotrope. Mt (GA, WV): limestone glades and barrens; rare. WV, KY, IN, IL, IA, and KS south to mw. GA, AL, MS, LA, and TX. [= C, F, G, K, Z; = *Lithococcum tenella* (Nuttall) Small – S]
**Heliotropium polyphyllum** Lehmann, Pinel. Heliotrope. Cp (FL): pine flatwoods, pond margins; common. FL. [= K] {add synonym; not yet keyed}

357. **CONVOLVULACEAE** A.L. de Jussieu 1789 (Morning Glory Family) [in SOLANALES]

A family of about 56 genera and 1600 species, nearly cosmopolitan, especially in tropical and subtropical areas. Tribes follow the classification of Stefanović, Austin, & Olmstead (2003). References: Wilson (1960b); Austin (1979), Stefanović, Krueger, & Olmstead (2002); Stefanović, Austin, & Olmstead (2003). [including CUSCUTACEAE]

| 1 Plant parasitic; stems orange; [tribe Cuscuteae] | Cuscuta |
| 1 Plant photosynthetic; stems green. |
| 2 Corolla 0.1-0.2 cm long; capsule deeply 2-lobed; leaves orbicular-reniform, 1-3 cm long and wide, not fleshy; [tribe Dichondraceae] |
| 2 Corolla 1-10 cm long; capsule entire; leaves various, but not as above (most similar vegetatively are *Calystegia soldanella*, *Ipomoea pes-caprae* var. *emarginata*, and *I. imperati*; all beach plants with fleshy, emarginate, and usually larger leaves). |
| 3 Styles 2, free nearly to the ovary or fused most of their length (at least the terminal 1-2 mm free); corolla 1-2.5 cm long; leaves cuneate or rounded at the base, and narrowly ovate, lanceolate, or linear; [tribe Cresseae]. |
| 3 Styles free, each 2-cleft, the stigmas therefore 4, linear-filiform. |
| 4 Styles free or fused at the base, the stigmas 2, globose-peltate. |
| 4 Styles free or fused at the base, the stigmas 2, globose-peltate (garden escape occasionally naturalised) (Garden escape occasionally naturalised) ......... Evolus |
| 5 Flowers not double, corolla entire; leaves orbicular-reniform, 1-3 cm long and wide, not fleshy; [tribe Dichondraceae]. |
| 5 Flowers not double, corolla entire; leaves orbicular-reniform, 1-3 cm long and wide, not fleshy; [tribe Convolvulaceae]. |
| 6 Calyx concealed by 2 large bracts; [tribe Convolvulaceae]. |
| 6 Calyx not concealed by bracts. |
| 7 Stigma 1, capitate (sometimes lobed); leaves 3-5 cm long, mostly strongly hasteate or cordate at base; corolla white, pink, lavender, blue, orange, or red. |
| 7 Stigma 1, capitate (sometimes lobed); leaves 3-5 cm long, mostly strongly hasteate or cordate at base; corolla white, pink, lavender, blue, orange, or red. |
| 8 Anthers straight after dehiscence; fruits valvate-dehiscent; [tribe Ipomoeae]. |
| 8 Anthers twisted after dehiscence; fruits longitudinally or irregularly dehiscent; [tribe Merremiae]. |

**Calystegia** R. Brown 1810 (Bindweed)

A genus of about 25 species, vines, cosmopolitan. Stefanović, Krueger, & Olmstead (2002) conclude (based on molecular phylogeny) that *Calystegia* should be combined with *Convolvulus*. References: Wilson (1960b); Lewis & Oliver (1965); Brummitt (1965, 1980); Austin, Diggs, & Lipscomb (1997)=Y.

| 1 Leaves about as wide as long, rounded at the tip. | C. soldanella |
| 1 Leaves longer than wide, abutse, acute, or acuminate at the tip. |
| 2 Flowers double, the corolla deeply divided into many parts (garden escape occasionally naturalised) | C. pubescens |
| 2 Flowers double, the corolla deeply divided into many parts (garden escape occasionally naturalised) | C. pubescens |
| 3 Stems mostly less than 1.5 m, erect at least in the lower part, but sometimes twining towards the apex, flowers mostly borne in lower leaf axils. |
| 3 Stems mostly less than 1.5 m, erect at least in the lower part, but sometimes twining towards the apex, flowers mostly borne in lower leaf axils. |
| 4 Stems not twining, up to 0.6 m high; leaves overtopping the stem apex 1.5-6 cm long. |
| 4 Stems not twining, up to 0.6 m high; leaves overtopping the stem apex 1.5-6 cm long. |
| 5 Stems twining in the upper part; mostly 0.8-1.4 m high; leaves overtopping stem apex less than 1 cm long. |
| 5 Stems twining in the upper part; mostly 0.8-1.4 m high; leaves overtopping stem apex less than 1 cm long. |
| 6 Stem and leaves glabrous to pubescent; leaves more or less flat at maturity, with basal lobes 0-5 mm long. |
| 6 Stem and leaves glabrous to pubescent; leaves more or less flat at maturity, with basal lobes 0-5 mm long. |
| 7 Corolla pink. |
| 7 Corolla pink. |
| 8 Bracteoles forming a continuous spiral series with sepals, the flower appearing to have 3 bracteoles when seen from side; leaves with almost closed sinus, the lobes posteriorly truncate. |
| 8 Bracteoles forming a continuous spiral series with sepals, the flower appearing to have 3 bracteoles when seen from side; leaves with almost closed sinus, the lobes posteriorly truncate. |
| 9 Leaves with basal lobes rounded or with a single angle, or if with 2 angles then not spreading; plant glabrous or commonly pubescent to tomentose onstem and. |
| 9 Leaves with basal lobes rounded or with a single angle, or if with 2 angles then not spreading; plant glabrous or commonly pubescent to tomentose onstem and. |
| 10 Bracteoles saccate at base, obtuse to truncate at apex, strongly overlapping each other; leaf sinus with more or less parallel sides; often with 2 peduncles in the same leaf axil. |
| 10 Bracteoles flat to weakly saccate at base, more or less acute, not or scarcely overlapping each other; leaf sinus not parallel sided; peduncles solitary in leaf axils. |
Calystegia catesbaiana Pursh, Catesby’s Bindweed. Mt (WV), Cp (VA), {GA, NC, SC}: longleaf pine savannas, marsh edges, openings in dry to dry-mesic montane forests; {abundance} (rare in GA, VA, and WV). [= K; < Calystegia spithamea – C; < Convolvulus spithamaeus Linnaeus var. pubescens (Gray) Fernald – F; = Calystegia sericata (House) Bell – RAB, W; = Convolvulus sericus House – S, Z]

* Calystegia pubescens Lindley. Mt (WV), {NC, VA}; rare in WV, native of e. Asia. [? Calystegia pellita (Ledebour) G. Don – K; < Convolvulus pellitus Ledebour – F, Z; < Convolvulus japonicus Thunberg – G; < Calystegia hederacea Wallroth – C]

Calystegia sepium (Linnaeus) R. Brown sp. american (Sims) Brummitt. Mt (WV), {GA, NC, VA}; uncommon in WV. [= K; < Calystegia sepium – RAB, C, GW, W; < Convolvulus sepium Linnaeus var. repens (Linnaeus) A. Gray – F, WV, Z; > Convolvulus sepium Linnaeus var. repens (Linnaeus) A. Gray – G; > Convolvulus sepium var. americanus Sims – G; > Convolvulus americanus (Sims) Greene – S; > Convolvulus repens Linnaeus – S]

Calystegia sepium (Linnaeus) R. Brown spx. angulata (Sims) Brummitt. Mt (WV), {GA, NC, SC, VA}; {habitats}; (uncommon in WV). NB to BC, south to SC, TX, NM, and OR. [= K, Y; < Calystegia sepium – RAB, C, GW, W; < Convolvulus sepium Linnaeus var. sepium – F, G, Z]

Calystegia sepium (Linnaeus) R. Brown sp. appalachiana Brummitt. Mt (WV), {NC, VA}; {habitats}; common in WV. [= K; < Calystegia sepium – RAB, C, GW, W; < Convolvulus sepium Linnaeus var. sepium – F, G, Z; = Convolvulus linnophila Greene]

Calystegia sepium (Linnaeus) R. Brown sp. britannica. Mt (WV), {DE, GA, NC, SC, VA}; {habitats}; common in WV. [= K; < Calystegia sepium – RAB, C, GW, W; < Convolvulus sepium Linnaeus var. sepium – F, W, Z; > Convolvulus sepium var. britannicus R. Tryon – G; < Convolvulus sepium – S]

Calystegia silvatica Grisebach spx. fraterniflora (Mackenzie & Bush) Brummitt. Mt (VA, WV), Pd (VA), Cp (VA), {GA, NC, SC}; {habitats}; uncommon in VA, rare in WV. Ssp. silvatica and ssp. disjuncta are European. [= K, Y; < Calystegia sepium – C; > Convolvulus sepium Linnaeus var. fraterniflorus Mackenzie & Bush – F, G, WV, Z; = Calystegia sepium (Linnaeus) R. Brown var. fraterniflora (Mackenzie & Bush) Shimer]

* Calystegia soldanella (Linnaeus) R. Brown ex Roemer & J.A. Schultes. Cp (NC, VA): beaches, dunes; rare, native of {}. [= RAB, K; = Convolvulus soldanella Linnaeus]

Calystegia spithamea (Linnaeus) Pursh spx. spithamea, Low Bindweed. Pd (DE, VA), Mt (VA, WV): dry limestone areas; uncommon in VA and WV. [= K; < Calystegia spithamea – RAB, C, W; = Calystegia spithamea var. spithamea; = Convolvulus spithameus var. spithamea – F; > Convolvulus spithameus Linnaeus – G, S; < Convolvulus spithameus – Z]

Calystegia spithamea (Linnaeus) Pursh spx. stans (Michaux) Brummitt, Shale Bindweed. Mt (GA, NC, SC, WA, VA): shale barrens and woodlands, less typically on limestone; uncommon. [Calystegia spithamea (Linnaeus) Pursh spx. purshiana (Wherry) Brummitt – K; = Calystegia spithamea spx. stans (Michaux) Brummitt – K; < Calystegia spithamea – RAB, C, W; > Calystegia spithamea var. pubescens; > Convolvulus spithameus Linnaeus var. pubescens (A. Gray) Fernald – F; > Convolvulus purshianus Wherry – G; > Convolvulus spithameus – G; < Convolvulus spithameus – Z]

Calystegia macounii (Greene) Brummitt. Reported for NC and VA; Brummitt says this species does not occur east of the Mississippi River. Rejected pending convincing documentation. [= K, Y; = Convolvulus macounii Greene] {not keyed}

Convolvulus Linnaeus 1753 (Field-bindweed)

A genus of about 100 species, vines, cosmopolitan, especially in temperate areas. [also see Calystegia]


Cuscuta Linnaeus 1753 (Dodder)


Identification notes: corolla measurements are from the base to the sinuses of the corolla. The infrastamininal scales are transparent structures at the base of the stamens.

1 Styles more-or-less united; capsule circumscissile; [subgenus Monogynella]
CONVOLVULACEAE


Cuscuta harperi Small, Harper's Dodder. Cp (GA), Pd (GA): outcrops of granite ( Piedmont) and Altamaha grit (Coastal Plain), typically on plants such as Liatris microcephala, Bigelowia nutallii, Hypericum gentianoides, and Croton willdenowii; rare. September-November. C. and we. GA west to nw. AL. [= K, S, V, Z]
**CONVOLVULACEAE**


* **Cuscuta japonica** Choisy, Japanese Dodder. Mt (SC), Cp (FL): disturbed area; rare, native of e. Asia. Apparently eradicated in Pickens County, SC. [= K, WH, Z]

**Cuscuta obtusiflora** Kunth var. *glandulosa* Engelmann, Glandular Dodder. Cp (FL, GA): on herbs in calcareous glades and other habitats; rare. GA and OK south to FL, TX, Mexico; West Indies. See Anderson (2007) for FL Panhandle record. [= G, GW, K, V, WH, X; = *C. glandulosa Small* – S]


**Cuscuta polygonorum** Engelmann, Smartweed Dodder. Cp (DE), Pd (DE, VA), Mt (VA, WV): on *Polygonum* and other hosts; rare. NY and ON west to ND, south to FL and TX. [= C, F, G, K, S, W, V, X, Y, Z]


**Cuscuta cuspidata** Engelmann. IN, ND, and UT south to KY, MS, TX, and NM. [= C, F, K, X, Z]

**Cuscuta glomerata** Choisy. OH, MI, MN, and ND south to KY, TN, MS, and TX. [= C, F, G, GW, K, S, X, Z]

* **Cuscuta suaveolens** Seringe, Fringed Dodder. Scattered sites in eastern North America, including AL, MD, and OH. [= C, G, K, Z]

**Dichondra** J.R. Forster & G. Forster 1775 (Ponyfoot, Dichondra)

A genus of about 8 species, of tropical and warm temperate areas. References: Tharp & Johnston (1961)–Z.

1 Calyx lobes > 2× as long as wide, exceeding the fruit; pedicels straight or nearly so....................................................... *D. carolinensis*  
1 Calyx lobes < 2× as long as wide, shorter than the fruit; pedicel strongly recurved just below the calyx ........................................ *D. micrantha*

**Dichondra carolinensis** Michaux, Carolina Ponyfoot. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt*, (VA*, WV*): lawns, roadsides, moist pinelands; common (uncommon in VA, rare in Mountains of VA and WV). March-May. Se. VA south to s. FL, west to AR and TX; also in Bermuda and reported for the Bahamas; sometimes adventive beyond that range. This plant is rarely seen in a "natural" habitat, but is often seen in lawns and other mowed grassy areas. [= RAB, C, GW, K, S, WH, Z; = *D. repens* J.R. Forster var. *carolinensis* (Michaux) Choisy – F, G]


**Evolvulus** Linnaeus 1762 (Dwarf Morning-glory)

A genus of about 90-100 species, almost all of tropical, subtropical, and warm temperate America. References: Ward (1968); Wilson (1960b)–Z.

1 Leaves densely pilose on both surfaces with spreading to loosely appressed hairs; internodes short, generally < 1 cm long; [calcareous glades and barrens of c. TN].......................................................................................................................... *E. pilosus*  
1 Leaves densely pilose with appressed (sericous) hairs below, the upper surface glabrous or loosely pubescent; internodes long, many over 1.5 cm long; [wet flatwoods, seepages, bogs, Altamaha Grit outcrops in the the Coastal Plain].................................................................................. *E. sericus*

**Evolvulus sericus** Swartz var. *sericus*, Silky Dwarf Morning-glory. Cp (FL, GA): wet flatwoods, seepages, bogs, Altamaha Grit outcrops; uncommon (rare in GA). Coastal Plain of ec. GA (Appling, J eff Davis, and Coffee counties) (Bridges & Orzell 1989; Patrick, Allison, & Krakow 1995) south to s. FL; AR and LA west to AZ, south into Mexico; West Indies. [= K; < *E. sericus* – S, WH, Z]

* **Evolvulus nuttallianus** J.A. Schultz, Shaggy Dwarf Morning-glory, in c. TN (Chester, Wofford, & Kral 1997), disjunct from the Great Plains. [= F, K, Z; = *E. nuttallianus* – C, orthographic variant; = *E. pilosus* Nuttall – G]

**Ipomoea** Linnaeus 1753 (Morning-glory)

**Ipomoea alba** Linnaeus, Moonflowers, Tropical Morning-glory. Cp (FL): hammocks, marsh edges; rare. Ne. FL south to s. FL. [= WH; *Calonyction aculeatum* (Linnaeus) House]  
* Ipomoea batatas* (Linnaeus) Lamark, Sweet Potato. Cp (FL, GA?, NC, SC, VA?): persistent in fields after cultivation, disturbed areas; rare, apparently native of tropical America. [= RAB, K, S, Y, Z]  
Ipomoea hederacea

* Ipomoea hederifolia
Linnaeus, Scarlet Creeper. Cp (FL, GA, SC): disturbed areas; uncommon. {Distribution in our area uncertain, native of tropical America – Kartesz (1999) says GA only} [= GW, K, WH, Y, Z; = I. coccinea Linnaeus var. hederifolia (Linnaeus) A. Gray]

Ipomoea imperati
(Vahl) Grisebach, Beach Morning-glory. Cp (FL, GA, NC, SC): beaches, dune blowouts, fore-dunes; common (rare in NC and SC). August-October. Se. NC south to s. FL, west to TX, and extensively distributed in the tropics. [= K, WH, Y; = I. stolonifera (Cirillo) J.F. Gmelin – RAB, GW, S, Z]

Ipomoea indica
(Burmann) Merr. var. acuminata (Vahl) Fosberg. Cp (FL): hammocks, coastal areas, disturbed areas; uncommon. Also AL, MS, LA. [= K, WH; ? Pharbitis cathartica (Poiret) Choisy – S] {add to synonymy}

Ipomoea lacunosa

Ipomoea macrorhiza
Michaux, Indian-midden Morning-glory, Manroot. Cp (FL, GA, NC, SC): hammocks, shell middens, dry sands, disturbed maritime areas; uncommon (rare north of FL). June-July. Se. NC south to s. FL, west to s. AL. [= RAB, K, S, WH, Y, Z]

* Ipomoea muricata

Ipomoea pandurata

Ipomoea pes-caprae
(Linnaeus) R. Brown var. emarginata Hallier f., Railroad Vine, Goat's-foot, Bay Hops, Bay Winders. Cp (FL, GA, NC, SC): ocean beaches; uncommon (rare north of FL). E. NC (Carteret County), SC (Beaufort, Horry, Charleston, Colleton, and Georgetown counties), south to FL, west to TX, and widespread on tropical shores of the the New World and Old World. The records in the Carolinas may reflect the periodic arrival of sea-borne seeds. [= I. pes-caprae – GW, S, Z; = I. pes-caprae ssp. brasiliensis (Linnaeus) van Ooststroom – K, WH, Y]

* Ipomoea purpurea

* Ipomoea quamoclit

Ipomoea sagittata
Poiret. Cp (FL, GA, NC, SC): edges of brackish marshes, moist thickets on barrier islands, hammocks; common. July-September. E. NC south to s. FL, west to TX; also in the West Indies. [= RAB, GW, K, S, WH, Y, Z]

* Ipomoea triloba
Linnaeus, Little-bell. Cp (FL): hammocks, sand dunes; uncommon. N. FL south to s. FL; West Indies; New World and Old World tropics. [= S, WH] {add to synonymy}

* Ipomoea tricolor
Cavanilles is reported for several locations in se. PA (Rhoads & Klein 1993). [= K] {not yet keyed; synonymy incomplete}

Merremia
dennstedt ex Endlicher 1838

A genus of about 90 species, tropical, subtropical, and warm temperate areas, especially America. References: Wilson (1960b)=Z.
* Merremia dissecta (Jacquin) Hallier f., Noyau Vine. Cp (FL, GA): disturbed areas; common (rare in GA), native of South America. Ranges as far north as e. and sw. GA. [= K, WH, Z; =? Ipomoea sinuata Ortega; = Operculina dissecta (Jacquin) House]

Stylisma Rafinesque 1825 (Dawnflower)

A genus of about 6 species (and about 8 taxa), vining to trailing herbs, endemic to se. North America. References: Myint (1966) = Z; Shinners (1962) = Y; Wilson (1960b) = X.

1 Corolla < 2× as long as the calyx; leaves < 2 cm long; [of FL] ............................................................................................................................... *S. abdita*

2 Corolla pink or purple; filaments glabrous, or nearly so; leaves densely and conspicuously silvery-sericeous; [of seasonally wet habitats] ...

3 Larger leaves (7-) 12-30 mm wide; peduncles with (1-) 3-7 (-12) flowers; stems with a tendency to twine, at least near growing tip.

4 Septal glabrous; [widespread in the Coastal Plain and Piedmont of our area] ................................................................. *S. humistrata*

5 Bracteoles 1-3 (-5) mm long;stylar branches usually fused more than 5/6 of the total length (occasionally fused less than 1/6 of length), the free portion of the stylar branches usually less than 3 mm long; sepal villous, 4-6 (-7) mm long, ovate-elliptic with obtuse to acute apices; leaves 1-3 mm wide.

6 Stylar branches 1-1.5 mm long, usually unequal in length, the longer nearly 2× as long as the shorter; sepal mostly acute; [of MS westward] ................................................................................................. *S. pickeringii var. pattersonii*

7 Larger leaves 2-10 mm wide; peduncles with 1 (-5) flowers; stems without a tendency to twine.

Bracteoles (2-) 10-20 mm long; stylar branches usually fused more than 5/6 of the total length (occasionally fused less than 1/6 of length), the free portion of the stylar branches usually less than 3 mm long; sepal villous, 4-6 (-7) mm long, ovate-elliptic with obtuse to acute apices; leaves 1-3 mm wide.

Stylisma abdita Myint. Cp (FL): scrub; rare. Ne. FL (Clay County) south to s. FL. [= K, WH, Z; = Bonamia abdita (Myint) R.W. Long]

Stylisma humistrata (Walter) Rafinesque, Water Dawnflower. Cp (AL, FL, GA, LA, MS, NC, SC): clay-based Carolina bays and wet savannas; uncommon (rare in NC and SC). June-July. Se. NC south to c. and w. FL Panhandle, west to se. AR and e. TX. *S. aquatica*, as the epithet implies, occurs in wetter habitats than our other species. [= GW, K, WH, Z; = Bonamia humistrata (Walter) A. Gray = RAB, Y; = Breveria michauxii Fernald & Schubert = F; = Bonamia michauxii (Fernald & Schubert) K.A. Wilson = X]

Stylisma humistrata (Walter) Chapman, Southern Dawnflower. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): sandhills and other dry woodlands, especially on dryish stream terraces; common (uncommon in FL and rare in VA). June-August. Se. VA south to Panhandle FL, west to AR and e. TX, north in the interior to n. AL and w. TN. [= C, K, WH, Z; = Bonamia humistrata (Walter) A. Gray = RAB, X, Y; = Breveria humistrata (Walter) A. Gray = F, G]


Stylisma patens (Desrousseaux) Myint var. patens, Common Dawnflower. Cp (GA, NC, SC): sandhills and other relatively dry sandy areas; common. June-August. Overall, the most common and widespread taxon of the genus in our area, regularly encountered in its habitat. E. NC south to n. FL, and west to s. MS. [= Stylisma patens (Desrousseaux) Myint var. patens = K, Z; = Bonamia patens (Desrousseaux) Shinners var. patens = RAB, Y; = S. trichosanthes (Michaux) House = S, misapplied; = S. patens = WH; = Bonamia aquatic (Walter) A. Gray = X, misapplied]

Stylisma pickeringii (Torrey ex M.A. Curtis) A. Gray var. pickeringii, Pickering's Dawnflower. Cp (AL, GA, MS, NC, NJ, SC): sandhills, usually in the driest, most barren, deep-sand areas, occasionally colonizing dry, disturbed areas in sandhills, such as sandy roadbanks, known from the Fall-line Sandhills, aeolian rims of Carolina bays, and sandhills on relic tidal riverine dunes along Coastal Plain rivers; rare. June-August (-September); July-September. Var. pickeringii ranges from s. NC south through SC, GA, AL, and e. MS, with a disjunct area in the Pine Barrens of s. NJ, sometimes treated as a separate variety “caesariensis” (see synonymy). This rare species is easily recognizable by its growth form, with numerous stems arching from a central point, then trailing radially away, forming a mound 1-2 meters in diameter. The narrowly linear leaves are borne vertically. Fernald & Schubert (1949) named four varieties in this widely but disjunctly distributed species; Myint (1966) reduced this to two varieties, one eastern and one western. [= C, K, Z; = Bonamia pickeringii (Torrey ex M.A. Curtis) A. Gray = RAB, X, Y; = Breveria pickeringii (Torrey ex M.A. Curtis) A. Gray var. pickeringii = F; = Breveria pickeringii var. caesariensis Fernald & Schubert = F; = Breveria pickeringii – G; = Stylisma pickeringii (Torrey ex M.A. Curtis) A. Gray = S]

Stylisma villosa (Nash) House, Hairy Dawnflower. Cp (FL, GA): sandhills, scrub; uncommon (rare in GA). Late April-July. S. GA south to s. FL, west to e. TX. [= K, WH, Z; = Bonamia villosa (Nash) K.A. Wilson = X, Y; = Breveria villosa Nash]
Stylisma pickeringii (Torrey ex M.A. Curtis) A. Gray var. pattersonii (Fernald & Schubert) Myint. Cp (MS): sandhills; rare. IL and IA south through KS and OK to w. LA and e. TX; disjunct east of the Mississippi River in w. MS (the material somewhat ambiguous as to varietal affinity). [= K, Z; < Bonamia pickeringii (Torrey ex M.A. Curtis) A. Gray – X, Y; < Stylisma pickeringii (Torrey ex M.A. Curtis) A. Gray – S]

358. SOLANACEAE A.L. Jussieu 1789 (Nightshade Family) [in SOLANALES]

Subfamily Browalliioideae: Cestrum
Subfamily Nicotaniioideae: Calibrachoa, Nicotiana, Nierembergia, Petunia
Subfamily Solanioideae, tribe Solaneae: Alkekengi, Capsicum, Physalis, Salpichroa, Solanum
Subfamily Solanioideae, tribe Datureae: Datura
Subfamily Solanioideae, tribe Lycieae: Lycium
Subfamily Solanioideae, tribe Nicandreae: Nicandra
Subfamily Solanioideae, tribe Hyoscyameae: Hyoscyamus

2 Fruiting calyx bright red (fresh or dry); corolla white; [cultivated and weakly naturalized near gardens]......................... Alkekengi

2 Fruiting calyx green, yellow, or orange, drying brown or tan; corolla yellow, often marked with 5 large spots in the throat; [collectively widespread].............................................................................................................................................................................................. Physalis

Alkekengi P. Miller 1754 (Chinese-lantern Plant)
A monotypic genus, a perennial herb, native of e. Asia. I here separate Alkekengi from Physalis as generically distinct, on the presumption that the re-typification of Physalis proposed by Whitson (2011) will be accepted. References: Mione et al. (1994); Whitson & Manos (2005); Whitson (2011).

* Alkekengi officinarum Moench, Chinese-lantern Plant. Pd (DE), Mt (WV), {VA?}: disturbed suburban areas; uncommon (rare in VA), native of Japan, Korea, and n. China. Commonly cultivated as an ornamental and occasionally naturalized in e. North America, as at scattered locations in TN (Chester, Wofford, & Kral 1997). It is perennial, readily recognized by its mature calyces red-orange and up to 5 cm long. [= Physalis alkekengi Linnaeus – C, F, G, K, WV, Z]

Bouchetia Augustin de Candolle ex Dunal 1852 (Bouchetia)
A genus of about 3-4 species, tropical American.

Bouchetia erecta A.P. de Candolle. {MS}. Reported for MS and TX. [= K; = Salpiglossis erecta (A.P. de Candolle) D’Arcy] {synonymy incomplete}

Calibrachoa Cervantes 1825 (Seaside Petunia)
References: Hunziker (2001)=Z.


Capsicum Linnaeus 1753 (Red Pepper, Chile)

1 Flowers usually only one per node after the first flowering node (rarely more); corolla bright to milky white (rarely bluish or violet) ...................

1 Flowers 2-5 per node above the first flowering node; corolla greenish-white

2 Pedicel of mature fruit with constriction (waist) at junction with calyx; pedicels declining or erect at anthesis; corolla lobes planar;
[habanero, scotch bonnet]................................................................................................................................................................ [C. chinense]

2 Pedicel of mature fruit broadening evenly into the calyx, without constriction; pedicels erect at anthesis, the flower itself nodding; corolla lobes usually slightly revolute; [tabasco]................................................................................................................................................................ C. frutescens
* **Capsicum annuum** Linnaeus, Bell Pepper, Chile, Pimiento, Paprika, Chile Piquín, Ancho, Cayenne, Pepperoncini, Jalapeño, Serrano, Chiltepin, and others. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA): naturalized or persistent from gardens; commonly cultivated, rare as a naturalized species, native of Mexico (but early spread through Central America by native Americans, and since nearly worldwide in distribution at least in cultivation). June-frost. A very influential food crop introduced from the New World to the Old World, now important in various (especially tropical or subtropical) cuisines, including Hunan, Szechuan, Indian, Thai, various African, Mexican, and others. The great majority of our cultivated forms are of this species. The wild form, *var. glabriusculum*, was certainly present at one time in the Southeast and may still be represented in our area as reverted forms; it probably cannot be reliably distinguished from cultivars of *C. annuum*, and the two are not here distinguished taxonomically. [= RAB, S, > C. annuum var. annuum – K, V, X, Y, Z; > Capsicum annuum Linnaeus var. glabriusculum (Dunal) Heiser & Pickersgill – K, V, X, > C. annuum var. aviculare (Dierbach) D’Arcy & Eshbaugh – Y, Z]


* **Capsicum chinense** Jacquin, Habanero, Scotch Bonnet. Rarely cultivated, not (yet) reported as persistent or escaped. Native of Andean South America. [= V, X, Y, Z]

**Cestrum** Linnaeus 1753 (Night-flowering Jessamine)

A genus of 150-200 shrubs (rarely trees or vines), of Tropical America. References: Hunziker (2001)=Z.


**Datura** Linnaeus 1753 (Jimsonweed)

A genus of about 10 species, of s. North America (probably originally native to sw. United States and Mexico). Several species of *Datura* are known to have been in our area at the time of first settlement by Europeans. They may have been weeds in Indian fields, or grown for their hallucinogenic properties. The common name "Jimsonweed" is a corruption of "Jamestown Weed." References: Avery, Satina, & Rietsema (1959)=Z. {needs thorough rework, based on herbarium material and clarification of nomenclature}

1. Calyx 3-5 cm long, the tube strongly angled, the angles even narrowly winged; corolla 7-10 cm long; capsule erect, dehiscent by 4 valves; [section *Datura*] .............................................................................................................................................. *D. stramonium*
1. Calyx 5-15 cm long, the tube terete or slightly angled; corolla 12-25 cm long; capsule inclined or nodding, irregularly dehiscent; [section *Datura*],
2. Corolla with 10 teeth, lavender; spines of capsule few, very stout-based .................................................................................................................................................. *D. metel*
3. Corolla with 5 or 10 teeth, white or pale lavender; spines of capsule many, hispid (the base only slightly thickened).
3. Corolla with 10 teeth; leaves soft-pubescent .................................................................................................................................................... *D. inoxia*
3. Corolla with 5 teeth; leaves glaucescet. ............................................................................................................................................................ *D. wrightii*

* **Datura inoxia** J.S. Miller, Indian-apple. Cp (NC, SC), Pd (NC, SC), Mt (WV), {VA?}: disturbed areas; rare, native of Mexico. September-October. This species may not be distinct from *D. wrightii*. {It is currently not known with confidence which records in our area apply to which taxon,} [= K, Z; = D. inoxia – F, S, WV, orthographic variant; ? D. meteloides – G, misapplied]

* **Datura metel** Linnaeus (NC): location and habitat in our area not known; rare, presumably introduced, allegedly native of tropical Africa and Asia. July-August. [= RAB, C, K, S, Z]

* **Datura stramonium** Linnaeus, Jimsonweed. Cp (AL, DE, FL, GA, LA, MS, NC, SC, VA), Pd (AL, DE, GA, NC, SC, VA), Mt (AL, GA, NC, SC, VA, WV): fields, pastures, disturbed areas, especially common in severely over-grazed pastures; common, presumably introduced from further south and west (Mexico or Central America). July-September; August-October. The plant is dangerously poisonous. [= RAB, C, K, S, W, WV, Z; > D. stramonium var. stramonium – F; > D. stramonium var. tatula (Linnaeus) Torrey – F; > D. tatula Linnaeus]


* **Datura quercifolia** Kunth is reported for sw. GA by Jones & Coile (1988). [= K] {not yet keyed}

**Hyoscyamus** Linnaeus 1753 (Henbane)

A genus of about 23 species, herbs, of Eurasia and n. Africa.

SOLANACEAE

* Lycium Linnaeus 1753 (Matrimony-vine, Wolfberry, Goji Berry)

A genus of about 100 species, shrubs, of warm temperate and tropical areas of the Old World and New World (especially America).

1 Leaves succulent, oblanceolate, 1-5 mm wide; [native, in maritime situations]......................................................... *L. carolinianum*

1 Leaves herbaceous, elliptic, ovate, or broadly oblanceolate, 8-30 mm wide; [introduced, persistent or naturalized, usually around old home sites].

2 Corolla lobes shorter than the corolla tube; leaves gray-green, 2-5 cm long............................................................. *L. barbarum*

2 Corolla lobes longer than the corolla tube; leaves bright green, 3-8 cm long............................................................. *L. chinense*

* Lycium barbarum Linnaeus, Common Matrimony-vine, Wolfberry, Goji Berry. Cp (NC, SC, VA), Pd (DE, GA, NC, VA), Mt (GA, NC, VA, WV): old home sites, disturbed areas, along railroad tracks; rare, native of s. Europe. May-November; August-December. [= K; ? L. halimifolium P. Miller – RAB, F, G, S, W, WV; < L. barbarum – C (also see L. chinense)]

Lycium carolinianum Walter, Christmas-berry, Carolina Matrimony-vine. Cp (FL, GA, SC): shell middens, shell mounds, shelly sand dunes, brackish marshes, maritime sand spits; uncommon (rare in GA and SC). September-October. Se. SC and e. GA south to FL, west to e. TX; also in the West Indies. Apparently not recently seen in SC; its occurrence in that state is based on Walter's flora. [= RAB, GW, S, WH; > L. carolinianum var. carolinianum – K]

* Lycium chinense P. Miller, Chinese Matrimony-vine, Wolfberry, Goji Berry. Mt (NC, VA), Cp (VA): old home sites; rare, native of China. May-November; August-December. [= RAB, F, G, K; < L. barbarum – C]

Nicandra Adanson 1763 (Apple-of-Peru)

A monotypic genus, an annual herb native of Peru.

* Nicandra physalodes (Linnaeus) Gaertner, Apple-of-Peru. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (DE, NC, SC, VA): disturbed places, such as cultivated fields; uncommon, native of Peru. July-September; August-October. [= RAB, C, F, G, K, W, WV; > Physalodes physalodes (Linnaeus) Britton – S]

Nicotiana Linnaeus 1753 (Tobacco)


1 Plant a shrub or small tree, 3-10 m tall; stems glabrous and glaucous; [section Paniculatae] ......................................................... *N. glauca*

1 Plant an herb, 0.5-3 m tall; stems densely viscid-puberulent (or sparsely so to merely tuberculate in *N. longiflora*).

2 Corolla tube 1.2-1.7 cm long, greenish yellow, with limb 3-6 mm wide; leaves distinctly petiolate; [section Rusticae] ......................... *N. rustica*

2 Corolla tube 3.0-12.0 cm long, cream, white, yellow, or pink, with limb 10-25 mm wide; leaves auriculate clasping.

3 Larger leaves on a plant 3.5-8 dm long; corolla tube 3.0-5.5 cm long, 4-7× as long as the average diameter, the limb 10-15 mm wide, pink or reddish (rarely white); [section Nicotiana] .............................................................. *N. tabacum*

3 Larger leaves on a plant 1-3 dm long; corolla tube 4.0-12.0 cm long, 10-20× as long as the average diameter, the limb 15-25 mm wide, white or lavender; [section Alatae].

4 Rosette of a few leaves, not persisting; cauline leaves clasping and decurrent on the stem .................................................... *N. alata*

4 Rosette persisting; cauline leaves clasping but not decurrent on the stem ................................................................. *N. longiflora*


* Nicotiana longiflora Cavanilles, Long-flower Tobacco. Pd (DE): disturbed areas, rare, native of South America. Cultivated and may be found as a waif or persistent. [= K, S, Z]

* Nicotiana rustica Linnaeus, Indian Tobacco, Wild Tobacco. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): formerly commonly cultivated by native Americans in all parts of our area, persistent following cultivation, now apparently extinct in our area; rare, originally native of Peru. This was the tobacco cultivated by American Indians at the time of contact by Europeans, and was the first tobacco taken to Europe and cultivated there. [= RAB, C, F, K, S; > *N. rustica* var. rustica – Z]

* Nicotiana tabacum Linnaeus, Cultivated Tobacco. Pd (GA, NC, SC, VA), Cp (GA, NC, SC, VA), Mt (GA, NC, SC, VA): persistent after cultivation; commonly cultivated, rarely naturalized, native of tropical America. June-frost; September-October. This is the tobacco currently cultivated in our area for the manufacture of cigarettes, cigars, and other smoking and chewing tobacco products. Two different strains are cultivated. Burley tobacco, with acute to acuminate leaves, grown mostly in the
Mountains and upper Piedmont, is air-cured in open barns, and used mostly for cigar and pipe tobacco. Flue-cured tobacco, with obtuse or broadly acute leaves, is grown mostly in the Coastal Plain and lower Piedmont, cured in closed, cubical barns with forced heat, and used mostly for cigarettes. [= RAB, C, F, K, S]

Nierembergia Ruiz & Pavón 1794 (Cupflower)

A genus of about 23 species, of Mexico, Central America, and South America.

* Nierembergia frutescens Durieu, Tall Cupflower, is reported from sw. GA (Jones & Coile 1988). [= K]

Petunia Antoine Laurent de Jussieu 1803 (Petunia)

[also see Calibrachoa]

* Petunia ×hybrida Vilmorin [P. axillaris × integrifolia], Petunia. Cp (FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (WV): disturbed areas, garden edges, common in cultivation; rare, native of Argentina. May-November. Individual plants may closely resemble either parent, but this taxon in our area is best considered as a variable hybrid taxon. [= WH; = P. ×atkinsiana D. Don ex Loudon – RAB; > P. axillaris (Lamarck) Britton, Sterns, & Poggenburg – C, F, G, K, S; > P. violacea Antoine Laurent de Jussieu – F, S, misapplied; > P. integrifolia (Hooker) Schinz. & Thellung – C, G, K; > P. ×atkinsiana D. Don ex Loudon – K]

Physalis Linnaeus 1753 (Ground-cherry)

(contributed by Milo Pyne)

A genus of about 80 species, nearly cosmopolitan, but especially diverse in America. Many of the species of Physalis in our area occur primarily in disturbed habitats; their pre-Columbian ranges are unclear and they may have been introduced to e. North America by native Americans. Of the species treated here, only a few are definitely introduced. References: Sullivan (2004) = Z; Waterfall = Y (1958, 1967); Sullivan (1985) = X; Ward (2008a) = V; Mione et al. (1994); Whitson & Manos (2005); Whitson (2011). Key based in part on Sullivan (2004).

1 Flowers 2 or more per leaf axil; berries with spherical seed-like bodies intermixed with the flattened, reniform seeds; [of the Gulf Coastal Plain]...................................................................................................................................................................................................... P. carpenteri

2 Berry 20-40 mm in diameter, green or yellow-green when ripe (tomatillo); anthers strongly coiled after dehiscence, blue; corolla throat with bluish tinge; [cultivated and weakly naturalized near gardens]........................................................................................................ P. philadelphica

2 Berry to 20 mm in diameter, orange, yellow, or green when ripe; anthers not coiled after dehiscence, yellow, blue, or purple; corolla throat purple, brown, green, or ochre; [collectively widespread].

3 Plants pubescent with stellate hairs, these in some taxa abundantly covering the leaves, or if leaves glabrous, the stellate hairs visible on the tips and margins of the sepals; plants perennial, from deeply buried rhizomes.

4 Leaves linear, 10-20× as long as wide, glabrous; plants erect; [of FL Panhandle westwards]......................................................... P. angustifolia

4 Leaves ovate, elliptic, obovate or spatulate, 2-10× as long as wide, stellate pubescent, especially on the young growth, flowering calyces, and pedicels (or glabrous south of our area); [of FL Panhandle, peninsula, and Atlantic coast from VA southwards]............... .................................................. P. walteri

3 Plants glabrous, or pubescent with simple hairs; plants annual or perennial.

5 Leaves glabrous or essentially so.

6 Perennials from rhizomes, frequently with remnant of last year's stem attached to crown; corolla with 5 dark maculations in the throat.

7 Hairs on the pedicels and young stems retrorse or retrorse-spreading; flowering calyx 5-angled, indented at base ......................... P. virginiana var. virginiana

7 Hairs on the pedicels and young stems antrorse; flowering calyx subterete, with 10 ribs, not indented at base ................................ P. longifolia var. subglabrata

6 Annuals from taproots; corolla with or without 5 dark maculations in the throat.

8 Upper part of the stem glabrous or glabrate (when young, sometimes with minute, deflexed hairs in lines); corolla with or without 5 dark maculations in the throat.

9 Corolla 7-15 mm long, yellow and with 5 dark maculations in the throat; anthers 2.5-4 mm long; berry to 40 mm in diameter ................................................................. P. philadelphica

9 Corolla 4-10 mm long entirely yellow, without 5 dark maculations in the throat; anthers 1-2.3 mm long; berry 8-11 mm in diameter.

10 Principal cauleine leaf blades generally < 2.5× as long as wide; flowering and fruiting pedicels 0.5-1.0 cm long; pedicels and calyx essentially glabrous at anthesis except for hairs on the margins of the calyx lobes .... P. angulata var. angulata

10 Principal cauleine leaf blades generally > 2.75× as long as wide; flowering pedicels 1.5-2.5 cm long, elongating to 3.0-4.0 cm long in fruit; pedicels and calyx covered at anthesis with fine, even, antrorse hairs, especially at the base of the calyx. ........................................................................................................[P. angulata var. pendula]

8 Upper part of the stem with long, spreading hairs; corolla with 5 dark maculations in the throat.
Physalis angulata Linnaeus var. angulata, Smooth Ground-cherry. Cp (DE*, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA): disturbed areas, open woodlands, agricultural fields; common (uncommon in VA, rare in DE). August-October. Var. angulata is widely distributed in tropical America, north to se. VA and MO, and scattered as an adventive further north.

Physalis lanceolata Michaux, Sandhills Ground-cherry. Cp (GA, NC, SC): sandhills; rare. June-July; July-September. Endemic to sandhill habitats of (primarily) sc. and (rarely) se. NC (northern limit in Lee, Wayne, and New Hanover counties), south through SC to just over the Savannah River in Richmond County, GA. Many earlier florals included midwestern material in the concept of this species; it is, however, limited to the Carolinas and Georgia. See Hinton (1970) for discussion of its taxonomic status. [= RAB, Z; < P. virginiana – F, G, S (also see P. hispida (Waterfall) Cronquist)]

Physalis longifolia Nuttall var. subglabrata (Mackenzie & Bush) Cronquist, Longleaf Ground-cherry. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, FL), {GA, SC}: open woodlands, gardens and disturbed areas; common (uncommon in GA, NC, SC, VA). June-August; August-October. The species is widespread in e. and c. United States; var. subglabrata is more eastern, south to Panhandle FL, var. longifolia more western. [= C, G, K, W, Z; = P. virginiana Miller var. subglabrata (Mackenzie & Bush) Waterfall – RAB; = P. subglabrata Mackenzie & Bush – F, S, WV; < P. longifolia – WH] * Physalis philadelphica Lamarck, Tomatillo. Cp (DE), Pd (DE, NC), Mt (VA, WV): naturalized after cultivation; uncommon (rare in NC and VA), native of Mexico and Central America. June-August; July-October. See Kartesz & Gandhi (1994) for a discussion of this group. It is the large-flowered plant (and therefore P. philadelphica in the narrow sense) that is weakly naturalized after cultivation in our area. [= C, Z; < P. ixocarpa Brotero ex Hornemann – F, G, misapplied; > P. philadelphica var. immaculata Waterfall – K]


Physalis pubescens Linnaeus var. pubescens, Thickleaf Downy Ground-cherry. Mt (WV), {VA}: disturbed areas; rare in WV. The distribution, abundance, and habitats of the two varieties are poorly known. July-September; August-October. Widespread in the American tropics, north to VA. [= C, K; < P. pubescens var. pubescens – RAB; > P. barbadensis Jacquin var. barbadensis – F; > P. barbadensis Jacquin – G, S; > P. pubescens – S; > P. barbadensis Jacquin – S; < P. pubescens – WH, Z] * Physalis virginiana P. Miller var. virginiana, Virginia Ground-cherry. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, FL, GA, NC, SC, VA), Candiland and disturbed areas; common (rare in FL and WV). April-May; June-July. This complex species is widespread in e. and c. North America. Var. virginiana is the most eastern of a number of varieties, some of the others being var. campaniforma Waterfall, var. polypylla (Greene) Waterfall, and var. texana (Rydb) Waterfall. The validity and true affinities of some of these varieties is, at present, uncertain; var. texana may be actually affiliated with P. longifolia. [= RAB, K; < P. virginiana – C, F, G, V, W, Z; > P. virginiana – S; > P. intermedia Rydb – S; > P. monticola C. Mohr – S]

Physalis walteri Nuttall, Dune Ground-cherry. Cp (FL, GA, NC, SC, VA): dunes of sea-beaches, openings in maritime forests, sandhills (southwards), and rarely inland as a waif in disturbed areas; common (uncommon in GA, NC, SC, rare in VA). May-September. This species ranges from se. VA south to s. FL and west to s. MS. See Sullivan (1985) for further information on this species and its relatives. It is largely replaced on the Gulf Coast by the related P. angustifolia, with which it locally intergrades in peninsular FL. P. viscosa Linnaeus is South American. [= C, K, WH, Z; < P. viscosa Linnaeus spp. maritima (M.A. Curtis) Waterfall – RAB; < P. maritima M.A. Curtis – F; < P. viscosa – G, S; > P. walteri var. walteri – V; > P. walteri var. glabra (Waterfall) D.B. Ward – V]

* Physalis acutifolia (Miers emend Sandwith) Sandwith, native to AZ and vicinity, was collected once in NC (in 1936), from a nursery in Mecklenburg County, NC, and is now in MS (Sullivan 2004). It may not be established. It is most similar to P. angulata, but differs in its white to cream-colored corollas, with yellow basal spots, and the presence of hairy petals, alternating with the stamens near the base of the corolla limb. [= K, Z]


* Physalis cinerascens (Dunal) A.S. Hitchcock var. cinerascens, native to OK, TX, and Mexico, occurs locally in the Southeastern United States in weedy situations; it has been found once in our area, in a disturbed habitat in SC. It is probably not established. It resembles P. walteri in having stellate pubescence, but differs in having leaves ovate to suborbicular, with margins sinuate, dentate, or entire (vs. leaves obovate, with margins entire), anthers at least 1.5× as long as the filaments (vs. anthers equal to or shorter than the filaments), and fruiting pedicels mostly at least 1.5× as long as the calyces (vs. fruiting pedicels equal to or shorter than the fruiting calyces). [= K, Z] (not yet keyed; full treatment)

Physalis longifolia Nuttall var. longifolia. East to PA, WV, KY, TN, and GA (Kartesz 1999). [= K, Z]


* Physalis peruviana Linnaeus, Cape Gooseberry or Po'ha, is also cultivated. Native to South America, it is now cultivated for its edible fruit in various tropical and temperate areas, and is known to rarely persist in e. North America. [= K]

* Physalis viscosa Linnaeus. Reports in the Southeast are based on a broad interpretation of P. viscosa to include southeastern taxa P. angustifolia and P. walteri. Rejected.

Salpichroa Miers 1845

A genus of about 17 species, herbs and shrubs, native of South America. References: Hunziker (2001)=Z.
**Solanum** Linnaeus 1753 (Nightshade, Tomato, Potato, Horse-nettle)  
*(contributed by Milo Pyne and Alan S. Weakley)*


<table>
<thead>
<tr>
<th>1</th>
<th>Anthers opening by longitudinal slits, convinent into a slender cone with sterile tip; berry fleshy, seeds pubescent; plant glandular &quot;clammy&quot;-pubescent; [cultivated plant, also appearing as a waif, escape, or discard, e.g. on sewage sludge]</th>
<th><em>S. hirsutum</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Stems and leaves not prickly or spiny.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Leaves irregularly pinnatifid or auriculate-lobed.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Woody climbing or twining vine; leaves auriculate-lobed</td>
<td><em>S. dulcamara</em></td>
</tr>
<tr>
<td>5</td>
<td>Herb, not twining; leaves irregularly pinnatifid.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Foliage densely pubescent to puberulent with spreading hairs, especially on undersurface.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Trichomes stellate; ripe berry yellow; corolla lavender</td>
<td><em>S. elaeagnifolium</em></td>
</tr>
<tr>
<td>8</td>
<td>Berry black when ripe; leaves lance-elliptic, 1-2.5 cm wide, style usually protruding beyond anthers by &gt; 1 mm; plants strictly coastal, on dunes and similar habitats</td>
<td><em>S. pseudogracilis</em></td>
</tr>
<tr>
<td>9</td>
<td>Berry green to yellow when ripe; leaves ovate, 2.5-6 cm wide, style not protruding; plants widespread, weedy</td>
<td><em>S. sarrachoides</em></td>
</tr>
<tr>
<td>10</td>
<td>Inflorescence subracemose, corymbose or umbellate, pedicels and peduncles becoming stout; anthers 1.8-2.6 [2.2-2.9] mm long; berry dull; seed 1.7-2.2 mm long [1.8 mm wide or wider]; sclerotic granules (concretions of stone cells) typically absent</td>
<td><em>S. nigrum</em></td>
</tr>
<tr>
<td>11</td>
<td>Inflorescence umbellate, pedicels and peduncles remaining slender; anthers 1.4-2 mm long; berry glossy; seed 1.2-1.8 mm long; sclerotic granules typically present but occasionally absent</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Berry black (rarely green, never red), up to 0.5 cm wide at maturity, ruderal weeds.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Corolla violet to (rarely) white, anthers all similar; calyx loosely enveloping the fruit, seeds minutely reticulate-pitted</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Corolla yellow, anthers dissimilar, the lowest larger and longer; calyx tightly enveloping the fruit, seeds coarsely undulate-rugose</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Ripe berry yellow, immature berry green with white mottles, leaves shallowly lobed (sinus depth typically &lt; 1/3 distance from leaf margin to midvein).</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Leaves linear-lanceolate, 1-3 cm wide, trichome clusters 0.5 mm broad, with 12 or more rays.</td>
<td><em>S. elaeagnifolium</em></td>
</tr>
<tr>
<td>17</td>
<td>Stellate trichomes of lower leaf surface stipitate, the 6-8 rays essentially equal; corolla 3-4 cm wide, calyx 8-12 mm long</td>
<td><em>S. dimitidum</em></td>
</tr>
<tr>
<td>18</td>
<td>Leaves entire, margins at most sinuate; plants up to 2 dm in stature; prickles few, absent, and/or confined to midveins; corollas white; [rare plants of Bibb and Chilton counties, AL]</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Leaves not enveloped by prickly calyx; the leaves not pinnately parted or divided (except in <em>S. sisymbriifolium</em>), or only weakly so (sinus depth &lt; ½ the distance from leaf margin to midvein).</td>
<td></td>
</tr>
</tbody>
</table>

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*S. capsicoides*
**Solanum americanum** P. Miller. Cp (FL, GA), [GA]: hammocks, disturbed areas; common. North to e. GA (SC). South to s. FL. [= K, WH; < S. americanum – RAB; F; < S. nigrum – C, G, S]

**Solanum capiscoides** Allioni, Soda Apple. Cp (FL, SC), Pd* (NC*): disturbed areas; uncommon (rare in NC and SC). [= K, WH; = S. aculeatissimum – RAB; S, misapplied]


* Solanum dulcamara Linnaeus, Bittersweet, Nightshade. Mt (NC, WA, WV), Pd (DE, VA), Cp (FL, VA), [GA]: disturbed areas; common (rare in FL, GA, NC, and VA), native of Europe. [= RAB, C, W, WH, WV; > S. dulcamara var. dulcamara – F, K]


* Solanum lycopersicum Linnaeus, Tomato. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): persistent and weakly naturalized around gardens, especially where compost or sewage sludge is spread; commonly cultivated, rare as a naturalized species. June-frost. The species is native to the Andes Mountains of nw. South America. *S. lycopersicum* is one of the most important and influential of edible species native of the New World introduced to the Old World, along with two other Solanaceae, the potato (*Solanum tuberosum*) and the chili (*Capsicum annuum*). There appears to be little reason to separate *Lycopersicon* from *Solanum*. [= Lycopersicon esculentum – RAB, C, F, G; > Solanum lycopersicum Linnaeus var. cerasiforme (Dunal) Spooner, J. An derson, & R.K. Jansen – K; > Solanum lycopersicum var. lycopersicum – k; = Lycopersicon lycopersicum (Linnaeus) Karsten – S; > Lycopersicon esculentum var. cerasiforme (Dunal) Alefani]

* Solanum pseudocapsicum Linnaeus, Jerusalem-cherry. Cp, Mt (GA), Pd (NC), [SC]: rarely cultivated, perhaps not established, native of Mediterranean Europe. [= K; = S. pseudo-capsicum – F, orthographic variant]


* Solanum pumilum Dunal. [GA]: Known from dolomitic Ketona glades in Bibb County, c. AL (Allison & Stevens 2001) and historically in GA (GAHP). [= Solanum carolinense Linnaeus var. hissutum (Nuttall) A. Gray – K]


* Solanum sarrachoides Sendtner, Hairy Nightshade. Cp (NC, VA), Pd (DE, NC, VA): disturbed areas; uncommon, native of South America. Works by Edmonds and associates have established that *S. sarrachoides* and *S. physalifolium* Rusby are two distinct species, but both are presently known from North America. Mistranslations of Cronquist's 1991 treatment of *Solanum* (e.g. by Kartesz 1999) have given rise to the incorrect belief that only *S. physalifolium* is found in North America. True *S. physalifolium* is present in the western United States, *S. sarrachoides* in the Southeast. [= RAB, C, Z; < S. physalifolium Rusby – K; = S. sarrachoides – F, orthographic error]


* Solanum viarum Dunal, Tropical Soda Apple. Cp (GA, NC, SC): pastures; rare, native of South America (s. Brazil, Paraguay, and n. Argentina). This species has only recently appeared in our area, but has been publicized as a severe, extremely aggressive and, rapidly spreading weed further south (Wunderlin et al. 1993, Mullaley et al. 1993, Mullaley 1996). [= K]
**360. SPHENOCLEACEAE** von Martius ex A.P. de Candolle 1839 (Chickenspike Family) [in SOLANALES]

A family of one genus and 2 species, annual herbs, of tropical regions, native of the Old World. References: Rosatti (1986)=Z.

*Sphenoclea* Gaertn. (Chickenspike)

A genus of 2 species, annual herbs, native of the Old World.

* Sphenoclea zeylanica* Gaertn., Chickenspike. Cp (FL, SC), Pd (GA, NC): rice plantations, reservoirs, other disturbed wetlands; rare, native of Old World tropics. August-October. [= K, S, WH, Z; = S. zeylandica – RAB, GW, orthographic error (presumably from a mistaken notion that the epithet refers to New Zealand rather than Ceylon)]

**361. HYDROLEACEAE** Berchtold & J. Presl 1820 (Hydrolea Family) [in SOLANALES]

A family of one genus and about 12 species, herbs and shrubs of water bodies and wetlands, primarily tropical. The Hydroleaceae is not closely related to Hydrophyllaceae; recent molecular data confirm the view prevailing through most of the 19th century that *Hydrolea* should be placed in its own family. References: Ferguson (1998); Hilger & Diane (2003); Angiosperm Phylogeny Group (1998, 2003, 2009).

*Hydrolea* Linnaeus 1762

A genus of about 11 species, aquatic and wetland herbs, of tropical and subtropical regions.

1. Flowers in axillary cymes; leaves 3-14 cm long, 1.5-4 cm wide; axillary spines present in the axils of some leaves; corolla 7-8 mm long.
2. Calyx and stem glabrous, or minutely puberulent or with sessile glands...............................................................................................................................................................................H. quadrivalvis
3. Calyx and stem sparsely pubescent with spreading hairs 2-3 mm long.............................................................................H. uniflora

1. Flowers in terminal cymes or corymb; leaves 2-6 cm long, 0.6-2.5 cm wide; axillary spines present or absent; corolla 10-15 mm long.
3. Leaves ovate to ovate-lanceolate, 3-6 cm long, 1.5-2.5 cm wide; axillary spines preset, well-developed, to 1.5 cm long.............H. ovata

*Hydrolea corymbosa* J. Macbride ex Elliott, Skyflower. Cp (FL, GA, SC): pond cypress savannas, depression meadows; uncommon (rare north of FL). Ne. SC south to sw. GA and s. FL. See Nelson (1993). The author is sometimes stated as J.F. Macbride, but this is an error. [= RAB, GW, K, WH; = *Nama corybosum* (Macbride ex Elliott) Kuntze – S]


*Hydrolea uniflora* Rafinesque. Swamp forests, sloughs, marshes. June-September. Mainly in the Mississippi River Alluvial Plain, west to e. TX and east to AL, TN, and KY. [= C, F, G, GW, K; = *Nama affine* (A. Gray) Kuntze – S; = *Hydrolea affinis* A. Gray]

**364. OLEACEAE** Hoffmannsegg & Link 1813 (Olive Family) [in LAMIALES]


1. Leaves compound.
2. Leaves pinnately compound with > 5 leaflets; petals absent; fruit a samara; small to large tree; [tribe Oleaeae, subtribe Fraxininae]..........
3. Flowers white, lilac, or purplish; fruit a drupe or 4-seeded capsule.
4. Leaves cordate or truncate at the base; fruit a 4-seeded capsule; corolla lobes shorter than the tube; flowers lilac or white, in terminal panicles; [tribe Oleaeae, subtribe Ligustrinae].................................................................Syringa
5. Corolla absent; calyx minute or lacking; flowers in axillary fascicles; [tribe Oleaeae, subtribe Oleinae]..................................Forestiera

*Oleaceae* Linnaeus 1753

A family of one genus and 2 species, trees and shrubs, nearly cosmopolitan, but centered in Asia.

1. Flowers in axillary cymes; leaves 3-14 cm long, 1.5-4 cm wide; axillary spines present in the axils of some leaves; corolla 7-8 mm long.
2. Calyx and stem glabrous, or minutely puberulent or with sessile glands...............................................................................................................................................................................H. quadrivalvis
3. Calyx and stem sparsely pubescent with spreading hairs 2-3 mm long.............................................................................H. uniflora

1. Flowers in terminal cymes or corymb; leaves 2-6 cm long, 0.6-2.5 cm wide; axillary spines present or absent; corolla 10-15 mm long.
3. Leaves ovate to ovate-lanceolate, 3-6 cm long, 1.5-2.5 cm wide; axillary spines preset, well-developed, to 1.5 cm long.............H. ovata

*Hydrolea corymbosa* J. Macbride ex Elliott, Skyflower. Cp (FL, GA, SC): pond cypress savannas, depression meadows; uncommon (rare north of FL). Ne. SC south to sw. GA and s. FL. See Nelson (1993). The author is sometimes stated as J.F. Macbride, but this is an error. [= RAB, GW, K, WH; = *Nama corybosum* (Macbride ex Elliott) Kuntze – S]


*Hydrolea uniflora* Rafinesque. Swamp forests, sloughs, marshes. June-September. Mainly in the Mississippi River Alluvial Plain, west to e. TX and east to AL, TN, and KY. [= C, F, G, GW, K; = *Nama affine* (A. Gray) Kuntze – S; = *Hydrolea affinis* A. Gray]
Chionanthus Linnaeus 1753 (Fringe-tree, Old Man's Beard)

A genus of controversial circumscription, either of only 3 species, limited to se. North America and e. Asia, or (if including Linociera) of about 60, primarily tropical. *C. pygmaeus* Small is endemic to scrub in peninsular FL. References: Hardin (1974)=Z.

*Chionanthus virginicus* L. (Fringe-tree, Old Man's Beard. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, FL, GA, NC, SC, VA, VA), April-May; July-September. NJ, s. PA, s. OH, and MO south to c. peninsular FL and e. TX. *C. virginicus* in our area shows a diversity of morphology and correlated habitat that suggests the possible presence of two taxa. Swamp- and pocosin-inhabiting populations in the outer Coastal Plain have leaves 4-8× as long as wide and seem very different than Piedmont dry woodland populations with leaves 1-2× as long as wide; further and more careful study is needed. *C. virginicus* is a traditional southern yard plant, often used as a "specimen plant," very showy in spring, particularly when grown to its full size. [= RAB, C, F, G, GW, K, S, W, WH, Z]

Forestiera Poiret 1812 (Forestiera)


1 Leaves (6-) 7-8 (-9) cm long, long-acuminate or acuminate (rarely acute) at the apex, the tip sharply pointed; [of swamp forests, sloughs, and ponds] ......................................................................................................................................................F. acuminata
   1 Leaves 1.5-7 (-8) cm long, obtuse at the apex, or if short-acuminate the ultimate tip blunt; [of shell middens and calcareous bluffs].
   2 Leaves deciduous, at least sparsely pubescent on the midrib above, pubescent and non-punctate below.  First-year twigs pubescent, the pubescence evenly distributed (not in 2 lines); petioles moderately pubescent; flowering in early spring from buds on twigs of the previous season; leaves 5-7 (-8) cm long .................................................................F. godfreyi
   2 Leaves evergreen, glabrous above, glabrous and punctate below; leaf margins entire ............................................F. segregata
   3 First-year twigs pubescent, the pubescence in 2 lines on either side of the twig; petioles glabrous (or with a very few hairs); flowering in mid-late summer, the flowers in leaf axils; leaves mostly 2-5 cm long .............................................................................................................................................F. ligustrina

*Forestiera acuminata* (Michaux) Poiret, Swamp-privet. Cp (FL, GA, SC): swamp forests, especially over calcareous substrates; uncommon. March; May-June. SC south to n. FL, west to TX, north in the interior to KY, e. and c. TN, IN, IL, MO, and KS. [= RAB, C, F, G, GW, K, S, Q, WH, X, Y, Z]

*Forestiera godfreyi* L.C. Anderson, Godfrey's Forestiera. Cp (FL, GA, SC): shell middens, maritime forests over shell substrate; rare. Mid January-February; April-May. Se. SC (Beaufort and Charleston counties) to e. GA and n. peninsular and e. Panhandle FL. [= K, WH, X, Y; < F. pubescens Nuttall – S, in part (apparently)]

*Forestiera ligustrina* (Michaux) Poiret, Southern-privet. Cp (FL, GA, SC), Pd (GA, SC): upland forests and slopes along streams, mostly on shell middens or calcareous rocks; uncommon (rare in SC). E. SC south to n. peninsular FL, west to se. TX, north in the interior to c. TN and KY. [= K, S, Q, X, Z]

*Forestiera segregata* (Jacquin) Krug & Urban var. segregata, Florida-privet. Cp (FL, GA, SC): calcareous scrub, shell middens, maritime forests and thickets; rare. Se. SC south to s. FL, and in the West Indies. Var. pinetorum (Small) M.C. Johnston is restricted to s. FL. [= K, Q, Z; > F. porulosa (Michaux) Poiret – S; > F. globularis Small – S; < F. segregata – WH, X]

Forsythia Vahl 1804 (Forsythia, Golden-bells)


1 Mature branches hollow or irregularly pith-filled between the nodes; leaves oblong-ovate, toothed or 3-parted; branches arching when well-developed .................................................................................................................F. suspensa
   1 Mature branches cross-septate (chambered) between the nodes; leaves oblong-lanceolate, toothed; branches upright ................................F. viridisssima

1 Young twigs 4-angled or narrowly 4-winged; [trees of calcareous woodlands west of ne. WV, sw. VA, e. TN, nw. GA, and c. AL]; [section Dipetalae] ............................................................................................................................. ......................................................................................

1 Young twigs terete (rounded in cross-section); [trees of various habitats, collectively widespread in our area].

2 Lateral leaflets sessile; calyx absent; seed cavity of samara flattened in cross-section; [of VA and KY northwards]; [section Fraxinus] ..........

2 Petiole bases and leaf scars oblong-obovate to widely obovate with a nearly truncate apex; samaras (32-) 33-54 mm long, samara wings (19-) 25-32 (-38) mm long, 1.5-2.5 mm wide; twigs, petioles, petiolules, and rachises glabrous

3 Leaves minutely honeycomb-reticulate beneath (best seen at magnification of 40× or more), and sometimes pubescent, more-or-less strongly whitened; wing of the samara decurrent only onto the upper 1/3 (or less) of the samara body ............................... F. americana

3 Leaves glabrous to pubescent beneath (and sometimes with papillae and small scales visible at 40×, but never minutely honeycomb-reticulate), green; wing of the samara decurrent onto 1/2 (or more) of the samara body.

4 Petiolules of the lowermost leaves 1-9 mm long, all but 1-2 mm narrowly winged; samara mostly < 7 mm wide; calyx 0.5-1.5 mm long ................................................................. F. pennsylvanica

4 Petiolules of the lowermost leaves 3-20 mm long, not winged (except F. caroliniana); samara mostly > 7 mm wide; calyx 1-6 mm long.

5 Body of samara flattened, winged the full length of the samara body; calyx 1 mm long; leaf scars slightly notched; small tree, often multi-trunked ......................................................................................................................... F. caroliniana

5 Body of samara terete or subterete, winged about 1/2 the length of the samara body; calyx 2.5-6 mm long; leaf scars deeply notched; medium to large tree, typically single-trunked ............................................................................................................................. F. profunda

New provisional key

1 Leaves minutely honeycomb-reticulate beneath (best seen at magnification of 40× or more), more-or-less strongly whitened (and otherwise variously glabrous or pubescent).

2 Petiole bases and leaf scars V- to U- or crescent-shaped with a deeply concave or notched apex; samaras (19-) 25-32 (-38) mm long, samara wings 3-5 (-6) mm wide, samara bodies (5-) 6-11 mm long, 1.5-2.5 mm wide; twigs, petioles, petiolules, and rachises glabrous

3 Twigs, petioles, petiolules, and rachises densely hirtellous to hirtellous-puberulent to tomentulose; samaras 33-54 mm long, samara wings 6-8 mm wide, samara bodies (7-) 11-15 mm long, 2-4 mm wide ......................................................................................................................... F. biltmoreana

3 Twigs, petioles, petiolules, and rachises glabrous; samaras (32-) 36-44 mm long, samara bodies (4.5-) 5-7 mm wide, samara bodies (9-) 10-13 mm long, 2.5-3.5 mm wide ............................................................................................................................. F. smallii

4 Youngest twigs 4-angled to narrowly 4-winged; petiole bases raised on a distinct pedestal; lateral leaflets sessile to subsessile.

5 Samara bodies flattened but clearly distinct from wings, wings 5-10 mm wide; buds gray to reddish brown; leaf scars crescent-shaped, apex concave; flowers bisexual ......................................................................................................................... F. quadrangulata

5 Samara bodies strongly flattened and often nearly indistinct from wings, wings 5-8 mm wide; buds black to blackish brown; leaf scars shallowly hemispheric, apex truncate; flowers bisexual and unisexual ......................................................................................................................... [F. excelsior]

4 Youngest twigs terete; petiole bases flush with stem; lateral leaflets sessile to subsessile or petiolulate.

6 Multi-trunked shrubs or small trees; samara wings 2-3, arising from the base or proximal ⅛ of body, (8-) 10-20 mm wide ...................... F. caroliniana

6 Trees; samara wings 2, arising from near the base to near apex of body, (5.5-) 6-10 (-12) mm or 4-7 mm wide.

7 Lateral leaflets sessile; samara bodies strongly flattened and often nearly indistinct from wings; buds black to blackish brown, corky-ridged ............................................................................................................................. F. profunda

7 Lateral leaflets petiolulate; samara bodies distinct from wings; buds brownish, not corky-ridged

8 Leaflets mostly (6-) 7.5-11 (-12) cm × 2.5-5(-6) cm, bases obtuse to acute or abruptly attenuate; samaras 20-45 (-60) mm, wings arising abruptly from distal ⅔/1-5/ (⅗) of body, 4-7 mm wide ................................. F. pennsylvanica

8 Leaflets (7-) 9-15 (-25) cm × (2.5-) 3.5-7 (-11) cm, bases often rounded, less commonly obtuse to acute or acuminate; samaras (35-) 40-70 (-75) mm, wings gradually expanded from near the base of the body to proximal ⅓, (5.5-) 6-10 (-12) mm wide ..........

Fraxinus Linnaeus, White Ash, American Ash. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): mesic slopes, rich cove forests, dryish calcareous or mafic glades and woodlands (with Juniperus

OLEACEAE

1 Leaves trifoliolate; flowers white ................................................................................................................................. [J. multiflorum

2 Leaflets 1-3 cm long; flowers 2.5-7 cm across .............................................................................................................. J. mesnyi

2 Leaflets 2.5-7 cm long; flowers 3.5-5 cm across ............................................................................................................ [J. nudiflorum


* Jasminum nudiflorum Lindley, Winter Jasmine, native of China, is commonly planted and often persists. It has green stems and yellow flowers. Reported for GA (K). [= K]

Ligustrum Linnaeus 1753 (Privet)

[contributed by Guy L. Nesom and Alan S. Weakley]

1. Leaves (3-) 4-13 (-15) cm long.
2. Leaves mostly (3-) 4-8 (-9) cm long, primary lateral veins 3-5 pairs, apex acute to abruptly acuminate, abaxial midvein covered by epidermis; flowers short-pedicellate on pedicels 0.5-2 mm; corolla tube hardly exserted from calyx, ca. equal lobe length .................. L japonicum
3. Leaves 4.5-6 x 13 (-15) cm, primary lateral veins (5-) 6-8 pairs, apex usually long-acuminate, abaxial midvein not covered by epidermis; flowers subsessile on pedicels 0-0.5 mm; corolla tube distinctly exserted from calyx, ca. 2 x longer than lobes ...................... L lucidum

1. Leaves 1.5-6 (-6.5) cm long.
2. Branchlets glabrous and usually glossy ................................................................. L ovalifolium
3. Branchlets minutely hirsutellous, hirsute-hirtellous, or hirsutulous, dull.
4. Leaf blades hirsutulous abaxially, rarely only along the nerves, sparsely hirsute-striose adaxially, sometimes mostly near the margins, primary lateral veins (5-) 6-8 pairs, apices sharply acute (to slightly acuminate, or rarely obtuse) ......................... [L tschonoskii]
5. Leaf blades glabrous on both surfaces or sometimes sparsely hairy along the abaxial midvein, primary lateral veins (2-) 3-6 pairs, apices obtuse to acute (in L vulgar) or obtuse to rounded.
6. Leaf blades narrowly oblanceolate to oblanceolate-elliptic, oblanceolate or narrowly obovate, usually broadest slightly above the middle; inflorescence usually narrowly cylindric, flowers sessile to subsessile in verticil-like clusters ......................... L quihoui
7. Leaf blades variously shaped; inflorescence broadly cylindric to pyramidal, flowers sessile to pedicellate in broadly cylindric to pyramidal panicles of cymes.
8. Corolla tube < 1.2 x as long as the lobes.
9. Leaf blades oval-elliptic to oblong-ovate, elliptic-lanceolate, or suborbicular, primary lateral veins (3-) 4-5 pairs, apex obtuse to rounded or retuse, abaxial midvein usually sparsely hirsutulous to puberulent; inflorescence diffuse and open panicles terminal and on essentially leafless, lateral branches interspersed with leafy ones; branchlets hirtellous to loosely substipitate with straight hairs of uneven length; corolla tube slightly shorter than lobes, often barely exserted from the calyx tube; pedicels glabrous ......................................................... L sinense
10. Leaf blades narrowly oblong-elliptic to oblanceolate-elliptic, oblanceolate or narrowly obovate, usually broadest slightly above the middle; inflorescence usually narrowly cylindric, flowers sessile to subsessile in verticil-like clusters ......................... L vulgar
11. Corolla tube 1.5-3 x longer than the lobes.
12. Leaf blades usually sparsely villous abaxially; calyx and pedicels sparsely to densely hirtellous (rarely nearly glabrous); corolla tube 2-3 x as long as the lobes .......................... L obtusifolium var. obtusifolium
13. Leaf blades usually glabrous abaxially; calyx and pedicels glabrous to very sparsely hirtellous; corolla tube 1.5-2 x as long as the lobes ............................................. L obtusifolium var. suave

* Ligustrum lucidum* Aiton f., Glossy Privet, Broadleaf Privet. Pd (NC), Cp (FL, NC): disturbed places; rare, native of China, Japan, and Korea. This species is superficially similar to *L japonicum*; the lateral leaf veins are translucent in this species. [= K, WH, Y, Z]
* Ligustrum obtusifolium* Siebold & Zuccarini var. obtusifolium. Cp (NC, VA), Pd (NC, VA), Mt (VA, WV), {SC}: disturbed places; uncommon (rare in WV), native of Japan. [= Y; = L obtusifolium – C, F, G, K, Z]
* Ligustrum obtusifolium* Siebold & Zuccarini var. suave (Kitagawa) H. Harms, Privet. Cp, Pd (NC, VA), Mt (VA), {SC}: disturbed places; uncommon, native of Japan. [= Y; = L amurense Carrière – RAB, C, F, G, K, Z; = Ligustrum obtusifolium Siebold & Zuccarini var. amurense (Carrière) Mansfeld]
* Ligustrum sinense* Loureiro, Chinese Privet. Cp (FL, GC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): moist forests, especially alluvial bottomlands; common, native of China. This species is one of the most noxious of our weeds, choking out native vegetation in hundreds of square kilometers of land in our area. The rapidity with which it has engulfed southern wetlands is hinted at by Small's (1933) mention of it only as "an escape in southern Louisiana." [= RAB, C, G, GW, K, S, W, WH, Y, Z]

Ligustrum tschonoskii Decaisne. Pd (DC): suburban forests; rare, native of Japan. Known in the flora area "only from the woods along the bank of Rock Creek in Rock Creek Park" (Nesom 2009a; Shetler and Orli 2000). Two varieties within *L tschonoskii* were recognized by Noshiro (1985), distinguished by slight and overlapping size differences. Var. *tschonoskii* is restricted in native range to Japan; var. *kiyozumianum* (Nakai) Ohwi occurs in Japan and Korea. [= Y]

Osmanthus Loureiro 1790 (Wild Olive, Devilwood)

OLEACEAE

1 Leaf margins entire; leaves usually >7 cm long; [native tree of Coastal Plain forests] ................................................................. **O. americanus**

1 Leaf margins spiny-toothed; leaves < 10 cm long; [horticulturally planted, rarely naturalizing] .............................................................. **O. ×fortunei**

**Osmanthus americanus** (Linnaeus) Bentham & Hooker f. ex A. Gray, Wild Olive, Devilwood. Cp (FL, GA, NC, SC, VA): maritime forests and (in FL, GA, SC, and extreme s. NC) dry, sandy forests well inland, and reported for wet habitats as well further south; uncommon (rare in VA). April-May; August-October. Se. VA south to c. peninsular FL, west to LA; also in Mexico. **O. megacarpus** Small, sometimes treated as a variety, **O. americanus** var. **megacarpus** (Small) P.S. Greene, is endemic to pine scrub in peninsular FL and differs primarily in having a larger fruit. The very hard, tough, and “unsplittable” wood is the inspiration for the common name “Devilwood.” **O. americanus** is a conspicuous element of maritime forests in most of our area, readily recognizable by the flattened twigs characteristic of the family, and the opposite (or typically, actually subopposite), glossy, oblanceolate to obovate, evergreen leaves. [= RAB, F, G, GW, WH; = **O. americanus** var. **americanus** – C, K, Z; = **Amarolea americana** (Linnaeus) Small] *

**Osmanthus ×fortunei** Carrière [= **O. fragrans** × **heterophyllus**], Fortune’s Sweet Olive. Pd (NC): suburban woodlands, escaped from horticultural plantings; rare, hybrid originating in Japan of two species native to Japan.


**Syringa** Linnaeus 1753 (Lilac)


* **Syringa vulgaris** Linnaeus, Lilac. Mt (NC, VA, WV): commonly planted, persistent and naturalizing around old farms; rare, native of se. Europe. [= C, F, G, K, Z]

365. **TETRACHONDRACEAE** Wettstein 1924 (Tetrachondra Family) [in LAMIALES]

A family of 2 genera, **Polypremum** and **Tetrachondra** (Oxelman et al. 1999), and 3 species, perennial herbs, of s. North America south to South America, and New Zealand. The assignment of **Polypremum** to family has been controversial, with placement formerly in Loganiaceae or Buddleiacae. A recent molecular analysis strongly suggests that its closest relationship is with **Tetrachondra** (Oxelman et al. 1999), and the treatment followed here reflects the current general consensus. References: Oxelman et al. (1999); Wagstaff in Kadereit (2004).

**Polypremum** Linnaeus 1753 (Polypremum)

The genus is monotypic, an herb, or warm temperate, subtropical and tropical America. References: Rogers (1986)=Z; Wagstaff in Kadereit (2004).

**Polypremum procumbens** Linnaeus, Polypremum, Rustweed, Juniperleaf. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): fields, disturbed areas; common, rare in Mountains. Late May-September; August-October. Se. NY, NJ, and MO south to FL and TX, and south into Central America, South America West Indies. [= RAB, C, F, G, GW, K, S, W, Z]

368. **PLANTAGINACEAE** A.L. de Jussieu 1789 (Plantain Family) [in LAMIALES]

As newly and radically recircumscribed, a family of about 120 genera and 1800 species. References: Albach, Meudt, & Oxelman (2005); Olmstead et al. (2001); Schwarzbach in Kadereit (2004); Fischer in Kadereit (2004).

1 Leaves alternate, at least those on the upper stem; calyx 5-merous; stamens 4.

2 Corolla lacking a spur or pouch at the base.

3 Stem erect; flowers > 10 mm long; [tribe **Digitaleae**] ................................................................................................................................. **Digitalis**

3 Stems prostrate; flowers < 5 mm long; [tribe **Limoselleae**] .................................................................................................................. **Limosella**

2 Corolla with a distinct spur or broad pouch protruding between the 2 lower calyx lobes; [tribe **Antirrhineae**].

4 Corolla with a broad pouch at the base.
5 Corolla with a slender spur at the base.
6 Flowers in terminal racemes.
7 Corolla yellow; capsule 9-12 mm long.................................................................Linaria
8 Stems erect; leaves linear ......................................................................................Chaenorrhinum
9 Calyx lobes distinctly unequal, all longer than the corolla tube; corolla 25-40 mm long; leaves to 15 mm wide. ………Antirrhinum
5 Calyx lobes about equal, all shorter than the corolla tube; corolla 25-40 mm long; leaves to 15 mm wide. ………Antirrhinum
4 Corolla with a slender spur at the base.
6 Flowers solitary in leaf axils.
7 Corolla blue; capsule 2-3 mm long........................................................................Nuttallanium
8 Stems prostrate; leaves orbicular, ovate, or triangular.
9 Leaves orbicular in outline, palmately lobed and veined; stems rooting at nodes .................................................Cymbalaria
10 Leaves strongly basally disposed, usually all the leaves basal; petals 4, scarious and translucent in texture; inflorescence a spike; [tribe Plantagineae] ..................................................................................................................Antirrhinum
10 Leaves caulescent, either opposite or whorled; petal 0, or 4, or 5; inflorescence various.
11 Leaves opposite.
12 Aquatic; leaves 5-30 mm long, lanceolate, toothed to deeply dissected into linear segments; [tribe Gratioleae] ..................Limnophila
13 Calyx and corolla 4-merous.
14 Calyx and corolla 5-merous.
16 Plants erect, moderately robust, usually > 4 dm tall, larger leaves > 5 cm long; inflorescences terminal (the bracts subending flowers strongly reduced in size in comparison to main leaves of the stem); [tribe Cheloneae] .........................................................Chelone
17 Inflorescence compact, the inflorescence axis generally hidden by the closely packed and overlapping flowers; each flower subended by large overlapping bracts. .........................................................................................Chelone
18 Stamens 2; [section Gratioleae].
19 Capsule flattened, wider than long, notched; leaves dimorphic, with narrow submersed leaves on the lower stems, and broad floating leaves just subending the aerial inflorescences; [of vernal pools on granite outcrops in Piedmont SC, GA, and AL]. .................................................................................................................Gratiola amphibantha
20 Flowers and fruits on definite pedicels; annual or perennial; leaves not papillose .........................................................Gratiola
21 Sepals evidently connate into a tube about as long as the lobes; [section Cheloneae] .........................................................Collinsia
22 Leaves deeply pinnatifid; [tribe Stemoniaceae] ..........................................................Leucospora
23 Corolla nearly radially symmetrical; corolla lobes about as long as the corolla tube; leaves palmately veined, with parallel veins diverging from the base, margins entire to crenulate; of aquatic to moist habitats, often somewhat succulent ..........................................................................................................................Bacopa
24 Flowers and fruits sessile or subsessile, the pedicels < 1 mm long; perennial; leaves papillose on the surfaces and margins ..............................................................................................................................Sophronanthus
25 Stamens 4.
26 Plants creeping, decumbent or erect, small, usually < 4 dm tall (except Mecardonia, to 5 dm tall), larger leaves < 5 cm long; inflorescences axillary (all or most of the flowers axillary to more-or-less normally sized leaves).
27 Flowers and fruits on definite pedicels; annual or perennial; leaves not papillose .........................................................Mecardonia
28 Stamens 2; [section Gratioleae].
29 Capsule turgid, longer than wide; leaves monomorphic; [collectively of many habitats and widespread].
30 Flowers and fruits sessile or subsessile, the pedicels < 1 mm long; perennial; leaves papillose on the surfaces and margins ..............................................................................................................................Sophronanthus
31 Stamens 4.
32 Plants erect, moderately robust, usually > 4 dm tall, larger leaves > 5 cm long; inflorescences terminal (the bracts subending flowers strongly reduced in size in comparison to main leaves of the stem); [tribe Cheloneae] .........................................................Chelone
33 Inflorescence more diffuse, the inflorescence axis readily visible between the flowers; flowers lacking extra subending bracts .........................................................................................................................Chelone
34 Leaves entire or toothed; [tribe Cheloneae].
35 Corolla distinctly bilabiate; corolla lobes shorter than the corolla lobe; leaves pinnately veined, with a single main-vein and lateral veins diverging along it, margins serrate; of moist habitats, not succulent .................................................Mecardonia

Antirrhinum Linnaeus 1753 (Snapdragon)
A genus of about 20 species, herbs, of Mediterranean Europe. References: Sutton (1988)=Z; Pennell (1935)=P. [also see Misopates]

* Antirrhinum majus Linnaeus, Common Snapdragon. Mt (VA, WV), Pd (VA): cultivated, rarely persistent or naturalized; rare, native of Mediterranean Europe. July. [= C, G, K, P, WV, Z]

Bacopa Aublet 1775 (Water-hyssop)
A genus of about 50 species, herbs (mostly aquatic or at least wetland), of tropical, subtropical, and warm temperate regions of the Old and New Worlds. References: Schuyler (1989)=Z; Fernulal (1942); Pennell (1935)=P.

1 Leaves ovate to oblanceolate, cuneate at the base, 1-veined (or with 1-2 additional obscure veins), 3-8 mm wide; stems glabrous; fresh plants not aromatic ..............................................................................................................................B. monnieri
1 Flowers and young fruits lacking bracts at their base; leaves monomorphic, obovate-spatulate, rounded at the tip. Schuyler (1989) concluded that GW, K, Z; F, G, GW, K, W, WH; Bacopa rotundifolia where apparently native (though C considers introduced). Known in NC only from Lake Mattamuskeet, Hyde County, where not muddy shores, streams and pools; common (uncommon in GA, NC, SC, and VA). E. VA south to s. FL, west to c. TX; disjunct in KY. The strongly fragrant stems and leaves are unique. [= RAB, C, F, G, GW, K, W, WH; = Hydrotridica rotundifolia (Walter) Small – P, S]

2 Fresh plants not aromatic when bruised; corolla pale to bright blue, 9-13 mm long; calyx subtended by 2 subulate bractlets; stamens 4-10 mm long; calyx not subtended by bractlets; stamens 2 or 4.
3 Flower margin either not winged or with a wing < 0.05 mm wide, narrowing towards the base of the fruit before ending above the base; fruit ellipsoidal, obovoid, or nearly heart-shaped.
4 Leaves strongly clasping, mostly ovate; stamens 2 (or very rarely 4); [native] Bacopa repens


Bacopa inominata (Gómez Maza) Alain, Tropical Water-hyssop. Cp (FL, GA, NC, SC, VA): freshwater tidal mudds, marshes, shallow water; uncommon (rare in GA, NC, SC, and VA). June-September. MD south to s. FL, and in the West Indies and Central America. B. stragula Fernald has been considered a rare endemic of tidal areas in VA and MD, differing from B. inominata in its glabrous stems (vs. pubescent), smaller flowers (the corolla < 3 mm long vs. > 3 mm long), and shorter, glabrous pedicels 3-6 mm long (vs. pubescent and to 8 mm long). Schuyler (1989) concluded that B. stragula is an intertidal form of B. inominata, the morphologic differences induced by the flooding regime. Additional work, perhaps involving growth under experimental conditions or chemical or molecular studies, is needed to corroborate Schuyler's conclusion. See Schuyler (1989), F, and Fernald (1942) for further discussion. [= C, GW, K, WH, Z; B. cyclophyila Fernald – RAB; B. stragula Fernald – F, G; ? Herpestis rotundifolia Gaertner – P, S; ? Macuillamia obovata Rafinesque – P]


Bacopa rotundifolia (Michaux) Wettstein, Midwestern Water-hyssop. Cp (NC, VA): tidal mudds, shallow water of large natural lake; rare. June-September. IN and IA west to ND and MT, south to AL and AZ, disjunct in e. MD, e. VA, and ne. NC, where apparently native (though C considers introduced). Known in NC only from Lake Mattamuskeet, Hyde County, where not seen since 1929. B. simulans Fernald has been considered a rare endemic of tidal areas in VA and MD. It is alleged to differ from B. rotundifolia in its glabrous to glabrescent stems (vs. pubescent), more succulent condition, smaller leaves (the larger 1-2 cm long and 0.6-1.5 cm wide vs. 2-3.5 cm long and 1.5-2.7 cm wide), smaller flowers (corolla 3-4 mm long vs. 6-10 mm long). Schuyler (1989) concluded that B. simulans is an intertidal form of B. rotundifolia, the morphologic differences result the the differences of inundation. Additional work, perhaps involving growth under experimental conditions or chemical or molecular studies, is needed to corroborate Schuyler's conclusion. See Schuyler (1989), F, and Fernald (1942) for further discussion. [= C, GW, K, Z; B. rotundifolia – F, G; B. simulans Fernald – F, G; = Macuillamia rotundifolia (Michaux) Rafinesque – P, S]

Callitrichie Linnaeus 1753 (Water-starwort)

A genus of 20-50 species, annual and perennial herbs of aquatic, wetland, and upland habitats, notably cosmopolitan. This genus should be included in a greatly expanded Plantaginaceae. References: Angiosperm Phylogeny Group (2003, 2009); Crow & Hellquist (2000)–Z; Fassett (1951)–Y; Erbar & Leins in Kaderéeit (2004). Key based on Z.

1 Flowers and young fruits with 2 inflated bracteoles at the base; leaves dimorphic (with floating rosettes of spatulate leaves and submerged linear leaves) or monomorphic.
2 Fruit margin distinctly winged, the wing nearly 0.1 mm wide, extending the entire distance from the summit to the base of the fruit; fruit globose
3 Flower margin either not winged or with a wing < 0.05 mm wide, narrowing towards the base of the fruit before ending above the base; fruit ellipsoidal, obovoid, or nearly heart-shaped.
4 Flowers and young fruits lacking bracts at their base; leaves monomorphic, obovate-spatulate, rounded at the tip.
5 Mericarps bent at an angle and thickened on one side at the base; [of SC southward] Mericarps not bent at an angle nor thickened at the base; [collectively widespread].
6 Fruit on pedicels 0.5-7 mm long; margin of fruit curled over on itself, appearing thickened; fruit developing underground 
7 Fruit on pedicels 0.1-0.6 mm long; margin of fruit narrow, thin; fruit developing aboveground

Callitrichie heterophylla Pursh var. heterophylla, Common Water-starwort. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA, WV): pools, slow-moving streams, ditches; common (uncommon in GA, NC, SC, and VA Piedmont, uncommon in Mountains). March-October. Greenland west to AK, south to c. peninsular FL, TX, CA, and Mexico. The other variety, var. bolanderi (Hégelmann) Fassett, with larger fruits, co-occurs with var. heterophylla in nw. North America
and is of uncertain taxonomic status, having been treated as species, subspecies, variety, and lumped. [<\textit{C. heterophylla} – RAB, C, G, GW, S, WH, Z; > \textit{C. heterophylla} – F; > \textit{C. aniceps} Fernald – F, Y; = \textit{C. heterophylla} ssp. \textit{heterophylla} – K; > \textit{C. heterophylla} var. \textit{heterophylla} – Y]

\textbf{Callitriche palustris} Linnaeus, Swamp Water-starwort. Cp (DE, VA), Pd (DE, VA), Mt (VA, WV): ponds, lakes, stagnant streams, wet soil; rare. Circumboreal, in North America south to VA, WV, IL, TX, and CA; South America. The nomenclatural debate between \textit{C. palustris} and \textit{C. verns} is difficult to resolve. = C, F, K, S = \textit{C. verns} Linnaeus – G, W, Y, Z

\textbf{Callitriche pedunculosa} Nuttall. Cp (FL, GA, NC), Pd (NC): low fields, pond shores; rare. NC, c. TN, and OK south to c. peninsular FL, AL, and TX. = [K, WH; = \textit{C. nutallii} Torrey – GW, Y, Z]

\textbf{Callitriche peplodes} Nuttall. Cp (FL, GA, SC): low fields, ditches; rare. April-June. SC south to s. FL, west to TX; disjunct inland in TN, AR; e. Mexico south to Costa Rica. = RAB, GW, K, S, W; = \textit{C. peplodes} var. \textit{peplodes} – Y)

* \textbf{Callitriche stagnalis} Scopoli. Pd (DE, VA), Mt (VA), Cp (VA): ponds, stagnant water, wet soil; rare, native of Europe, or possibly also native in some areas. See Philbrick, Aakjaer, & Stucky (1998) for additional discussion of the spread of this species in North America. = C, F, K, Y, Z


\textbf{Chaenorrhinum} (A.P. de Candolle ex Duby) Reichenbach 1828

\textit{Dwarf Snapdragon, Lesser Toadflax)}


\textbf{Chelone} Linnaeus 1753 (Turtlehead)


\textbf{Identification notes:} The four fertile stamens are inserted on either side of the corolla near its base and are flattened and conspicuously pilose. The single staminodium (the color of which is used in the key) is much shorter (often only a few mm long), and is inserted uppermost on the corolla near its base.

1 Leaves sessile; flowers distinctly 4-ranked; staminodium purple; corolla purple ................................................................. \textit{C. cuthbertii}

1 Leaves with petioles 0.5-1.5 cm long (or subsessile in \textit{C. glabra}); flowers less distinctly 4-ranked; staminodium white or green; corolla purple or white.

2 Petioles 1.5-4 cm long; leaf blade rounded at the base; leaf blades averaging 2× as long as wide, 4-8 cm wide; staminodium white; corolla purple ......................................................................................................................................................... \textit{C. elongata}

2 Petioles 0.1-1.5 cm long; leaf blade cuneate at the base; staminodium white or green; leaf blades averaging 3× (or more) as long as wide, 1-6 cm wide; corolla purple or white.

3 Corolla white (or tinged with purple near the summit); staminodium green ..................................................................................... \textit{C. glabra}

3 Corolla purple throughout; staminodium white .............................................................................................................................. \textit{C. obliqua}


**Collinsia** Nuttall 1817 (Blue-eyed Mary)


**Cymbalaria** Hill 1756 (Kenilworth-ivy)


* Cymbalaria muralis P.G. Gaertner, B. Meyer, & Scherbias ssp. muralis, Kenilworth-ivy. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE, VA): naturalized on walls and rock crops near plantings, roadsides, disturbed areas; uncommon (rare in NC and VA), native of Eurasia. May-August. The other two subspecies, both villous throughout (vs. glabrous or with a few scattered hairs in ssp. muralis) are Mediterranean and are not known to be naturalized in North America. Reported for NC (Henderson County) by Pittillo & Brown (1988) as "derived from potted plants that have become established beneath the overhang of a porch for over a decade," and reported again more recently as spreading from plantings in Alleghany County, NC (Poindexter 2006) and Buncombe County, NC (C.A. McCormick, pers.comm. 2009). Reported by Pennell (1935) as being "in herbaria" from DC, KY, MD, SC, TN, WV, and other states beyond our area. [= Z; < C. muralis – C, F, G, K, P, WV; = C. cymbalaria (Linnaeus) Wettstein; = Linaria cymbalaria (Linnaeus) P. Miller]

**Digitalis** Linnaeus 1753 (Foxglove)

A genus of about 19 species, herbs, of Europe west to central Asia. Famous as the source of the drug digitalis, a cardiac glycoside. References: Pennell (1935)=P.

1 Corolla 1.3-1.8 cm long, pale yellow to white; plant nearly glabrous .................................................................[D. lutea]
2 Corolla 2-5.5 cm long, white, yellow, or purple; plant conspicuously pubescent on the stem and/or leaves.


* Digitalis purpurea Linnaeus, Digitalis, Common Foxglove, Purple Foxglove, Lady’s-glove. Mt (NC, WV), Cp (VA): disturbed areas, bog margins; uncommon (rare in NC and VA), native of Europe. June-August. Introduced and established at scattered locations in ne. North America, as far south as PA (Rhoads & Klein 1993). [= C, P, WV; > D. purpurea var. purpurea – K; > D. purpurea var. alba – K]

* Digitalis lutea Linnaeus, Straw Foxglove. Naturalized south to MD, PA, and OH. [= C, G, K]

**Gratiola** Linnaeus 1753 (Hedge-hyssop)


**Identification notes:** Gratiola amphiantha somewhat resembles Callitriche, but has floating leaves in single pairs rather than in a whorl.

1 Capsule flattened, wider than long, notched; leaves dimorphic, with narrow submersed leaves on the lower stems, and broad floating leaves just subtending the aerial inflorescences; [of vernal pools on granite outcrops in Piedmont SC, GA, and AL]...............................G. amphiantha
2 Capsule turgid, longer than wide; leaves monomorphic; [collectively of many habitats and widespread].
3 Flowers and fruits sessile or sub sessile, the pedicels < 1 mm long; perennial.
4 Leaves linear-subulate; corolla 2-3× as long as the calyx .................................................................[see Sophronanthe hispida]
5 Leaves ovate; corolla 1-1.5 × as long as the calyx .................................................................[see Sophronanthe pilosa]
6 Flowers and fruits on definite pedicels; annual or perennial.
7 Calyx subtended by 0 (-1) bractlet; corolla lobes white; corolla tube greenish yellow, conspicuously veined.........................G. ramosa
8 Calyx subtended by 2 bractlets; corolla lobes white or yellow-orange; corolla tube greenish yellow and conspicuously veined, or orange and not conspicuously veined.
9 Corolla lobes and tube yellow-orange (very rarely white), not conspicuously veined; sepals and flower stalks sparsely or not at all glandular-puberulent.................................................................G. aurea
10 Corolla lobes white to lavender, corolla tube greenish yellow, usually conspicuously veined; sepals and flower stalks densely glandular-puberulent.

Gratiola aurea Pursh, Yellow Hedge-hyssop, Golden-pert. Cp (DE, FL, GA, NC, SC): blackwater river banks, pondcypress savannas in Carolina bays, other acidic wetlands; uncommon (rare in FL). May-September. NL (Newfoundland) and QC south in the Coastal Plain to Panhandle FL; disjunct around the Great Lakes and inland in NY, ON, IL, and ND. [= RAB, C, F, G, GW, K, S, WH; > G. lutea Rafinesque var. typica – P; > G. lutea var. obscura (Pennell) Pennell – P]


Gratiola parviflora D. Estes, Limestone Hedge-hyssop, Quarterman’s Hedge-hyssop. Ip (TN): limestone glades; rare. April-early June. C. TN south to n. AL; c. TX (Edwards Plateau); s. ON; ne. IL. [= Z; < G. neglecta – C, GW, K, P, S, W; < G. neglecta var. neglecta – F]

Gratiola ramosa Walter. Cp (FL, GA, NC, SC, VA): wet pine savannas, marshes, pond margins; ditches; common (rare in VA). May-June. Se. NC south to s. FL, west to sw. LA; disjunct in se. VA (Greenville County) and (at least historically) in c. MD. [= RAB, C, F, G, GW, K, P, S, WH]

Gratiola virginiana Linnaeus, Virginia Hedge-hyssop. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, WV): sluggish streams, bogs, wet areas; common (uncommon in WV). March-May. NJ west to OH and IA and KS, south to c. peninsular FL, c. TX. Var. aestuariorum Pennell, of s. NJ south to e. VA, is alleged to differ in being shorter, with more rounded leaves, short pedicels (< 2 mm long), a shorter calyx and corolla, and a smaller capsule; it is likely merely a stunted form, but needs additional study (see F and P for additional details). [= RAB, C, G, GW, S, W, WH, WV; > G. virginiana var. virginiana – F, K, P; > G. virginiana var. aestuariorum Pennell – F, K, P]


Kickxia Dumortier 1827 (Fluellen, Cancerwort)


1 Leaves round-ovate, rounded to cordate at the base; pedicels villous throughout their length; [ballast wair] ..........................................

K. spuria

1 Leaves triangular-ovate or hastate, truncate at the base; pedicels glabrous through much of their length or villous; [more widespread alien].
2 Stems densely villous; stems robust (usually 1.5-3.5 mm thick), often much-branched; pedicels 5-12 (-20) mm long, 0.25-0.35 mm in diameter, often villous their entire lengths..............................................................K. elatine ssp. crinita
2 Stems sparsely villous; stems slender (to 1.5 mm thick), sparingly (if at all) branched, pedicels mostly (8-) 15-25 (-30) mm long, 0.1-0.2 mm in diameter, glabrous except for immediately below the calyx ..............................................................................K. elatine ssp. elatine


**Leucospora** Nuttall 1834 (Leucospora)

A genus of 2 species, herbs, of e. North America and Coahuila, Mexico. *Leucospora* may not be distinct from *Stemodia.* References: Pennell (1935)=P.

*Leucospora multifida* (Michaux) Nuttall, Leucospora, Narrowleaf Paleseed. Cp* (FL*, NC*), Pd (VA*), Mt (GA, WV): moist to wet, sandy margins of artificial ponds, drawdown areas on riverbanks, drawdown depressional wetlands, other seasonally ponded disturbed areas; rare, probably introduced in most of our area from c. United States. S. ON west to IA and KS, south to nw. GA, AL, LA, and e. TX; scattered occurrences further east (as in e. NC, FL, KY, TN, VA, and se. PA) may be recent introductions. [= C, G, GW, K, P, S, = Conoeba multifida (Michaux) Bentham – F, WH; = Stemodia multifida (Michaux) Sprengel]

**Limnophila** R. Brown 1810 (Marshweed)

A genus of about 37 species, of tropical regions of the Old World.


**Limosella** Linnaeus 1753 (Mudwort, Awl-leaf)

A genus of about 11 species, aquatic herbs, of cosmopolitan distribution. References: Pennell (1935)=P.

*Limosella australis* R. Brown, Mudwort, Awl-leaf. Cp (DE, NC, VA): fresh or slightly brackish tidal flats; rare. June. NL (Newfoundland) and QC south along the Atlantic Coast to se. VA and extreme ne. NC. This plant is very inconspicuous, though locally abundant. [= K; ? L. subulata Ives – RAB, C, F, G, GW, P]

**Linaria** P. Miller 1754 (Yellow-toadflax)

A genus of about 150 species, of temperate regions of Eurasia. References: Sutton (1988)=Z; Pennell (1935)=P. [also see Nuttallanthus]


*Linaria maroccana* Hooker f., Moroccan Toadflax. Mt (WV), Pd (VA): disturbed areas; rare, native of n. Africa. Introduced in VA (perhaps just a waif) and WV. [= K] {investigate; not yet keyed; synonymy incomplete}

**Mecardonia** Ruiz & Pavón 1794 (Mecardonia, Axil-flower)

A genus of about 10 species, of tropical, subtropical, and warm temperate regions of America. References: Pennell (1935)=P.

1 Corolla yellow; outer sepals broadly lanceolate to ovate, overlapping the shorter, much narrower inner sepals.................................................M. procumbens
1 Corolla white, with purple veins; sepals lanceolate nearly equal in length.
2 Peduncles > 10 mm long; sepals < 2 mm wide ...............................................................................................................................M. acuminata var. acuminata
2 Peduncles < 10 mm long; sepals > 2 mm wide ...............................................................................................................................[M. acuminata var. microphylla]


*Misopates* Rafinesque 1840 (Weasel's-snout)


* *Misopates orontium* (Linnaeus) Rafinesque, Weasel's-snout, Lesser Snapdragon. Pd (VA), Cp (FL): disturbed sites; rare, cultivated, persistent or possibly naturalized, native of Eurasia. Introduced at least far south as se. PA (Rhoads & Klein 1993), KY (Pennell 1935), and FL Panhandle (Hansen & Wunderlin 2008). [= K, WH; = *Antirrhinum orontium* Linnaeus – C, G, P, Z]

*Nuttallanthus* D.A. Sutton 1988 (American-toadflax)

A genus of 4 species, herbs, of North and South America. Sutton (1988) separates these three species, along with *N. subandinus* (Diels) D.A. Sutton, of Bolivia, Chile, Ecuador, Peru, and Uruguay, from *Linaria* on the basis of "the corolla with the abaxial lip greatly exceeding the adaxial lip; the palate weakly developed and scarcely occluding the tube; the spur very slender or absent and the prismatic seeds with 4-7 longitudinal ridges." *Nuttallanthus* is American; *Linaria* is Eurasian. References: Sutton (1988)=Z; Pennell (1935)=P. Key based on Z.

1 Infructescence axis zigzag; fruiting pedicels densely glandular pubescent, 5-13 mm long, 2× or more as long as the calyx............ *N. floridanus*
1 Infructescence axis straight or nearly so; fruiting pedicels glabrous or with a few scattered glandular hairs, 2-6 (-9) mm long, < 1× as long as the calyx.

2 Corolla 8-11 (-13) mm long (measured from the tip of the spur to the apex of the adaxial lip), the abaxial lip 2-6 mm long; seeds longitudinally ridged, the intervening faces smooth or with sparse low tubercles......................................................... *N. canadensis*  
2 Corolla 14-22 mm long (measured from the tip of the spur to the apex of the adaxial lip), the abaxial lip 6-11 mm long; seeds densely tuberculate, not longitudinally ridged............................................................ *N. texanus*

**Nuttallanthus canadensis** (Linnaeus) D.A. Sutton, Common Toadflax. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA, WV): in a wide variety of natural and disturbed habitats, especially common and weedy in disturbed sites such as roadsides and fields, also common and apparently native in thin soil of rock outcrops; common (rare in WV, rare in Mountains of VA). March-May. NS west to ND, south to s. FL and TX; also adventive on the west coast, from WA to CA. Sutton (1988) comments that there is substantial variation in this species not taxonomically explained. [= K, Z; < *Linaria canadensis* (Linnaeus) Dumortier – RAB, W (also see *N. texanus*); = *Linaria canadensis var. canadensis* – C, F, G, S; = *Linaria canadensis* (Linnaeus) Dumortier – P, WH, WV]

**Nuttallanthus floridanus** (Chapman) D.A. Sutton, Florida Toadflax. Cp (FL, GA): sandhills, scrub, dunes, other dry, sandy places; uncommon. E. GA south to s. FL and west to s. MS. [= K, Z; = *Linaria floridana* Chapman – P, S, WH]

**Nuttallanthus texanus** (Scheele) D.A. Sutton, Texas Toadflax. Cp (FL, GA, NC*?, SC*, VA*?), Pd (NC*, SC): granite flatrocks, dry sandy soils, tidiest soils of roadsides and fields; uncommon, native of sc. United States, not clear how far east the original range extended. March-May. Ranging as a native species in sc. and sw. North America and in temperate South America; introduced elsewhere (as in most of our area, the exact limits unclear). [= K, Z; < *Linaria canadensis* (Linnaeus) Dumortier – RAB, W; = *Linaria canadensis var. texana* (Scheele) Pennell – C, F, G, S; = *Linaria texana* Scheele – P, WH]

**Penstemon** Mitchell 1769 (Beard-tongue, Penstemon)


1 Cauline leaves bipinnatifid; basal leaves sessile; [ endemic to GA]; [ section *Dissecti*].............................................................................................................. *P. dissectus*  
1 Cauline leaves entire or toothed; basal leaves petiolated; [collectively widespread].

2 Infructescence with many nodes; anther cells dehiscing by short proximal slits; [ s. GA south to s. FL]; [ section *Multiflori*]...... *P. multiflorus*  
2 Infructescence with <10 nodes; anther cells dehiscing their entire length; [collectively widespread].

3 Corolla glandular-pubescent within; [ section *Tubiflori*]........................................................................................................... *P. tubiflorus*  
3 Corolla pubescent with non-glandular hairs within; [section *Gracilis*].
PLANTAGINACEAE

802

4 Lower lobes of the corolla essentially equaling the upper lobes; corolla throat with little ridging on its floor; sterile filament slightly to moderately bearded.
5 Anthers with short, stiff hairs; corolla white, lined with purple.
6 Stems pubescent; inflorescence glabrous or slightly glandular-pubescent; corolla 16-23 mm long ..................[P. alluviorum]
5 Anthers glabrous; corolla purple to violet.
7 Sepals long-attenuate, to 12 mm long; leaves finely serrate; corolla 20-35 mm long ..................[P. calycosus]
7 Sepals < 8 mm long; leaves obscurely serrate; corolla leaves boldly deflexed; corolla 15-22 mm long ..................[P. laevigatus]
4 Lower lobes of the corolla projecting beyond the upper lobes; corolla throat strongly ridged on its floor; sterile filament densely bearded (only moderately bearded in P. pallidus).
8 Throat of corolla more-or-less closed by a palate formed by the upward arch of the corolla lip (opened only by the weight of the landing pollinator).
9 Buds yellow-purple; corolla violet-purple with white lobes (fading white when dried); leaves essentially glabrous..................[P. hirsutus]
9 Buds yellow; corolla creamy white; leaves pubescent ..........................................................[P. tenuiflorus]
8 Throat of corolla open.
10 Peduncles strongly ascending, the inflorescence therefore narrow; corolla reddish-purple ....................[P. australis]
10 Peduncles spreading, the inflorescence therefore relatively broad; corolla white to violet or purple.
11 Leaves pubescent, but not velvety; corolla violet or purple.
11 Leaves velvety pubescent; corolla white with fine purple lines ..................................................[P. pallidus]
12 Basal leaves truncate or cordate at base; lower bracts of inflorescence foliose, slightly smaller than the cauleine leaves..........................[P. smallii]
12 Basal leaves cuneate at base; lower bracts of inflorescence reduced, much smaller than the cauleine leaves.
13 Cauline leaf blades wide, ovate-lanceolate to ovate ..........................................................[P. canescens]
13 Cauline leaf blades narrow, acute to acuminate ..........................................................[P. laxiflorus]


?? Penstemon digitalis Nuttall ex Sims, Tall White Beardtongue. Mt (NC, SC, VA, WV), Pd (DE, VA), Cp (DE, VA): alluvial forests, moist fields, disturbed areas; common (rare in Coastal Plain of VA). May-June; July-August. NS and ME west to MN and SD, south to e. VA, w. SC, AL, and TX. [= RAB, C, F, G, GW, K, P, S, W, WV, Z]

Penstemon disectus Elliott, Georgia Beardtongue, Grit Beardtongue. Cp (GA): Altamaha Grit outcrops, sandhills; rare. Endemic to Altamaha Grit outcrops and other sandy areas from e. GA south and west to sw. GA. This species is unmistakable because of its bipinnatifid leaves. [= K, P, S, Z]


Penstemon laxiflorus Pennell. Cp (FL, GA): dry sandy areas; rare. C. GA, FL Panhandle, and n. AL west to c. OK and c. TX. [= K, P, S, Z; < P. australis – WH; = P. laxiflorus Small sp. laxiflorus (Pennell) Bennett]


Penstemon species 1. Of e. AL, with very small corollas and sharply dentate teeth. Under study by Dwayne Estes.

Penstemon tenuiflorus Pennell, Plateau Beardtongue, Limestone Beardtongue, Kentucky Beardtongue. Endemic to the Interior Low Plateau of wc. KY, c. TN, n. AL, extending slightly into the Coastal Plain to the west, and disjunct in the Black Belt of AL and MS. [= C, F, G, K, P, S, Z]

Penstemon tubiflorus Nuttall, Tube Beardtongue. A more western species, reaching its eastern limit in w. TN (Chester, Woffor, & Kral 1997). It is also known from adventive sites further east, as in e. PA (Rhoads & Klein 1993). [= S; = P. tubaeﬂorus – C, G, P, Z, orthographic

1 Leaves cauline, opposite; spikes on peduncles from the leaf axils; [section Psyllium] ..............................................................................................................P. psyllium

2 Leaves ovate to broadly lanceolate or broadly oblongate, distinctly broadened upward from a petiolar base, the leaves > 1 cm wide (some species keyed both ways).

3 Leaf venation pinnate, some major veins departing from the midvein well above the leaf base; perennial from thick, fleshy rootstock, typically 3-8 cm wide near its summit, with a cavity below (like an inverted bowl), and with 3-10 fleshy roots 3-15 mm thick descending or spreading from the bowl rim; capsule 2-4-seeded; scapes hollow and terete; [aquatic or semi-aquatic]; [section Palaeopsyllium] ..............................................................................................................P. cordata

4 Leaves broadly ovate-elliptic, the blades 1-3× as long as wide, distinctly petiolate; scapes solid and terete; [section Plantago].

5 Fruit 2.5-4 mm long, dehiscent near the middle, the terminal portion about as long as the basal; sepals broadly ovate, ca. 1.5× as long as wide, mostly obtuse; petals usually green and pubescent at the base........................................................................P. major

6 Bracts and calyx glabrous; perennial, flowering April-November.

7 Mature seeds 2.5-3 mm long, reddish, nearly flat on both sides; sepals with an excurrent midrib; leaves typically toothed; [rare

8 Spikes very densely flowered, the rachis hidden; capsule 2-30-seeded; scapes either solid and terete, solid and angled, or hollow and terete; [terrestrial].

9 Summer and winter leaves not dimorphic, all leaves lanceolate or linear, plant either perennial from thin, fibrous roots, or annual from a small taproot; [terrestrial].

10 Leaves mostly broadly oblongate, broadly lanceolate, or spatulate, (3-) 4-10× as long as wide, attenuate to the only somewhat petiolar base; scapes solid and 5-angled, or hollow (tu solid) and terete.

11 Bracts of the lower flowers in the spikes not conspicuously exserted, < 2× as long as the subtended flower.

12 Leaves ovate; [section Virginica] ..............................................................................................................P. virginica

13 Bracts of the lower flowers in the spikes conspicuously exserted, at least 2× as long as the subtended flower.

14 Leaves glabrous or puberulent above; longer bracts 8-30 mm long; seeds 2.2-3.0 mm long .................................................P. aristata

15 Bracts 1-2× as long as the calyx; seeds 1.3-1.9 mm long .................................................................P. patagonica

16 Annual; flowers with 2 stamens; capsule 4-25-seeded; leaves linear, 0.5-5 mm wide; [section Micropsyllium].

17 Capsule mostly 10-25-seeded; seeds 0.5-0.8 mm long .................................................................P. heterophylla

18 Spikes loosely flowered, the rachis visible its entire length; scape terete; [rare native of Coastal Plain pinelands and adjacent fire-plow lines, ditches, and mowed roadsides]; [section Palaeopsyllium] ..............................................................................................................P. sparsiflora

* Plantago aristata Michaux, Buckhorn Plantain. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed areas, especially dry, barren, exposed soil, such as clay soils denuded by bull-dozing; common (uncommon
in DE), introduced from farther west (though the original distribution is unclear, and the species is sometimes considered native in at least portions of our area). Late April-July. [= RAB, C, F, G, K, S, W, WH, WV, Z]

**Plantago cordata** Lamarck, King-root, Heartleaf Plantain. Pd (NC), Mt (GA, VA), Cp (VA): aquatic or semi-aquatic in streambeds with outcrops of slate, aquatic in tidal estuaries; rare. March-April; May-June. NY and s. ON west to WI, south to w. VA, c. NC, nw. GA, AL, sc. TN, and MO, very scattered and rare in every state in which it occurs, except MO. Characteristically, *P. cordata* is a very robust plant, the inflorescences often 1 meter in height, and the glabrous leaves with ovate blades to 30 cm long and 20 cm wide, on ascending petioles up to 40 cm long and 2 cm wide; Winter leaves are 3-10 cm long, ca. 1 cm wide, and remotely toothed. Slighting show a gradual transition from the winter form to the summer form. *P. cordata* is not known to be extant in VA, where it formerly occurred in the estuary of the Potomac River and in Smyth County in sw. VA. In NC, *P. cordata* is apparently limited to 2 slate-bottomed streams in s. Davidson County, where it is locally abundant. A recent study of morphological and genetic variability in the species found the 2 NC populations to "represent sites of primary [conservation] concern with unique genetic composition" (Myrnes & Les 1993). [= RAB, C, F, G, K, S, W, X, Z]


**Plantago major** Linnaeus, Common Plantain, Whiteman's-foot. Cp (DE, FL*, GA, NC, SC, VA), Pd (DE, GA, NC, VA), Mt (GA, NC, SC, VA, WV): lawns, roadsides, disturbed areas; common (uncommon in FL, GA, NC, SC, VA, and WV), native of Europe, possibly also native in ne. North America, possibly as far south as the northern part of our area. June-November. Very variable, and possibly worthy of some of the infraspecific subdivisions suggested by various authors. The Coastal Plain populations associated with the Chesapeake Bay in VA may represent a native, estuarine genotype. [= RAB, C, GW, K, S, WH, WV, Z, > P. major var. major – F; > P. major var. scopolum Fries & Broberg – F; > P. major ssp. pleiosperma Pilger var. paludosa Béguinot – G; > P. major ssp. pleiosperma Pilger var. scopolum Fries & Broberg – G; > P. major var. intermedia (A.P. de Candolle) Pilger]

**Plantago maritima** Linnaeus var. juncoides (Lamarck) A. Gray, Seaside Plantain. Cp (VA): salt marshes; rare. Var. *juncoides* apparently ranges from Greenland and ne. Canada south to e. VA. Other varieties occur in nw. North America and n. Eurasia, the species as a whole is an intermediately circumboreal plant of ocean shores, also disjunct inland in saline areas. [= K; = P. maritima ssp. juncoides (Lamarck) Hultén – C; > P. juncoides Lamarck var. decipiens (Barneoud) Fernald – F; < P. maritima – G]


* **Plantago rhodopensis** Decaisne, Redseed Plantain, reported as ranging east to KY, TN, and GA (Kartesz 1999), probably as adventive from further west. The reports for GA and TN require confirmation. [= C, F, G, K]


* **Plantago sparsiflora** Michaux, Pineland Plantain. Cp (FL, GA, NC, SC, VA): wet savannas over calcareous substrates (coquina limestone), now usually found in moister human-created microhabitats adjacent to these sites, such as fire-plow lines, shallow ditches along roadsides, or mowed powerline rights-of-way; rare. April-October. Se. NC south to ne. FL, restricted to the Coastal Plain. Harper (1944), with his usual keen understanding of the ecology of southeastern plants, has provided the most succinct and accurate description of the habitat of this plant: "flatish pine-barrens where there is evidently some calcareous material not far from the surface." Reports of this species for VA are in error. [= RAB, GW, K, S, WH, X, Z]


* **Plantago wrightiana** Decaisne, Wright's Plantain. Cp (FL, GA, NC, SC), Pd (GA, NC, SC, VA): roadsides, lawns, disturbed areas; common (uncommon in NC). Late April-July. VA, NC, OK, and AZ south to c. peninsular FL, MS, TX, and Mexico, the original distribution unclear. [= K, WH, Z; = P. hookeriana Fischer & C.A. Meyer var. nuda (A. Gray) Poe – RAB, W]

* **Plantago floccosa** Decaisne. Cp (FL): disturbed areas; rare, native of {}. Panhandle FL. [= WH] {not yet keyed; add to synonymy}

**Scoparia** Linnaeus 1753 (Goat-weed, Sweet-broom)
| 1 | Corolla white; sepals 4, ovate; stem 3-8 dm tall; annual ................................................................. | \( S. \) dulcis |
| 1 | Corolla yellow; sepals 5, lanceolate; stem 1-1.5 d tall; perennial .................................................. | \( S. \) montevidensis var. glandulifera |


*Scoparia montevidensis* (Sprengel) R.E. Fries var. glandulifera (Fritsch) R.E. Fries. Cp (FL, NC): on ballast, other disturbed areas; rare, native of South America. [= K, P, WH]

**Sophronanthe Bentham 1836**

A genus of 2 species, herbs, of southeastern North America. The two taxa included here are not part of *Gratiola*. References: Pennell (1935) = P.

| 1 | Leaves linear-subulate; corolla 2-3× as long as the calyx .......................................................... | \( S. \) hispida |
| 1 | Leaves ovate; corolla 1-1.5 × as long as the calyx ................................................................. | \( S. \) pilosa |


**Veronica Linnaeus 1753 (Speedwell)**

A genus of about 180 species, herbs, nearly cosmopolitan (at least now), most diverse in Europe. The genus appears to be paraphyletic as currently circumscribed (Albach & Chase 2001). References: Walters & Webb (1972)=Z; Crow & Hellquist (2000)=Y; Pennell (1935)=P. Key partly based on C.

| 1 | Flowers in axillary racemes; upper bracteal leaves opposite throughout. | .......... |
| 2 | Leaves and stems pubescent; [plants of mesic to dry habitats]; [section Veronica]. | .......... |
| 3 | Leaves cuneate at the base; leaves widest at the middle or beyond; pedicels equaling or longer than the subtending bracts. | .......... |
| 4 | Stem pubescence generally distributed; calyx shorter than the capsule; style 6-8 mm long; stems erect .... | \( V. \) austriaca ssp. teucrium |
| 5 | Stems pubescence restricted to 2 lines; calyx longer than the capsule; style 3-5 mm long; stems creeping or ascending. | .......... | \( V. \) chamaedrys |

| 1 | Leaves broadest towards the base, acute at the tip; style 2.5-3.5 mm long .................................................. | \( V. \) americana |
| 1 | Leaves broadest near or above the middle, rounded at the tip; style 1.8-2.2 mm long ......................................... | \( V. \) beccabunga |

| 1 | Leaves (at least the middle and upper) sessile. | .......... | \( V. \) scutellata |
| 2 | Capsule flattened, conspicuously notched at the style and therefore appearing 2-lobed, wider than long; seeds 1.2-1.8 mm long; leaves (3-)4-20+ as long as wide; < 1 cm wide, tapering to the base and not clapping; [section Veronica]. | .......... | \( V. \) austriaca ssp. teucrium |
| 3 | Capsule turgid, slightly or not notched at the style, about as long as wide; seeds <0.5 mm long; leaves 1.5-5 (8-) as long as wide, mostly > 1 cm wide, clapping at the base; [section Beccabunga]. | .......... | \( V. \) austriaca ssp. teucrium |
| 4 | Racemes 20-65-flowered; pedicels 4-8 mm long; capsule ovoid to globose, not notched or barely so ............... | \( V. \) anagallis-aquatica |
| 5 | Racemes 5-25 (-35)-flowered; pedicels 3-6 mm long; capsule broadly obcordate, distinctly though slightly notched at the style..... | .......... | \( V. \) catenata |

| 1 | Flowers in terminal racemes or solitary and axillary, subtended by normally-sized leaves; upper bracteal leaves often alternate. | .......... | \( V. \) serpyllifolia var. peregrina |
| 9 | Bracts abruptly smaller than the foliage leaves, the flowers thus in well-developed terminal racemes or spikes; perennials from rhizomes. | .......... | \( V. \) serpyllifolia var. peregrina |
| 10 | Stems 3-10 dm tall; flowers in a crowded terminal spike; larger leaves > 4 cm long, sharply serrate; [section Pseudolysimachium] .......... | .......... | \( V. \) longifolia |
| 11 | Flowers bright blue; pedicels with some longer gland-tipped hairs; flowers usually < 12 per raceme .... | \( V. \) serpyllifolia var. humifusa |
| 12 | Flowers pale blue with darker blue lines; pedicels puberulent; flowers usually > 12 per raceme ............... | \( V. \) serpyllifolia var. serpyllifolia |
| 13 | Bracts gradually reduced in size upwards, all of the flowers or at least those lower on the stem axillary in the axes of well-developed foliage leaves; annuals (except \( V. \) filiformis); [section Pocilla]. | .......... | \( V. \) serpyllifolia var. peregrina |
| 14 | Pedicels 0-2 mm long; flowers in the axils of bracts, all or at least the upper of which are very different than foliage leaves. | .......... | \( V. \) serpyllifolia var. xalapensis |
| 15 | Leaves 3-10× as long as wide, toothed or entire; flowers white or very pale, ca. 2 mm across; stems usually glabrous (except \( V. \) serpyllifolia var. xalapensis) | .......... | \( V. \) serpyllifolia var. peregrina |
| 16 | Stem glabrous; sepals and fruit glabrous .................................................................................................. | \( V. \) serpyllifolia var. peregrina |
| 17 | Stem pubescent with short, gland-tipped hairs; sepals and fruit glabrous or pubescent with short, gland-tipped hairs ............................................................................................................. | \( V. \) serpyllifolia var. xalapensis |
13 Leaves 1-2× as long as wide, palmately lobed or toothed; flowers blue, 2-4 mm across; stems pubescent.
15 Upper leaves and lower bracts trilobed, the lobes cut > ½ way to base. \(\text{V. triphylllos}\)
15 Leaves unlobed (though crenate-serrate). \(\text{V. arvensis}\)
16 Style 0.4-1.0 mm long. \(\text{V. dillenii}\)
16 Style ca. 1.5 mm long. \(\text{V. serpyllifolia}\)
12 Pedicels 5-40 mm long; flowers in the axils of leaves similar in shape and size to foliage leaves (though the upper are sometimes somewhat smaller).
17 Perennial, the stems rooting at the nodes the length of the stem; pedicels > 2× as long as the the leaves. \(\text{V. filiformis}\)
17 Annual, the stems not rooting at the base (or at most only at the base of the plant); pedicels < 2× as long as the the leaves.
18 Calyx lobes cordate at the base; leaves with 3-7 teeth or shallow lobes. \(\text{V. hederifolia}\)
18 Calyx lobes cuneate to rounded at the base; leaves with usually > 7 small teeth or crenations.
19 Lobes of the capsule with apices diverging at ca. 90 degrees; corolla > 8 mm wide. \(\text{V. persica}\)
19 Lobes of the capsule with apices parallel or diverging at an acute angle; corolla < 8 mm wide.
20 Capsule with all hairs straight and gland-tipped; corolla white to pale blue or violet. \(\text{V. agrestis}\)
20 Capsule with a mixture of short, arching, non-glandular hairs and longer, straight, gland-tipped hairs; corolla bright blue. \(\text{V. polia}\)

* Veronica agrestis* Linnaeus, Field Speedwell. Pd (DE, GA, NC), Cp (DE, FL), Mt (GA), {VA, WV}: lawns and disturbed areas; common (rare in FL, GA, NC, and VA), native of Eurasia. [= C, F, G, K, P, WH, Z; < *V. agrestis* – RAB, G; < *V. polia* – WV]

* Veronica americana* Schweinitz ex Bentham, American Speedwell, Brooklime. Mt (NC, VA, WV), Pd (DE, VA), {SC}: bogs, marshes, streamside; uncommon (rare in DE, NC, and SC). May-June; July. NL (Newfoundland) west to AK, south to NC, TN, TX, and CA; ne. Asia. [= RAB, C, F, G, K, P, S, W, WV, Y]

* Veronica anagallis-aquatica* Linnaeus, Water Speedwell. Mt (NC, VA, WV), Cp (DE, NC, VA), Pd (DE, VA): bogs, marshes, streamside, ditches; uncommon (rare in NC). May-June; July. Circumboreal, south in North America to c. peninsular FL, TX, and CA; some occurrences probably represent introductions of European material. Some authors interpret *V. anagallis-aquatica* as being non-native in North America. [= C, F, G, P, WH, WV, Y; < *V. anagallis-aquatica* – RAB, C, K, W, Z]


* Veronica dillenii* Crantz, Dillenius’s Speedwell. Mt (VA): disturbed areas; rare, native of Europe. [= C, G, K, P, Z; < *V. verna* Linnaeus – F]


?? * Veronica officinalis* Linnaeus, Common Speedwell, Gypsyweed, Heath Speedwell. Mt (GA, NC, VA, WV), Pd (DE, NC, VA), Cp (DE, NC, SC, VA): fields and forests; common, often interpreted as being of mixed native and alien background. May-August. [= RAB, C, G, P, S, W, WV, Z; > *V. officinalis var. officinalis* – F, K; > *V. officinalis var. tournefortii* (Vill.) Reichenbach – F, K]

* Veronica peregrina* Linnaeus var. persica, Common Purslane Speedwell. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): fields, roadsides, disturbed areas; common. April-May. NS and ND south to FL and TX; AK south to OR (perhaps only as an introduction?); South America. [= C, F, G, S, WV; = *V. peregrina* ssp. persica – K; < *V. peregrina* – RAB, W, Z; = *V. peregrina* var. typica – P; ? *V. peregrina* – WH]

* Veronica peregrina* Linnaeus var. xalapensis (Kunth) Pennell, Western Purslane Speedwell. Cp (GA), {NC?, SC?): fields, lawns, disturbed places; rare, probably introduced in our area on ballast. April-May. QC and AK south to MA, KY, TX, and south to Guatemala. [= C, F, G, P, S, WH, Z; < *V. peregrina* – RAB, G; ? *V. didyma* Tenore – P, misapplied; < *V. polia* – WV]


* Veronicastrum catenata* Pennell. Streams and wetlands. Circumboreal, the southern limits obscure because of taxonomic confusion, misidentifications, and misattributions. [= C, G; misapplied

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**369. SCROPHULARIACEAE** A.L. de Jussieu 1789 (Snapdragon Family) [in LAMIALES]

There is increasing evidence that the Scrophulariaceae as traditionally constituted includes two main and quite distinct groups (Olmstead & Reeves 1995; Young, Steiner, & dePamphilis 1999; Albach, Meudt, & Oxelman 2005). Based on molecular analysis, Young, Steiner, & dePamphilis (1999) suggest that Scrophulariaceae, Antirrhinanthaceae, and Orobanchaceae be restructured to include the current members of Orobanchaceae, Scrophulariaceae, and Callitrichaceae. Beardsley & Olmstead (2002) suggest that *Mimulus* and *Mazus* be included with *Phryma* in a redefined Phrymaceae. Additional changes have been suggested, as summarized blow. References: Pennell (1935)=P; Olmstead & Reeves (1995); Young, Steiner, & dePamphilis (1999); Olmstead et al. (2001); Beardsley & Olmstead (2002). [also see OROBANCHACEAE, PAULOWNIACEAE, PHRYMACEAE, and PLANTAGINACEAE]

Disposition of the traditional Scrophulariaceae (including Antirrhinanthaceae), Orobanchaceae, Plantaginaceae, Buddlejaceae, Phrymaceae: Lindeniaceae: *Lindernia, Heisteria, Microphantherum, Torenia*

Orobanchaceae: *Agalinis, Aureolaria, Buchnera, Castilleja, Conopholis, Dasistoma, Epifagus, Macranthera, Melamphyrum, Orobanche, Pedicularis, Schwalbea, Seymeria, Sriga.*


Phrymaceae: *Glossostigma, Mazus, Mimulus, Phryma.*

Scrophulariaceae s.s.: *Buddleja, Scrophularia, Verbascum.*

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**Buddleja** Linnaeus 1753 (Butterfly-bush)

A genus of about 90 species, trees and shrubs, of subtropical and tropical America, Asia, and Africa. The two species listed (and others) are grown for ornament and for their attractiveness as nectar-feeding sites for butterflies. References: Rogers (1986)=Z; Oxelman, Kornhall, & Norman in Kadereit (2004).

1 Leaves serrate or crenate; corolla, calyx, pedicels, and inflorescence rachis pubescent (not granular-farinose)…………………………………………………………………………………………………………………………………...*B. davidii*

1 Leaves entire or remotely dentate; corolla, calyx, pedicels, and inflorescence rachis granular-farinose……………………………………………………………………………………*B. lindleyana*

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* Buddleja alternifolia* Maximowicz. Reported as introduced in NC by Kartesz (1999), but the alleged documentation is not present. *B. officinalis* Maximowicz is reported as introduced in GA by Kartesz (1999), but the alleged documentation is not available. [not keyed; not mapped; rejected as a component of our flora]

* Buddleja davidii* Franchet, Summer-lilac, Orange-eye Butterfly-bush. Mt (GA, NC, VA, WV), Pd (DE, SC): planted, rarely escaped to disturbed places, such as thickets or streambanks (Wise Co., VA); rare, native of China. June-October. [= RAB, C, F, G, K, Z]

* Buddleja lindleyana* Fortune ex Lindley. Pd (GA, NC, SC), Mt, Cp (NC, SC): rarely escaped to disturbed areas; rare, native of China. June-October. [= RAB, K, Z; = Adenoplea lindleyana (Fortune ex Lindley) Small – S]
SCROPHULARIACEAE

Scrophularia Linnaeus 1753 (Figwort)

A genus of about 200 species, of temperate and tropical regions of the Old and New Worlds. Though our 2 species are only subtly distinct morphologically, they are clearly distinct. References: Pennell (1935)=P; Fischer in Kadereit (2004).

1 Sterile filament (hidden under the upper corolla lip) yellowish-green, often wider than long; leaf serrations coarse, often > 3 mm long; flowering May-early July; capsule 4-7 mm long. ............................................................................................................................................................................ S. lanceolata


Verbascum Linnaeus 1753 (Mullein)


1 Leaves green and glabrous on both sides, or sparingly pubescent with glandular hairs; hairs of the calyx and upper stem simple and glandular.

2 Flowers < 2 mm long. ............................................................................................................................................................................ V. thapsus

3 Inflorescence generally simple (sometimes with 1-several small branches), dense and spike-like (at least initially); leaves moderately to densely tomentose above; upper 3 filaments bearing white hairs.

4 Leaves sessile, decurrent down the stem to the next leaf; stigma capitate; corolla yellow ............................................................ V. thapsus

5 Basal leaves lobed; inflorescence lacking glandular hairs; filaments bearing white hairs .................................................................. V. lycnitis

6 Basal leaves lobed; inflorescence with glandular hairs; filaments bearing violet hairs .................................................................. V. virgatum


* Verbascum sinuatum Linnaeus, Wavyleaf Mullein, is introduced at scattered locations in MD, PA, NJ, and NY, on ballast and in disturbed areas. July-August. [= G, K]

371. LINDERNIACEAE Borsch, K. Müller, & Eb. Fischer 2005 (False-pimpernel Family) [in LAMIALES]


1 Calyx conspicuously 5-winged .......................................................................................................................................................... Torenia

2 Flowers > 4 mm long. ........................................................................................................................................................................ Lindernia

3 Leaves elliptic, cuneate at the base; calyx lobes even, all of the sinuses reaching nearly to the base of the calyx. .................................. Hemianthus
LINDERNIACEAE

Hemianthus Nuttall 1817


1 Calyx lobes acute, ⅓ to ⅔ as long as the calyx tube; flowers opening, chasmogamous.................................H. glomeratus
1 Calyx lobes obtuse, < ⅓ as long as the calyx tube; flowers not opening, cleistogamous...............................H. micranthemoides

Hemianthus glomeratus (Chapman) Pennell. Lake margins, ponds. January-December. Panhandle FL (Gadsden County) south to s. FL. [= P; = Micranthemum glomeratum (Chapman) Shimmers WH]

Hemianthus micranthemoides Nuttall, Nuttall's Micranthemum. Muddy, freshwater intertidal shores, possibly extinct. NY (Hudson River) south to VA (Chesapeake Bay, Potomac River, James River). [= C, G, P; = Micranthemum micranthemoides (Nuttall) Wettstein F, K]

Lindernia Allioni 1755 (False-pimpernel)


1 Fertile stamens 4; calyx lobes connate at anthesis for > ⅔ their length, later separating; [section Torenioides].................................L. crustacea
1 Fertile stamens 2 (with 2 staminodia without anthers, or with rudimentary anthers); calyx lobes separate, or connate at base for < ⅓ the length of the calyx.

2 Capsule lanceoloid, > 8× as long as its diameter; calyx lobes connate at base < ⅓ the length of the calyx; [section Bonnaea].........L. antipoda
2 Capsule ovoid to ellipsoid, < 5× as long as its diameter; calyx lobes distinct to the base at anthesis and after; [section Brachycarpae].

3 Pedicels shorter than or about as long as the subtending leaves ..........................................................L. dubia var. dubia
3 Pedicels longer than the subtending leaves (or bracteal leaves in some species).
4 Leaves nearly orbicular; stems creeping .................................................................................................L. grandiflora
4 Leaves distinctly longer than wide; stems erect (sometimes decumbent at the base and rooting if knocked down by water).
5 Leaves not glandular punctate; seeds 2-3× as long as wide.................................................................L. dubia var. anagalidea
5 Leaves glandular punctate; seeds ca. 1× as long as wide.
6 Leaves primarily in a basal rosette, leaves of the stem strongly reduced upward to bracts; capsule (1.8-) 3.4-7 mm long; [primarily of seepage of flatrocks].............................................L. monticola ("monticola" form)
6 Leaves primarily on the stem, not conspicuously reduced upward; capsule 1.4-3.4 mm long; [of stream or river banks]..........L. monticola ("saxicola" form)

* Lindernia antipoda (Linnaeus) Alston. Disturbed areas; native of se. Asia, Polynesia, and n. Australia. [= K, Y]
* Lindernia crustacea (Linnaeus) F. Mueller. Lawns; native of Malaysia. September. [= RAB, GW, K, P, WH, X, Y]
* Lindernia diffusa (Linnaeus) Wettstein. Reported for SC by Kartesz (1999) on the basis of specimens at NCU, but the specimens so labelled are actually L. dubia. [rejected; not keyed or mapped]


Lindernia monticola Muhlenberg ex Nuttall, Flatrock Pimpernel, Riverbank Pimpernel. In seasonal seepage on granitic flatrocks, and on river-scoured siliceous rocks. April-June (-September). Nc. and sw. NC south to ne. FL and ec. AL. L. saxicola appears to be merely a form of L. monticola, the leafy stems the result of the basal leaves being covered by silt deposited by floodwaters (Qualls 1984; Lewis 2000); this needs additional study. [= K, WH, X; > L. monticola – RAB, GW, P, W, Y; > L.
LINDERNIACEAE


* Lindernia procumbens (Krock.) Borb. One record as a waif in Arlington County, VA. {rejected; not keyed or mapped}

Micranthemum Michaux 1803


Micranthemum umbrosum (J.F. Gmelin) Blake, Shade Mudflower. Shallow pools, stagnant streams, wet depressions in swamp forests. May-October. Se. VA south to FL, west to TX, and south into tropical America (Mexico, Central America, West Indies, e. South America). [= RAB, C, F, G, GW, K, P, WH; = Globifera umbrosa J.F. Gmelin – S]

Torenia Linnaeus 1753 (Blue-wings)


* Torenia fournieri Linden ex E. Fournier, Bluewings, Wishbone-flower. Disturbed areas, flowerbeds; native of China. Also reported for Mountains of NC (Pitillo & Brown 1988), but it appears that it was a short-lived waif there. Likely to be found sporadically, especially southwards. [= K, WH]

372. PEDALIACEAE R. Brown 1810 (Sesame Family) [in LAMIALES]

A family of about 13 genera and 70 species, herbs, shrubs, and trees, of the Old World tropics.

Sesamum Linnaeus 1753 (Sesame)

A genus of about 19 species, of the old World tropics.

* Sesamum orientale Linnaeus, Sesame. Disturbed areas; native of the East Indies. January-December. Also reported for AL. [= K, WH; = S. indicum Linnaeus – S]

373. LAMIACEAE Lindley 1836 or LABIATAE A.L. de Jussieu 1789 (Mint Family) [in LAMIALES]

A family of about 230-250 genera and 6700-7170 species, herbs, shrubs, vines, and trees, cosmopolitan. The placement in the Lamiaceae of several genera traditionally placed in Verbenaceae (e.g. Clerodendrum) is strongly supported by several lines of evidence. References: Harley et al. in Kadereit (2004).

incertae sedis: Callicarpa.
subfamily Viticoidae: Vitis.
subfamily Ajugoideae: Ajuga, Clerodendrum, Teucrium, Trichostema.
subfamily Scutellarioideae: Scutellaria.
subfamily Lamioideae:
tribe Synandreae: Synandra, Macbridea, Physostegia
tribe Stachydeae: Galeopsis, Stachys, Sideritis
tribe Leonurideae: Leonurus
tribe Marrubieae: Marrubium
tribe Lamieae: Lamium
subfamily Nepetoideae:
tribe Elsholtzieae: Collinsonia, Elsholtzia, Mosla, Perilla.
tribe Mentheae:
subtribe Salviinae: Rosmarinus, Salvia.
LAMIACEAE


subtribe Nepetinae: Agastache, Dracocephalum, Glechoma, Mechania, Nepeta.

incertae sedis: Melissa.

tribe Ocimeae:

subtribe Hypytidinae: Hypytis.

subtribe Ociminae: Ocimum.

I. Callicarpa Linnaeus 1753 (Beautyberry)


1 Leaves 7-23 cm long, stellate-scurfy beneath; peduncles 1-5 mm long.................................................................C. americana
1 Leaves 2-6.5 (-7) cm long, glabrous or nearly so beneath (except on the midrib); peduncles 10-20 mm long.
2 Inflorescence supra-axillary, diverging from the twig 1-4 mm above the leaf axil ..........................................................C. dichotoma
2 Inflorescence axillary, borne directly in the axil of the leaf..........................................................................................C. japonica

* Callicarpa americana Linnaeus, Beautyberry, American Beautyberry, French-mulberry. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, NC, SC): hammocks, other forests (especially with sandy or rocky soils), maritime forests (the main habitat northwards), disturbed areas; common (rare in Mountains). June-July; August-October (persisting into the winter). MD and AR south to s. FL, TX, Mexico, West Indies. [= RAB, C, F, G, K, S, W, WH]
* Callicarpa dichotoma (Loureiro) K. Koch, Chinese Beautyberry. Pd (NC, VA), Cp (DE, NC, VA), Mt (NC), {SC}: roadsidess, powerline rights-of-way, woodland edges, suburban woodlands, bogs; uncommon (rare in DE and VA), native of Asia. September-November. This species is beginning to spread more rapidly in the Southeast. [= RAB, C, K]

2 Vitex Linnaeus 1753 (Chaste Tree)


1 Leaves palmately 5-7-foliolate; leaflets lanceolate; plant an upright small tree.................................................................V. agnus-castus
1 Leaves unifoliolate (or palmately 3-foliolate); leaflets orbicular or obovate; plant a sprawling and spreading shrub/vine ............V. rotundifolia

* Vitex negundo Linnaeus, Chinese Chaste-tree. Reported for FL, MS, LA, KY. June-July; August-November. [= WH; > V. negundo var. intermedia (S.J. Pei) Moldenke – K; > V. negundo var. negundo – K, Z; > V. negundo var. heterophylla (Franchet) Rehder – K, Z; > V. negundo var. cannabifolia (Siebold & Zuccarini) Handel-Mazzetti – Z] (not keyed; rejected as not definitively naturalized in Flora area)
* Vitex rotundifolia Linnaeus f., Beach Vitex, Roundleaf Chaste-tree. Coastal dunes, planted for ornament and stabilization and now spreading aggressively as an invasive species; native of e. Asia, se. Asia, and nearby islands. See Cousins et al. (2010) and Roecker & Socha (2004) for additional information. The runners are reported to reach 10 m in length. [= K, Z; < V. trifolia Linnaeus ssp. littoralis Steenis]

3. Ajuga Linnaeus 1753 (Bugle, Bugleweed)


1 Leaves deeply cleft into narrow segments; corolla yellow; annual......................................................................................A. chamaepitys
1 Leaves entire to shallowly lobed; corolla blue (to white or pink); perennial.
2 Plants not stoloniferous; stems hairy all around................................................................................................................A. genevensis
2 Plants stoloniferous; stems hairy in lines .........................................................................................................................A. reptans
* Ajuga chamaepitys* (Linnaeus) Schreber, Yellow Bugle, Ground-pine Bugle. Cp (VA): disturbed areas; rare, native of Europe. May-September. [= C, F, G, K]

* Ajuga genevensis* Linnaeus, Standing Bugle. Mt (WV): disturbed areas; rare, native of Europe. Cultivated and rarely escaped in ne. North America, reported as naturalized as far south as PA (Rhoads & Klein 1993), MD (Kartesz 1999), and WV (Harmon, Ford-Werntz, & Grafton 2006), where considered “not confirmed as naturalized.” [= C, F, G, K, WV]


4. *Teucrium* Linnaeus 1753 (Germander)


* Teucrium botrys* Linnaeus, Cutleaf Germander. Mt (WV): disturbed areas; rare, native of Europe. July-September. [= C, K] {add to synonymy}

Teucrium canadense Linnaeus var. canadense. Mt (WV), Cp (DE), {GA, NC, SC, VA}: rich bottomlands; common. Mainly coastal, NS south to FL, west to TX and OK. [= C, F, G, K; < T. canadense – RAB, GW, W; = T. littorale Bicknell – S]

Teucrium canadense Linnaeus var. hypoleucum Grisebach. {GA, NC, SC}. E. NC south to FL, west to TX. [= K; < T. canadense – RAB, GW, W; = T. nashi Kamey – S]

Teucrium canadense Linnaeus var. occidentale (A. Gray) McClintock & Epling. Mt (VA, WV*). Reported for VA (Kartesz 1999). {investigate} Occurs at least as far south and east as PA (Rhoads & Klein 1993) and ne. WV. [= C, G, K; > T. occidentale A. Gray var. occidentale – F; > T. occidentale A. Gray var. boreale (Bicknell) Fernald – F, WV]

Teucrium canadense Linnaeus var. virginicum (Linnaeus) Eaton. Pd (DE), {AL, GA, MS, NC, SC, VA}: {habitat}; common. NY, QC, and MN south to GA, AL, MS, and TX. [= C, F, G, K; < T. canadense – RAB, GW, W; = T. canadense – S]

Teucrium cubense Jacquin var. cubense. AL. [= K] {synonymy incomplete}

5. *Clerodendrum* Linnaeus 1753 (Glory-bower)

A genus of about 400-500 species, trees and shrubs, mostly tropical and warm temperate, African and Asian (after removal of the “Pantropical Coastal” clade into Volkmemia (Yuan et al. 2010). References: Yuan et al. (2010); Steane et al. (1999); Hsiao & Lin (1995); Steane, de Kok, & Olmstead (2004); Harley et al. in Kadereit (2004).

| 1 Corolla tube > 8 cm long. | .......................................................... C. indicum |
| Corolla tube < 3 cm long. | .......................................................... C. chinense |
| 2 Calyx 5-8 mm long | .......................................................... C. bungei |
| 2 Calyx > 10 mm long. | .......................................................... C. chinense |
| 3 Corolla double | .......................................................... C. chindense |
| 3 Corolla single | .......................................................... C. trichotomum var. ferrugineum |

* Clerodendrum bungei* Steudel, Rose Glory-bower. Cp (FL, GA), Pd (GA, SC): roadsides and suburban woodlands; rare, native of e. Asia. August-September. First reported from South Carolina by Hill & Horn (1997); also reported for our area by W. Duncan (pers. comm.). [= K, WH]


* Clerodendrum japonicum* (Thunberg) Sweet. Also cultivated and is reported to be naturalized in MD (Staff of the Bailey Hortorium 1976). [= K] {not yet keyed}


* Clerodendrum trichotomum* Thunberg var. ferrugineum Nakai, Harlequin Glory-bower. Pd (NC), Mt (NC), Cp (FL), {GA}: roadsides, streambanks; rare, cultivated and strongly naturalized, native of e. Asia. [= K; < Clerodendron trichotomum – WH]

6. *Trichostema* Linnaeus 1753 (Blue Curls)

A genus of about 18 species, shrubs, annual and perennial herbs, of temperate North America (especially diverse in w. North America). Morphology, pollen, and phytogeography suggest the plausible recognition of *Trichostema* section *Orthopodium* (which includes this species and several from w. North America) as *Isanthus*, a genus distinct from section *Trichostema* (which includes all other eastern North American species). References: Weakley (in prep.)=Z; Lewis (1945)=Y; Harley et al. in Kadereit (2004).
1 Calyx lobes essentially equal; stamens straight, < 10 mm long; leaves acute to slightly acuminate, the two main lateral veins reascending to the midvein; [section Orthopodium] .......................................................... T. brachiatum
1 Calyx strongly bilobate; stamens strongly arched, 12-20 mm long; leaves obtuse, the two main lateral veins not reascending to the midvein; [section Trichostema]
2 Plants annual; larger leaves 3-7 cm long (excluding the petiole); plants with long internodes near the base, near-basal branches absent, the best-developed branches from the mid or upper stem; hairs on the upper stem long (0.5-2.0 mm long) or short (0.1-0.4 mm long); [collectively widespread, in a wide variety of habitats, primarily inland, though occasionally occurring as a weed in coastal areas].
3 Leaves 2.5-4× as long as wide; longer hairs of the upper stem (0.3-0.5-2.0 mm long).................................................. T. dichotomum
3 Leaves 5-15× as wide; longer hairs of the upper stem 0.1-0.3-0.4 mm long.......................................................... T. setaceum
2 Plants perennial; larger leaves 1-4 cm long (including the petiole); plants with short internodes near the base, near-basal branches well-developed, these often branching again; hairs on the upper stem short (0.1-0.4 mm long); [of the Coastal Plain]
4 Corolla deep blue (almost black in bud); flowers stems typically virgate, not branched above the base; hairs of the stem not longer at each node; [of peninsular FL, inland as well as on sand ridges near the coasts] ........................................................................................................ T. suffrutescens
4 Corolla pastel blue or pink; stems typically rebranching above the base, the plant more-or-less bushy; hairs of the stem longer at the node (in a line between the 2 petals); [of NC south to s. FL and west to s. MS; restricted to barrier islands, coastal peninsulas, and other maritime situations within 10 km of the ocean]
5 Anthers lemon yellow; leaves ovate-rombic, 1-1.5× as long as wide; corolla lavender (definitely with a pinkish tint); bark on older stems dark, tight; plants 1-4 dm tall, forming a tight, compact, hemispheric bush; [of maritime dunes, grasslands, and forest openings from 10 km north of Cape Hatteras (Dare County, NC) south to near Cape Romain (Georgetown County, SC) .................. T. species 1
5 Anthers blue; leaves spatulate, the petiole relatively well-developed, 1.5-3× as long as wide; corolla bluish (lacking a well-developed pinkish tint); bark on older stems yellow to tan, somewhat papery; plants 3-7 dm tall, often gangly and irregularly shaped; [of maritime dunes, grasslands, and coastal scrub from e. GA around the FL peninsula west to s. MS]................................. T. species 2

Trichostema brachiatum Linnaeus, Glade Blue Curls, False Pennyroyal. Mt (GA, NC, VA, WV), Pd (NC, SC, VA): shale barrens, outcrops of calcareous or mafic rock, diabase barrens, calcareous dry prairies, disturbed rocky areas; uncommon (rare in NC). August-September. VT and s. ON west to MN and NE, south to c. NC, nw. GA, AL, TX, and AZ. [= W, Y; = Isanthus brachiatus (Linnaeus) Britton, Sterns, & Poggenburg – C, F, K, S, WV; > Isanthus brachiatus var. brachiatus – G]


Trichostema species 1. Dune Blue Curls, Carolina Blue Curls. Cp (NC, SC): dunes on barrier islands, vegetated with perennial grasses (especially Uniola paniculata), openings in maritime scrub; rare. August-November. Endemic to barrier islands from slightly north of Cape Hatteras, Dare County, NC south to North Island, Georgetown County, SC, north of Cape Romain. When growing together, the flowering period of T. species 1 is about 2-3 weeks later than that of T. dichotomum. Despite a considerable overlap of blooming period, only one hybrid has been seen, and that in common-garden cultivation in the Piedmont. [= Z]

Trichostema species 2. Florida Blue Curls. Cp (AL, FL, GA, MS): maritime dunes, grasslands, and coastal scrub; uncommon. August-November. E. GA around the FL peninsula west to s. MS; Bahamas. [= Z; > T. dichotomum var. puberulum Fernald & Griscom – F; > T. dichotomum – WH; < T. dichotomum – Y; < T. suffrutescens – Y]

Trichostema suffrutescens Kearney, Scrub Blue Curls. Cp (FL): scrub, sandhills; rare. August-November. Ne. FL (Clay County) south to s. peninsular FL. [= Z; < T. dichotomum – WH; < T. suffrutescens – Y]

7. Scutellaria Linnaeus 1753 (Skullcap)


Identification notes: Recognizable by the "tractor seat"-shaped protuberance on the upper calyx. *Note: in key break 22b, corollas of S. alabamensis may reach 22 mm long; its calyces are both stipitate glandular and punctate glandular, thus differing from S. arenicola and S. mellichampii. In key break 22a, corollas of S. mellichampii may be as short as 21 mm; its calyces are punctate glandular only, unlike S. incana var. australis which has both punctate glands and stipitate glands on calyces.

1 Flowers axillary, bracts resembling stem leaves; stem leaves sessile or petioles < 4 mm.
2 Corollas 12-32 mm long .................................................. Sc. galericulata
2 Corollas 5-10 mm long.
3 Lower leaves hastate; plants glabrous.................................................. Sc. racemosa
3 Lower leaves ovate or deltoid-ovate; plants puberulent or pubescent.
4 Stems glabrate, the pubescence ascending, curled or appressed, eglandular.
5 Median leaves 10-15 mm long; corolla 6.5-9 mm long.................................................. Sc. leonardii
5 Median leaves 20-40 mm long; corolla 8-10 mm long.................................................. Sc. nervosa
4 Stems obviously hairy, pubescence spreading, glandular or not (or both).
LAMIACEAE

814

6 Lower leaf surface with glandular hairs only; leaf veins tending to anastomose along leaf margins ...................................................... Sc. australis
6 Lower leaf surface with glandular hairs or eglandular; leaf veins usually unbranched along margins .................................................. Sc. parvula
1 Flowers in racemes, bracts much reduced (not leaf-like); stem leaf petioles > 4 mm.
7 Corolla tube glabrous within or sparsely hairy, lacking a sharply defined ring of hairs at bend of tube (non-anunnulate).
8 Racemes second.
9 Corollas ca. 6 mm long; racemes terminal and axillary. ................................................................................................................. Sc. lateriflora
9 Corollas ca. 10 mm long; racemes terminal or terminating axillary branches .................................................................................. Sc. saxatilis
8 Racemes not second, flowers on more than one side of axis.
10 Stems and petioles with ascending hairs; at least some racemes from axillary branches; mid to upper leaves truncate basally ..............
................................................................................................. Sc. saxatilis
10 Stems and petioles with spreading or retrorse hairs; racemes terminal or in panicles; mid to upper leaves strongly cordate.
11 Margins of lower lip cleft and erose; lower lip with large lateral auricles (flabelliform)......................................................................... Sc. ovata ssp. bracteata
11 Margins of lip entire; lip undulate or weakly auriculate.
12 Lower lip entirely white with a few blue spots; leaf surface smooth with sparse glandular hairs .................................................... Sc. ovata ssp. ovata
12 Lower lip blue with two longitudinal white stripes; leaf surface rugose, usually densely glandular hairy (but may be eglandular).
13 [Ridge and Valley (especially shale barrens) of VA, WV, MD] ............................................................................................... Sc. ovata ssp. rugosa var. rugosa
13 [Blue Ridge (moist talus slopes) of NC, TN] ............................................................................................................................... Sc. ovata ssp. rugosa var. 1

7 Corolla tube with sharply defined ring of hairs (annulous) at bend of tube.
14 At least some upper leaves entire.
15 Leaves without stipitate glands. .................................................................................................................................................. Sc. multiglandulosa
15 Leaves with stipitate glands.
16 Corolla glabrous, lower lip with immaculate white central band; leaf bases long-attenuate ................................................................ Sc. glabriuscula
16 Corolla short pilose, lower lip with blue spots or lines on white central band; leaf bases cuneate to deltoid.
17 Lowest pedicels of main axis of inflorescence >4 mm, or if less, then subtending bracts < 13 mm ...................................................... Sc. arenicola
17 Lowest pedicels < 4 mm, or if more, then bracts >13 mm ................................................................................................................ Sc. integriglora
14 All leaves serrate or crenate.
18 Second internode below base of inflorescence stipitate glandular.
19 Corollas 24-33 mm long and upper surfaces of leaves punctate glandular ................................................................. Sc. pseudoserrata
19 Corollas 14-23 mm, or if longer, then upper surfaces of leaves eglandular.
20 Corollas 25-36 mm long; bracts elliptic to oblanceolate, apices acute ........................................................................................ Sc. montana
20 Corollas 14-23 mm; bracts obovate to broadly oblanceolate, apices obtuse.
21 Bases of upper leaves cuneate to rounded; corollas 14-18 (-21) mm ...................................................................................... Sc. elliptica var. hirsuta
21 Bases of upper leaves cordate to rounded; corollas 18-23 mm ......................................................................................... Sc. ocmulgee
18 Second internode below base of inflorescence eglandular.
22 Corollas > 21 mm long*.
23 Calyces densely to sparsely canescent, eglandular or with punctate glands (stipitate glands may also be present).
23 Calyces densely to sparsely canescent, eglandular or with punctate glands (stipitate glands may also be present).
24 Leaves softly villous beneath; calyces and bracts eglandular ................................................................................................. Sc. incana var. incana
24 Leaves glabrate, with appressed hairs on veins.
25 Stems canescent; calyces and bracts densely punctate glandular .......................................................................................... Sc. incana var. 1
25 Stems glabrous; calyces and bracts eglandular ...................................................................................................................... Sc. incana var. punctata
23 Calyces pilose with spreading stipitate glandular hairs.
26 Bracts with stipitate glands; leaves eglandular ................................................................................................................... Sc. elliptica var. elliptica
26 Bracts without stipitate glands; leaves densely punctate glandular.
27 Corollas 19-22 mm long; [Mountains of AL] .............................................................................................................................. Sc. alabamensis
27 Corollas 11-16 mm long; [Coastal Plain of SC and GA] ............................................................................................................... Sc. altamaha

Scutellaria altamaha Small, Altamaha Skullcap. Cp (GA, SC), Pd (GA, SC): sandy or rocky, dry forests; rare (GA Special Concern). Ne. SC to ec. GA and se. GA. [= K, S, Y; < S. mellichampii Small – RAB]
Scutellaria arenicola Small, Sandhill Skullcap. Cp (FL, GA): sandy scrub; rare. GA and ne. FL south to s. FL. [= K, S, WH, Y]
Scutellaria australis (Fassett) Epling, Southern Skullcap. Pd (GA, NC, SC, VA), Mt (WV), Cp (FL, GA): bottomland forests; rare. VA, s. WV, KY, IN, IL, MO, and KS, south to Panhandle FL, LA, and e. TX. [= G, WV, X; < S. parvula – RAB, S, WH; = S. parvula Michaux var. australis Fassett – F, K]
Scutellaria elliptica Muhlenberg ex Sprengel var. hirsuta (Short & Peter) Fernand. Mt (GA, NC, VA, WV), Pd (VA): mesic to dry forests; uncommon. Late May-June; June-July. PA and MI south to w. VA, w. NC, nw. GA, s. AL, and e. TX. [= C, F, G, K, W, WV, Y; < S. elliptica – RAB; < S. ovatifolia – S; = S. ovatifolia ssp. hirsuta (Short & Peter) Epling – X]
LAMIACEAE

Scutellaria glabrisscula Fernald, Georgia Skullcap. Cp (AL, FL, GA, MS): sandhills; rare. Sw. GA and w. FL Panhandle west through s. AL to s. MS. [= K, S, WH, Y]

Scutellaria incana var. 1. Cp (FL, GA, NC): dry sandy open woods or woodland margins; rare. July-August. Gulf Coastal Plain of sw. GA, nw. FL, s. AL, and c. MS; disjunct to Brunswick County, NC. [= S. altamaha Small ssp. australis Epling; < S. incana – WH; = S. incana var. australis (Epling) Collins comb. nov. ined.]

Scutellaria incana Biehler var. incana. Pd (NC, VA), Cp (NC, VA), Mt (WV): dry to mesic forests and woodlands; uncommon. NY, OH, IN, and IL, south to e. VA, c. NC, KY, w. TN, MS, and AR. [= C, F, G, K, WV, Y; < S. incana – RAB, S; = S. incana – X]


Scutellaria mellichampi Small, Mellichamp's Skullcap. Cp (GA, SC): sandy deciduous forests on river bluffs; rare (GA Special Concern). June; July. Se. SC south to e. GA; seemingly disjunct in c. AL. [= S, X, Y; < S. mellichampii – RAB; = S. incana Biehler var. australis (Epling) Collins comb. nov. – K, misapplied]

Scutellaria montana Chapman, Large-flowered Skullcap. Mt (GA): mesic hardwood (or hardwood-shortleaf pine) forests; rare. Se. TN south to nw. GA. [= K, S, Y; = S. serrata Andrzejedowski var. montana (Chapman) Penland – F]


Scutellaria nervosa Pursh, Bottomland Skullcap, Veined Skullcap. Pd (DE, NC, SC, VA), Cp (NC, VA), Mt (VA, WV), {GA}: alluvial forests, mesic forests; common (uncommon in VA Mountains and Piedmont, rare in DE, GA, NC, and SC, rare in VA Coastal Plain). May-June; June-July. NY, MI, and IA, south to GA, AL, and LA. [= RAB, K, S, W, WV; > S. nervosa var. nervosa – C, F, G; > S. nervosa var. calvifolia Fernald – C, F, G}

Scutellaria ocmulgee Small, Ocmulgee Skullcap. Cp (GA): bluff forests and other mesic hardwood forests; rare (GA Threatened). Endemic to e. GA. [= K, S, Y]

Scutellaria ovata Hill ssp. bracteata (Bentham) Epling. Mt (GA), Cp (FL): dry forests and woodlands, hammocks; rare. MO south through AR and OK to c. TX; disjunct eastward in s. MS, c. and n. AL, w. Panhandle FL, and nw. GA. [= K, W, WH, X; < S. ovata var. ovata – C, F, G; = S. ovata var. bracteata Bentham; > Scutellaria ovata Hill ssp. cuthbertii (Alexander) Epling – K, X; > S. cuthbertii Alexander – S; = S. ovata var. bracteata (Bentham) Epling var. bracteata – Z] [synonymy incomplete]


Scutellaria pseudoserrata Epling. Mt (GA), Pd (GA), {NC?, SC}: rich, rocky forests; rare. Also in e. TN (Chester, Wofford, & Kral 1997), nc. and e. GA (Jones & Coile 1988). Cultivated in Highlands, Macon Co., NC. [= K, W, X, Y]


**Scutellaria alabamensis** Alexander. AL (Epling 1942, Kartesz 1999). [= K, S, X, Y]

**Scutellaria drummondii** Bentham var. *drummondii*. Drummond's Skullcap. Cp (FL*, GA): blackland prairies, dry disturbed areas; rare. GA west to LA, south into Mexico. First reported for GA by Lee Echols in 2005 (pers. comm.). [= K; < S. *drummondii* = WH] [not yet keyed]

**Scutellaria floridana** Chapman, Florida Skullcap. Cp (FL): pine flatwoods; rare. Endemic to FL Panhandle. [= K, S, WH] [not yet keyed]

8. **Synandra** Nuttall 1818 (Synandra)


**Synandra hispidula** (Michaux) Baillon, Synandra, Gyandotte Beauty. Mt (NC, VA, WV): moist, rich forests; rare. Late April-May; May-June. A broad Appalachian endemic: s. OH west to s. IL, south to sw. VA, w. NC, and n. AL. [= RAB, C, F, G, K, S, W, WV]

9. **Macbridea** Elliott in Nuttall 1818 (Birds-in-a-nest, Macbridea)


1  Corolla white (faintly marked with purple in the throat); leaf tips obtuse to rounded; [FL Panhandle] .................................................... *M. alba*

1  Corolla lavender or pink; leaf tips acute; [se. NC south to s. GA] .......................................................... *M. caroliniana*


**Macbridea caroliniana** (Walter) Blake, Carolina Birds-in-a-nest, Carolina Macbridea. Cp (GA, NC, SC): swamp forests, especially in sphagnous seepage areas away from direct flooding, savanna edges, ditches; rare). July-November. Se. NC to s. GA; reported but undocumented from n. FL, AL, and MS. Apparently rare throughout its range. [= RAB, GW, K; = *M. pulchra* Elliott – S]

10. **Physostegia** Bentham 1829 (Obedient-plant)

10 Calyx and rachis lacking stalked glands; nutlets 2.0-3.6 mm long, smooth.

11 Uppermost pair of leaves below the terminal raceme often no larger than the floral bracts, the next pair of leaves down the stem 0.4-3.2 cm long, generally 0.1-0.3× as long as the internode 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A genus of about 300 species, herbs and shrubs, mainly temperate, nearly cosmopolitan (except Australia and New Zealand). References: Nelson (1981) – Z; Nelson & Fairey (1979); Mulligan & Munro (1989); Pringle (2002); Harley et al. in Kader (2004). Key adapted from various manuscript keys of the contributors.

1. Herbage variously pubescent or glabrous; [rare escapes from cultivation].
2. Biennial; leaf blades silky-pillose or tomentose, rounded to ciliate at the base, obviously dentate; calyx lobes projecting beyond the pubescence.................................................. S. germanica
3. Perennials from rhizomes, not branching in the lower portion (unless damaged); leaf blades often > 5 cm long, with acute apices; [natives, except S. floridana and S. palustris].

6. Petioles poorly developed, less than one-fifth as long as the blade or absent.
7. Calyx strongly glandular with atrophic glands or gland-tipped hairs, or both.
8. Calyx lobes narrowly lanceolate, about as long as the calyx tube; leaf blades lance-ovate to lanceolate, < 3 cm wide; stem angles glabrate to short retrorse pubescent; roots with moniliform tubers; [adventive weed of the Coastal Plain].......................... S. floridana
9. Calyx lobes deltoid; leaves broadly rounded to crenulate at the base and crenulate margins.................................................. S. cordata
10. Leaves ovate to elliptic with long acuminate apex and truncate base, margins strongly dentate.............................. S. lingnanii
11. Leaves ovate to broadly ovate, deeply ciliate at base.......................................................... S. subcordata
12. Calyx hispidulus to strong hispid with long, stiff, deflexed hairs; stems moderately to densely pubescent on the sides and angles; leaves usually pubescent above (some forms glabrate); petioles rarely 1-2 cm long............................ S. hispida
13. Leaf blades wider, ovate-oblong to elliptic; calyx lobes deltoid-acminate to an apiculate tip, ½ to 2/3 as long as the calyx tube; bracts of the inflorescence usually conspicuous and only gradually reduced upward; plants generally more pubescent

22. Leaf margins serrulate or serrate; stem nodes not bearded (sometimes obscure fine-hairy); stem angles with scattered, pustulate, short deflexed hairs; [high-elevation montane habitats] ........................................... S. latifolius

24. Leaves ovate-oblong to elliptic, usually widest near the middle, (1.6)-2.0-5.0(-6.0) cm wide; leaf margins crenate to sharply serrate.
25. Stem (including the sides) and usually the leaves with minute but copious atrophic glands............................. S. ephlei
26. Leaves and stem glandular or with a few scattered glands.
27. Mature calyx lobes triangular deltoid and abruptly apiculate, less than half as long as the calyx tube.
28. Leaf margins serrulate or serrate; stem nodes not bearded (sometimes obscure fine-hairy); stem angles with scattered, pustulate, short deflexed hairs; [high-elevation montane habitats] ........................................... S. latifolius
29. Leaf margins crenulate or crenate; stem nodes bearded; lower stem angles copiously pubescent with 3-celled spreading hairs; [low-elevation Piedmont and Coastal Plain habitats] .......................................................... S. species 1

Stachys agraria Chamisson & Schlechtendahl, Mouse’s-ear, Shade Betony. Cp (FL, SC): calcareous hammocks; rare. SC south to s. FL, west to TX. [= Stachys crenata Rafinesque – K, WH] (add synonymy)


Stachys arenicola Britton, Woundwort. Mt (VA, WV), Pd (VA), Cp (SC): marl fens, roadsides, banks of waterfowl impoundments; rare, possibly adventive in part from further west, but at least some populations native. NS and QC west to AK, south to VA, KY, AR, OK, NM, AZ, and CA. [= s. palustris Linnaeus var. pilosa (Nuttall) Fernald – C, F, G; < s. palastris Linnaeus ssp. pilosa (Nuttall) Epling; = s. pilosa var. arenicola (Britton) Mulligan & Monroe – K; < s. palastris – WV]


Stachys clingmannii Small, Clingman’s Hedge-nettle. Mt (NC), Cp (VA?), {SC?}: cove forests, especially periglacial boulderfields, mostly at high elevations (and see comments below); rare. June-September; September-October. A narrow Southern Appalachian endemic, known only from sw. NC and se. TN. Some plants similar to and perhaps referable to this species occur in Surry County VA (calcareous bushy thickets and ravines) and in IN. [= C, G, K, S, W, Z; < S. clingmannii – RAB]

Stachys cordata Riddell, Heart-leaved Hedge-nettle. Mt (GA, NC, VA), Pd (NC, VA): moist forests, especially alluvial bottomlands or over calcareous rocks; uncommon (rare in GA). June-August; September-October. NY west to IL, south to SC, GA, AL, and AR. Primarily montane, but extending east to Stokes County, NC, and Campbell County, VA. See Pringle (2002) for a discussion of nomenclature. [= S; < S. nuttallii Shuttleworth ex Bentham – K, W, Z; > S. cordata – C; = S. riddellii House – F, G; > S. salvioides Small – S]

Stachys eplingii J. Nelson, Epling’s Hedge-nettle. Mt (GA, NC, SC, VA, WV), Pd (VA): mesic forests, bogs, wet meadows over calcareous or mafic substrates; rare. June-August; August-September. W. VA and WV south to e. TN, w. NC, and w. SC. This species has a scattered and sporadic range in the southern and central Appalachians; material in the Interior Highlands previously included in S. eplingii has been separated as S. itisii J. Nelson (Nelson 2008). See Nelson & Fairney (1979) for a discussion of the nomenclural change. [= C, GW, K, W, Z; < S. nuttallii – RAB, F, G, S, WV, misapplied]


Stachys hispida Pursh, Hissy Hedge-nettle. Mt (NC, VA), Pd (DE, VA), Cp (DE, VA), ?? (GA): wet meadows and mesic forests; common (uncommon in NC and VA, rare in GA). {distribution} A highly variable taxon. [= C, G; = S. tenella Wildenow var. hispida (Pursh) Fernald – F; < S. tenella var. tenufolia – K, Z]


16. Lamium Linnaeus 1753 (Dead-nettle, Henbit)


1 Corolla yellow; anthers glabrous; bracts present, reflexed ...................................................... L. galeobdolon
1 Corolla blue or white; anthers with tufts of hairs; bracts absent or present (if present not reflexed).
2 Perennial, with rhizomes or stolons; corolla 18-35 mm long, the tube curved; leaves all petioled; [section Lamiotypus].
3 Corolla white; leaves not blotched with white; lower corolla lip with 2-3 teeth on each side; pollen light yellow ...... L. album ssp. album
3 Corolla pinkish-purple (rarely white); leaves usually marked with white; lower corolla lip with 1 tooth on each side; pollen orange........... L. maculatum

2 Annual, lacking rhizomes or stolons; corolla 10-18 (-20) mm long, the tube straight; leaves all petiolate or upper leaves sessile and clasping:

4 Leaves subtending flower clusters sessile; [section Amplexicaule] ........................................ L. amplexicaule var. amplexicaule

4 Leaves all petiolate; [section Lamium],

5 Leaves subtending whors deeply serrate, with many teeth > 2 mm long; nutlets (2.5-) 2.7-3.0 (-3.3) mm long............. L. dissectum

5 Leaves subtending whors crenate-serrate, with teeth < 2 mm long; nutlets (2.0-) 2.2-2.5 (-2.8) mm long............. L. purpureum


* Lamium dissectum Withering, Cutleaf Dead-nettle. Lawns, fields, roadsides, disturbed areas; native of Eurasia. April-May. This taxon is apparently an allopolyploid derivative (2n=36), resulting from hybridization of L. purpureum and another species, perhaps L. amplexicaule. Because of its allopolyploid status, this taxon should not be treated as a variety of L. purpureum. It is, however, possible that some individuals identified here may be sterile hybrids (2n=18). [= L. hybridum Villars – RAB, C, F, G, misapplied; = L. purpureum Linnaeus var. incisum (Willdenow) Persoon – K, Z]

* Lamium galeobdolon (Linnaeus) Linnaeus, Yellow Archangel. Disturbed areas; native of Europe and e. Asia. Several subspecies are recognized in Europe. [= Lamiumstrum galeobdolon (Linnaeus) Ehrendorfer & Polatschek – FNA, K; = Lamium galeobdolon (Linnaeus) Linnaeus – Z; = Galeobdolon luteum Hudson]


17. Collinsonia Linnaeus 1753 (Horsebalm, Richweed, Stoneroot)


1 Inflorescence an unbranched thyrse, the lower nodes with (3-) 6 flowers per node; floral bracts absent; pedicels flattened at base; leaves (2-) 4 (-6), the 4 upper (or only) leaves subverticillate; flowers light pink to lavender; flowering April-June; [subgenus Micheliella] ...... C. verticillata

1 Inflorescence a panicle (rarely unbranched), the flowers 2 per node; floral bracts present, minute to large; pedicels not enlarged basally; leaves 6 or more, opposite; flowers cream to yellow; flowering July-September; [subgenus Collinsonia].

2 Fertile stamens 4; fresh plants with anise scent; [GA southward and westward] ................................................................. C. anisata

2 Fertile stamens 2; fresh plants with lemon scent; [collectively widespread in our area].

3 Blades of the larger stem leaves 8.0-10.5 cm long, with 5-15 teeth on each margin, glabrous or hispidulous on the main veins beneath; plant from a small, rounded tuber-like crown, to 6 cm long and 5 cm in diameter. ................. C. tuberosa

3 Blades of the larger stem leaves 8-25 cm long, with 11-42 teeth on each margin, glabrous or variously pubescent beneath; plant from an elongate, woody, rhizome-like crown, to 15 cm long.

4 Calyx 2-5 mm long; calyx teeth lance-subulate to narrowly lanceolate; flowers 8-13 mm long........................................ C. canadensis

4 Calyx 4.5-7 mm long; calyx teeth broadly lanceolate; flowers 12-17 mm long ................................................................. C. punctata

Collinsonia anisata Sims, Southern Horsebalm, Anise Horsebalm. Pd (GA), Cp (FL, GA): rich foods; uncommon. Late July-September; September-October. C. GA south and west to Panhandle FL and west to s. MS, on the Piedmont and Coastal Plain. This species is apparently distinct, but Shinners’ concept of it included hybrids with C. canadensis and aberrant C. canadensis (Peirson, Cantino, & Ballard 2006). [= Y; < Collinsonia serotina Walter – K, W, WH, Z; < C. canadensis var. punctata (Elliott) A. Gray – F, misapplied; < C. punctata Elliot – S; ? Micheliella anisata (Sims) Briquet – S]

Collinsonia canadensis Linnaeus, Richweed, Northern Horsebalm. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): cove forests, rich forests, especially over calcareous or mafic substrates; common (rare in VA Coastal Plain). Late July-September; September-October. QC, MI, and WI, south to Panhandle FL and LA. [= RAB, C, F, G, K, S, W, WV, Z; < C. canadensis – Y (also see C. tuberosa)]

Collinsonia punctata Elliott, Florida Horsebalm. Cp (FL, GA, SC): rich woods; rare. Late August-mid October; September-October. S. SC (Barnwell County) to e. LA, on the Coastal Plain. [= Y; < Collinsonia serotina – K, WH, Z]
Collinsonia species 1. Pd (GA). Under study by Steve Bowling. (not yet keyed)

**Collinsonia tuberosa** Michaux, Stoneroot. Pd (GA, NC, SC), Mt (GA): rich forests, over calcareous or mafic substrates; rare (NC Watch List). Late July-September; September-October. C. NC west to c. TN, south to n. GA and MS (or LA?). Peirson, Cantino, & Ballard (2006) conclude that *C. tuberosa* should be merged into *C. canadensis*, a conclusion not followed here. [= RAB, K, S, W, Z; < C. canadensis – Y; = C. canadensis Linnaeus var. tuberosa (Michaux) A. Wood]

**Collinsonia verticillata** Baldwin, Whorled Horsebalm. Pd (GA, NC, SC, VA), Mt (GA): rich forests, ranging from moist (cove) forests to rather dry oak forests over mafic or calcareous rocks; rare. Late April-early June; June-July. Sc. VA west to e. TN, south to w. NC, nw. SC, c. GA, and MS; disjunct in s. OH. The range is strangely scattered and fragmented. [= RAB, C, G, K, W, Y; = Michelia verticillata (Baldwin) Briquet – F, S]

18. Elsholtzia Willdenow 1790


19. Mosla (Bentham) Buchanan-Hamilton ex Maximowicz 1875 (Mosla)


* Mosla dianthera (Buchanan-Hamilton ex Roxburgh) Maximowicz, Mosla. Mt (GA, NC), Pd (VA): disturbed areas; rare, native of e. Asia. August-September. This species is becoming a noxious weed west of our area (in KY and TN); it should be expected to become more widespread in our area. [= RAB, F, G, K; = Orthodon dianthera (Buchanan-Hamilton) Handel-Mazzetti – C]

20. Perilla Linnaeus 1764 (Perilla, Beefsteak-plant)


* Perilla frutescens (Linnaeus) Britton, Perilla, Beefsteak-plant. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, FL, GA, NC, SC, VA): moist disturbed areas; common (uncommon in DE Coastal Plain, rare in FL), native of India. August-October; October-December. Two varieties are sometimes recognized. Var. *crispa* (Bentham) Deane (leaves purple above and below; leaf margins laciniate-dentate and also crisped) and var. *frutescens* (leaves purple below; leaf margins dentate, not crisped). These probably represent cultivars more than taxonomically distinct entities. [= RAB, C, G, S, W, WH; > P. frutescens var. frutescens – F, K, WV; > P. frutescens (Linnaeus) Britton var. crispa (Bentham) Deane – F, K, WV]

Agastache Clayton ex Gronovius 1762 (Giant-hyssop)

A genus of about 22 species, herbs, of c. and e. Asia, and North America to Mexico. References: Vogelmann (1985); Lint & Epling (1945); Harley et al. in Kadereit (2004).

1 Leaves densely white tomentose below; corolla blue; [cultivated as an ornamental and rarely naturalized] ......................... A. foeniculum

1 Leaves glabrous to villous beneath, appearing green; corolla yellow, greenish-yellow, or pinkish; [native].

2 Corolla yellow or greenish-yellow; calyx lobes obtuse or sub acute, 1-1.5 mm long at anthesis; calyx lobes and bracts green; midstem internodes glabrous or minutely pubescent; lower surface of the leaf pubescent on the veins and surface................................. A. nepetoides

2 Corolla pinkish; calyx lobes acute or acuminate, 2-2.5 mm long at anthesis; calyx lobes and bracts with white or pink margins; midstem internodes at least sparsely long-pubescent; lower surface of the leaf pubescent mainly on the veins ........................................ A. scrophulariifolia

* Agastache foeniculum (Pursh) Kuntze, Lavender Giant-hyssop. Pd (DE, NC): disturbed areas, spread from cultivation; rare, native of w. North America. Cultivated as an ornamental and naturalized in scattered locations in PA (Rhoads & Klein 1993), KY (Kartesz 1999), and elsewhere. [= C, F, G, K]

* Agastache nepetoides (Linnaeus) Kuntze, Yellow Giant-hyssop. Pd (DE, NC, SC, VA), C (DE, NC, VA), Mt (GA, NC, VA, WV): woodlands and forests, generally over calcareous or mafic rocks; uncommon (rare in DE, rare in Coastal Plain of NC and VA). July-September; September-October. VT west to MN, south to nw. GA and OK. In our area, this species occurs mostly in the Piedmont. [= RAB, C, F, G, K, S, W]


Blephilia Rafinesque 1819 (Woodmint, Pagoda-plant)

1 Stem glabrate below the middle; leaf lower surface glabrous or with a few unicellular hairs on the midvein; [of sandy or rocky habitats of the Coastal Plain and Piedmont, from s. NC southward].

2 Plant a shrubby perennial, not flowering the first year; [of sandy or rocky habitats of the Coastal Plain and Piedmont, from s. NC southward].

3 Corolla light lavender or pink with darker spots, 10-20 mm long; calyx 5.0-7.5 mm long.

4 Leaves ovate or elliptic, sharply serrate, not revolute; leaves distinctly petioled; leaf surfaces glabrous.

5 Stem pubescent; leaves of flowering stems elliptic to ovate; [alien or native, generally of disturbed or weedy situations].

6 Plant stoloniferous, bearing leafy stolons with ovate leaves; leaves of the flowering stems 1-2 cm long, 1-5 mm wide, entire.

7 Axillary flower clusters in peduncled, contracted cymes.

8 Calyx 6.0-10.2 mm long, the hairs inside the throat barely or not exerted; blades of larger stem leaves 2-5 cm long.

9 Corolla 4-5 mm long; calyx 2.5-3.5 mm long.

10 Whorls with 8 or fewer flowers; calyx 2-3 mm long; corolla 12-12.5 mm long.

823
Clinopodium arkanasum (Nuttall) House, Arkansas Calamint. Mt (VA): dry limestone glades; rare (VA Rare). On west to MN, south to w. NY, nw. PA, w. VA, WV, IL, c. TN, and s. WI; also in MO, OK, AR, and TX. There appears to be confusion about the identities and distributions of this taxon and Clinopodium glabellum. [= K; Y; = Satureja glabella (Michaux) Briquet var. angustifolia (Torrey) Svenson – C, G; = Satureja arkanasum (Nuttall) Briquet – F; < Calamintha arkanasum (Nuttall) Shinners – GW (also see Clinopodium glabellum); = Calamintha arkanasum (Nuttall) Shinners – Z; < Clinopodium glabellum (Michaux) kuntze – S]

* Clinopodium ascendens (Jordan) Sampayo, Common Calamint. Cp (VA): rich calcareous slope; rare, native of Europe. August. [= Calamintha sylvatica Bromfield ssp. ascendens (Jordan) P.W. Ball – K, < Calamintha officinalis – Z]

Clinopodium ashei (Weatherby) Small, Ashe's Calamint, Ashe's Savory, Ohoopee Dunes Wild Basil. Cp (GA): xeric sandhills; rare. Peninsular FL (south of our area); disjunct in e. GA (Candler and Tatnall counties). [= K, S, Y; = Calamintha ashei (Weatherby) Shinners – WH, Z; = Satureja ashei Weatherby]


* Clinopodium calamintha (Linnaeus) Stace, Lesser Calamint, Basil-thyme. Mt (NC, VA), Pd (NC, VA), Ip (KV), Cp (NC, VA), {GA}: disturbed areas; common (uncommon in Europe). July-October. [= Satureja calamintha (Linnaeus) Scheele var. nepeta (Linnaeus) Briquet – RAB, F, G, W; = Satureja calamintha (Linnaeus) Scheele – C; > Satureja calamintha var. calamintha – F; > Satureja calamintha var. nepetoides (Jordan) Briquet – F, G; > Satureja calamintha var. glandulosa (Riquien) Briquet – F; > Calamintha nepeta (Linnaeus) Savissp. nepeta – K; > Calamintha nepeta ssp. glandulosa (Riquien) P.W. Ball – K; = Clinopodium nepeta (Linnaeus) kuntze – S; > Calamintha officinalis Moench – Z; > Calamintha nepeta (Linnaeus) Savi – Z]


Clinopodium glabellum (Michaux) kuntze. Ip (KY): dry-mesic to mesic shaley forests, limestone barrens; uncommon. Nc. KY, c. TN, south to c. AL; MO and AR. Reports of this for VA (Kartesz 1999) are apparently based on confusion with Clinopodium arkanasum. [= Y; = Satureja glabellum (Michaux) Briquet var. glabella – C; > Clinopodium glabellum (Michaux) kuntze – K; < Calamintha arkanasum (Nuttall) Shinners – GW; < Clinopodium glabellum (Michaux) kuntze – S; = Calamintha glabella (Michaux) Bentham]

* Clinopodium gracile (Bentham) kuntze, Slender Wild Basil. Cp (AL, FL, LA, MS): disturbed areas, bottomland forests; rare, native of Asia. June-August; August-October. Introduced in s. AL, FL, LA (Kartesz 1999; Woods, Diamond, & Searcy 2003) and MS (S.W. Leonard, pers. comm. 2005). [= K, WH] [add to synonymy]

Clinopodium vulgare Linnaeus, Wild Basil. Mt (KY, NC, VA, WV), Pd (DE, NC, VA), Cp (DE, NC, VA), Ip (KY): pastures, roadsides, forests, thin soils around rock outcrops; common (uncommon in DE Piedmont; rare in DE Coastal Plain). July-September. Nl (Newfoundland) to MB, south to NC, sc. TN, and KS, scattered in the west, widespread in Europe. Plants in our area may reflect both native and introduced genotypes. [= K, S, Y, Z; = Satureja vulgaris (Linnaeus) Fritsch – RAB, C, F, G, W; > Satureja vulgaris var. vulgaris – F; > Satureja vulgaris var. diminuta (Simon) Fernald & Wiegand – F; > Satureja vulgaris var. neogaea Fernald – F; > Clinopodium vulgare var. neogaea (Fernald) C.F. Reed]

Clinopodium dentatum (Chapman) kuntze, Florida Calamint, Toothed Savory. Cp (FL, GA): sandhills and xeric steepheads; rare. Endemic to sw. GA and Panhandle FL. [= K, S; = Satureja dentata (Chapman) Briquet; = Calamintha dentata Chapman – WH] [not yet keyed; add to synonymy]

Clinopodium species 1, Indian Grave Mountain Wild Basil. It occurs in montane longleaf pine/chestnut oak/Gorgia oak woodlands on Hollis quartzite along the main Pine Mountain ridge. Under study by Jim Allison. [not yet keyed]

* Condradina A. Gray 1870 (Condradina, Rosemary)


1 Leaves ob lanceolate, slightly revolute, the leaf undersurface mostly visible and showing 1-4 raised lateral veins; [Putnam County, FL, adjacent to the coverage area].
2 Calyx 8.5-11 mm long, the upper lobe 3.6-4.4 mm long; cyme 1.5-flowered; unicellular hairs of the lower leaf surface thin-walled, collapsing and flattened in drying; [ec. Putnam County, FL] ........................................................................................................... C. cymniflora
2 Calyx 7-8.5 mm long, the upper lobe 1.8-3.5 mm long; cyme 3-7-flowered; unicellular hairs of the lower leaf surface thick-walled, terete to conical, unchanged in drying; [w. Putnam County, FL] ................................................................................................. C. etonia
1 Leaves either linear and strongly revolute such that essentially only the mid vein is visible on the undersurface (C. canescens) or linear to narrowly ob lanceolate, slightly to strongly revolute, some leaf surface sometimes showing on the leaf undersurface, but lacking raised lateral veins (C. glabra and C. verticillata); [collectively more widespread].
3 Leaves densely gray-pubescent above and below; midrib on lower leaf surface densely gray-pubescent to gray-pilo se. ............ C. canescens
3 Leaves sparsely or glabrous or inconspicuously short-pubescent; midrib on lower leaf surface glabrous or glabrate, contrasting with the more densely pubescent lower leaf surface.
4 Plants upright to 8 dm tall; calyx tube glabrous or minutely and inconspicuously puberulent; [Coastal Plain of Panhandle FL and s. AL] ................................................................................................................... C. glabra
4 Plants decumbent, rooting at the nodes; calyx tube densely short-pubescent and also pilose with longer glandular hairs; [Cumberland Plateau of KY and TN].................................................................................................................................................C. verticillata


Conradina verticillata Jennison, Cumberland Rosemary. Mt (KY, TN): flood-scoured cobbble bars of large rivers; rare. Endemic to the Cumberland Plateau area of ne. TN and se. KY. It has an odor similar to rosemary, and showy purplish flowers. [= K, Y, Z; = C. montana Small – S]

Cunila D. Royen ex Linnaeus 1759 (Stone-mint, American-dittany, Wild-oregano)


Dicerandra Bentham 1830 (Dicerandra)


1 Corolla tubular, straight or slightly curved; superior lobe cucullate (hoodlike); stamens and style arching under the hooded upper lobe of the corolla, included or slightly exerted beyond its apex; filaments inserted at 2 levels within the corolla; odor of fresh plant cinnamon-like, spicy; [section Lecontea].

2 Corolla tube ca. 18 mm long, the orifice ca. 2 mm wide; leaves (15-) avg. 25 (-45) mm long, linear, the margins entire; [s. SC south through much of the Coastal Plain of GA].........................................................................................................................D. odoratissima

3 Corolla funnel-shaped, the tube geniculate; superior corolla lobe a lobed, flaring standard; stamens and style exserted, the stamens either widely flaring to the sides or declined along the lower lobe of the corolla; filaments inserted at the same level within the corolla; odor of fresh plant minty; [section Dicerandra].

4 Leaves narrowly rhombic; cymes 5-7-flowered; corolla purplish red to vivid purple; anthers strongly reddish brown; [extreme s. GA south into e. Panhandle FL and ne. FL]. [..........................D. linearifolia var. robustior]

Dicerandra densiflora Bentham, Florida Balm. Cp (FL): longleaf pine sandhills; rare. October-early November. Reported for GA by Small (1933), but this report is apparently in error; Huck (1987) regards it as endemic to n. peninsular FL. This taxon is tetraploid. [= K, S, WH, X, Y, Z]

Dicerandra linearifolia (Elliott) Bentham var. linearifolia. Cp (AL, FL, GA): sandhills and flatwoods; uncommon. Mid September-late November. W. and ec. Coastal Plain of GA south to ne. FL and s. AL. This taxon is hexaploid. [= K, WH, X, Y, Z; < D. linearifolia – S]

Dicerandra linearifolia (Elliott) Bentham var. robustior R.B. Huck. Cp (FL, GA): sandhills and flatwoods; uncommon. Late September-late November. Sc. Coastal Plain of GA (Brooks, Echols, Lowndes counties) (Huck 1987) south to e. Panhandle FL and ne. FL. This taxon is tetraploid. [= K, WH, X, Y, Z; < D. linearifolia – S]

Dicerandra odoratissima R.M. Harper. Cp (GA, SC): sandhills; uncommon (SC Rare). Late August-early October. S. SC south to se. GA. This taxon is tetraploid. [= RAB, K, S, Y, Z]

Dicerandra radfordiana R.B. Huck, Radford's Dicerandra. Cp (GA): dry flatwoods and sandhills; rare (GA Special Concern). September-October. Endemic to e. GA (McIntosh County). This species was postulated to be a polyploid derivative of D. odoratissima by Huck (1984, 1987); later study has shown that this is not the case (Huck & Chambers 1997). Both taxa are tetraploid. [= K, Y, Z]

Dracocephalum Linnaeus 1753 (Dragon's-head)
A genus of about 45-70 species, herbs, of Eurasia and North America. References: Harley et al. in Kadereit (2004). [also see Physostegia]

* Dracocephalum parviflorum Nuttall, Dragon's-head. Pd (DE, NC), WV (Mt): cultivated ground; rare, native west of the Appalachians. May-July; July-September. [= C, F, G, K, WV; = Moldavica parviflora (Nuttall) Britton – RAB]

** Glechoma Linnaeus 1753 (Gill-over-the-ground)**

A genus of about 4-10 species, herbs, of temperate Eurasia. References: Harley et al. in Kadereit (2004).


**Hedeoma** Persoon 1807 (American Pennyroyal)


1 Leaves elliptic, 4-11 mm wide, slightly to strongly crenate; nutlets subspHERiCAL, 0.7-1.0 mm long, 0.6-0.9 mm wide, the surface smooth, mottled, not glaucous; [subgenus Hedeoma] ................................................................................................................................. H. pulegioides
2 Leaves linear to narrowly elliptic, 1-4 mm wide, entire; nutlets narrowly ovoid, 1.0-1.3 mm long, 0.4-0.6 mm wide, the surface areolate and strongly glaucous; [subgenus Saturejoidei].

1 Calyx teeth converging, closing the orifice at maturity; bracteoles subtending the individual flower pedicels 1-2 mm long, about ½ as long as the pedicel; leaves (5.0-) avg. 7.7 (-11.0) mm long, (1.2-) avg. 2.2 (-4.0) mm wide, 1-5× as long as wide .......... [H. drummondii]
2 Calyx teeth spreading (the upper) to slightly convergent (th lower), not closing the orifice at maturity; bracteoles subtending the individual flower pedicels (1.5-) 2.5-6 mm long, generally as long as or longer than the pedicel; leaves (11.0-) avg. 16.4 (-21.0) mm long, (1.0-) avg. 2.2 (-3.0) mm wide, > 5× as long as wide .......................................................................................................................... H. hispida

*? Hedeoma hispida* Pursh, Rough Pennyroyal. Pd (GA, SC, VA), Mt (GA, WV*), Cpt (FL, GA): disturbed areas, pastures, granitic flatrocks; rare, apparently adventive from further south and west. Irving (1980) shows H. hispida east to e. Panhandle FL, c. AL, nc. TN, and s. OH; it may be recently arrived further east or previously overlooked. First reported for SC by Hill & Horn (1997). [= C, F, G, K, WV, Z; = H. hispida – WH (orthographic variant)]

**Hedeoma pulegioides** (Linnaeus) Persoon, American Pennyroyal. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cpt (DE, NC, SC, VA): dry soils of woodlands, roadbanks, woods-roads, especially common in shaly parts of the VA and WV mountains; common (uncommon in NC and SC). Late July-October. NS, s. QC, s. ON, MI, WI, and IA south to c. SC, c. GA, and AR. The fragrant oil is apparently very similar to that of the European Pennyroyal, *Mentha pulegium* Linnaeus. The oil is a powerful insect repellent and insecticide, often used on pets to repel fleas. It is also poisonous to humans, however, at least in substantial quantities. It is sometimes used as a tea; native Americans are reputed to have used it as an abortion inducer. This plant should be used with great caution, if at all. [= RAB, C, F, G, K, S, W, WV, Z]

Hedeoma drummondii Bentham. Cpt (AL, MS): black belt prairies; rare. MN and MT south to TX and CA; disjunct eastwards to AR, MS, and AL, where it occurs in black belt prairies. [= K, Z]

**Hypis** Jacquin 1786 (Cluster Bushmint)


1 Flowers borne in large, globose heads, 1.5-2.5 cm across, on peduncles 2-6 cm long; leaves lancolate, narrowed to a narrowly cuneate, subpetiolar base ............................................................................................... H. alata
2 Flowers borne in irregular verticillate spikes, sessile to pedunculate on peduncles 1-2 mm long; leaves either ovate to deltate, narrowed to a broadly cuneate to truncate base and well-developed petiole (4-6 cm long on larger leaves), or lancolate and narrowed to a cuneate, subpetiolar base.

1 Stem scabrous on the angles; corolla blue-purple; leaves ovate to deltate .......................................................................................................................... H. mutabilis
2 Stem glabrous or pubescent; corolla white; leaves lancolate .............................................................................................................................. H. verticillata

**Hypis alata** (Rafinesque) Shinners, Musky Mint, Cluster Bushmint. Cpt (FL, GA, NC, SC): wet pine savannas, margins of swamp forests, wet powerline rights-of-way, ditches; common. Late June-September. Ne. NC south to s. FL, west to se. TX; West Indies. [= RAB, GW, K, WH; = H. radiata Willdenow – S]

* Hypis mutabilis* (A. Richard) Briquet, Tropical Bushmint. Cpt (FL, GA, SC, VA); moist disturbed areas; common (uncommon in GA, rare in SC and VA), native of South America. [= GW, K, S, WH]
**LAMIACEAE**

827


Hyssopus Linnaeus 1753 (Hyssop)


* Hyssopus officinalis* Linnaeus, Hyssop. {NC} Reported for NC (see G and S); documentation not known. Native of Eurasia. July-October. [= RAB, C, F, G, K, S]

Leonotis (Persoon) R. Brown 1810 (Lion's-ears)

A genus of about 9 species, herbs, shrubs, and small trees, of sub-Saharan Africa. References: Iwarsson & Harvey (2003)=Z.


Lycopus Linnaeus 1753 (Bugleweed, Water-horehound)


1. Calyx lobes acute at the apex, shorter than or equaling the nutlets.
   2. Plant usually with tubers; leaf base tapered to a long, winged petiole; corolla lobes 4, erect; leaf teeth (6-) avg. 8.6 (-11) per side;... *L. viriginicus*
   3. Calyx lobes 4, one erect and three spreading; nutlet tubercles well-developed, deeply toothed; leaf teeth (2-) avg. 4.5 (-6) per side;... *L. cokeri*
   4. Nutlet tubercles well developed.
   5. Leaves evidently petiolate, the petioles narrowly winged; stems and branches sparsely pubescent with hairs 0.5-1.6 mm long; leaf teeth blunt to acute... *L. europaeus*
   6. Leaves sessile or subsessile.
   7. Leaves ovate to lanceolate, usually rounded at the base, scarcely reduced upward on the stem... *L. angustifolius*


* Lycopus europaeus* Linnaeus, Gypsywort, European Bugleweed. Cp (DE, NC, VA), Pd (DE), Mt (WV): marshes, ditches; common (uncommon in NC and VA, rare in WV), native of Europe. June-November. In the Great Lakes and St. Lawrence River regions, hybrid swarms involving *L. americanus* and *L. europaeus* are numerous (Webber & Ball 1980). However, to date there is no evidence that these species have hybridized within the Flora region. [= RAB, C, G, K, S, Z; > L. europaeus var. europaeus – F; > L. europaeus var. mollis (Kern.) Brijt. – F]
LAMIA CEE

Lycopus rubellus Moench, Stalked Bugleweed. Cp (DE, FL, GA, NC, SC, VA), Pd (NC, SC, VA), Mt (GA, VA, WV*): marshes, swamp forests, bottomlands; common (rare in WV, rare in VA Mountains). June-November. ME west to MI, south to FL and TX. [= C, S, Z; = L. rubellus var. rubellus – RAB, GW; < L. rubellus – G, K, W, WH (also see L. angustifolius); > L. rubellus – S; > L. velutinus Rydberg – S]

Lycopus uniflorus Michaux, Northern Bugleweed. Mt (NC, SC, VA, WV), Pd (DE, NC, VA), Cp (DE): bogs, seeps, wet forests; common. July-October. NL (Newfoundland) west to AK, south to w. NC, AR, and CA. [= RAB, C, F, G, S, W, WV; Z; < L. uniflorus – GW (also see L. cokeri); > L. uniflorus var. uniflorus – K]


Meehania Britton 1894 (Meehania)


Melissa Linnaeus 1753 (Balm)


Mentha Linnaeus 1753 (Mint)


Identification notes: The distribution, habitats, phenology, and abundance of all Mentha species need substantial additional herbarium investigation.

1 Flowers in axillary verticils subtended by ordinary foliage leaves, and separated by internodes of ordinary length.

2 Calyx glabrous throughout, or pubescent toward the tips only; calyx 2-3.5 mm long; plants usually sterile; fresh plant usually with spearmint odor or flavor ..............................................................................................................................................................................M. × gracilis

2 Calyx pubescent throughout its length; calyx 1.5-2.5 mm long; plants usually fertile; fresh plant usually with a rather unpleasant odor of flavor.

3 Leaves subtending the inflorescence mostly broadly rounded at the base; leaves of the inflorescence relatively narrow; [alien] ......................... ..................................................................................................................................................................................M. × arvensis ssp. arvensis

3 Leaves subtending the inflorescence mostly cuneate at the base; leaves of the inflorescence relatively broad; [native, though often in weedy situations] ............................................................................................................................................................................................................................................M. canadensis

1 Flowers in terminal spikes or heads, the subtending leaves absent or distinctly smaller than the foliage leaves.

4 Inflorescence a terminal glbose to ovoid head of 1-3 verticils.

5 Pedicels, calyx, and leaves pubescent; plants usually fertile. ...........M. aquatica var. aquatica

5 Pedicels and calyx glabrous, leaves glabrous or nearly so; plants usually sterile ..................................................................................M. aquatica var. citrata

4 Inflorescence a spike of several to many verticils.

6 Bracteal leaves much longer than the flowers, resembling the foliage leaves, but smaller or narrower .................................................M. × gracilis

6 Bracteal leaves linear to lanceolate, little surpassing the flowers.

7 Calyx tube glabrous; leaves glabrous, or with scattered hairs on the lower surface.

8 Petioles of the main leaves 4-15 mm long; spikes stout; plants sterile; fresh plant with peppermint odor or flavor ................................ ..................................................................................................................................................................................................................................................................................M. × gracilis var. piperita

8 Petioles of the main leaves 0-3 mm long; spikes slender; plants fertile; fresh plant with spearmint odor or flavor ................................ ..................................................................................................................................................................................................................................................................................M. spicata var. spicata

7 Calyx tube pubescent; leaves moderately to densely hairy on the lower surface.

9 Leaves lanceolate to oblong-lanceolate, > 3x as long as wide.

10 Hairs of the leaf undersurface unbranched; leaves widest near the middle, slightly rugose; fertile anthers 0.28-0.38 mm long; fresh plant with musty flavor or odor ..................................................................................................................M. longifolia ssp. longifolia

10 Hairs of the leaf undersurface denticulate; leaves oblong lanceolate, widest towards the base, conspicuously rugose; fertile anthers 0.38-0.52 mm long; fresh plant with spearmint odor or flavor ..................................................M. spicata var. spicata

9 Leaves oblance to ovate, 1-3x as long as wide.
11 Leaves generally 1-2× as long as wide, ovate- orbicular, broadly rounded to subcordate at the base, obtuse at the apex; leaf serrations rounded and often turned downward (thus appearing crenate); leaf surface strongly rugose, with scattered denticulate hairs below; fresh plant with sickly or sweet flavor or odor. ................................................................. M. suaveolens

11 Leaves generally 1-3× as long as wide, ovate to oblong, broadly cuneate to rounded at the base, acute at the apex; leaf serrations sharp; leaf surface moderately rugose; fresh plant with spearmint odor.

12 Leaves generally oblong, with nearly parallel sides and a broadly rounded base; flowers consistently with 4 fertile anthers ......... M. ×rotundifolia

12 Leaves generally ovate, infrequently oblong; flowers typically with all or mostly sterile anthers ......................... M. ×villosa

* Mentha aquatica Linnaeus var. aquatica, Water Mint, Lemon Mint. Cp (DE), Mt (WV), {NC, VA}: disturbed areas; uncommon, native of Europe. [= Y; = M. aquatica – C, F, G, S, Z; < M. aquatica – K (also see Mentha aquatica var. citrata)]

* Mentha aquatica Linnaeus var. citrata (Ehrhart) Fresen., Lemon Mint, Orange Mint, Bergamot Mint. {VA} native of Europe. [= Y; = M. ×piperita Linnaeus (pro sp.) var. citrata (Ehrhart) Briquet (pro sp.) – Z; = M. ×citrata Ehrhart – C; = M. citrata – F, G, S; < M. aquatica – K]

* Mentha arvensis Linnaeus ssp. arvensis, Field Mint. Pd (DE), Mt (VA, WV): marshes, disturbed areas; uncommon (rare in VA and WV), native of Europe. [= Y; = M. arvensis var. arvensis – C, F, G; = M. arvensis Linnaeus – S, Z; = M. arvensis ssp. arvensis – Y; < M. arvensis – K]

Mentha canadensis Linnaeus, Canada Mint. Mt (VA, WV), Cp (DE, VA), Pd (DE, VA), {NC}: moist soils; common.

{distribution} [= S, Y; = M. arvensis Linnaeus var. canadensis (Linnaeus) Kuntze – C; ? M. arvensis – RAB, misapplied; ? M. gentilis Linnaeus – RAB; = M. arvensis var. villosa (Bentham) S.R. Stewart – F, WV; > M. arvensis var. glabrata (Bentham) Fernald – G; > M. arvensis var. lanata Piper – G; = M. arvensis Linnaeus ssp. canadensis (Linnaeus) H. Harr; < M. arvensis – K]


* Mentha longifolia (Linnaeus) Linnaeus ssp. longifolia, Horse Mint. {VA} Native of Europe. [= Y; < M. longifolia – RAB, C, G, WV; > M. longifolia (Linnaeus) Hudson var. longifolia – F; > M. longifolia (Linnaeus) var. undulata (Wildenow) Fiori & Paolotti – F]

* Mentha ×piperita Linnaeus (pro sp.) var. piperita [Mentha aquatica × spicata], Peppermint. Cp (DE, FL, VA), Pd (DE, VA), Mt (VA), {GA, NC, SC}: disturbed areas; uncommon, native of Europe. [= C, K, Y, Z; = M. piperita – RAB, G, S, WV; > M. piperita – F; > M. crispa Linnaeus – F; < M. piperita – WH]

* Mentha ×rotundifolia (Hudson) (pro sp.) [Mentha longifolia × suaveolens]. Mt (NC, VA), Pd (VA), Cp (VA), {GA, SC}: rare, native of Europe. [= C, K, Y; = M. rotundifolia – G, S, WV]

* Mentha spicata Linnaeus var. spicata, Spearmint. Mt (VA), Pd (DE, VA), Cp (FL, VA), {GA, NC, SC}: disturbed areas; uncommon (rare in FL and VA Coastal Plain), native of Europe. [= Y; < M. spicata – RAB, C, F, G, K, S, WH, WV, Z]

* Mentha suaveolens Ehrhart sp. suaveolens, Apple Mint, Pineapple Mint, Round-leaved Mint. Cp (DE, FL, NC), Mt (NC), Pd (DE, NC?), {SC, VA}?: disturbed areas; rare, native of Europe. See Denslow & Poindexter (2009) for helpful information on distinguishing M. suaveolens from M. ×rotundifolia. [= Y; < M. suaveolens – C, K, WH, Z]

* Mentha ×villosa Hudson (pro sp.) [Mentha spicata × suaveolens]. Introduced south to PA and KY. [= C, K, Z; > M. alopecuroides Hull – F; > M. ×villosa var. villosa – Y; > M. ×villosa var. alopecuroides (Hull) Briquet – Y] {not yet keyed}


* Mentha ×veteciliana Linnaeus (pro sp.) [Mentha arvensis × aquatica]. Mt (WV): most soils; rare, native of Europe. [= C, K, WV, Z] {add synonymy; not yet keyed}

Monarda Linnaeus 1753 (Bergamot)

A genus of about 12-20 species, herbs, of North America. Many of our species are cultivated, especially M. didyma in various selected forms. Additional studies are needed on a number of taxonomic problems in Monarda. Most of the varieties recognized above have been considered valid by a succession of workers; they do seem to describe morphologically distinguishable (if not entirely discrete) entities which make phytogeographic sense. References: McClintock & Epling (1942)=Z; Scora (1967)=Y; Fosberg & Artz (1953)=X; Gill (1977); Prather & Keith (2003); Harley et al. in Kader et al. (2004).

1 Flowers in 2-6 glomerules, terminal and at 2-5 successive nodes down the stem; stamens included; leaves lanceolate to narrowly elliptic, usually broadest near the middle and tapered to a cuneate base, (2.5-) 3-8× as long as wide.

2 Calyx lobes attenuated into a spinose awn 2-7 mm long; corolla white to pink; inner bracts subending the flowers 4-9 mm wide, abruptly acuminate into a spinose bristle ................................................................. M. citriodora var. citriodora

2 Calyx lobes narrowly to broadly triangular, acute or long-acuminate but not awned; corolla yellow, spotted with purple; inner bracts 8-14 mm wide, acuminate.

3 Lower leaf surface moderately to densely silvery-tomentose; stem densely villous with spreading or downwardly-curved coarse hairs, lacking coarse, horizontal bristles and short downwardly-curved hairs. ................................................................. M. punctata var. villosa

3 Lower leaf surface pubescent mainly on the midvein and other main veins, appearing green; stem pubescent with short downwardly-curved hairs, also with coarse, horizontal bristles and/or upwardly-curved hairs.

4 Stem with many coarse horizontal bristles, also pubescent with short, downwardly-curved hairs; leaves (40-) 50-70 (-95) mm long, 10-28 mm wide (at least some over 15 mm wide), averaging ca. 3× as long as wide ................. M. punctata var. arkansana

4 Stem with few or no coarse horizontal bristles, also pubescent with a mixture of upwardly-curved and downwardly-curved hairs; leaves (25-) 35-55 (80) mm long, 5-17 mm wide (the widest very rarely over 15 mm wide), averaging ca. 4× as long as wide ................. M. punctata var. punctata
LAMIAEAE

1 Flowers in 1-2) glomerule, terminal (rarely also 1 at the next node down the stem); stamens exerted; leaves ovate to ovate-lanceolate, broadest near the rounded, truncate, or suborbate base, 1.5-3 (-4) x as long as wide.

5 Corolla 30-45 mm long, scarlet-red, (3-) 4-8 mm broad at the expanded portion of the throat; [primarily of mountain seepages, streambanks, and boggy places]...

**M. didyma**

5 Corolla 14-33 (-36) mm long, white, lavender, or purple, 1-3 (-4) mm broad at the expanded portion of the throat; [of various habitats, usually dryish to mesic].

6 Leaves deltoid-ovate to ovate, 2-6 cm wide, usually ca. 2 x as long as wide; orifice of the calyx glabrous to slightly hirsute with a few long hairs; upper lip of the corolla 5-8 mm long and not bearded (M. clinopodia) or 13-16 mm long and slightly bearded (M. media) near its apex; outer surface of the corolla glabrous to evenly pubescent with short curled hairs.

7 Corolla white, greenish, or pale pink, the lower lip spot-pilose; outer bracts subtending the inflorescence green or pale (rarely with a purplish midvein); upper lip of the corolla 5-8 mm long, not bearded...

**M. clinopodia**

7 Corolla deep purple, the lower lip usually not spotted; outer bracts subtending the infloresence purple to red; upper lip of the corolla 13-16 mm long and slightly bearded near its apex;...

**M. media**

6 Leaves narrowly-deltoid, ovate-lanceolate to lanceolate, 1-4 cm wide, usually ca. 3 x as long as wide; orifice of the calyx densely hirsute with numerous erect, stiff, white hairs; upper lip of the corolla prominently bearded near its apex; outer surface of the corolla evenly pubescent with short curled hairs.

8 Corolla deep purple; middle lobe of the lower corolla lip 4-6 mm long; outer bracts subtending the inflorescence reddish...

**M. fistulosa** var. *rubra*


**M. clinopodia** Linnaeus, Basil Bergamot. Mt (NC, SC, VA), Pd (DE, NC, SC, VA): mesic, forested slopes; common (uncommon in VA Piedmont, rare in DE). Late May-September; July-October. NJ, w. NY, and IL, south to n. GA, and c. AL (some of the range perhaps accountable to cultivation). There appear to be a number of chemical races in *M. clinopodia* which may warrant taxonomic status. [= RAB, C, F, G, K, S, W, Y, Z; = *M. fistulosa* Linnaeus var. *clinopodia* (Linnaeus) Cooperrider]

**M. didyma** Linnaeus, Bee-balm, Oswego Tea. Mt (NC, SC, VA, WV), Pd (DE*, NC, VA), Cp* (NC*): seepage slopes, periglacial boulderfields with abundant seepage, streambanks, boggy places, usually in strong to moderately filtered sunlight; common (rare in Piedmont, rare in Coastal Plain, rare in SC). July-September; September-October. ME west to MI, south to PA and OH, and in the Appalachians south to sw. NC, se. TN, and ne. GA (part of the northern range is likely only by introduction). McClintock & Epling (1942) describe 2 forms of *M. didyma*: the "broad-leaved form," with leaves averaging 9.2 cm long and 5.2 cm wide and corollas averaging 35 mm long, ranging south to se. PA and ne. WV, and the "narrow-leaved form," with leaves averaging 11.8 cm long and 4.4 cm wide and corollas averaging 39 mm long, occurring throughout the range of the species. Further study seems warranted. [= C, F, G, K, S, W, Y, Z; = *M. didyma* – RAB (also see *M. medio*)]

**M. fistulosa** Linnaeus var. *brevis* Fosberg & Artz, Smoke Hole Bergamot, Cedar Glade Bergamot. Mt (VA, WV): limestone outcrops, cliffs, barrens, and glades, and on limestone talus; rare. June-August; July-October. Apparently endemic to w. VA (Giles County) and e. WV. This variety is seemingly very distinct (Kimball et al. 2002). It had been collected only a very few times prior to the work of Bargtis (1993), who found it to be a characteristic plant of limestone barrens and woodlands in localized areas in the Ridge and Valley Province of WV. It flowers about a month earlier than *M. fistulosa* in the vicinity (Bargtis, pers. comm.). [= WV, X, Y; = *M. fistulosa* ssp. *brevis* (Fosberg & Artz) Scora, comb. nov. ined. – K; < *M. fistulosa* – W]

**M. fistulosa** Linnaeus var. *fistulosa*, Appalachian Bergamot. Mt (NC, VA, WV), Pd (DE, NC, VA): moist wooded slopes; roadsides, woodland edges, old fields; common (rare in DE). June-September; August-October. CT south to sw. NC, nearly or entirely limited to the Appalachians. I have interpreted var. *fistulosa* and var. *mollis* somewhat differently than some previous workers. A more coherent geographic pattern is achieved by limiting var. *fistulosa* to plants with spreading hairs only. [= F, WV, X, Y; < *M. fistulosa* – RAB, W; = *M. fistulosa* ssp. *fistulosa* var. *fistulosa* – K; < *M. fistulosa* var. *fistulosa* – C, G, Z (also see var. *mollis*); = *M. fistulosa* – S]


**M. fistulosa** Linnaeus var. *rubra* A. Gray, Purple Bergamot. Mt (NC, VA), {GA}: moist slope forests; rare (NC Watch List). ME to NJ, and from nw. NC to n. GA, in the Appalachians. Perhaps native only in the Southern Appalachians. A problematic taxon; see *M. media* for comments. [= X, Y, Z; < *M. fistulosa* – RAB, W; = *M. fistulosa* ssp. *fistulosa* var. *rubra* A. Gray – K; < *M. media* – C, F, S]

**M. media** Willdenow, Purple Bee-balm. Mt (GA, NC, VA, WV): grassy balds, moist slopes, mostly at high elevations; rare. July-September; September-October. VT west to IN, south to w. MD; disjunct in w. NC and sw. TN, part of the range perhaps the result of cultivation. *M. media* is a problematic taxon, especially in combination with *M. fistulosa* var. *rubra*.
Many have suggested that *M. media* is the result of hybridization or introgression of *M. didyma* with either *M. fistulosa* or *M. clinopodia*, or both (see Scora 1967). Scora (1967) implies that *M. media* consists of hybrids, backcrosses, and "introgressive elements" involving all three pairwise combinations, but that *M. fistulosa* var. *rubra* is not of hybrid origin. Needed are studies of *M. media*, *M. fistulosa* var. *rubra*, and their possible parents which go beyond the herbarium and determine the genetics, origin, and population structure of these taxa. It seems best for the moment to recognize (or to attempt to!) *M. media* and *M. fistulosa* var. *rubra* in order to foster additional observation and study, hopefully leading to a more definite understanding of their taxonomic status(es).

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**Monarda punctata** Linnaeus var. *arkansana* (McClintock & Epling) Shiners, Arkansas Horse-mint. Mt (NC), Pd (GA): dryish forests over mafic rock; rare. McClintock & Epling (1942) map and discuss this taxon as endemic to AR and immediately adjacent TX, but mention that "a specimen collected near Columbus, Polk County, North Carolina (Townsend, 1897) is scarcely different from subsp. *arkansana*." Scora (1967) treats var. *arkansana* as similarly endemic, though he cites (but does not map) a specimen from Cherokee County, GA and annotated (following the publication of his paper) a later collection from Polk County, NC as var. *arkansana*. The Polk County, NC material is manifestly var. *arkansana* and might be considered merely aberrant or a chance introduction, were it not for its repeated collection and the phytogeographic interest of the Blue Ridge Escarpment of Polk County, which harbors numerous Ozarkian and other Midwestern disjuncts, such as *Veratrsum woodii*.  

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**Nepeta** Linnaeus 1753 (Catnip, Catmint)  


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**Ocimum** Linnaeus 1753 (Basil)  

A genus of about 65 species, herbs and shrubs, of warm temperate and tropical areas. References: Harley et al. in Kadereit (2004).

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**Origanum** Linnaeus 1753 (Oregano, Marjoram)  


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**Piloblephis** Rafinesque 1838 (Florida Pennyroyal)  

**Piloblephis rigida** (Bartram ex Bentham) Rafinesque, Florida Pennyroyal. Cp (GA): xeric oak scrub, with *Quercus myrtifolia*; rare. S. GA; c. to s. peninsular FL. [= K, WH; = Pycnothymus rigidus (Bartram ex Bentham) Small – S; = Satureja rigida II. Bartram ex Bentham]

**Prunella Linnaeus 1753 (Self-heal, Heal-all)**

A genus of about 4-7 species, herbs, of n. temperate areas. References: Harley et al. in Kadereit (2004).

1 Upper leaves pinnatifid; flowers creamy yellow or white (rarely pale blue) .................................................................................................................................................. *P. lacinia*

1 Upper leaves entire to obscurely toothed; flowers blue-violet (rarely pink or whitish).

2 Principal or median cauline leaves lanceolate to oblanceolate, (2-) avg. 3 (-5)× as long as wide; leaf cuneate at the base .................................................. *P. vulgaris var. lanceolata*

2 Principal or median cauline leaves ovate to ovate-oblong, (1.5-) avg. 2 (-2.5)× as long as wide; leaf broadly rounded at the base .......... *P. vulgaris var. vulgaris*

* *Prunella lacinia* (Linnaeus) Linnaeus, Cutleaf Self-heal. Mt (NC!, VA), {GA}: disturbed areas; rare, native of Eurasia. [= RAB, C, G, K, S]

**Prunella vulgaris** Linnaeus var. lanceolata (W. Barton) Fernald, American Self-heal. Pd (DE), Cp (DE), {Mt, Pd, Cp (FL, GA, NC, SC, VA, WV)}: disturbed areas, pastures, roadsides, bottomland forests; other forests and woodlands; common. April-December. Additional herbarium work is needed to determine the relative ranges, distributions, habitats, and abundances of the two varieties. NL (Newfoundland) west to AK, south to NC, SC?, TN, MO, KS, NM, AZ, and CA. [= C, F, G; < *P. vulgaris* – RAB, S, W; = *P. vulgaris* ssp. lanceolata (W. Barton) Hultén – K]

* *Prunella vulgaris* Linnaeus var. vulgaris, Eurasian Self-heal. Pd (DE), {Mt, Pd, Cp (FL, GA, NC, SC, VA, WV)}: disturbed areas, pastures, roadsides, bottomland forests; other forests and woodlands; uncommon in DE, native of Eurasia. April-December. Additional herbarium work is needed to determine the relative ranges, distributions, habitats, and abundances of the two varieties, var. vulgaris and var. lanceolata. The possible additional recognition of var. hispida also needs assessment. Var. hispida Bentham, considered to have been originally e. Asian, is alleged to be widespread in se. United States. It differs from *P. vulgaris* var. vulgaris in having the "stems, petioles, and often the lower surfaces of leaves densely villous-hispid" (vs. "only sparingly and not conspicuously pilose" – F). [< *P. vulgaris* – RAB, S, W, WH; > *P. vulgaris* var. vulgaris – C, F, G; > *P. vulgaris* var. hispida Bentham – C, F, G; = *P. vulgaris* ssp. vulgaris – K]

**Pycnanthemum** Michaux 1803 (Mountain-mint, Wild-basil)


1 Leaves 1-15 mm wide (to 30 mm wide in *P. setosum*), mostly > 3× as long as wide (except in *P. nudum*); calyx lobes not tipped with a tuft of long, jointed bristles (except *P. clinopodioides*).

2 Longer calyx lobes 1.5-5 mm long, attenuate-aristate, stiff, whitened; [Coastal Plain pinelands, rarely in Mountain bogs with Coastal Plain affinities].

3 Principal stem leaves 5-15 mm wide .......................................................................................................................... *P. flexuosum*

3 Principal stem leaves 10-30 mm wide ......................................................................................................................... *P. setosum*

2 Longer calyx lobes 0.5-1.6 mm long, deltoid to narrowly triangular, not notably stiff (except in *P. tenuifolium*) or whitened; [widespread in our area, but mainly of the Piedmont and Mountains].

4 Leaves 10-15 mm wide (or more often even wider, to 25 mm wide, in *P. clinopodioides*); longer calyx lobes 0.7-1.6 mm long, tipped with a few long (1-3 mm) jointed bristles (*P. clinopodioides*) or not tipped (P. nudum).

5 Leaves 3-5× as long as wide, herbaceous; stems and leaves pubescent; [NC northward] ........................................................................................................ *P. clinopodioides*

5 Leaves 1.2-2.5× as long as wide, coriaceous; stems and leaves glabrous; [se. SC southward] ........................................................................................................ *P. nudum*

4 Leaves 1-12 (-15) mm wide; longer calyx lobes 0.5-1.5 mm long, variously pubescent but not tipped with a tuft of long jointed bristles.

6 Leaves glabrous on the lower and upper surface, with 2-3 pairs of lateral veins; stems glabrous on the faces and angles (rarely with a few small upwardly-curled hairs on the angles).

7 Leaves 5-15 mm wide, 1-2.5× as long as wide; calyx lobes and inner bracts of the inflorescence herbaceous .................. *P. nudum*

7 Leaves 1-4 (-5.5) mm wide, 8-15× as long as wide; calyx lobes and inner bracts of the inflorescence semi-spinose, their tips subulate, thickened, and stiff .......................................................... *P. tenuifolium*

6 Leaves pubescent at least on the lower surface along the midrib and main veins; leaves with 4-5 pairs of lateral veins; stems glabrous or pubescent on the faces, pubescent on the angles.

8 Stems pubescent on the angles only (or distinctly less pubescent on the faces); leaves 3-10 mm wide .................. *P. virginianum*

8 Stems pubescent on the faces and angles, the hairs distributed more-or-less evenly; leaves 8-12 (-15) mm wide.

9 Longer calyx teeth 1.0-1.5 mm long, lanceolate and attenuate; bracts of the inflorescence and leaves glabrous or very sparsely pubescent on the upper surface .......................................................... *P. toreyi*

9 Longer calyx teeth 0.5-1.0 mm long, narrowly deltoid; bracts of the inflorescence (and usually also the leaves) canescent on the upper surface .................................................................................. *P. verticillatum var. verticillatum*

1 Leaves broad, 15-40 mm wide, mostly 1.5-3× as long as wide; calyx lobes mostly tipped with a tuft of long, jointed bristles (except *P. curvipes, P. muticum, P. setosum*).
species (n = 19).  

**Pycnanthemum monorchidum** Fernald.  Cp (VA): sandy woodlands; rare.  Allegedly endemic to se. VA.  Perhaps only a hybrid or else likely more widespread and overlooked.  (= F, G, K)


**Pycnanthemum muticum** (Michaux) Persoon.  Mt (GA, NC, SC, VA, WV), Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), (GA): bogs, wet meadows, moist to wet forests; common (uncommon in Piedmont, uncommon in DE Coastal Plain, rare in WV).  June-August; September-October.  MA west to MI and MO, south to FL and LA.  A diploid, tetraploid, and hexaploid (?) species (n = 20, 40, ca. 54).  (= RAB, C, F, G, GW, K, Y; = Koellia mutica (Michaux) Kunze – S)

**Pycnanthemum nudum** Nuttall, Smooth Mountain-mint.  Cp (FL, GA, SC): wet pine flatwoods; uncommon (rare in GA and SC).  Se. SC south to n. peninsular FL, Panhandle FL, and se. AL.  Small (1933) attributes this species to NC; the documentation is unknown (and doubtful).  This is a diploid species (n = 20).  (= GW, K, WH, Z; = Koellia nuda (Nuttall) Kunze – S)

**Pycnanthemum pycnanthemoideae** (Leavenworth) Fernald var. **pycnanthemoideae**.  Mt (GA, NC, SC, VA), Pd (NC, SC, VA): forests and woodland borders; common.  July-August.  VA and IL south to w. SC and n. GA.  A tetraploid species (n = 36).  (= K, WH, Z; < P. incamun – RAB; < P. pycnanthemoideae – C, Y; < P. pycnanthemoideae – G (also see P. loomisii); < Koellia pycnanthemoideae (Leavenworth) Kunze – S; > P. tullia Bentham – Z)


**Pycnanthemum torreyi** Bentham, Torrey’s Mountain-mint.  Mt (NC, SC?, VA), Pd (DE, VA), Cp (DE, VA).  (GA?): dry rocky woodlands, over mafic, ultramafic, or calcareous rocks, dry powerline rights-of-way; rare.  NH west to IL, south to NC (and SC?).  A tetraploid and hexaploid species (n = 40 and ca. 60).  The epithet spelling ‘torrei’ is a correctable error under the Vienna code.  (= C, G, Y, Z; < P. verticillatum – RAB; = P. torrei – K, orthographic variant; > P. torrei var. torrei – F; > P. torrei var. leptodon (Gray) Boomhour – F; = Koellia leptodon (Gray) Small – S)

**Pycnanthemum verticillatum** (Michaux) Persoon var. **verticillatum**.  Mt (NC, SC, VA), Pd (DE, NC, VA), Cp (DE, VA): upland rocky woodlands; common (uncommon in DE).  July-September.  Var. **verticillatum** ranges from VT west to MI, south to NC and KY.  A tetraploid species (n = 38-39).  (= C, K; < P. verticillatum – RAB (also see P. clinopodioides, P. torrei); > P. verticillatum – F, G, Y, Z; > Koellia verticillata (Michaux) Kunze – S; > Koellia leptodon (A. Gray) Small – S; > P. verticillatum – W)


**Pycnanthemum floridanum** E. Grant & Epling.  Cp (FL, GA): sandhills; rare.  Se. GA south to n. peninsular FL and e. Panhandle FL.  (= K, WH; not yet keyed; synonymy incomplete)

**Pycnanthemum verticillatum** (Michaux) Persoon var. **pilosum** (Nuttall) Cooperrieder.  Mt (WV): (GA).  Var. **pilosum** (Nuttall) Cooperrieder ranges from s. ON west to MI and IA, south to TN, AR, and OK.  It differs in having the stems thickly (vs. thinly pubescent), the lower surface of the leaves evenly pubescent (vs. pubescence chiefly restricted to the midrib).  In c. TN, and reported from a single county in e. TN (Chester, Wofford, & Kral 1997), in se. PA (Rhoads & Klein 1993), and WV (Kartesz 1999).  (= C, K; = P. pilosum Nuttall – F, G; = Koellia pilosa (Nuttall) Britton – S; not yet keyed; synonymy incomplete)

**Rosmarinus** Linnaeus 1753 (Rosemary)

A genus of 2-3 species, herb/shrubs, of Mediterranean Europe.  Closely related to *Salvia* (Walker et al. 2004), and probably to be combined there.  References: Harley et al. in Kadereit (2004).
LAMIACEAE

* Rosmarinus officinalis* Linnaeus, Rosemary. Cp (NC, SC), Pd (NC, SC): gardens; commonly cultivated, rarely persistent or established, native of Mediterranean Europe. October-April. [= K]

Salvia Linnaeus 1753 (Sage, Clary)

A genus of about 900 species, shrubs and herbs, almost cosmopolitan. Walker et al. (2004) have determined that *Salvia* as traditionally circumscribed is polyphyletic. References: Epling (1938)—Z; Walker et al. (2004).

1 Leaves predominantly basal.
2 Veins of the 3 upper calyx lobes parallel, the lobes themselves minute and widely-spaced (> 1 mm between the 2 lateral teeth), separated by flattish sinuses; basal leaves lobed; [native, though weedy, common throughout our area]............................ *S. lyrata*
3 Veins of the 3 upper calyx lobes converging, the lobes themselves minute and spaced within a distance of 1 mm; basal leaves lobed or toothed; cauline leaves toothed (rarely lobed); [alien weeds, rarely naturalized in our area].
4 Upper corolla-lip strongly arched; leaves serrate .................................................................................................................. *S. pratensis*
5 Upper corolla-lip straight; leaves lobed. ............................................................................................................................. *S. verbenacea*

1 Leaves predominantly cauline, not lobed.
4 Leaves rhombic-ovate, the base cordate, subcordate, truncate, or broadly cuneate.
5 Petiole not clearly differentiated from the leaf blade (leaf tissue decurrent on the petiole for most or all its length); corolla blue.................. ............................................................................................................................. *S. urticifolia*
6 Petiole clearly differentiated from the leaf blade; corolla blue, white, or scarlet.
7 Corolla scarlet; larger leaves 3-6.5 cm long ................................................................. *S. coccinea*
8 Corolla blue or whitish; leaves 5-20 cm long ............................................................... *S. officinalis*
9 Corolla blue or whitish; leaves 5-10 flowers per node; corolla > 13 mm long
10 Upper calyx lip > ½× as long as the calyx tube; flowers 4-12 per node; leaves (8-) 12-20 cm long ................................................................. *S. sclarea*
11 Upper calyx lip < 1/3× as long as the calyx tube; flowers 12-30 per node; leaves 5-10 cm long ................................................................. *S. verticillata*

6 Corolla blue or whitish; leaves 5-20 cm long

7 Upper calyx lip > ½× as long as the calyx tube; flowers 4-12 per node; leaves (8-) 12-20 cm long ................................................................. *S. sclarea*

8 Leaves canescent, gray; [introduced, rarely persistent from cultivation in gardens]............................ *S. officinalis*
9 Leaves puberulent, green; [native, of dry woodlands from SC NC southwest and westward].
10 Flowers 2-4 (per) node; corolla 81-12 mm long.......................................................................................................................... *S. reflexa*
11 Flowers 6-10 flowers per node; corolla > 15 mm long

Salvia azurea* Michaux ex Lamarcq var. azurea* Azure Sage. Cp (FL, GA, NC, SC), Pd (GA, NC, SC), Mt (GA): sandhills, hammocks, other sandy or rocky woodlands; common (rare in NC). Late August-October; October-November. S. NC south to Panhandle FL, west to TX. [= K; < S. azurea – RAB, S, WH]

Salvia azurea* Michaux ex Lamarcq var. grandiflora* Bentham. Mt (GA): prairies, woodlands over calcareous or mafic rocks; rare. August-October; October-November. IL, IA, NE, and eastern CO south to nw. AL, ne. MS, LA, se. TX, and c. TX. [= F, K; = S. pitcheri Torrey ex Bentham – C, G; < S. azurea – S; = S. azurea ssp. pitcheri (Torrey ex Bentham) Epling]

Salvia coccinea* P.J. Buc’hoz ex Etlinger, Scarlet Sage, Blood Sage. Cp (FL, GA, SC**?), Pd (GA**?): hammocks, disturbed areas; uncommon (rare in GA and SC), in the more northern part of its distribution (such as SC) perhaps only introduced from farther south and west. May-November. [= RAB, C, F, G, K, S, W, WH, WV]


* Salvia officinalis* Linnaeus, Garden Sage. Cp (VA, WV), Pd (VA): cultivated as a garden herb, rarely persistent; rare, native of Europe. [= C, F, G, K, WV]

* Salvia pratensis* Linnaeus, Meadow Sage, Meadow Clary. Cp (VA): fields and disturbed areas; rare, native of Europe. [= C, F, G, K]

* Salvia reflexa* Hornemann, Lanceleaf Sage, Mintweed. Mt (WV): dry sandy soil, disturbed areas; rare, native of c. North America. In c. TN (Chester, Wofford, & Krall 1997). The apparent ascription by C of *S. reflexa* Hornemann to "N.C." is a typographic error for "N.D." This species is, however, sometimes adventive as far east as WV. [= C, F, G, K, Z] [not yet keyed]

* Salvia sclarea* Linnaeus, Clary. Mt (NC?); cultivated as a garden herb, rarely persistent; rare, native of Europe. [= C, G, K, S]

Salvia chapmanii A. Gray. AL and FL. Uncertain taxonomic status, often included in S. urticifolia. [= K, S] (not yet keyed; synonymy incomplete)

Satureja Linnaeus 1753 (Savory)

A genus of ca. 38 species, herbs, of Mediterranean Europe west to c. Asia.

* Satureja hortensis Linnaeus, Summer Savory. Pd (DE), Mt (WV): disturbed areas; uncommon, native of Mediterranean Europe and sw. Asia. July-September. [= C, K]

Stachydeoma Small 1903


Thymus Linnaeus (Thyme)


* Thymus pulegioides Linnaeus, Lemon Thyme. Pd (VA), Cp (VA): disturbed areas; rare, native of Eurasia. [= K]

374. PHRYMACEAE Schauer 1847 (Lopseed Family) [in LAMIALES]

As radically circumscribed, a family of about 20 genera and 240 species, herbs, cosmopolitan. See Tank et al. (2006). References: Lee et al. (1996)=Z; Tank, Beardsley, Kelchner, & Olmstead (2006); Thieret (1972); Wagstaff & Olmstead (1997); Fischer in Kadereit (2004); Cantino in Kadereit (2004).

1 Plant a rhizomatous aquatic; leaves spatulate, entire, 10-20 mm long and 0.3-2 mm wide (reminiscent of Limosella or Lilaeopsis)..........................Glossostigma

1 Plant terrestrial (though sometimes in wetlands) with an aerial; leaves ovate, elliptic, or obovate, > 20 mm long and > 2 mm wide.

2 Inflorescence of a solitary, terminal flower; bracteal leaves alternate..............................................................Mazus

2 Inflorescence either of axillary flowers or of terminal and axillary spikes; bracteal leaves or bracts opposite.

3 Inflorescence of axillary flowers; flowers 17-30 mm long ............................................................................Mimulus

3 Inflorescence of terminal and axillary spikes; flowers 6-8 mm long .................................................................Phryma

Glossostigma Wight & Arnott 1836


Mazus Loureiro 1790

A genus of 10-15 species, herbs, of Asia to Australia. References: Pennell (1935)=P.

1 Plant stoloniferous, perennial; corolla ca. 15 mm long ..................................................................................M. miquelii

1 Plant not stoloniferous, annual; corolla 7-10 mm long ....................................................................................M. pumilus

* Mazus miquelii Makino. Pd (NC, VA), Mt (WV): lawns; rare, native of e. Asia. April-June. [= C, K; = M. miquelii – RAB, misspelling; ? M. reptans N.E. Brown]


Mimulus Linnaeus 1753 (Monkey-flower)
A genus of about 150 species, herbs and shrubs, of w. North America, s. Africa, Asia, and e. North America. References: Grant (1924)=Y; Pennell (1935)=P.

1 Corolla yellow; stem viscid glandular-pubescent; plant usually 2-4 dm tall ..............................M. moschatus

1 Corolla blue; stem glabrous; plant usually 3-15 dm tall; [section Mimulus].

2 Leaves petiolate (the upper sessile or nearly so); pedicels 2-15 mm long; stem with 4 winged angles .....................M. alatus

2 Leaves sessile; pedicels 20-45 mm long; stem with 4 rounded angles ...........................................M. ringens var. ringens


Mimulus moschatus Douglas ex Lindley, Muskflower, Musky Monkey-flower. Mt (NC, VA, WV): streambanks, brookbanks, saturated soil of cold springs; rare. July; August. NL (Newfoundland) and QC west to MI, south to w. VA, WV, NC, and MI, and in w. North America. The native/naturalized status of M. moschatus in e. North America is controversial. Some at least of our populations appear to be native, not occurring in situations where likely to have been introduced. [= RAB, C, F, G, P, W, WV; > M. moschatus var. moschatus – K]


Phryma Linnaeus 1753 (Lopseed)

A genus of 1-2 species, herbs, of e. North America and Asia. The disjunct populations have been variously treated as species, varieties, or races. References: Lee et al. (1996)=Z; Thieret (1972); Wagstaff & Olmstead (1997); Cantino in Kadereit (2004).

Phryma leptostachya Linnaeus var. leptostachya, American Lopseed. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): bottomland forests, nutrient-rich slopes, mesic hammocks, in the Coastal Plain primarily in places underlain by coquina limestone ("marl") and essentially absent from the more acidic portions of the Coastal Plain; common (uncommon in Coastal Plain). June-August; August-October. The species is interpreted as occurring disjunctly in e. North America and e. Asia. Var. leptostachya ranges from QC west to MB, south to ne. FL, Panhandle FL, and TX; var. asiatica Hara occurs in e. Asia. The fruits "lopped down" against the stem are unmistakable. [= Z; < P. leptostachya – RAB, C, G, K, S, W, WH, WV; > P. leptostachya var. leptostachya – F; > P. leptostachya var. confertifolia Fernald – F]

375. PAULOWNIACEAE Nakai 1949 (Paulownia Family) [in LAMIALES]

A monogeneric family, trees, of e. Asia. There has been disagreement over whether Paulownia is best placed in Scrophulariaceae, Bignoniaceae, or its own family, Paulowniaceae; superficially it closely resembles Catalpa of the Bignoniaceae. Armstrong (1985) concluded that Paulownia's affinities lie with the Scrophulariaceae, based on floral anatomy, embryo morphology, and seed morphology. A molecular study by Spangler & Olmstead (1999) conclude that Paulownia is best retained in its own family. Manning (2000) concurs with its removal from Bignoniaceae. Molecular evidence supports that it is sister to the reconstituted Orobancheaceae. References: Spangler & Olmstead (1999); Manning (2000).

Paulownia Siebold & Zuccarini 1835 (Princess-tree)


* Paulownia tomentosa (Thunberg) Siebold & Zuccarini ex Steudel, Princess Tree, Empress Tree, Paulownia. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): roadsides, disturbed areas, roadcuts, forests; common (uncommon in DE Coastal Plain, rare in FL), native of China. April-June; September-October. Paulownia is becoming a nuisance, showing an ability to invade pristine woodlands. The very soft wood is highly prized in Asia. The leaves of stump sprouts can reach very large sizes (at least to 80 cm long and wide). The woody capsules are persistent, and the densely tomentose, tan flower buds are conspicuous through the winter. [= RAB, C, F, G, K, S, W, WH, WV]

376. OROBANCHACEAE Ventenat 1799 (Broomrape Family) [in LAMIALES]

A family of about 96 genera and 2060 species, root-parasitic herbs lacking chlorophyll (Orobanchaceae sensu stricto) and chlorophylllose hemi-parasites (formerly placed in the Scrophulariaceae), of temperate and subtropical regions of the Northern Hemisphere (Manen et al. 2004). References: Thieret (1971); Olmstead et al. (2001); Fischer in Kadereit (2004).

1 Plants lacking chlorophyll (parasitic), variously pink, purple, brown, tan, orange, or white.
2 Stem panically branched; flowers dimorphic, those low in the inflorescences small, pistillate, and fertile, those high in the inflorescence larger, apparently perfect but functionally stamine; [tribe Orobancheae] .............................................................................................................................. 6. Epifagus

2 Stem simple (rarely few-branched); flowers all alike.

3 Calyx deeply cleft on the lower side; stamens exerted; [tribe Rhinantheo] ............................................................................................................................. 14. Conopholis

3 Calyx either nearly regular, or deeply cleft above and below into 2 lateral halves; stamens included; [tribe Orobancheae] ............................................................................................................................. 7. Orobanche

1 Plants with chlorophyll (hemiparasitic), with foliage and stems normally green.

4 Stem leaves alternate.

5 Leaves pinnately lobed; [tribe Rhinantheae] .............................................................................................................................. 12. Pedicularis

5 Leaves entire or 3-5-lobed at the tip.

6 Bract subtending flowers orange, red, or yellow; calyx 4-lobed; capsule loculicidal; pedicel lacking bracteoles; seeds broad, wingless; [tribe Castillejoae] ................................................................................................................................................................................................... 11. Castilleja

6 Bracts subtending flowers green; calyx 5-lobed; capsule septicipetalic and tardily also loculicidal; pedicel with 2 bracteoles; seeds narrow, winged; [tribe Cymbarieae] ................................................................................................................................................................................................... 10. Schwatbea

4 Stem leaves (at the lowest) the opposite.

7 Corolla salverform; [tribe Buchnerae].

8 Plant strict, unbranched unless damaged; flowers in a terminal spike; corolla purple; [native, sometimes weedy] .................. 8. Buchnera

8 Plant strongly branched; flowers solitary and axillary; corolla red or orange; [alien, in agricultural fields] ................. 9. Striga

7 Corolla various, but not salverform.

9 Calyx 4-lobed or essentially unlobed; corolla strongly bilabiuate, the upper lip consisting of 2 petals almost wholly connate and strongly cucullate (hooded); corolla white or yellow; [tribe Rhinantheae].

10 Lower lip of corolla with raised yellow, densely pubescent palate; stem leaves entire (bracteal leaves in and near the inflorescence sometimes pectinately fringed; annual, 1-4 dm tall) ........................................................................................................................................................................... 13. Melampyrum

10 Lower lip of corolla without palate; stem leaves pinnately lobed, the lobes themselves crenate; perennial, 3-8 dm tall ........ 12. Pedicularis

9 Calyx 5-lobed; corolla 5-lobed, the lobes relatively similar in size and shape, spreading; corolla yellow, orange, red, or pink; [tribe Geraniaceae].

11 Corolla pink; leaves linear and thread-like (except lanceolate in A. auriculata) ................................................................. 1. Agalinis

11 Corolla yellow or orange; leaves either lanceolate or broader, at least the basal pinnately or bipinnately lobed or toothed, or pinnately or bipinnately divided into linear segments.

12 Leaves pinnately or bipinnately divided into linear segments up to 2 mm wide; corolla rotate, the tube shorter than the lobes .

12 Leaves not lobed or divided, or the segments broader; corolla tubular, campanulate, or funnelform, the tube much longer than the lobes.

13 Corolla orange, tubular, the tube narrow and straight, > 5× as long as the diameter ....................................................... 3. Macranthera

13 Corolla yellow, campanulate or funnelform, the tube conical, < 4× as long as the diameter.

14 Anthers pubescent; lower leaves ≤ 12 cm long ................................................................................................................. 4. Aureolaria

14 Anthers glabrous; lower leaves 20-40 cm long ..................................................................................................................... 5. Dasistoma

I. Agalinis Rafinesque 1836 (Agalinis, Purple-foxtglove)

A genus of about 40 species, hemiparasitic herbs, of tropical and warm temperate regions of America. References: Canne (1979); Hays (1998b); Pennell (1935) = P.

1 Perennial, from horizontal rootstalk bearing slender, scaly rhizomes; corollas 3-4 cm long; [of Carolina bays, cypress savannas, limesink ponds] .................................................................................................................... A linifolia

1 Annual, with 1-several fibrous roots from the stem base; corollas < 3 cm long (except sometimes A. fasciculata and A. purpurea).

2 Stem retrorse-hispid; leaves lanceolate to ovate, usually lobed at the base; [of mafic glades and woodlands] .......................... 8. Buchnera

2 Stem leaves opposite.

3 Leaves reduced to scales < 2.5 mm long; plant thus appearing leafless ................................................................................. 3. Macranthera

3 Leaves not scale-like, > 8 mm long.

4 Pedicels less than 1.5× as long as the calyx, mostly 1-5 mm long at anthesis, mostly < 8 mm long in fruit.

5 Plants fleshy; [of saline or brackish marshes and salt flats].

6 Pedicels usually longer than or equaling the leaflike bracts; corollas 15-20 mm long; anther cells 1.8-2.3 mm long, usually long-lanose; [of Princess Anne County, VA, southward] ................................................................................................. A. maritima var. grandiflora

6 Pedicels usually less than or equaling the leaflike bracts; corollas 12-17 mm long; anther cells 1.3-1.8 mm long, glabrous or somewhat pubescent; [of the Delmarva Peninsula northward] ..................................................................................... A. maritima var. maritima

5 Plants not fleshy; [not inhabiting saline habitats, though some species may be found in freshwater interdune swales].

7 Stems appearing copiously leafy because of the well-developed fascicles of axillary leaves; [inhabiting dry to moist, often ruderal, habitats] ................................................................. A. aphylla

7 Stems not copiously leafy, the axillary fascicles absent or poorly developed; [inhabiting moist to wet natural habitats].

8 Corolla (10-)15-20 mm long; calyx lobes from 0.4-1.9× as long as the calyx tube; pollen sacs 1.4-2.0 mm long .................. A. paupercula var. paupercula

8 Corolla 18-38 mm long; calyx lobes 0.2-0.5× as long as the calyx tube; pollen sacs 2.5-3.5 mm long.

9 Branches spreading or ascending; stems more-or-less scabridulous; corollas 18-38 mm long ......................... A. purpurea

9 Branches virgate; stems glabrous; corollas 20-25 mm long .................................................................................. A. virgata

4 Pedicels > 2.5× as long as the calyx, mostly 5-20 mm long at anthesis, mostly > 10 mm long in fruit.

10 Living plants dull green, usually suffused with much purplish pigment; leaves < 20 mm long; dried plants dark, sometimes blackish; dried calyx deep purple, the veins obscure (difficult to see even at 10×).
11 Upper lip of the corolla arched forward over the stamens, greatly reducing the opening of the throat; corolla throat glabrous or glabrate within; [of the Piedmont and Mountains] .................................................

_**A. tenuifolia**_

11 Upper lip of the corolla erect or reflexed, the throat open; corolla throat densely hairless within; [of the Coastal Plain].

12 Branches widely spreading or laxly ascending; pedicels > 4× as long as the leaflike bracts; anterior filaments 5-5.5 mm long; [of Berkeley and Beaufort counties, SC, southward] .................

_**A. laxa**_

12 Branches ascending to somewhat spreading; pedicels < 3× as long as the leaflike bracts; anterior filaments 7-9 mm long; [widespread] .................................................................

_**A. setacea**_

10 Living plants light green or glaucous, usually with no purple pigment; leaves < 15 (-20) mm (except _A. decemloba_, with leaves 15-25 mm long); dried plants not dark, but turning pale yellowish green; dried calyx pale yellowish green, the veins distinct and obvious without magnification.

13 Corolla throat within lacking 2 yellow lines; leaves widen distally to obtuse tips; stem and branches distinctly rough-scalbridulous to the touch.................................................................

_**A. obtusifolia**_

13 Corolla throat with 2 prominent yellow lines; leaves taper to acute or acuminate tips; stem and branches not (or very slightly) scalbridulous.

14 Corolla 10-15 mm long, its lobes emarginate or reulate; [of the Piedmont and Mountains, and rarely the upper Coastal Plain].

14 Corolla 15-20 mm long, its lobes entire to slightly emarginate; [of the Coastal Plain, from c. NC southward] ..............

_**A. tenella**_


_Agalinis auriculata_ (Michaux) S.F. Blake, Earleaf Foxglove. _Pd_ (SC, VA), _Cp_ (AL), _PD_ (WV): glands, barrens, blackbelt prairies, and disturbed clearings on mafic rocks (such as diabase and gabbro) or calcareous rocks; rare. August-October; September-November. KY and OH west to MN, south to n. AL, wc. AL (Schotz 2009), AR, and TX; also rarely disjunct east of the Blue Ridge, in NJ, n. VA, and nc. SC. In Lewis County, KY (D. White, pers. comm.). Sometimes treated in the genus _Tomanthera_.

_Agalinis decemloba_ (Greene) Pennell. _Pd_ (NC, SC, VA), _Mt_ (GA, NC): dry clayey or sandy woodlands; rare. [= RAB, S, W; < _A. obtusifolia_ – C, K; = _Gerardia decemloba_ Greene – _F, G, P_]


_Agalinis maritima_ (Rafinesque) Rafinesque var. _maritima._ _Cp_ (DE, NC, VA): tidal marshes; uncommon (rare in DE).

July; August. NS and s. ME south to se. VA and e. NC. [= K; < _A. maritima_ – RAB, C, GW; = _Gerardia maritima_ Rafinesque var. _maritima_ – _F_; = _Gerardia maritima_ – _G_; = _Gerardia maritima_ ssp. _typica_ – _P_]


_Agalinis paupercula_ (A. Gray) Britton var. _paupercula._ _Mt_ (VA): calcareous fens; rare. NS west to MB, south to NJ, PA, OH, IN, IL, and IA; disjunct in sw. VA (Washington County). [= K; < _A. purpurea_ (Linnaeus) Pennell var. _parviflora_ (Bentham) B. Boivin – _C_; = _Gerardia paupercula_ (A. Gray) Britton var. _paupercula_ – _F_; = _Gerardia purpurea_ Linnaeus var. _parviflora_ Bentham – _G_; = _Gerardia paupercula_ var. _typica_ – _P_] (not yet keyed)

_Agalinis plukenetii_ (Elliott) Rafinesque. _Cp_ (FL, GA), _Pd_ (GA), _Mt_ (SC): sandhills, other dry forests; uncommon. SC south to c. peninsular FL, west to wc. LA, and northward in the interior to extreme se. TN (Polk County) (Chester, Wofford, & Kral 1997). Scattered in GA (e.g., Baldwin and Laurens counties). [= K, S; = _Gerardia plukenetii_ Elliott – _P_]


839


Agalinis acuta Pennell, Sandplain Agalinis. Cp (MD): coastal sand plains; rare. MA south to Baltimore County, MD. [= C, K; = Gerardia acuta Pennell – F, G, P] [not yet keyed]

Agalinis divaricata (Chapman) Pennell, Pineland Agalinis. Cp (FL, GA): sandhills; common (rare in GA). GA (Decatur County) south to c. peninsular FL, west to MS (Sorrie & LeBlond 2008). [= K, S, WH; = Gerardia divaricata (Chapman) Pennell – P] [not yet keyed]

Agalinis filicaulis Bentham Pennell, Spindly Agalinis. Cp (FL, GA): wet pine savannas, prairies; rare. GA (Tattnall County) south to c. peninsular FL and Panhandle FL, west to w. LA. [= K, S, WH; = Gerardia filicaulis (Bentham) Chapman – P] [not yet keyed]

Agalinis filifolia (Nuttall) Rafinesque, Seminole Agalinis. Cp (FL, GA): dry longleaf pine savannas, scrub; uncommon (rare in GA). S. GA (east to Liberty County) south to s. FL, west to sw. AL (Baldwin County) (Sorrie & LeBlond 2008). [= K, S, WH; = Gerardia filifolia Nuttall – P] [not yet keyed]

Agalinis flexicaulis Hayns. Cp (FL): wet pinelands; rare. Endemic to ne. FL. (Bradford County, to be expected in adjacent counties). See Hays (2010) for detailed information. [not yet keyed]

Agalinis gattengeri (Small) ex Britton. Barrens, glades, outcrops, woodlands. ON, MN, and NE south to AL, MS, LA, and TX. In c. TN, east to e. TN (Rhea and Scott counties) (Chester, Wofford, & Kral 1997). Reported for NC (Kartesz 1999). [investigate] [= K, S; = Gerardia gattengeri Small – G, P]


Agalinis harperi Pennell in Small. Cp (FL, GA, SC?): wet pine savannas, interdune swales; uncommon (rare in GA). GA south to s. FL, west to w. LA. Glynn County, GA and east to McIntosh County, GA as A. pinetorum. See Hays (1998a) who has established the nomenclatural priority of A. harperi. Reported for SC (Kartesz 1999); [investigate]. [= S, WH; > A. harperi Pennell in Small – S; > A. pinetorum – S; = A. pinetorum Pennell – K; > A. delicatula Pennell; = Gerardia harperi (Pennell in Small) Pennell – P] [not yet keyed]

Agalinis heterophylla (Nuttall) Small ex Britton. GA west to s. MO, AR, e. OK, and e. TX. [= G, K]

Agalinis oligophylla Pennell. Sc. TN (Coffee and Warren counties) (as A. pseudophylla) (Chester, Wofford, & Kral 1997), c. and s. AL, west through s. MS to w. LA. [= K, S; > Gerardia pseudophylla (Pennell) Pennell – P; > A. pseudophylla (Pennell) Shinners; > A. pseudophylla (Pennell) Shinners, an orthographic variant

Agalinis pulchella Pennell. Cp (FL, GA): pine savannas and sandhills; rare. Reported for Coffee and Ware counties, GA. [Nomenclatural and typification problems] [= K, S, WH; = Gerardia pulchella Pennell – P] [not yet keyed; synonymy incomplete]

Agalinis skinneriana (A. Wood) Britton. Coffee County, TN (Chester, Wofford, & Kral 1997). [= K; = Gerardia skinneriana A. Wood – G, P] [not yet keyed; synonymy incomplete]

Agalinis tenuifolia var. leucantha (Rafinesque) Pennell. Cp (FL, GA): savannas; rare (GA Special Concern). [= K, S; < A. tenuifolia – WH] [not yet keyed; synonymy incomplete]

Agalinis tenuifolia (Vahl) Rafinesque var. macropylla (Bentham) Blake. [= K, S; = Gerardia tenuifolia Vahl ssp. macropylla (Bentham) Blake – P] [not yet keyed; synonymy incomplete]

Agalinis tenuifolia (Vahl) Rafinesque var. polyphylla (Small) Pennell. Pd (GA): granitic flatrocks; uncommon? Endemic to granite flatrocks in GA. [= K, S; = Gerardia tenuifolia Vahl ssp. polyphylla (Small) Pennell – P; = Gerardia polyphylla (Small) Pennell – P] [not yet keyed; synonymy incomplete]

2. Seymeria Pursh 1814 (Seymeria)

A genus of about 25 species, herbs, of s. North America (including Mexico). References: Pennell (1935)=P.

1 Corolla pubescent on its outer surface; leaf segments linear, < 0.5 mm wide; stem glabrous or puberulent; seeds wingless (though with ridges).


Seymeria pectinata Pursh sps. pectinata, Comb Seymeria. Dry pinelands, sandhills. July-October. Sps. pectinata ranges from se. NC south to c. peninsular FL, west to s. MS, a Southeastern Coastal Plain endemic. Sps. penuinarius (Pennell) Pennell ranges from n. peninsular FL south to s. FL. [= K; < S. pectinata – RAB, WH; = S. pectinata ssp. typica – P; = Afzelia pectinata (Pursh) Kuntze ssp. pectinata – S]

3. Macranthera Nuttall ex Bentham 1836 (Flameflower)

Macranthera flammnea (Bartram) Pennell, Flameflower, Hummingbird-flower. Pitcherplant bogs, bayheads. July-September. Nearly restricted to the East Gulf Coastal Plain (e. GA and FL Panhandle west to se. LA), but ranging east to the Atlantic Coastal Plain of e. GA (Bullock County), within a county of the SC border. [= GW, K, P, S, WH]

4. Aureolaria Rafinesque 1836 (Oak-leach, False-foxglove)

A genus of about 10 species, hemiparasitic herbs, of e. North America and Mexico. References: Pennell (1935)=P.

1 Plant pubescent (especially on the calyx, corolla, capsule, and lower stem) with glandular hairs; annual; seeds 0.8-1.0 mm long, not winged.
2 Calyx tube hemispherical, glandular-hirsute to glandular-lanate on the outer surface; capsule ovoid; trichomes of the leaves usually glandular, at least in part; leaf lobes usually acute.................................................................A. pectinata
2 Calyx tube turbinate, glandular-puberulent on the outer surface; capsule ellipsoid; trichomes of the leaves usually non glandular, leaf lobes usually obtuse ................................................................................................................A. pedicularia

1 Plant glabrous or pubescent with nonglandular hairs; perennial; seeds 1.3-2.7 mm long, winged.
3 Capsule pubescent; inflorescence, pedicels, and/or calyx pubescent with nonglandular hairs; pedicels 1-3 mm at anthesis; flowering May-July .................................................................A. flava
3 Capsule glabrous; inflorescence, pedicels, and calyx glabrous (or pubescent with nonglandular hairs in Au. patula); pedicels 1-25 mm long at anthesis; flowering August-September.

4 Inflorescence, pedicels, and calyx pubescent (at least sparsely so); pedicels slender, ca. 0.5 mm in diameter .........................A. patula
4 Inflorescence, pedicels and calyx glabrous; pedicels stout, ca. 1 mm in diameter.
5 Lower leaves entire to serrate (or with only a few shallow lobes at the base of the leaf); pedicels 1-8 mm long at anthesis, straight; corolla 3.0-4.0 cm long; capsule 10-15 mm long; stem not glaucous .................................................................A. laevigata
5 Lower leaves pinnately lobed, the lobes themselves usually serrate, the sinuses extending over half of the distance to the midrib; pedicels 4-25 mm long at anthesis, upwardly curved; corolla 3.5-6 cm long; capsule 12-20 mm long; stem slightly to strongly glaucous .............................................................................A. flava

Aureolaria flava (Linnaeus) Farwell, Smooth Oak-leach. Oak forests and woodlands. August-September; September-October. ME west to MN, south to GA. c. peninsular FL, AL, and e. LA. The various named varieties or subspecies need additional study; the variation seems to be too clinal to be practically recognized taxonomically. [= RAB, W, WH; > A. flava var. flava – C, G, K; > Gerardia flava Linnaeus var. flava – F; > Gerardia flava var. reticulata (Rafinesque) Cory – F; > A. flava ssp. typica – P; > A. flava ssp. flavicarpa – S; > A. flava ssp. reticulata (Rafinesque) Pennell – P; S; > A. flava (Linnaeus) Farwell var. macrantha Pennell – F; > A. flava ssp. macrantha Pennell – P; > A. flava ssp. flavicarpa – S; > A. flava ssp. flavicarpa var. pedicellaris (Pennell) Pennell – P]

Aureolaria laevigata (Rafinesque) Fernald, Appalachian Oak-leach. Oak forests and woodlands. August-September; September-October. PA west to s. OH, south to SC and GA, primarily a Central and Southern Appalachian endemic, but extending into adjacent provinces, and, rarely, even the Coastal Plain. [= RAB, C, G, K, P, S, W; = Gerardia laevigata Rafinesque – F]


Aureolaria pectinata (Nuttall) Pennell, Southern Oak-leach. Turkey oak sandhills, other dry oak forests and woodlands. May-September, September-October. NC south to s. FL, west to LA, inland north to AR and MO. Related to A. pedicularia, but much more southerly in distribution. [= RAB, K; = A. pectinata (Linnaeus) Rafinesque var. pectinata (Nuttall) Gleason – C, G, WH; = Gerardia pectinata (Linnaeus) (Nuttall) Bentham – F; > A. pectinata ssp. eurycarpa (Pennell) Pennell – P; S; > A. pectinata ssp. transcedens (Pennell) Pennell – P; S; > A. pectinata ssp. typica – P; > A. pectinata ssp. pectinata – S; < A. pedicularia – W]

Aureolaria pedicularia (Linnaeus) Rafinesque, Annual Oak-leach. Oak forests and woodlands. September-October; November. ME west to NY and e. MN, south to nw. SC, ne. GA, e. TN, and n. IL. The various named varieties or subspecies need additional study; the variation seems to be too clinal to be practically recognized taxonomically. [= RAB, W; > A. pedicularia var. pedicularia – C, G, K; = Gerardia pedicularia Linnaeus var. pedicularia – F; > A. pedicularia ssp. caesariensis Pennell – S; > A. pedicularia ssp. carolinensis Pennell – P; S; > A. pedicularia (Linnaeus) Rafinesque var. austromontana Pennell – C, G, K; > Gerardia pedicularia Linnaeus var. austromontana (Pennell) Fernald – F; > A. pedicularia ssp. austromontana (Pennell) Pennell – P, S; > A. pedicularia (Linnaeus) Rafinesque var. intercedens – Pennell – C, G; K; > Gerardia pedicularia Linnaeus var. intercedens (Pennell) Fernald – F; > A. pedicularia ssp. intercedens (Pennell) Pennell – P]


5. Dasistoma Rafinesque 1819 (Mullein Foxglove)
A monotypic genus, a hemiparasitic herb, endemic to se. North America. The genus is sometimes spelled 'Dasystoma.'

References: Pennell (1935)=P.

Dasistoma macrophyllum (Nuttall) Rafinesque, Mullein Foxglove. Xeric to dry-mesic woodlands and bluffs, riverbanks, over limestone or diabase. July-September. WV, OH, s. WI, IA, and NE, south to sw. VA (Lee County), nc. SC, nw. GA, c. AL, MS, LA, and nc. TX. First reported for VA by Wieboldt et al. (1998). [= Dasistoma macrophylla – RAB, C, G, K, P, S, orthographic variant; = Seymeria macrophylla Nuttall – F, GW, WV; = Dasystoma macrophylla, orthographic variant]

6. Epifagus Nuttall 1818 (Beechdrops)


7. Orobanche Linnaeus 1753 (Cancer-root, Broomrape)


Orobanche ludoviciana Nuttall, Prairie Broomrape. Pastures, upland areas, and glades, parasitic on perennial composites such as Grindelia, Artemisia, and Heterotheca. April-August. SK and BC south to MO, w. TX, AZ, and n. Mexico. [= X; < O. ludoviciana – F, G, Z; < O. ludoviciana var. ludoviciana – C; < O. ludoviciana ssp. ludoviciana – K] {excluded; not keyed or mapped}


* Orobanche ramosa Linnaeus, Branching Broomrape. Disturbed areas; native of Asia. As discussed by Musselman (1984), the identity of the sole NC record (collected in 1884) is somewhat presumptive, and the precise location uncertain. An infestation of this serious weed was discovered in 2007 at a car wash in urban Norfolk, VA (Musselman & Bolin 2008). [= C, F, G, K]

Orobanche riparia L.T. Collins, Riparian Broomrape. Bottomlands, parasitic on annual composites such as Ambrosia trifida, Xanthium strumarium, and Ambrosia artemisiifolia. August-October. VA, s. WV, and DC (James, Potomac, Shenandoah, and New rivers); OH, IN, IL, MO, TN (Mississippi and Ohio rivers and their tributaries); NE and CO south to w. TX and NM. See Collins, Colwell, & Yatskievych (2009) for detailed discussion. [= X; < O. ludoviciana var. ludoviciana – C; < O. ludoviciana – F, G, W, Z; < O. ludoviciana ssp. ludoviciana – K]

OROBOCHACEAE

A genus of about 100 species, hemiparasitic herbs, of tropical and warm temperate regions of the Old and New Worlds. The taxonomy of this genus is poorly understood. The plants are root hemi-parasites, apparently not particular about the host species. References: Sorrie & Weakley (in prep.)=Z; Pennell (1935)=P.

Identification notes: Lower leaves are broadest, mid and upper leaves narrowest, often markedly so; the key refers to lower leaves. Leaf teeth are usually few in number and vary in development, from crenate to 2-3 mm long and sharply pointed. The former condition is normal for *B. floridana*, the latter for *B. americana*. Calyx length is ca. 0.5 mm longer in fruit than in flower. The foliage turns black on drying.

1 Leaves lanceolate to narrowly ovate, tapering to a point; veins of lower stem leaves consisting of 3 major and 2 minor ones (narrow leaves may only have 3 total veins); leaf teeth usually well developed, rarely absent, usually 2-3 mm long; calyx (6.0-) 6.5-8.0 mm long; corolla lobes 5.0-7.0 mm long; [primarily of moderate to high pH soils in southern Great Plains, ranging to southern margin of the Great Lakes and eastward to the mid Atlantic seaboard, especially in mafic or calcareous glades and prairies, sometimes in more acid sites]........... *B. americana*

1 Leaves narrowly oblanceolate to lanceolate, rounded at tip; veins of lower stem leaves consisting of 1 major and 2 minor ones (narrow leaves may only have 1 vein); leaf teeth usually crenate but may be absent, < 2 mm long; calyx (4.0-) 4.5-5.5 mm long; corolla lobes 4.0-5.0 mm long; [primarily of low pH soils on the southern Atlantic and Gulf Coastal Plain, sometimes in calcareous sites (especially outside of our area)].......................................................................................................................................................................................................

*Buchnera americana* Linnaeus, Prairie Bluehearts, American Bluehearts, Plains Bluehearts. Dry (seasonally moist) rocky, gravelly, or clayey soil of limestone glades, glades over mafic rock (such as diabase, gabbro, etc.), wet meadows, sandy roadsides. July-September; August-October. NY and s. ON west to MI, IL, MO, and s. KS, south to c. NC, GA, Panhandle FL, and TX. In addition to the key characters given, *B. americana* is overall a larger and more robust plant than *B. floridana*, though both are quite variable in size, depending on the conditions in which they grow. *B. americana* has apparently declined very greatly in our area, probably owing to fire suppression in its habitats. [= K; = S. lutea Loureiro – RAB]

*Buchnera floridana* Gandoger, Savanna Bluehearts, Florida Bluehearts. Pine savannas, flatwoods, seepage bogs, sandy roadsides. April-October; May-September. se. NC south to s. FL, west to TX, and in the West Indies. Previous attributions of *B. longifolia* Kunth (including *B. elongata* Small) to southeastern states (notably FL, AL, GA, and MS) are based on misidentifications of material which is actually *B. floridana*. [= RAB, GW, S; >* B. americana – K, WH; > B. americana var. australis (Pennell) Reveal & C.R. Broome]

9. *Striga* Loureiro 1790 (Witchweed)

A genus of about 40 species, hemiparasitic herbs, of tropical to temperate regions of the Old World.

* Striga asiatica* (Linnaeus) Kuntze, Witchweed. Cultivated fields, parasitic on the roots of corn and other grasses; native of the Old World. A serious weed, *Striga* has been the subject of eradication efforts and quarantine policies since its appearance in our area. [= = K; = S. lutea Loureiro – RAB]

10. *Schwalbea* Linnaeus 1753 (Chaffseed)

The genus is monotypic, a hemiparasitic herb, of se. North America. References: Pennell (1935)=P.

*Schwalbea americana* Linnaeus, Chaffseed. Savannas, sandhill-pocosin ecotones (in the uphill portions), mesic loamy-soil slopes or swales in sandhill longleaf pine woodlands, fire-maintained interior woodlands and barrens. May-June; August. Formerly rather widespread in e. North America, primarily in the Coastal Plain, from e. MA, south to c. peninsular FL and west to TX, and disjunct in the Cumberland Mountains of KY and TN. The species is now limited to a few scattered sites in NJ, NC, SC, GA, FL, AL, and LA. It appears to require high fire frequency, especially during the growing season, perhaps related to its establishment ecology. The tiny seeds are hyaline-winged. [= = RAB, C, F, G, GW, K, WH; >* S. americana – P, S; > S. americana var. australis (Pennell) Reveal & C.R. Broome]

11. *Castilleja* Mutis ex Linnaeus f. 1782 (Indian Paintbrush)

A genus of about 200 species, hemiparasitic herbs, primarily of w. North America, with a few species also in e. North America, Eurasia, Central America, and Andean South America. References: Pennell (1935)=P.
**12. Pedicularis** Linnaeus 1753 (Wood-betony, Lousewort)


1 Inflorescence 1-4 dm tall; stem leaves alternate; stem pubescent, at least near the inflorescence; flowering April-May ............... *P. canadensis*

1 Inflorescence 4-10 dm tall; stem leaves opposite; stem glabrous; flowering August-October ............................................. *P. lanceolata*

**Pedicularis canadensis** Linnaeus, Eastern Lousewort, Wood-betony. Moist to dry forests and woodlands, streambanks. April-May; May-July. ME, QC, and MB south to ne. FL, FL Panhandle, TX, and n. Mexico. Var. *dobbsii* Fernald, alleged to differ in having nearly solitary flowering stems and stoloniform basal offsets, needs additional study. [= RAB, C, G, GW, P, S, W, WH, WV; > *P. canadensis var. canadensis* – F; > *P. canadensis var. dobbsii* Fernald – F; > *P. canadensis* ssp. *canadensis* – K]

**Pedicularis lanceolata** Michaux, Swamp Lousewort. Springheads and swampy areas, over calcareous, mafic, or ultramafic rocks. August-October; September-October. MA and NY west to MN and ND, south to e. VA, w. NC, e. TN, ne. GA, w. TN, n. AR, and NE. [= RAB, C, F, G, GW, K, P, S, W, WV]

**13. Melampyrum** Linnaeus 1753 (Cow-wheat)

A genus of about 35 species, hemiparasitic herbs, of temperate regions of North America and Eurasia. References: Pennell (1935)=P.

1 Lowermost bracteal leaves generally with a few prominent sharp teeth or segments; leaves 2-10 mm wide; plants usually with numerous branches (often 10 or more); internodes of the midstem usually 1-3 cm long. ................................................................. *M. lineare var. latifolium*

1 Lowest bracteal leaves entirely or nearly so, or the uppermost with a few short basal teeth; leaves (2-) 10-30 mm wide, the widest leaves on a plant usually over 10 mm wide; plants usually simple or with 4 (rarely more) branches; internodes of the midstem usually 4-6 cm long. ...

................................................................. *M. lineare var. latifolium*

1 Teeth of the middle and upper bracts shorter than the width of the undivided portion of the bracts; leaves lanceolate, (2-) 5-10 mm wide; [widespread in our area] ........................................................................................................... *M. lineare var. americanum*

1 Teeth of the middle and upper bracts commonly as long as the width of the undivided portion of the bracts; leaves linear to lanceolate, 2-6 (-8) mm wide; [of the Coastal Plain] .............................................................................................. *M. lineare var. pectinatum*

**Melampyrum lineare** Desrousseaux var. *americanum* (Michaux) Beauverd, Common Cow-wheat. Dry soils. May-July; August-September. QC west to MN, south to VA, NC, and TN. Our three varieties are quite distinctive in morphology and have distinctive geographic ranges, they seem worthy of distinction from one another at the varietal level, at least. The fourth variety, var. *lineare*, is more northern, ranging from NL (Labrador) west to BC, south to New England, n. MI, and n. MN. It is similar to var. *latifolium* in its entire bracteal leaves, but overall is more like var. *americanum*, differing in the bracteal teeth and in its linear leaves, rarely over 5 mm wide. The distinction between var. *americanum* and var. *lineare* may not be worth making; if combined (as by K), the correct name is var. *lineare*. [= C, F, G; < *M. lineare* – RAB, W; < *M. lineare* var. *lineare* – K, WV; < *M. lineare* var. *typicum* – P; < *M. lineare* – S]
Melampyrum lineare Desrousseaux var. latifolium Barton, Appalachian Cow-wheat. Dry soils in ridgetop woodlands, in thin soils around rock outcrops. Late April-July; August-September. MA and NY south to n. GA, mostly in the Appalachians. [= C, F, G, K, P, WV; < M. lineare – RAB, W; = M. latifolium (Barton) Muhlenberg ex Britton - S]

Melampyrum lineare Desrousseaux var. pectinatum (Pennell) Fernald, Pine-barren Cow-wheat. Dry sandy areas. May-July; August-September. E. MA to se. VA, on the Coastal Plain. [= C, F, G, K, P; < M. lineare – RAB, W]

1. Conopholis Wallroth 1825 (Squawroot, Bearcorn)


Conopholis americana (Linnaeus) Wallroth, Squawroot, Bearcorn. Rich, moist forests, under Quercus species. March-June. NS west to WI and south to c. peninsular FL, AL, and TN; disjunct in e. Mexico (Chiapas, Oaxaca, and Puebla). Haynes (1971) discusses the nature of the parasitism. Conopholis apparently germinates near an oak root, forms a parasitic connection to the root, resulting in the formation of a gall consisting of both Quercus and Conopholis tissue. The gall can be up to 25 cm in diameter, and lasts for many years, repeatedly sending up flowering shoots. It is believed that the gall exists underground for some years prior to first flowering. [= RAB, C, F, G, K, P, S, WH, WV, X, Y, Z]

377. LENTIBULARIACEAE Richard 1808 (Bladderwort Family) [in LAMIALES]


1 Leaves or leaf segments linear, borne along a subterranean or submersed stem; carnivory via specialized bladder-like traps; flowers in (1-) many-flowered racemes, each flower pedicel subtended by a bract ................................................................. Utricularia

2 Leaves ovate or elliptic, in a basal rosette; carnivory via the viscid-slimy upper leave surfaces; flowers solitary on bractless peduncles .......... Pinguicula

2 Leaves of the lower portion of the scape elongated, pointed, multicellular, nonglandular, transitioning upward to 1-celled glandular hairs; expanded portion of corolla markedly "veiny" (darker along the veins); [of se. NC southward to s. peninsular FL and e. Panhandle FL]. ................................................................. P. caerulea

3 Hairs throughout scape glandular; expanded portion of corolla not "veiny," [collectively of sw. GA and FL Panhandle westward to s. MS].

4 Fresh leaves dull red or reddish green; corolla lobes ca. 2× as long than broad, the lobes notched almost ½ their length. ... P. planifolia

5 Corolla tube violet, with darker violet veins; hairs of the inner corolla tube white ................................................................. P. ionantha

6 Corolla tube yellow, with reddish-brown veins; hairs of the inner corolla tube yellow ................................................................. P. primuliflora

Pinguicula caerulea Walter, Blue Butterwort. Pine savannas and wet pine flatwoods, mostly in the outer Coastal Plain, rarely extending inland to seepages and sandhill-pocosin ecotones in the fall-line Sandhills of NC and SC. April-May. Se. NC
Utricularia, as monographed by Taylor (1989), consists of 214 species in 35 sections, with a nearly cosmopolitan distribution. In our area, 14 or 15 species in 5 sections are known to occur. References: Taylor (1989)=Z; Schnell (2002b)=Y; Müller & Borsch (2005); Fischer et al. in Kadereit (2004). Key based in part on Z and GW.

1 Flowers white or cream-white, 1-3 mm long; inflorescence peduncles very reduced, the pedicels appearing to arise directly from the stolons; tracts 0.3-0.8 mm long; plants floating unattached in water (sometimes deposited land by dropping water, but then the principal branch systems stranded on the soil surface); capsules ca. 1 mm long, fusiform, indiscernent, with 1 seed; seeds essentially smooth, unornamented; leaves absent; [section Utricularia] [section Setiscapella] [very rare in our area]; [section Lecticula] .................................................................U. resupinata

2 Plants attached (with principal branch systems within the soil); leaves absent or simple, linear, grass-like aerial leaves; bladders 0.2-1.1 mm long, most or all on a plant usually < 1.0 mm long; seeds reticulate-alveolate (also angled in U. resupinata), 0.20-0.25 mm long. [section Stomoisia].

3 Flowers pink; inflorescence 1 (-2)-flowered; bract at base of the pedicel tubular, flattened; [section Vesiculina] .................................................................U. cornuta

4 Bracts subtending the pedicels peltate (attached near their middles), unattached at either end; pair of bracteoles absent; spur of the corolla oriented forward, more-or-less appressed to the lower lip; aerial leaves (when present) with subacute to obtuse apex; [section Vesiculina] .................................................................U. juncea

5 Corolla 1.5-2.0 cm long; spur 8-12 mm long; raceme usually short, the (1-) 2-6 flowers crowded together, all of them chasmogamous ......................................................................................................................U. cornuta

5 Corolla 0.25-1.5 cm long; spur 5-7 (-9) mm long; raceme usually elongate, the (1-) 2-15 flowers well-spaced, often the lower (sometimes all) cleistogamous and much smaller than the chasmogamous flowers ......................................................................................................................U. inflata

2 Plants floating unattached in water (sometimes deposited on land by dropping water, but then the principal branch systems stranded on the soil surface); leaves present and dissected into linear segments; bladders 0.7-5.0 mm long, most or all on a plant > 1.0 mm long; seeds papillose, reticulate, ridged, angled, or winged, 0.5-2.0 mm long.

6 Flowers purple; leaves divided into verticillate segments with terminal traps; [section Vesiculina] .................................................................U. purpurea

6 Flowers yellow; leaves divided into alternate segments with lateral traps; [section Utricularia].

7 Peduncle with whorl of inflated leaf-like organs (floats).

8 Floats 4-7, not fused basally to one another, fusiform, tapering gradually to base and apex from a widest point near the middle; leaves with the 2 primary divisions unequal; bracts of the scape longer than broad, entire; flowers (6-) 9-14 (-17) per scape; apex of corolla spur bifid .................................................................U. inflata

8 Floats (5-) 6-8 (-10), fused basally to one another, cylindrical, more-or-less parallel-sided through most of their length, tapering abruptly to base and apex; leaves with the 2 primary divisions equal; bracts of the scape broader than long, the apex slightly to strongly 3-lobed; flowers (1-) 3-4 (-7) per scape; apex of corolla spur usually entire (rarely bifid) .................. U. radiata

7 Peduncle without whorl of inflated leaf-like organs (floats).

9 Main axes distinctly flattened in cross-section, up to 10 mm wide ............................................................................................................U. foliosa
9 Main axes round in cross-section.
10 Lower lip of corolla 3-lobed; seeds disk-shaped, not angular or winged; inflorescences of 2 types, the chasmogamous on erect peduncles 2.5-25 cm long bearing 2-8 flowers, the cleistogamous without a peduncle, the solitary pedicels borne directly on the stolons, 0.5-2 cm long, deflexed..........................\textit{U. geminiscapa}
10 Lower lip of corolla entire or slightly irregular, not 3-lobed; seeds angular or winged; inflorescences of 1 type (erect, chasmogamous).

Upper corolla lip smaller than the lower, entire; capsule circumsissely dehiscent; seeds 0.7-1.0 mm long, 4-6-angled; corolla without stipitate glands on its external surface.

Leaves of one kind only, divided into numerous capillary segments bearing lateral traps; bracts scarcely auriculate; plant distinctly aquatic, floating in water and only rarely stranded; [of the Coastal Plain] ........................................\textit{U. macrorhiza}

Leaves of 2 or 3 kinds, some divided into capillary or narrowly linear segments and bearing few or no traps, others divided into fewer capillary segments and bearing more-or-less numerous traps; bracts distinctly auriculate; plants typically in boggy situations, in shallow water or frequently stranded; [either of the Mountains at high elevations or of various physiographic provinces northward].

Brodest leaf segments with 9-20 lateral setae (use 10× magnification); spur of corolla cylindrical, distinctly longer than wide, the apex distinctly curved forward............................................\textit{U. intermedia}

Brodest leaf segments lacking lateral seta; spur of corolla shortly saccate to broadly conical, wider than long, the apex not curved forward...........................................................................................................\textit{U. minor}

Upper corolla lip larger than the lower, obscurely 3-lobed; capsule laterally 2-valved or indehiscent; seeds 0.8-2.5 mm long, lenticular, with an irregular, lobed, or continuous wing; corolla (or at least the spur) with a few to many short stipitate glands (sometimes patchily distributed).

Vegetative shoots uniform, all bearing rather sparsely divided leaf segments bearing traps, seeds 0.8-1.1 mm long, with a continuous, circumferential wing, slightly to irregularly lobed.

Lower corolla lip 8-10 mm long, about equaling or slightly shorter than the conical, 5-9 mm long spur; leaves usually forked twice.........................................................................................\textit{U. biflora}

Lower corolla lip 5-6 mm long, exceeding the blunt, 3.5-4.5 mm long spur; leaves usually forked once ..........\textit{U. gibba}

Vegetative shoots of 2 kinds, some bearing leafy segments and few or no traps, others bearing reduced segments and more-or-less numerous traps; seeds 1.0-2.5 mm long, with an irregularly deeply lobed or partial wing.

Plant anchored in mud up to 100 cm below water surface; green leafy shoots up to 40 cm long and 5 cm wide; peduncle flexuous, to 100 cm long, only the uppermost ca. 10 cm emergent ..............................................\textit{U. floridana}

Plant in shallow water or stranded; green leafy shoots usually not >10 cm long and 2 cm wide; peduncle erect, straight, to 30 cm long, the uppermost 10-25 cm emergent .........................................................\textit{U. striata}

\textit{Utricularia biflora} Lamarrck, Longspur Creeping Bladderwort. Ponds, lakes, and ditches. June-October. This species may not be distinct from \textit{U. gibba} (which see for discussion). E. MA south to FL, west to TX and OK, primarily on the Coastal Plain; also apparently widespread in the New World and Old World tropics. [= RAB, C, F, G, GW, W; = \textit{U. pumilu} Walter – S, apparently misapplied; < \textit{U. gibba} – K, WH, Y, Z]

\textit{Utricularia cornuta} Michaux, Horned Bladderwort. Shores of limesink ponds (dolines), bogs, mountain bogs. May-September. NL (Newfoundland) and QC west to n. ON, AB, and MN, south to s. FL and e. TX; also in the Bahamas and Cuba. Taylor (1989) states that where sympatric with \textit{U. juncea}, \textit{U. cornuta} flowers much earlier. [= RAB, C, F, G, KW, W, WH, WV, Y, Z; = \textit{Stomoisca cornuta} (Michaux) Rafinesque – S]

\textit{Utricularia floridana} Nash, Florida Bladderwort. In deep water of natural Carolina bay lakes, other natural lakes, and limesink ponds (dolines). July-August. Se. NC south to c. peninsular FL, west to Panhandle FL and sw. GA. [= GW, K, S, WH, Y, Z]

\textit{Utricularia foliosa} Linnaeus, Flatstem Bladderwort. In deep water of natural lakes and ponds. Se. NC south to s. FL, west to TX (Brown & Marcus 1998); West Indies, South America, Africa. This species is reported for NC by Taylor (1989). See GW for a detailed description of this species. [= GW, K, S, WH, Y, Z]

\textit{Utricularia geminiscapa} Benjamin, Two-flowered Bladderwort, Hidden-fruitied Bladderwort. Beaver ponds, mucky seepages. NL (Newfoundland) and QC west to n. MI and n. WI, south to PA and sc. NC. [= C, F, G, KW, W, WH, WY, Y, Z]

\textit{Utricularia gibba} Linnaeus, Shortspp Creeping Bladderwort. Ponds, lakes, and ditches. May-September. QC west to WI, south to FL and LA; also apparently widespread in the West Indies and Central America and apparently the Old World tropics. Taylor (1989) includes \textit{U. biflora} in \textit{U. gibba}. Other authors have expressed doubts about the distinction, including RAB ("doubtfully distinct"). Taylor suggests that "further research is clearly indicated, but to be at all meaningful, it must be conducted on a worldwide basis." I have here, for the moment, retained the 2 traditionally recognized species, though intermediates will be encountered. [= RAB, C, F, G, S, W, WY; < \textit{U. gibba} – K, Y, Z (also see \textit{U. biflora})]

\textit{Utricularia inflata} Walter, Swollen Bladderwort, Inflated Bladderwort. Ponds, lakes, ditches. May-November. NJ south to s. FL, west to e. TX; disjunct in WA (probably introduced). Also disjunct in an artificial pond in Henderson County, NC (Carl Sandburg Home National Historic Site). [= C, G, KW, K, S, WH, Y, Z; = \textit{U. inflata var. inflata} – RAB, F]
**Utricularia intermedia** Hayne, Northern Bladderwort. {habitats} South to se. PA (Rhoads & Klein 1993), DE (?), and MD (Kartesz 1999). The report from sc. GA (Jones & Coile 1988) is in error. [= C, F, G, K, Y, Z]

**Utricularia juncea** M. Vahl, Southern Bladderwort. Shores of limesink ponds (dolines), borrow pits, wet sands. July-September. NY (Long Island) and NJ south to s. FL, west to e. TX and se. AR; also in the West Indies, Central America and South America. [= RAB, C, F, G, GW, K, WH, Y, Z; > Stomoisia juncea (M. Vahl) Barnhart – S; > Stomoisia virgatula Barnhart – S]

**Utricularia macrorhiza** Le Conte, Greater Bladderwort. Pools and ponds. May-September. NL (Newfoundland) west to AK, south to NC, SC, TX, CA, and Mexico; also in e. Asia. See Taylor (1989) for a discussion of the differences between this species and *U. vulgaris* of Europe and w. Asia, with which it has often been combined or associated as a variety. [= K, Y, Z; < U. vulgaris Linnaeus – RAB, C, F, G, WV, misapplied to American plants]

**Utricularia minor** Linnaeus, Lesser Bladderwort, Small Bladderwort. Fens and bogs, in the Southern Blue Ridge at about 1400 meters elevation. Circumboreal, south in North America to NJ, DE, PA, IN, IL, IA, NE, CO, UT, NV, and CA; disjunct in w. NC. [= C, F, G, K, Y, Z]

**Utricularia olivacea** Wright ex Grisebach, Dwarf Bladderwort, Minute Bladderwort. In floating mats (often algal) in water of limesink ponds (dolines), artificial lakes or beaver ponds. September-October. NJ south to FL, west to s. AL and s. MS (Sorrie & Leonard 1999), in the Coastal Plain; also in the West Indies (Cuba), Central America, and South America. [= RAB, GW, K, WH, Y, Z; = Biovularia olivacea (Wright ex Grisebach) Kam. – S]

**Utricularia purpurea** Walter, Purple Bladderwort. In water of ponds, ditches, other slow-moving water. May-September. NS and QC west to MN, south to NY, n. IN, s. MI, and WI, and on the Coastal Plain south to s. FL, west to se. TX; also in Mexico, the West Indies, and Central America. [= RAB, C, F, G, GW, K, WH, Y, Z; = Vesiculina purpurea (Walter) Rafinesque – S]

**Utricularia radiata** Small, Floating Bladderwort, Small Swollen Bladderwort. Ponds, depression ponds, lakes, and ditches. May-November. NS south to s. FL, west to TX; disjunct in w. VA, w. TN, nw. IN; reports of this species in Cuba and South America are apparently in error. [= C, G, K, S, W, WH, Y, Z; = U. inflata var. minor Chapman – RAB, F]

**Utricularia resupinata** B.D. Greene ex Bigelow, Northeastern Bladderwort, Resupinate Bladderwort. Wet pine flatwoods, pond margins, shores of natural lakes. NS west to nw. WI, south (irregular and scattered in part) to FL and sw. GA; also in the Bahamas (Sorrie & LeBlond 1997). Although "the curious gap in the North American range" [NC, SC, and VA] (Taylor 1989) is no longer strictly a gap, *U. resupinata* does appear to have a strangely bimodal range, with a center of distribution in ne. United States and se. Canada and a second extending from se. United States south into the West Indies and Central America. [= C, F, G, GW, K, WH, Y, Z; = Lecticula resupinata (B.D. Greene) Barnhart – S]

**Utricularia striata** Le Conte ex Torrey, Fibrous Bladderwort. Ponds, lakes, and ditches. May-November. Se. MA south to n. FL, west to e. TX and e. OK. [= K, WH, Y, Z; = U. fibrosa Walter – RAB, C, F, GW, S, of uncertain application and likely misapplied]

**Utricularia subulata** Linnaeus, Slender Bladderwort, Zigzag Bladderwort. Moist sands or peats of various kinds of acidic wetlands, including wet pine savannas and flatwoods, shores of limesink ponds (dolines), borrow pits, ditches. March-July (later). In North America primarily in the Coastal Plain, from NS and e. MA south to s. FL, west to TX, north in the interior to TN and AR; also in the West Indies, Central America, South America, Africa, and Asia. Taylor (1989) terms this "the most widespread of *Utricularia* species." [= RAB, C, F, G, GW, K, WH, Y, Z; > Setiscapella subulata (Linnaeus) Barnhart – S; > Setiscapella cleistogama (A. Gray) Barnhart – S]

**378. ACANTHACEAE** Durande 1762 (Acanthus Family) [in LAMIALES]


1 Plant a tree, with opposite leathery leaves; [of FL, s. MS, s. LA southward]........................................................................................................... *Avicennia*

1 Plant an herb, with various leaf arrangements.

2 Leaves in a basal rosette (sometimes with smaller leaves on a scape).
ACANTHACEAE

849

3 Leaves glabrate, to 22 cm long and 8 cm wide; corolla 0.8-1.3 cm long; capsule 8-10 mm long; stamens 2; [of moist to wet swamps] ............................................................ Elytraria

3 Leaves pubescent, to 10 cm long and 3 cm wide; corolla 1.8-4 cm long; capsule 9-18 mm long; stamens 4; [of dry upland pinelands].

4 Leaves 2-10 cm long, 1-3 cm wide; corolla 3-4 cm long; calyx lobes 15-30 mm long; capsule 12-18 mm long. ................. Ruellia ciliosa

4 Leaves 1.5-2.5 cm long, 0.7-0.8 cm wide; corolla ca. 2 cm long; calyx lobes 6-9 mm long; capsule ca. 10 mm long. ................. Stenandrium

2 Leaves cauline.

5 Fertile stamens 4; corolla not distinctly 2-lipped, the corolla lobes of nearly equal size (except distinctly 2-lipped in Hygrophila).

6 Corolla distinctly 2-lipped ......................................................... Hygrophila

6 Corolla not distinctly 2-lipped, the corolla lobes of nearly equal size.

7 Plant an herbaceous vine; leaves cordate-hastate at the base; flowers yellow to orange, usually with a dark purple “eye” .................

7 Plant an herb; leaves cuneate to rounded at the base; flowers white to various shades of blue or pink.

8 Calyx lobes linear-aristate; anther sacs awned or pointed at the base. ....................................................................................... Thanbergia

8 Calyx lobes lanceolate or linear; anther sacs blunt .......................................................... Dyschoriste

5 Fertile stamens 2; corolla distinctly 2-lipped (except salverform in Pseuderanthemum and with 4 nearly equal lobes in Yeatsea).

9 Corolla salverform, 5-lobed ........................................................................................................ Pseuderanthemum

9 Corolla distinctly 2-lipped or 4-lobed.

10 Bracts and bractlets inconspicuous, 2-5 mm long, linear or triangular; stem subterete or obscurely 4-angled ......... Justicia

10 Bracts and/or bractlets subtending the flowers conspicuous, 5-15 mm long, obovate; stem terete or 6-angled.

11 Stem six-angled in cross-section; corolla conspicuously 2-lipped ........................................................................... Yeatsea

11 Stem terete in cross-section; corolla 4-lobed, the lobes nearly equal .............................................................................. Yeatsea

Andrographis Wallich (False Water-willow)

A genus of about 20 species of tropical Asia.

* Andrographis echioides (Linnaeus) Nees, native of India, is reported for chrome ore piles near Newport News, VA, by Reed (1961); it is likely not established in our area. [= K] {not keyed; not mapped; rejected as a component of our flora}

Avicennia Linnaeus (Black Mangrove)


1 Corolla tan to purplish-pink, 15-20 mm long, the tube straight or nearly so ........................................................................ D. brachiata

1 Corolla scarlet red, 20-25 mm long, the tube curved ........................................................................................................ B. sexangularis

Dicliptera Antoine Laurent de Jussieu (Dicliptera, Foldwing)

A genus of 4-7 species, tropical. Of variable family placement, having been variously placed in the Acanthaceae, Verbenaceae, or Acanthaceae.

Avicennia germinans (Linnaeus) Linnaeus, Black Mangrove. Brackish and salt marshes and swamps. Scattered on the Gulf Coast in FL peninsula (Dixie county southward on the west coast, St. Johns County southwards on the east coast), Panhandle FL (Franklin and Taylor counties), s. MS, s. LA, and se. TX, southwards into the West Indies and Tropical America. [= RAB, C, F, GW, K, WH, Y; = K, WH, Y; = GW, K, WH; = K, WH, Y] ...........................

Dyschoriste Nees (Twinflower, Snakeherb, Dyschoriste)


1 Corolla 25-27 mm long (including the 5-10 mm lobes); capsule 10-14 mm long; [of pinelands] ........................................ D. oblongifolia

1 Corolla 10-15 mm long (including the 3.5 mm lobes); capsule 7-10 mm long

2 Leaves linear to linear-elliptic; [of moist pinelands] ........................................................................ D. angusta

2 Leaves elliptic to elliptic-ovate; [of floodplain forests] ........................................................................ D. humistrata

Dyschoriste angusta (A. Gray) Small, Pineland Twinflower. Moist pinelands. N. FL south to s. peninsular FL. Reported for FL Panhandle ( Wakulla County) by Kunzer et al. (2009). [= K, S, WH] {add GW, Y, Z to synonymy; improve key}

849
**ACANTHACEAE**

_Dyschoriste humistrata_ (Michaux) Kuntze, Swamp Twinflower, Swamp Dyschoriste. Bottomland forests, especially on soils over limestone. April-May. SC to c. peninsular FL, west to e. Panhandle FL. [= RAB, GW, K, S, WH, Y, Z]

_Dyschoriste oblongifolia_ (Michaux) Kuntze, Blue Twinflower, Pineland Dyschoriste. Pine savannas, flatwoods, and sandhills. April-May. SC to s. FL, west to se. AL and e. Panhandle FL. The basis of Small's (1933) attribution of this species to VA is unknown. [= RAB, K, S, WH, Y; > Dyschoriste oblongifolia var. oblongifolia – Z]

**Elytraria** Michaux (Elytraria)


_Hygrophila_ R. Brown


1 Leaf blades 5-12 cm long; calyx segments ca. 5 mm long, glabrous; flowers borne in axillary clusters .................................................. _H. lacustris_
1 Leaf blades 1-3.5 cm long; calyx segments ca. 2 mm long, pubescent; flowers borne in terminal and axillary spikes .......................... _H. polysperma_

_Hygrophila lacustris_ (Schlectendahl & Chamisso) Nees, Gulf Swampweed. Shallow water of swamps and shores. Sw. GA south to c. FL Peninsula, west to e. TX; West Indies. [= GW, K, S, Y, Z; = Hygrophila costata Nees et al. – WH; = Ruellia lacustris Schlectendahl & Chamisso]  


_Justicia_ Linnaeus (Water-willow)


1 Bracts of the inflorescence foliaceous and overlapping .................................................................................................................. _J. brandegeana_
1 Bracts of the inflorescence small, neither foliaceous nor overlapping.
2 Spike densely flowered; seeds verrucose; primary leaves averaging 6-8× as long as wide; [of the Piedmont, Mountains, and Coastal Plain]. .................................................................................................................................................. _J. americana_
2 Spike loosely flowered; seeds smooth or minutely muricate (with very fine, sharp projections); primary leaves either ca. 2-6× as long as wide .......................... _J. ovata_ var. _lanceolata_
3 Corolla purple, 18-30 mm long; leaves averaging > 8× as long as wide; cystoliths parallel to the midvein of the leaf; [of s. GA south into FL].
4 Upper leaf blades 4-7 cm long, not channeled, tough but not fleshy; calyx segments 5-7 mm long, < 1 mm wide ................. _J. angusta_
4 Upper leaf blades 8-13.5 cm long, channeled, fleshy; calyx segments 11-15 mm long, ca. 1 mm wide .................. _J. crassifolia_
3 Corolla pale lavender to white, 8-13 mm long; leaves averaging 2-6× as long as wide; cystoliths parallel to the secondary veins of the leaf; [of the Coastal Plain throughout our area].
5 Spikes lax, the flowers usually borne singly, secund; seeds smooth; leaves averaging ca. 5× as long as wide ............................. _J. ovata_ var. _ovata_


**Justicia brandegeana** Wasshausen, Shrimp-plant. Disturbed areas; native of Mexico. January-December. [= K2, WH]


**Justicia ovata** (Walter) Lindau var. lanceolata (Chapman) R.W. Long. Swamps, marshes. May. Se. GA west to TX, north in the Mississippi Embayment to s. IL, s. IN, w. KY. Needs additional study; may warrant specific status. [= K, WH, Y, Z; < J. ovata – GW; = J. lanceolata (Chapman) Small – S]


**Pseuderanthemum** Radlk.

A genus of about 60 species, mostly shrubs, of tropical regions.

* **Pseuderanthemum variabile** (R. Brown) Radlkofner, Night-and-Afternoon. Disturbed areas, also in potted plants and greenhouses; native of the Old World. Reported as a greenhouse weed from SC (Nelson & Kelly 1997), but not included as a regular member of the flora of SC because "it is unlikely that it could persist anywhere in South Carolina outside a greenhouse environment" (Nelson & Kelly 1997). [= K, Y; ? Ps. fasciculatum (Oerst.) Leonard – WH]

**Ruellia** Linnaeus (Wild-petunia)


1 Principal leaves linear-lanceolate, > 10× as long as wide (8-27 cm long, 0.7-2 cm wide); [alien, cultivated and naturalized] ..........**R. simplex**

1 Principal leaves elliptic, ovate or broadly lanceolate, 2-5× as long as wide (2-16 cm long, 0.5-7 cm broad); [native].

2 Calyx lobes narrowly linear-lanceolate, flattened to the tip, 1-4 mm wide ..............................................................................................................**R. strepens**

2 Calyx lobes linear, filiform or setaceous at least apically, < 1.2 mm wide at their widest point (usually the base), hairlike at the tip.

3 Corolla 6-10 cm long, opening at night and withering by mid-morning, white to pale lavender; calyx lobes 2.5-4.5 cm long; [of Coastal Plain seepage bogs and wet pine flatwoods][...............................**R. noctiflora**]

3 Corolla 3-7 cm long, opening during the day, lavender to lavender-blue (rarely white in *R. humilis*); calyx lobes 1-3 cm long; [of various habitats].

4 Flowers borne on peduncles 0.2-7 cm long, from the axils of lower and median nodes, not from the terminal node or terminal cluster.

5 Stem divergently branched (rarely simple); calyx glabrous or glabrate, with many partially imbedded cysoliths; calyx lobes 0.5-1 mm wide; tapering from the base to a very slender tip; [of dry to wet pine woodlands of the Coastal Plain][..................**R. pinetorum**]

5 Stem simple (rarely with a few ascending branches); calyx subulate, without cysoliths; calyx lobes 0.67-1.2 mm wide, widest near the middle and tapering to the apex; [of dry woodlands, forests, and glades of the Piedmont and Mountains] .........**R. purshiana**

4 Flowers sessile or sub sessile, in the axils of median and upper nodes, and usually also from the terminal node or cluster.

6 Leaves sessile or sub sessile; flower-bearing nodes usually 4-8; stem typically branched at base; stigma lobe 1 .................**R. humilis**

6 Leaves petiolate; flower-bearing nodes usually 1-3; stem typically simple below (unless damaged), sometimes branched upward; stigma lobes (1-) 2.

7 Plant with all leaves caulescent; leaves ovate, lanceolate, elliptic, or oblong; [widespread in our area] ..........**R. carolinensis**

7 Plant with a rosette of purplish basal leaves, flat on the ground; leaves spatulate to obovate; [restricted to dry pine woods in the Coastal Plain] ..............................................................................................................**R. ciliosa var. ciliosa**

**Ruellia carolinensis** (J.F. Gmelin) Steudel, Carolina Wild-petunia, Common Wild-petunia. Dry to moist forests and woodlands. (May-) June-September. NJ, s. OH, s. IN, s. IL, and OK, south to s. FL and e. TX. [= RAB, C, G, WH, X; > R.
* **Ruellia ciliata** Hooker, Hairyflower Wild-petunia. Disturbed areas; native of South America. [= K2, WH] [not yet keyed; add to synonymy]


**Ruellia noctiflora** (Nees) A. Gray, Night-flowering Wild-petunia. Wet pinelands and savannas. (May-) June-July (-August). E. GA (in counties immediately adjacent to SC) south to ne. FL; Panhandle FL west to se. LA. [= GW, K, S, WH, X, Y, Z]

**Ruellia pedunculata** Torrey ex A. Gray, Stalked Wild-petunia. Dry woodlands and forests. IL and MO south to w. LA and e. TX, apparently not in our area. [= F; < *R. pedunculata* – C, G; = *R. pedunculata* ssp. *pedunculata* – K, Y, Z] [not yet keyed]

**Ruellia pinetorum** Fernald, Pineland Wild-petunia. Dry to wet pinelands. May-September. SC south to Panhandle FL, west to e. TX. Although treated as only subspecifically distinct from *R. pedunculata* by many recent authors, there seem ample differences in morphology, distribution, and habitat to warrant specific distinction. First reported for GA by Sorrie (1998b). [= RAB, F, X; = *R. pedunculata* Torrey ex A. Gray ssp. *pinetorum* (Fernald) R.W. Long – K, WH, Y, Z]

**Ruellia purshiana** Fernald, Pursh’s Wild-petunia. Dry woodlands and forests, especially over mafic or calcareous rocks. May-(-June). MD south to c. GA and c. AL, in and adjacent to the Appalachians. [= RAB, F, K, W, WV, Y, Z; < *R. pedunculata* Torrey ex A. Gray – C, G]


**Stenandrium Nees**


**Stenandrium dulce** (Cavanilles) Nees var. *dulce*. Sweet Shaggytuft. Pine savannas. GA to FL. Var. *dulce* ranges from GA south to FL; var. *floridanum* A. Gray is restricted to s. peninsular FL. [= K, Y; < Gerardia *floridanum* (A. Gray) Small – S; < *S. dulce* var. *floridanum* A. Gray – Z]

**Thunbergia** Retzius (Clock-vine)
**ACANTHACEAE**

ACANTHACEAE

853


* Thunbergia alata Bojer ex Sims, Black-eyed-Susan Vine. Disturbed areas; native of Africa. [= K, S, WH, Y, Z]

**Yeatesia** Small (Bractspike)


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**BIGNONIACEAE** A.L. de Jussieu 1789 (Bignonia Family) [in LAMIALES]

A family of about 110 genera and 800 species, trees, shrubs, and lianas, mainly tropical and especially of South America. The monophyly of the Bignoniaceae (excluding Paulownia) was confirmed by Spangler & Olmstead (1999). References: Manning (2000)=Z; Spangler & Olmstead (1999); Fischer, Theisen, & Lohmann in Kubitzki (2004).

1 Leaves simple, cordate; plant a tree; corolla white (marked internally with other colors); [tribe Tecomeae]...........................1. Catalpa

1 Leaves pinnately compound; plant a vine; corolla reddish or yellowish.

2 Leaves 7-15-foliolate, with a leaflet in the terminal position; [tribe Tecomeae].........................................................2. Campsis

2 Leaves 2-foliolate, with a 3-branched tendril in the terminal position; [tribe Bignonieae].

3 Tendrils not hooked, claw-like.......................................................................................................................................................

3 Tendrils hooked, claw-like ........................................................................................................................................................

4. Macfadyena

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1. Catalpa Scopoli 1777 (Catalpa)

A genus of about 10 species, trees, of e. North America (2 species), e. Asia (4 species), and the West Indies (4 species). References: Manning (2000)=Z; Paclt (1952)=Y; Li (2008); Fischer, Theisen, & Lohmann in Kubitzki (2004).

1 Flowers creamy yellow, striped inside with deeper yellow and spotted with dark violet; leaves usually lobed; seeds elliptical, 2.5-3 mm long, 8-10 mm wide............................................................................................................................................................C. ovata

1 Flowers white or pale rose, striped inside with yellow and spotted with purple; leaves rarely lobed; seeds elongate, 4-10 mm long, 20-35 mm wide.

2 Corolla 2-4 cm wide, the lower corolla lobe densely spotted with purple, entire; pod 6-10 mm thick, each valve 9-15 mm wide when flattened; seeds with 2 elongated wings, each wing narrowing to an acutish end, the hairs at the end appressed to one another in 2 planes, thus forming a pointed tail; fresh foliage with a fetid odor.................................................................C. bignonioides

2 Corolla 4-6 cm wide, the lower corolla lobe sparsely spotted with purple, notched; pod 10-15 mm thick, each valve 13-18 mm wide when flattened; seeds with 2 elongated wings, each wing narrowing only slightly to a rounded or oblique end, the hairs at the end appressed to one another only in one plane, thus forming a flattish fringe; fresh foliage essentially odorless ......................................................C. speciosa

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Catalpa bignonioides Walter, Southern Catalpa. Bottomlands and streambanks (as a native), escaped or persistent after cultivation. June; October. S. GA, ne. FL, n. peninsular FL, and Panhandle FL west to s. MS (or LA?), on the Coastal Plain, early naturalized in a more widespread area, and now extending north to CT and MI. [= RAB, C, F, G, GW, K, W, WH, Z; = C. catalpa (Linnaeus) Karsten – S]

* Catalpa ovata G. Don, Chinese Catalpa. Suburban woodlands; native of China. Introduced in WV, MD, DC, PA, and other northeastern states (Manning 2000; Kartesz 1999), and beginning to be considered invasive. [= C, F, G, K, Z; > C. ovata var. ovata – Y; > C. ovata var. flavescens Bean – Y]

Catalpa speciosa (Warder) Warder ex Engelmann, Northern Catalpa. Bottomlands and river banks (as a native), also escaped or persistent after cultivation, and sometimes thoroughly naturalized. May-June; July-August. Native in the upper Mississippi River Embayment of s. IN and s. IL, south to w. TN and e. AR; early naturalized in a more widespread area. [= RAB, C, F, G, K, S, W, Z]

2. Campsis Loureiro 1790 (Trumpet-creeper)

*Campsist radicans* (Linnaeus) Seemann ex Bureau, Trumpet-creeper.  Bottomland forests, swamp forests, fencerows, old fields, forests, thickets, disturbed areas.  June-July; September-October.  NJ west to IA, south to s. FL and c. TX.  In the pre-Columbian landscape this plant was primarily limited to swamps and bottomlands; it has done well as a weedy colonizer of abandoned farmland, fencerows, and thickets (where particularly conspicuous on fenceposts and old tobacco barns).  In swamps of the Coastal Plain it is a common liana, often with its foliage in the canopy 30-40 m above the ground, and with stems to 15 cm in diameter.  Even when the foliage cannot be seen, *Campsis* is immediately recognizable by its shreddy tan or yellow bark (unlike any of our other high-climbing vines).  [= RAB, C, F, G, GW, K, W, WH, Z; *Bignonia radicans* Linnaeus – S]

3. *Bignonia* Linnaeus 1753 (Cross-vine)  

*Bignonia capreolata* Linnaeus, Cross-vine.  Swamp forests, bottomlands, forests, woodlands.  April-May; July-August.  MD west to s. OH and s. MO, south to c. peninsular FL and e. TX.  This species is absent from most of the Mountains in our area (also scarce in the Piedmont of Virginia and upper Piedmont of NC), reappearing at lower elevations on the west side of the Blue Ridge.  Though primarily a species of swamp and bottomland forests, *Bignonia* often occurs as well in mesic or even dry forests, where it generally remains stunted (most individuals with only a few leaves) and does not flower or fruit.  [= C, F, GW, K, W, WH, Z; *Anisostichus capreolata* (Linnaeus) Bureau – RAB; G; *Anisostichus crucigera* (Linnaeus) Bureau – S]

4. *Macfadyena* Alphonse de Candolle 1845 (Claw-vine)  

*Macfadyena unguis-cati* (Linnaeus) A.H. Gentry, Claw-vine, Cat’s-claw-vine.  Cultivated and naturalized; native of tropical America.  This vine is introduced and naturalized in s. and e. GA (Jones & Coile 1988) and is locally commonly naturalized in Charleston.  [= K, WH, Z; *Bignonia unguis-cati* Linnaeus]

382. VERBENACEAE J. St.-Hilaire 1805 (Verbena Family) [in LAMIALES]

As recently reworked, a family of about 34-41 genera and 950-1200 species, trees, shrubs, vines, and herbs, widespread in tropical, subtropical, and warm temperate regions of the Old World and New World.  References:  Atkins in Kadereit (2004).  [also see LAMIACEAE and PHRYMACEAE]

1 Shrubs; fruits fleshy; [tribe Lantaneae] ...................................................................................................................................................... *Lantana*  
1 Herbs; fruits dry.  
2 Mericarps 2; corolla 4-lobed, evidently zygomorphic (bilabiate); [tribe Lantaneae] ...................................................................................................................................... *Phyla*  
2 Mericarps 4; corolla 5-lobed, actinomorphic or only weakly irregular; [tribe Verbeneae].  
3 Mericarps not separating at maturity; [sandy woodlands of the Coastal Plain] .............................................................................................. *Stylodon*  
3 Mericarps separating at maturity; [collectively widespread].  
4 Styles > 6 mm long; calyx 8-10 mm long, longer than the fruit; corolla salverform ................................................................................. *Glandularia*  
4 Styles < 3 mm long; calyx 2-4 mm long, often shorter than the fruit; corolla funnelliform ........................................................................... *Verbena*

*Aloysia* Palau 1784 (Bee-brush)  
VERBENACEAE


1 Leaves finely dissected, the divisions 1 mm or less wide, the margins strongly revolute.
   2 Bracts as long as or longer than the calyx; leaf segments 1-4 mm wide ...................................................... G. bipinnatifida var. bipinnatifida
   1 Leaves coarsely dissected or lobed, the divisions > 1 mm wide, the margins slightly or not at all revolute.
   3 Calyx lobes > 3 mm long ........................................................................................................................................... G. canadensis
   3 Calyx lobes < 3 mm long ........................................................................................................................................... G. ×hybrida

Glandularia bipinnatifida (Nuttall) Nuttall var. bipinnatifida, Dakota Vervain. Cp (GA, Mt (GA)): dry prairies on clay soils; rare. KY, MO, SD, and CO south to e. GA, AL, AZ and s. Mexico; elsewhere in n. America as waifs. [= K; = Verbena bipinnatifida Nuttall – C] [synonymy incomplete]

Glandularia canadensis (Linnaeus) Nuttall, Rose Vervain, Rose Verbena, Creeping Vervain. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt* (WV*): roadsides, sandhills, other dry (especially sandy) soils; uncommon. March-May. PA, IL, and CO, south to FL and TX, and introduced elsewhere. [= K, S, Z; = Verbena canadensis Linnaeus – RAB, C, F, G]

* Glandularia ×hybrida (Grönland & Rümpler) Nesom & Pruski, Garden Vervain. Cp (SC): cultivated in gardens; uncommonly cultivated, rarely escaped or persistent. March-July. Nesom & Pruski (1992) have provided the transfer to Glandularia of this common garden plant. [= Verbena ×hybrida Grönland & Rümpler – RAB, G, K; = Verbena hybrida – C]


Lantana Linnaeus 1753 (Lantana)


1 Heads with an involucre; flowers pink or purple........................................................................................................... L. montevidensis
   2 Heads with bracts, but not an involucre; flowers orange, yellow, or multicolored.
   3 Calyx lobes acute, as long as or longer than the calyx tube ...................................................................................... L. camara
   3 Calyx lobes obtuse, shorter than the calyx tube ........................................................................................................... L. urticoides

* Lantana camara Linnaeus, Common Lantana, Hedgeflower. Cp (FL, GA, NC, SC): disturbed areas, especially near the coast; rare, native of the West Indies. [= RAB, K, S, Z]

Lantana depressa Small var. floridana (Moldenke) R. Sanders, Florida Lantana. Cp (FL, SC*?): edges of brackish marshes, dunes; rare, the SC occurrence apparently introduced from FL. Native from ne. FL south to se. FL. [= K, Z; = L. ovatifolia Britton – RAB, S, misapplied; = L. depressa Small – S]


* Lantana urticoides Hayek, West Indian Lantana. Cp (NC, SC): disturbed and brackish areas; rare, native of West Indies. May-December. [= K; = L. hordida Kunth – RAB, misapplied]

Phyla Loureiro 1790 (Frogfruit)


1 Leaves 2-6 cm long, lanceolate, widest at or below the middle, acute at the tip; leaf teeth (5-) 7-11 per leaf side ................. P. lanceolata
   1 Leaves 1-4 cm long, obovate, widest above the middle, obtuse to rounded at the tip; leaf teeth (3-) 5 (-7) per leaf side .................. P. nodiflora

Phyla lanceolata (Michaux) Greene, Marsh Frogfruit, Northern Frogfruit. Cp (DE, FL, GA, NC, SC, VA), Pd (VA), Mt (VA, WV): brackish marshes, other marshes, ditches; common (rare in DE, FL, GA, and WV). June-November. On west to SD, south to Panhandle FL, AL, MS, LA, CA, and n. Mexico; primarily in the outer Coastal Plain in the Carolinas, but extending inland in VA. [= C, G, GW, K, S, W, WH; = Lippia lanceolata Michaux – RAB, WV; > L. lanceolata var. lanceolata – F; > Lippia lanceolata var. recognita Fernald & Griscom – F]
Phyla nodiflora (Linnaeus) Greene, Creeping Frogfruit, Capeweed, Turkey-tangle, Matgrass. Cp (FL, GA, NC, SC, VA): sandy soils of roadsides, lawns, ditches, disturbed areas; common (rare in VA). May-November. Pantropical, in North America from se. VA south to s. FL and west to CA, north in the interior to AR, se. MO, and southward into the tropics. This species is very weedy, and is a familiar component of road margins and lawns in the southeastern Coastal Plain. [= C, G, GW, K, S, WH; = Glandularia nodiflora (Linnaeus) Michaux – RAB, F]

Verbena Linnaeus 1753 (Verbena, Vervain)


1 Spikes short and stout, the flowers or fruits overlapping and completely obscuring all of the rachis (except in V. montevidensis, the fruits spaced towards the base of the spike).

2 Plant procumbent or decumbent; leaves pinnately lobed or dissected; [section Verbena, series Bracteatae]................................. V. bracteata

3 Plant erect; leaves coarsely serrate.

4 Central spikes sessile to subsessile, spikes compact, 3-5 mm wide, fruits remaining densely overlapping at maturity; [section Verbena, series Bracteatae]................................................................. V. brasiliensis

5 Central spikes pedunculate, spikes loose, 2-3 mm wide, with fruits becoming remote at least in the proximal portion at maturity’ [section Verbena, series Bracteatae]................................. [V. montevidensis]

6 Leaves not lobed or dissected, or some of the leaves lower on the stem 3-lobed.

7 Leaves mostly lobed or dissected.

8 Plants much branched at base, stems decumbent to ascending; leaves 1-5 cm long; [section Verbena, series Tricesimae] .............................. [V. canescens]

9 Plants little branched, stems erect; leaves 3-12 cm long.

10 Basal and lower cauline leaves persistent, relatively thick, large and spatulate, margins revolute, cauline leaves quickly reduced in size distally and becoming linear-entire; rachis and calyces eglandular; [section Verbena, series Haleae]................................. V. halei

\[V. urticifolia\]

11 Stem leaves with well-developed petioles.

12 Leaves linear to narrowly oblanceolate, < 1.5 cm wide, > 6× as long as wide; [section Verbena, series Simplices] ............... V. simplex

13 Mericarps tightly adhering in fruit, appearing as one; calyx lobes curved inward in fruit; corolla pink to pinkish lavender; [section Verbena, series Candelabrae]................................. V. carnea

\[V. bonariensis\]

14 Leaves ovalate, 2-4 cm wide, < 4× as long as wide

15 Upper leaf surfaces densely scabrous or hirsute to hirsudulous; calyx lobes triangular, connivent; corollas mostly pinkish to bluish, lavender, or purple; nutlet outer surfaces deeply ridged and grooved, often with prominent cross-ridges, commissural faces consistently densely white minutely papillate-bullate; fibrous-rooted................................. V. scabra

\[V. xutha\]

16 Lower leaf surfaces scabrous to hirsute; calyx lobes deltate-subulate, not connivent or subconnivent; corollas white, rarely pinkish; nutlet outer surfaces smooth to longitudinally ridged, sometimes with cross-ridges distally, commissural faces smooth or rarely with slight development of minutely bullate ornamentation; taprooted................................. V. urticifolia

* Verbena bonariensis Linnaeus. Cp (GA, NC, SC): roadsides, disturbed areas, old fields; common, native of South America. May-October. [= V, X; = V. bonariensis – RAB, C, G, GW, S, WH (also see V. incompta); = V. bonariensis var. conglomerata Briquet – K]

**VERBENACEAE**


* Verbena halei* Small, Texas Vervain. Cp (FL, GA, NC*, SC*): dry hammocks, roadsides, pastures; common (rare in NC and SC, where presumably introduced). April-June. C. GA south to c. peninsular FL, TX, AZ, and Mexico; scattered as an introduction further north, as in NC and SC. [= RAB, K, S, X; = *V. officinalis* ssp. *halei* (Small) S.C. Barber – WH, Z]

* Verbena hastata* Linnaeus, Common Vervain, Blue Vervain, Simpler's-joy. Cp (DE, NC, VA), Pd (DE, NC, VA), Mt (NC, VA, WV): marshes, bogs, low fields; common (rare in NC). June-October. NS west to BC, south to NC, n. AL, AR, OK, n. TX, NM, AZ, CA; scattered occurrences further south appear to be introductions. The hybrid with *V. urticifolia*, *Verbena ×engelmannii* Moldenke, is known from our area. [= RAB, C, F, G, GW, S, W, WV, X, Z; > *V. hastata* var. *hastata* – K; > *V. hastata* var. *scabra* Moldenke – K]


* Verbena rigida* Sprengel. Cp (FL, GA, NC, SC, VA), Pd (GA): roadsides, disturbed areas; common (uncommon in NC, rare in VA), native of South America. Late March-July. [= K, S, WH, X, Y]

* Verbena scabra* Vahl, Rough Vervain, Harsh Vervain. Cp (FL, GA, NC, SC, VA), Pd (GA, VA), Mt (VA, WV?): brackish marshes, shell deposits, other wet habitats; common (uncommon in NC, rare in VA and WV). May-October. VA and WV south to s. FL, west to TX and CA, south into tropical America; mainly coastal in our area but with scattered inland records (probably adventive). [= RAB, C, F, G, GW, K, S, U, WH, WV, X]

* Verbena simplex* Lehmann, Narrowleaf Vervain. Pd (DE, GA, NC, SC, VA), Mt (GA, VA, WV), Cp (DE, FL, VA): glades, woodlands, forests, and roadsides, over mafic or calcareous rocks; common (uncommon in WV). May-September. NH west to MN and NE, south to Panhandle FL (Jackson County) and TX. [= RAB, C, F, G, K, WH, WH, X, Z; > *V. angustifolia* Michaux – S]


* Verbena urticifolia* Linnaeus, White Vervain, Velvetleaf Vervain. Cp (NC, SC, VA), Pd (NC, SC, VA), Mt (NC, SC, VA, WV): [habitats]; common. May-November. NB west to SK, south to Panhandle FL and TX. Two varieties have been distinguished by many authors (see synonymy), but the characters used are poorly correlated and the distributional ranges largely overlapping. The hybrid with *V. hastata*, *Verbena ×engelmannii* Moldenke, is known from our area. [= RAB, GW, W, U, X, Z; > *V. urticifolia* var. *leioarpa* Perry & Femald – C, F, G, K, WV; > *V. urticifolia* var. *urticifolia* – C, F, G, K, WV; = *V. urticaefolia* – S, orthographic variant]

* Verbena canescens* Kunth, Gray Vervain. Cp (AL): disturbed areas; rare, native of TX. Reported for s. AL. [= K, X]


* Verbena suhba Lehmann, Gulf Vervain. Cp (AL, LA, MS): [habitat]; rare. AL west to TX. [= K, S, X]

384. MARTYNIACEAE  Stapf 1895 (Martynia Family) [in LAMIALES]


**Probsocidea** Schmidel 1763 (Unicorn-plant)


* Probsocidea louisiana* (Miller) Thellung, Unicorn-plant, Devil's-claw, Cow Catcher. Disturbed areas; native of the Great Plains. The curious fruits are unmistakable. [= RAB, F, GW, WV, Y; = *P. louisiana* – C, G, orthographic variant; = *Martynia louisiana* Miller – S; > *P. louisiana* ssp. *louisiana* – K, Z]

389. AQUIFOLIALES Bartling 1830 (Holly Family) [in AQUIFOLIALES]
**AQIFOLIACEAE**

A monogenic family of about 500 species, nearly cosmopolitan.

*Ilex* Linnaeus 1753 (Holly, Winterberry, Gallberry)


**Identification notes:** Some of our species can be superficially similar to various shrubs and trees of the Rosaceae, in their alternate toothed leaves borne on spur shoots.

1 Leaves coriaceous, evergreen.

2 Leaves with a well-developed apical spine (and usually also marginal spines) 2-6 mm long.

3 Flowers in 1-few-flowered axillary cymes, on growth of the same year; [native trees of a wide variety of habitats]

4 Leaves dark green above, 1.5-5.0 cm long, 1.0-2.5 cm wide; [of FL]..........................*I. opaca* var. *arenicola*

5 Leaves deciduous, 3-12 cm long, 2.0-5.5 cm wide; [widespread in our area]..........................*I. opaca* var. *opaca*

6 Flowers in axillary clusters, on branches of the previous year; [alien shrub, rarely naturalized, especially in suburban areas] .......

7 Leaves toothed; [collectively of various habitats, widespread in our area] ..............................................................................

8 Leaves 1.5-3× as long as wide, with a few, irregularly spaced, marginal spinose prickles (or commonly entire), generally about 2-3 cm wide ..........................................................*I. coriacea*

9 Leaves 3-4× as long as wide, crenate in the apical 1/2 to 1/3 (or rarely entire), generally about 1 cm wide (almost never > 2 cm wide) ..........................................................*I. glabra*

10 Leaves lanceolate to narrowly oblong, 2-4 cm long, 3-8 mm wide, 3-7× as long as wide; petioles (3-) 5-15 mm long; leaf apex acute, obtuse, or rounded; branchlets strongly ascending, most of them forming an angle of < 45 degrees to the branch ..............

11 Pedicels of fruits and pistillate flowers (5.5-) 10-30 mm long; pedicels of staminate flowers (10-) 15-25 mm long; leaves rarely revolute; pubescence of the lower leaf surface stellate, distributed on the surface; leaf margins often ciliate.

12 Pedicels of fruits and pistillate flowers (5.5-) 10-30 mm long; pedicels of staminate flowers (10-) 15-25 mm long; leaves rarely revolute; pubescence of the lower leaf surface stellate, distributed on the surface; leaf margins often ciliate.

13 Leaves 4.5-8.5 (-10) cm long, 1.5-3 cm wide; fruits (4-) 5-8 (-9) mm in diameter; sepals not ciliate; [plant widespread in our area, in the Coastal Plain, Piedmont, and rarely Mountains of our area] ..................................................................

14 Upper leaf surface glabrous, or with trichomes confined to the veins or their vicinity; sepals ciliate; leaf blades crenate to distinctly serrate ..........................................................*I. cassinoides*

15 Upper leaf surface glabrous, or with trichomes confined to the veins or their vicinity; sepals ciliate; leaf blades crenate to distinctly serrate ..........................................................*I. longipes*

16 Sepals glabrous (in flower or fruit), acute; leaves lighter green, slightly if at all rugose ..................................................*I. laevigata*

17 Sepals ciliate (in flower or fruit), obtuse; leaves darker green, often moderately rugose ..................................................*I. verticillata*
AQUIFOLIACEAE

859

Ilex verticillata  
Fruits duller red, longer than broad, 5-7 mm in diameter, borne on stalks 1-6 mm long, primarily in the axils of leaves on normal shoots with ground pedicels will separate fruiting plants readily. [K, WV; = K, WV, C, F, G, GW, K, S, Y; ]

Ilex montana  
Fruits bright cherry-red, broader than long, (7-) 8-12 mm in diameter, borne on stalks 9-20 mm long, primarily in the axis of leaves on spur shoots; bark of 2-3 year old twigs usually light tan; calyx (persistent on fruit) 4-6 lobed; nutlets 4-6 per fruit, with bony white longitudinal striations on the back, the furrows between the striations very shallow if developed at all; petiole with a deeply U- to V-shaped channel on its upper surface (made by the decurrent leaf edges), with dark ascending trichomes in the channel; leaves variable, but mostly 3-6 cm wide and about 1.5× as long as wide, usually abruptly short-acuminate; [plant of bogs, seepages, streambanks, and (rarely) moist forests, mostly at high elevations]...........................................................................................................................................................................I. collina

Ilex ambigua (Michaux) Torrey, Carolina Holly. Sandy upland forests, dry slope forests, rarely in pocosin ecoregions in the fall-line sandhills region. April-June; April-September. Ne. NC, se. TN, n. AR, and se. OK south to c. peninsular FL, s. MS, and se. TX; disjunct in the Sierra Madre Oriental and Chiapas, Mexico. The various taxa that have been distinguished in this complex may have some merit, though a detailed study by Krakow (1989) did not show a clear basis for their recognition. I. buswellii Small, strictly of xeric habitats of the Coastal Plain from se. NC southward, has the larger leaves 2.3-5 (-4) cm long and 0.7-1.7 (-2.5) cm wide. I. ambigua (sensu stricto) is distributed in the Coastal Plain, Piedmont and Low Mountains, and has leaves 3.9-10.5 cm long and 1.7-6 cm wide. I. beadlei of the Low Mountains and Piedmont has leaves 7.9 (-10.5) cm long and 2.6 cm wide. [= K, Z; = I. ambigua var. ambigua – RAB, W, Y; > I. montana var. mollis (A. Gray) Britton – C, F; > I. montana var. beadlei (W.W. Ashe) Fernald – G; > I. ambigua – S; > I. beadlei W.W. Ashe – S; > I. buswellii Small – S; > I. ambigua (Michaux) Torrey var. monticola (A. Gray) Wunderlin & Poppleton – Y, misapplied; > I. beadlei var. laevis W.W. Ashe; > I. caroliniana Trelease ex Small; > I. mollis A. Gray]

Ilex amelanchier M.A. Curtis ex Chapman, Sarvis Holly. Banks of blackwater creeks and rivers, clay-based Carolina bays. April-May; October-November. A Southeastern Coastal Plain endemic: se. NC south to the FL Panhandle and west to se. LA (reports from se. VA appear to be based on confusion of material). The fruits are sometimes persistent until the following spring; the species is perhaps most conspicuous in the winter, when the dull red fruits can be easily seen. [= RAB, C, F, G, GW, K, S, Y; ]

Ilex cassine Limnaeus, Dahoon, Cassena. Blackwater stream swamps, pocosins, nearly always in very acid peaty or sandy sites. May-June; October-November. Primarily a Southeastern Coastal Plain endemic: se. NC south to se. FL and west to se. TX; also in Cuba and Mexico. I. cassine is variable in leaf shape, sometimes approaching I. myrtifolia. Some populations in our area show intergradation with or poor differentiation from I. myrtifolia, lending some credibility to their treatment as varieties. [= GW, S, Y; > I. cassine var. cassine – RAB; > I. cassine var. cassine – K]

Ilex collina Alexander, Long-stalked Holly, Cherry Holly. In peats of bogs and seepages, on banks of cold, high elevation streams (less common on moist, rocky slopes in northern hardwood forests or mixed spruce-hardwood forests) at moderate to high elevations (1100-1800m). May-June; (August-) September-October. A Southern Appalachian endemic: e. and c. WV, sw. VA, w. NC, and e. TN (Sevier County) (Boetsch & Nielsen 2003). The affinities of this species are with Ilex montana and I. verticillata, not with Ilex (Nemopanthus) microcarpon (Baas 1984). See Clark (1974) and Boetsch & Nielsen (2003) for additional information about this species. I. collina often occurs with or in close proximity to the similar I. montana and I. verticillata; the long fruiting pedicels will separate fruiting plants readily. [= K, W, V; = Nemopanthus collinus (Alexander) R.C. Clark – C, W; < I. longipes – F, G]

Ilex coriacea (Pursh) Chapman, Big Gallberry, Sweet Gallberry. Pocosins, more restricted to wet, peaty sites than I. glabra. April-May; September-October. A Southeastern Coastal Plain endemic: se. VA south to c. peninsular FL and west to e. TX. [= RAB, C, F, G, GW, K, S, Y; ]

* Ilex crenata * Thunberg, Japanese Holly. Planted as a landscaping shrub, escaped into forests in suburban areas; native of Japan. First reported for NC by Pittillo & Brown (1988). [= K]

Ilex cuthbertii Small, Cuthbert Holly. Upland circumneutral woodlands and forestse. Endemic to an area along the Fall Line in SC and adjacent GA (Krakow 1989). Perhaps best treated as a variety of * I. longipes *, but the combination has not yet been made. [= K; <= I. cuthbertii – S (as to type, not as to range); = I. longipes var. cuthbertii (Small) G.A. Krakow, in prep. – Z]

Ilex decidua Walter var. curtissii Fernald, Suwanee Possum-haw, Curtiss’s Holly. Floodplains and moist forests in the Suwanee River drainage. Mid-March-mid-April; September-October. Apparently endemic to the Suwannee River drainage of s. GA and n. FL. [= Z; < I. decidua – GW, K, Y; = I. curtissii (Fernald) Small – S]

Ilex decidua Walter var. decidua, Possum-haw. Floodplain forests, less commonly on mesic (or even dry), upland slopes. March-May; September-October. MD south to Panhandle FL, west to TX on the Coastal Plain, extending also to adjacent provinces (the Piedmont and rarely Mountains in our area), and extending north in the interior to c. TN, w. KY, s. IL, c. MO, se. KS, and e. OK; also disjunct (as a variety) in the Sierra Madre Oriental of e. Mexico. The Mexican material was recognized by Krakow (1989) at the varietal level, but has not been formally named; it is known from a single collection from Nuevo León, Mexico. [= Z; < I. decidua var. decidua – RAB; < I. decidua – C, F, G, GW, K, > I. decidua var. decidua – Y (also including I. cuthbertii)]

Ilex glabra (Linnaeus) A. Gray, Little Gallberry, Inkberry. Savannas, pine flatwoods, pocosin margins, swamps, primarily in wetlands, but extending upslope even into sandhills. May-June; September-November. NS and ME south to FL, west to TX. [= RAB, C, F, G, GW, K, S, Y]

Ilex laevigata (Pursh) A. Gray, Smooth Winterberry. Pocosins, other wet, acidic sites, such as in small blackwater stream swamps. April-May; September-October. ME and NY south to SC, mostly near the coast. [= RAB, C, F, G, GW, K, S]

Ilex longipes Chapman ex Trelease, Georgia Holly, Chapman's Holly. Upland forests. April-May; September-October. Sc. NC, sc. TN (Chester, Wofford, & Kral 1997), and wc. AR south to Panhandle FL, s. MS, and sc. TX. [= GW, K, S; = I. decidua var. longipes (Chapman ex Trelease) Ahles – RAB, Y; <= I. decidua – F, G (apparently also including I. collina); = I. longipes var. longipes – Z]

Ilex montana Torrey & A. Gray ex A. Gray, Mountain Holly. Mesic forests, rarely bogs or bog edges. April-June; August-September. W. MA and w. NY south to n. GA and n. AL, essentially an Appalachian endemic. The range of this species is sometimes stated or shown as broader, extending into the Coastal Plain in our area, and as far south as n. FL, LA, and e. TX, but these reports are based on misidentifications, primarily of the "beadlei" component of * I. ambiguus *. [= K, WV, Z; = I. ambiguus var. montana (Torrey & A. Gray ex A. Gray) Ahles – RAB; = I. montana var. montana – C, F, G; = I. monticola A. Gray – S; = I. ambiguus var. monticola (A. Gray) Wunderlin & Poppleton – W]

Ilex mucronata (Linnaeus) M. Powell, V. Savolainen, & S. Andrews, Nemopanthus. Bogs and moist, high-elevation forests. NL (Newfoundland) west to ON and MN, south to MD, WV, OH, IN, and IL (and allegedly in VA, according to Fernald 1950). It can be separated vegetatively from other hollies in the mountain regions of w. VA (I. montana, I. collina, I. opaca, and I. verticillata) by its smaller, narrower, entire (or nearly so) leaves, 2-5 (-6) cm long, 1-2.5 cm wide. Debate about the distinctiveness of * Nemopanthus * from * Ilex * have now been unequivocally answered, with * Nemopanthus * to be included in * Ilex * (Powell et al. 2000; Manen, Boulter, & Naciri-Graven 2002). [= X; = Nemopanthus mucronatus (Linnaeus) Trelease – C, F, G, K, WV]

Ilex myrtifolia Walter, Myrtle Holly. Limesink (doline) ponds, wet savannas. May-June; October-November. A Southeastern Coastal Plain endemic: se. NC south to n. peninsular FL and west to e. LA. See * I. cassine * for comments about these two taxa. [= GW, K, S, Y; = I. cassine var. myrtifolia (Walter) Sargent – RAB]
**Ilex opaca** Aiton var. *arenicola* (Ashe) Ashe, Scrub Holly. Xeric sands of sand pine scrub. Baker and Clay counties (ne. FL) south to c. peninsular FL. [= K; = I. *cumulicola* Small – S; = I. *arenicola* Ashe]

**Ilex opaca** Aiton var. *opaca*, American Holly, Christmas Holly. In a wide variety of forests, ranging from xeric to wetland. April-June; September-October. MA (?) NS and ME; IL, MO, and OK south to s. peninsular FL and TX. This is our only species of *Ilex* that becomes a medium to large tree. [= GW, K, Y; < I. *opaca* – RAB, C, F, G, WV; = I. *opaca* – S]


**Ilex vomitoria** Aiton, Yaupon. Maritime forests, other dry sandy forests. March-May; October-November. Widespread in the Southeastern United States, primarily on the Coastal Plain, from e. VA (from Northampton County south) south to c. peninsular FL and west to se. TX. *I. vomitoria* from the Deep South often has much smaller leaves than plants in our area. In NC and VA, yaupon is nearly restricted to maritime habitats, on the barrier islands and in a narrow band on the mainland, in forests with substantial maritime influence. *I. vomitoria* is increasingly popular as an ornamental shrub, and is persistent or establishing in suburban woodlands. [= RAB, C, F, G, GW, K, S, Y]

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391. **CAMPANULACEAE** A.L. de Jussieu 1789 (Bellflower Family) [in ASTERALES]

A family of about 80-82 genera and 2000-2400 species, mostly herbs, cosmopolitan. There is controversy about the circumscription of the family, specifically whether subfamily Lobelioideae should be recognized at the family level. References: Rosatti (1986)=Z; Eddie et al. (2003); Shulkina, Gaskin, & Eddie (2003); Lammers in Kadereit & Jeffrey (2007). [also see SPHENOCLEACEAE]

1 Corollas bilaterally symmetrical (zygomorphic); carpels 2; [subfamily Lobelioideae] ................................................................. 1. *Lobelia*

2 Capsule dehiscent laterally (the pores nearly apical in some *Campanula*); flowers in spikes, racemes, or panicles; [mostly native species of various habitats (some of them weedy)].

3 Inflorescence spicate, the flowers sessile, mostly in the axils of well-developed leaves; corollas rotate and style straight .......... 5. *Triodanis*

4 Flowers and fruits borne in an involucrate umbel (Jasione); [aliens, generally in weedy or disturbed situations].

5 Flowers large, 1 to few, solitary or nearly so; leaves large, ovate to elliptic; [Platycodonoid clade] ........................................... 2. *Platycodon*

6 Flowers small, several to many, borne in a diffuse inflorescence; leaves small, linear to narrowly elliptic; [Wahlenbergioideae clade] .... 3. *Wahlenbergia*

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1. **Lobelia** Linnaeus 1753 (Lobelia)

(contrIBUTED by A.S. Weakley and B.A. Sorrie)


**Identification notes:** Vegetative *Lobelia* can be recognized by their milky sap, and the alternate leaves with obscure, whitish, callus-tipped, and often irregular or divergent teeth.

1 Corolla bright red (faded in dried specimens) or very rarely white, 30-45 mm long; filament-tube 19-33 mm long ............... *L. cardinalis*
Corolla blue, purple, or white, 10-33 mm long; filament-tube 2-15 mm long.

Larger leaves in a basal rosette, either linear to linear-oblong lanceolate or orbicular, with a well-developed petiole; [plants generally of wetlands, often growing in shallow water, more rarely in dry or seasonally dry habitats].

Rosette leaf blades orbicular, broadly rounded at the base and the apex; stems trailing, rooting at nodes, mat-forming; [of FL].

Rosette leaf blades linear to linear-oblong lanceolate; stems erect.

Calyx segments with small auricles at the base; pedicels with very small bracteoles at the base; filament-tube 6-7.9 (-11) mm long; corolla tube not fenestrate (lacking lateral slits); larger leaves 10-30 cm long; plants (5-) 8-10 (-15) dm tall ................. \textit{L. floridana}

Calyx segments not auriculate; pedicels lacking bracteoles; filament tube 3-4.5 mm long; corolla tube fenestrate (with lateral slits); larger leaves 5-12 cm long; plants (4-) 5-6 (-13) dm tall ........................................ \textit{L. paludosa}

Larger leaves cauline; [collectively of a range of habitats].

Flowers relatively large, the corolla (including the hypanthium) 18-33 mm long, fenestrate (with a slit or window on each side of the tube near the base).

Calyx with prominent leafy auricles; pedicels with bracteoles near the middle.

Calyx not auriculate; pedicels with bracteoles near the base (or sometimes near the middle in \textit{L. puberula}).

Flowers relatively large, the corolla (including the hypanthium) 18-33 mm long, fenestrate (with a slit or window on each side of the tube near the base).

Calyx not auriculate; pedicels with bracteoles near the middle.

Calyx segments with small auricles at the base; pedicels with very small bracteoles at the base; filament-tube 6-7.9 (-11) mm long; corolla tube not fenestrate (lacking lateral slits); larger leaves 10-30 cm long; plants (5-) 8-10 (-15) dm tall ................. \textit{L. floridana}

Calyx segments not auriculate; pedicels lacking bracteoles; filament tube 3-4.5 mm long; corolla tube fenestrate (with lateral slits); larger leaves 5-12 cm long; plants (4-) 5-6 (-13) dm tall ........................................ \textit{L. paludosa}

Flowers relatively large, the corolla (including the hypanthium) 18-33 mm long, fenestrate (with a slit or window on each side of the tube near the base).

Calyx with prominent leafy auricles; pedicels with bracteoles near the middle.

Calyx not auriculate; pedicels with bracteoles near the middle.

Calyx not auriculate; pedicels with bracteoles near the middle.

Calyx segments with small auricles at the base; pedicels with very small bracteoles at the base; filament-tube 6-7.9 (-11) mm long; corolla tube not fenestrate (lacking lateral slits); larger leaves 10-30 cm long; plants (5-) 8-10 (-15) dm tall ................. \textit{L. floridana}

Calyx segments not auriculate; pedicels lacking bracteoles; filament tube 3-4.5 mm long; corolla tube fenestrate (with lateral slits); larger leaves 5-12 cm long; plants (4-) 5-6 (-13) dm tall ........................................ \textit{L. paludosa}

Flowers relatively large, the corolla (including the hypanthium) 18-33 mm long, fenestrate (with a slit or window on each side of the tube near the base).

Calyx with prominent leafy auricles; pedicels with bracteoles near the middle.

Calyx not auriculate; pedicels with bracteoles near the middle.

Calyx segments with small auricles at the base; pedicels with very small bracteoles at the base; filament-tube 6-7.9 (-11) mm long; corolla tube not fenestrate (lacking lateral slits); larger leaves 10-30 cm long; plants (5-) 8-10 (-15) dm tall ................. \textit{L. floridana}

Calyx segments not auriculate; pedicels lacking bracteoles; filament tube 3-4.5 mm long; corolla tube fenestrate (with lateral slits); larger leaves 5-12 cm long; plants (4-) 5-6 (-13) dm tall ........................................ \textit{L. paludosa}

Flowers relatively large, the corolla (including the hypanthium) 18-33 mm long, fenestrate (with a slit or window on each side of the tube near the base).

Calyx with prominent leafy auricles; pedicels with bracteoles near the middle.

Calyx not auriculate; pedicels with bracteoles near the middle.
23 Stems lacking hirsute hairs, either densely puberulent (at least below) or glabrous to glabrescent (with a few chaffy hairs on the lower stem); plant unbranched or with a few upright branches; hypanthium obconic, shorter than the corolla; hypanthium slightly inflated in fruit.

24 Stem glabrous to glabrescent (with a few chaffy hairs on the lower stem); leaf bases (all) clasping to rounded; flowers 10-15 mm long.

25 Calyx segments prominently ciliate-margined; basal auricles of the calyx segments prominent and declined, obscuring the corolla tube; plants to 9 dm tall.................................................................L. appendiculata

26 Calyx segments glabrous (rarely minutely ciliate); basal auricles of the calyx segments small, not declined and obscuring the corolla tube; plants to 5.5 dm tall.........................................................................................L. gattingeri

24 Stem densely puberulent, at least at the base; leaf bases petiolate to sessile (and then decrepentes); flowers 7-12 mm long.

26 Leaves chiefly basal, the stem leaves < 5 and much smaller than the basal; [of s. PA south to SC, west to LA, especially on the Piedmont]...............................................................................................L. spicata var. scaposa

27 Calyx lobes with long, slender auricles, these often as long as the hypanthium; [of WV south]...........................

28 Flowers 7-9 mm long, deep purplish-blue; anthers white; [south to NJ, DE, MD, WV, s. IN, and IL]..............

Lobelia amoena Michaux, Southern Lobelia. Marshes, streambanks, seeps, floodplain forests. Late July-October. W. NC and e. TN south through w. SC to c. GA and ec. AL; disjunct in FL Panhandle and Coastal Plain of GA and SC. Reported for VA by Kartesz (1999), supposedly on the basis of McVaugh (1936), but McVaugh does not record *L. amoena* for VA and no specimens have been seen from there. [= RAB, C, GW, S, Y; = L. amoena var. amoena – K, WH; < L. amoena – W]

*Lobelia appendiculata* Alphonse de Candolle. Pinelands, prairies, roadsides, usually in mesic or dry soils. AR and se. KS south to LA and TX; disjunct east of the Mississippi in c. AL, MS, and e. LA. [= GW, S, Y; = *Lobelia appendiculata* Alphonse de Candolle var. appendiculata – K]


*Lobelia brevifolia* Nuttall ex Alphonse de Candolle, Shortleaf Lobelia. Savannas, flatwoods, and bogs. July-November. Endemic to the East Gulf Coastal Plain of c. and w. Panhandle FL, west through s. AL and s. MS to e. LA (Florida Parishes). [= GW, K, WH, Y]

*Lobelia canbyi* A. Gray, Canby’s Lobelia. Depression ponds, Carolina bays, pine savannas. July-November. NJ to GA in the Coastal Plain; disjunct in Coffee County (and three other counties), TN, and in Bartow County, GA, with other Coastal Plain plants. [= RAB, C, F, G, KW, S, WH, Y]

*Lobelia cardinalis* Linnaeus, Cardinal Flower. Streambanks, riverbanks, marshes, swamp forests. July-October. NB, QC, ON, MN, CO, UT, and s. CA south to c. peninsular FL, TX, and south through Mexico and Central America to Colombia. See Thompson & Lammers (1997). [= RAB, F, G, K, S, WH, Y; > *L. cardinalis* var. cardinalis – C; > *L. cardinalis* ssp. cardinalis – GW; > *L. cardinalis* ssp. cardinalis var. cardinalis – K]

Lobelia amoena

Lobelia appendiculata

Lobelia boykinii

Lobelia brevifolia

Lobelia canbyi

Lobelia cardinalis


*Lobelia elongata* Small. River and stream margins, floodplain forests, marshes, bogs, pine savannas. August-October. Primarily a Southeastern Coastal Plain endemic from DE to se. GA, rarely inland onto the lower Piedmont of NC and SC. [= C, F, G, KW, S, WH; < *L. elongata* – RAB]

*Lobelia eyanyna* A. Gray, Bay Lobelia, Fey’s Lobelia. Open, moist areas. Ne. FL (Duval County) and e. Panhandle FL (Madison and Taylor counties) south to s. FL. [= GW, K, S, WH, Y]

*Lobelia flaccidifolia* Small. Depression ponds, swampy woods along rivers and streams. June-September. E. GA south into Panhandle FL, west to sw. AL (and presumably s. MS); disjunct in sw. LA and e. TX. [= GW, K, S, WH; > *L. halei* Small – Y]

*Lobelia floridana* Chapman, Florida Lobelia. Wet pine savannas and flatwoods, depression ponds. S. GA (Jones & Coile 1988) and Panhandle FL west to LA; disjunct in se. NC? McVaugh (1936) reports this species for Wilmington, New Hanover County, NC, based on a collection by MacFarlane in 1909 (PENN). This record seems unlikely and needs confirmation; mislabeling is a possibility. [= GW, K, S, WH, Y]

*Lobelia gattingeri* A. Gray, Gattinger’s Lobelia. Calcareous glades. Endemic to sc. KY south through c. TN to n. AL. [= GW, S, Y; = *Lobelia appendiculata* Alphonse de Candolle var. gattingeri (A. Gray) McVaugh – K]
Lobelia georgiana McVaugh. Swamps, floodplain forests, wet places. August-October. E. VA to Panhandle FL, inland to w. NC and e. TN. Very close to L. elongata and inhabiting apparently the same habitats; additional taxonomic work is desirable. See McVaugh (1940) for an explanation of the need to replace the name L. glandulifera with L. georgiana. [= C, F, G, GW; < L. elongata – RAB; = L. amoena Michaux var. glandulifera A. Gray – K, WH; = L. glandulifera (A. Gray) Small – S, Y; < L. amoena – W]

Lobelia glandulosa Walter. Seepage slopes, pitcher-plant bogs, streamhead margins, pine savannas, flatwoods, margins of beaver ponds. September-October. E. NC (or se. VA) to s. FL, west to s. AL. Prior reports from the Piedmont are erroneous, most referring to L. elongata and L. georgiana. [= RAB, C, F, G, GW, K, S, W, WH, Y]

Lobelia homophylla E. Wimmer. Just south of our area in FL (St Johns County) (Wunderlin & Hansen 2003). [= GW, K, S, WH, Y]

(neither keyed nor mapped)


Lobelia kalmii Linnaeus, Kalm’s Lobelia. Calcareaous swamps. July-September. NL (Newfoundland) and BC, south to PA, e. WV, OH, IL, and MN. [= C, F, G, K, Y]

Lobelia nuttallii J.A. Schultes, Nuttall’s Lobelia. Flatwoods, bogs, savannas. May-November. NY (Long Island) south to FL Panhandle on the Coastal Plain; less commonly disjunct inland to w. NC, w. SC, KY, and TN. [= RAB, C, F, G, GW, K, S, W, WH, Y]

Lobelia paludosa Nuttall, White Lobelia. Flatwoods, savannas, ditches, dune swales. March-May. Se. GA (Jones & Coile 1988) and FL Panhandle south to s. FL. [= F, GW, K, S, WH, Y]

Lobelia puberula Michaux var. mineolana F. Wimmer, Western Downy Lobelia. Forests, openings. W. KY, s. MO, and e. OK, south to s. AL, MS, LA, and e. TX. [= K; < L. puberula – C, G, GW, S; = L. puberula “form d” – Y]


Lobelia puberula Michaux var. simulans Fernald, Appalachian Downy Lobelia. Mt (GA, NC, SC, VA, WV), Pd (GA), Cp (GA): [habitats]; [abundance], common in WV. Late July-October. Sw. VA, s. WV, and IL south to n. FL, AL, MS, and LA. [= F, K; < L. puberula – RAB, C, G, GW, S, W; = L. puberula “form a” – Y]

Lobelia siphilitica Linnaeus var. ludoviciana A. DC., Western Great Blue Lobelia. Bottomlands, moist forests, ditches, wet meadows, streambanks. Late July-October. WI, MB, ND, and WY, south to MS, LA, and TX. [= C, F, G, GW, K, Y; < L. siphilitica – RAB, S]

Lobelia siphilitica Linnaeus var. siphilitica, Eastern Great Blue Lobelia. Bottomlands, moist forests, ditches, wet meadows, streambanks. Late July-October. ME, ON, and MN, south to GA, AL, MS, AR. [= C, F, G, GW, K, Y; < L. siphilitica – RAB, S, W]

Lobelia species 1, Batson’s Lobelia. Wet streamheads and seepage slopes. Endemic to the Sandhills Region of NC and SC. Under study by A. Bert Pittman. [= “L. batsonii” in prep.]

Lobelia spicata Lamarck var. campanulata McVaugh. [habitats]. S. ME west to MN, south to NJ, DE, MD, WV, s. IN, and IL. [= F, G, K, WV, Y; < L. spicata var. spicata – C; < L. spicata – W]

Lobelia spicata Lamarck var. scaposa McVaugh. Meadows, woodlands, disturbed areas. Late May-August. S. PA south to SC, west to LA. [= C, F, G, K, WV, Y; < L. spicata – RAB, GW, S, W]

Lobelia spicata Lamarck var. spicata. Meadows, woodlands, disturbed areas. Late May-August. ME and NB west to ND, south to PA and AR, and in the mountains to n. GA. [= F, G, K, WV; < L. spicata var. spicata – C; < L. spicata – RAB, GW, W; > L. spicata – S; > L. bracteata Small – S; = L. spicata var. originalis – Y]

2. Platycodon Alphonse de Candolle 1830 (Japanese Bellflower, Balloonflower)


* Platycodon grandiflorum (Jacquin) Alphonse de Candolle, Japanese Bellflower, Balloonflower. Ditches, disturbed areas, spread from horticultural cultivation; native of e. Asia. [= RAB, K, Z]

3. Wahlenbergia Schrader ex Roth 1821 (Wahlenbergia)


* Wahlenbergia linarioides (Lamarck) Alphonse de Candolle. Disturbed areas; native of s. South America. [= K] {add Z synonymy}

* Wahlenbergia marginata (Thunberg) Alphonse de Candolle. Sandy soils along roadsides and in fields; native of e. Asia and Oceania. February-December. Apparently only recently introduced in se. United States, the earliest recorded date 1937 in Alachua County, FL (Rosatti 1986), but now quite common on sandy roadsides. [= RAB, K, Z]

4. Jasione Linnaeus 1753 (Sheep's-bit)


5. Triodanis Rafinesque 1838 (Venus's Looking-glass)

A genus of 6-8 species, annual herbs, of America. References: McVaugh (1945) = Z; McVaugh (1948); Lammers in Kadereit & Jeffrey (2007). Key based on Z.

1 Openings of the capsule linear, 0.2-0.4 mm wide; seeds minutely tuberculate in longitudinal lines; [sw. TN westward] .................. T. holzingeri

1 Openings of the capsule broadly elliptic, oval, or rounded, 0.5-1.5 mm wide; seeds either muriculate over the entire surface or nearly to quite smooth; [collectively more widespread].

2 Pores at or very near the apex of the capsule; seeds smooth and highly polished; open (chasmogamous) corolla usually 1 (the terminal), the others usually closed (cleistogamous) .......................................................... T. biflora

2 Pores well below the apex of the capsule (usually 1-1.5 mm below), usually about midway between apex and base; seeds muriculate or smooth and lustrous; open (chasmogamous) corollas usually several .......................................................... T. perfoliata
**Triodanis biflora** (Ruiz & Pavón) Greene. Roadsides, gardens, glades, disturbed areas. April-June. E. VA, KY, KS, AZ, and OR, south c. peninsular FL and Mexico; South America. [= C, K, WH, Z; = Specularia biflora (Ruiz & Pavón) Fischer & C.A. Meyer – RAB, F, G; = T. perfoliata var. biflora (Ruiz & Pavón) Bradley – W]

**Triodanis holzingeri** McVaugh. {habitats} MO west to CO, south to sw. TN, AR, TX, and NM. [= K, Z; = Specularia holzingeri (McVaugh) Fernald – F]

**Triodanis perfoliata** (Linnaeus) Nieuwland. Roadsides, gardens, glades, dry forests, disturbed areas. April-June. ME and BC south to c. peninsular FL and Mexico; West Indies; Ecuador. [= C, K, Z, WH, = Specularia perfoliata (Linnaeus) Alphonse de Candolle – RAB, F, G, W; = T. perfoliata var. perfoliata – W]

### 6. Campanula Linnaeus 1753 (Bellflower)

A genus of about 300-425 species, herbs (rarely shrubby), north temperate, most diverse in s. Europe. The appropriate circumscription remains uncertain and controversial, and related genera are sometimes combined into a broadly circumscribed *Campanula*, or alternately, several segregates recognized (*Campanula, Rapunculus, Campanulastrum*, etc.). A broad circumscription is adopted here, based on considerations discussed in Roquet et al. (2008). Park et al. (2006) propose splitting *Campanula* into a number of segregates, a suggestion which also has some merits; if followed, most or all of our species would likely be placed in the genus *Rapunculus*. References: Roquet et al. (2008); Park et al. (2006); Rosatti (1986)=Z; Shetler & Morin (1986); Shetler (1982)=Y; Shulkina, Gaskin, & Eddie (2003); Lammers in Kadereit & Jeffrey (2007).

1. Corolla rotate
2. Stem erect; leaf obviously serrate or crenate; [of FL and northward, of uplands] .............................................................. *C. americana*
3. Stems weak and slender, reclining, 3-angled.
4. Corolla 4-10 mm long; pedicels divergent, the bractless portion 0.4-4 cm long; corolla white to very pale blue.............................. *C. aparinoïdes var. aparinoïdes*
5. Stems more robust, erect, terete or nearly so.
6. Corolla 6-8 mm long; leaves lanceolate, averaging about 1 cm wide, generally with prominent, often somewhat divergent teeth......... .............................................................. *C. divaricata*
7. Flowers on long pedicels (the upper < 5 mm long), the inflorescence a diffuse panicle; [native species of rock outcrops or rocky woodlands].
8. Capsules with pores in the apical half ............................................................................................................................................. *C. persicifolia*
9. Capsules with pores at or near the base ................................................................................................................................. *C. rotundifolia*

**Campanula americana** Linnaeus, Tall Bellflower. Moist to fairly dry forests, especially over mafic or calcareous rocks. Late June-September; August-October. NY, ON, MN, and SD, south to Panhandle FL, LA, and OK. Shetler & Morin (1986) stated that "Small's view [segregating *Campanula americana* into the monotypic genus *Campanulastrum*] appears to have increasing justification from palynological, cytological, and now seed evidence." Also recently supported as a genus by Shulkina, Gaskin, & Eddie (2003), but combined into *Campanula* by Lammers in Kadereit & Jeffrey (2007) and Roquet et al. (2008). [= RAB, C, F, G, W, WH, Z; = Campanulastrum americanum (Linnaeus) Small – K, S; = Rapunculus]

**Campanula aparinoides** Pursh var. *aparinoides*, Marsh Bellflower. Bogs, marshes, wet meadows, seepage slopes over mafic or calcareous rocks. Late June-August; August-September. Widespread in ne. North America, south to nc. GA (Jones & Coile 1988), KY, MO, and NE. [= C, G; < C. aparinoides – RAB, K, W, Z; = C. aparinoides – F, S]

**Campanula aparinoides** var. *grandiflora* Holzinger ranges south to PA. It should be sought in our area. It has been variously treated as a species, variety, geographic phase, or form; its taxonomic status is uncertain. [= C, G; < C. aparinoides – K; = C. uliginosa Rydberg – F] {not mapped}
**Campanula divaricata** Michaux, Southern Harebell, Appalachian Bellflower. Rock outcrops, cliffs, rocky summits, talus, up to at least 1850m. July-October; September-December. A broad endemic of the Southern and Central Appalachians: MD and KY south to AL and GA. [= RAB, C, F, G, K, W, Z; = C. flexuosa Michaux – S; Rapunculus]

**Campanula floridana** S. Watson ex A. Gray, Florida Bellflower. Cypress ponds, depressions marshes, wet prairies. March-May. Ne. FL and Panhandle FL south to s. peninsular FL. [= GW, K, WH; = Rotantha floridana (S. Watson ex A. Gray) Small – S]

*Campanula persicifolia* Linnaeus, Peachleaf Bellflower. Naturalized from gardens; native of Eurasia. This species was reported by Small (1933) as "escaping from gardens" in w. NC; no specimens have been seen to document this occurrence. Additional documentation is needed to confirm this record. [= RAB, K, S; = Rapunculus persicifolius (Linnaeus) Fournier; = Neocodon persicifolius (Linnaeus) A. A. Kolakovskii & L. B. Serdyukova]


**Campanula rotundifolia** Linnaeus, Bluebell, Harebell, Bluebell-of-Scotland. Limestone outcrops, high elevation rocky summits (in thin soil over amphibolite). July-August; August-September. A circumboreal species, widespread and common in n. North America and n. Eurasia, south to nw. NC, TN, MO, TX, NM, AZ, and CA. In our area rare, and generally limited to limestone in its occurrences in the Central Appalachians of WV and VA and to mafic rocks in nw. NC. It was added to the flora of NC in 1991 (Three Top Mountain, Ashe County). See Shetler (1982) for a detailed study of the species. [= C, F, G, K, Y, Z; Rapunculus]

**397. MENYANTHACEAE** Dumortier 1829 (Buckbean Family) [in ASTERALES]

A family of about 5 genera and 40 species, wetland herbs, of cosmopolitan distribution. References: Wood (1983a)=Z.

1 Leaves trifoliolate; inflorescence a raceme.............................................................................................................................................Menyanthes
1 Leaves simple; inflorescence an umbel...............................................................................................................................................Nymphoides

**Menyanthes** Linnaeus 1753 (Buckbean, Bogbean)

The genus is monotypic, an herb, circumboreal. References: Wood (1983a)=Z

**Menyanthes trifoliata** Linnaeus, Buckbean, Bogbean. Mucky soils of mountain bogs at high elevations over amphibolite (in the Blue Ridge), boggy marshes over calcareous rocks (in the Ridge and Valley), seepage swamps (in the Coastal Plain). May-June. This circumboreal species is widespread in n. North America and n. Eurasia, ranging south in North America to NJ, DE, w. VA, IN, MO, and CA, and disjunct to Long Hope Valley, Watauga County, NC. The NC populations are disjunct about 400 km from the next nearest populations in VA and WV. McDowell (1984) reported the first documentation of the species for NC. [= C, G, K, W, WV, Z; > M. trifoliata var. minor Rafinesque – F]
Nymphoides Séquier 1754 (Floating Heart)


**Identification notes:** As the scientific name indicates, the leaves of *Nymphoides* bear a superficial resemblance to those of *Nymphaea*. The leaves of *Nymphoides* are more cordate, the two basal lobes more rounded, rather than having a rather sharp corner or angle. *Nymphoides cordata* has much smaller leaves than *Nymphaea*, while the thickly pebbled texturing of *Nymphoides aquatica* is very unlike the glossy smoothness of *Nymphaea*.

1. Flowers yellow; floating stems usually with multiple leaves; capsules 12-25 mm long ................................................................. *N. peltata*
2. Flowers white; floating stems with single leaves; capsules 3-14 mm long. ....................................................................................... *N. cristata*
3. Adaxial petal surface bearing a ruffled crest down its length in the middle ................................................................................. *N. aquatica*
4. Leaves 3-7 cm wide, smooth below, thin in texture; stems 0.6-0.9 mm in diameter a few cm below the inflorescence, rarely spotted with red; tuberous roots of floating clusters slender, with pointed tips; seeds smooth (rarely papillate); capsule 4-5 mm long...........*N. cordata*

*Nymphoides aquatica* (Walter ex J.F. Gmelin) Kuntze, Big Floating Heart, Banana Floating Heart. Limesink ponds (dolines), other acidic and nutrient-poor water-filled depressions, sluggish streams, beaverponds, primarily in the Outer and Middle Coastal Plain. Late April-September. A Southeastern Coastal Plain endemic: NJ south to FL and west to TX. [= RAB, C, F, GW, K, S, Z; = *N. aquaticum* – G, orthographic variant]

*Nymphoides cordata* (Elliott) Fernald, Little Floating Heart. Upland depression ponds, sluggish streams, beaverponds, primarily in the fall-line Sandhills. NL (Newfoundland) and ON south MD; disjunct in the Coastal Plain of NC and SC; disjunct from sw. GA and Panhandle FL west to e. LA. [= RAB, C, F, GW, K, Z; = *N. cordatum* – G, orthographic variant; ? *N. lacunosa* (Ventenat) Kuntze – S, misapplied]

* Nymphoides cristata* (Roxburgh) Kuntze, Crested Floating Heart, Water Snowflakes. Ponds and lakes; native of China and India. Apparently first naturalizing in North America in FL in 2000; introduced for water gardens and aquariums, and considered a noxious aquatic weed in our area.

* Nymphoides peltata* (S.G. Gmelin) Kuntze, Yellow Floating Heart. Ponds; native of Europe. This European native is sparingly naturalized in e. North America; it is sold for cultivation in water gardens, and will likely become more widely naturalized. [= C, F, K; = *N. peltatum* – G, orthographic variant]

398. GOODENIACEAE R. Brown 1810 (Goodenia Family) [in ASTERALES]


*Scaevola* Linnaeus 1771 (Fanflower, Half-flower, Scaevola)


*Scaevola plumieri* (Linnaeus) Vahl, Beachberry, Inkberry, Gull-feed. Coastal dunes, marsh edges. January-December. N. peninsular FL south to s. FL; s. LA; s. TX south through Mexico into Central and South America; West Indies. [= K, S, WH]

399. CALYCERACEAE R. Brown ex Richard 1820 (Calycera Family) [in ASTERALES]

A family of 4 genera and ca. 60 species, perennial and annual herbs, endemic to s. South America. References: Hellwig in Kadereit & Jeffrey (2007).

*Acicarpa* Antoine Laurent de Jussieu

* Acicarpha tribuloides* Antoine Laurent de Jussieu, Madam Gorgon. On ship’s ballast near old port-cities; probably no longer present, native of South America (Brazil, Uruguay, Paraguay, and Argentina). The NC and SC records were both collected by Gerald McCarthy in 1888; though the localities are not specified, the likely sites (based on his itinerary and what is known of the species) are Wilmington (New Hanover County, NC) and Charleston (Charleston County, SC). DeVore (1991) discusses ballast plants and the apparent failure of *Acicarpha* to naturalize in North America. This species has not been collected in our area (or North America) since 1888; it is here treated for historical interest and to increase the likelihood that it will be relocated, if it is, indeed, actually naturalized. [*K, S, WH, Z*]

**Key A – shrubby composites**

1 Leaves strictly alternate; [tribe *Asteraceae*].
2 Heads discoid; shrubs to 5 m tall; [widespread in our area] .......................................................................................... Baccharis
3 Heads radiate.
   4 Rays yellow, orange, or red (sometimes with some brown, maroon, or purple coloration as well) ........ Key C [under construction]
4 Rays white, cream-colored, or pale pink or lavender ................................................................. Key D [under construction]
2 Leaves either alternate (not opposite even at lower nodes of the stem) or basal only (the heads on scapiform stems).
6 Heads liguliflorous (composed of ligulate florets); sap usually milky................................................................................ Key E
7 Heads discoid, disciform, radiant, or radiate; sap usually clear.
   8 Heads discoid or disciform ............................................................................................................... Key F [under construction]
7 Heads radiate or radiant ................................................................................................................ Key F [under construction]

**Key B – herbaceous composites with opposite or whorled leaves and discoid or disciform heads (lacking ray florets)**

1 Plant a shrub or woody vine, definitely with woody growth well above ground level................................................................. Key A
1 Plant an annual, biennial, or perennial, lacking woody growth above ground level.
2 Leaves opposite or whorled, at least on the lower stem nodes (the leaves higher on the stem sometimes alternate).
3 Heads discoid or disciform .................................................................................................................. Key B [under construction]
3 Heads radiate.
4 Rays yellow, orange, or red (sometimes with some brown, maroon, or purple coloration as well) ........ Key C [under construction]
4 Rays white, cream-colored, or pale pink or lavender ................................................................................ Key D [under construction]
2 Leaves either alternate (not opposite even at lower nodes of the stem) or basal only (the heads on scapiform stems).
6 Heads liguliflorous (composed of ligulate florets); sap usually milky................................................................................ Key E
7 Heads discoid, disciform, radiant, or radiate; sap usually clear.
   8 Heads discoid or disciform ............................................................................................................... Key F [under construction]
7 Heads radiate or radiant ................................................................................................................ Key F [under construction]

**Key C – herbaceous composites with opposite or whorled leaves and discoid or disciform heads (lacking ray florets)**

1 Plant a shrub or woody vine, definitely with woody growth well above ground level................................................................. Key A
1 Plant an annual, biennial, or perennial, lacking woody growth above ground level.
2 Leaves opposite or whorled, at least on the lower stem nodes (the leaves higher on the stem sometimes alternate).
3 Heads discoid or disciform................................................................................................................ Key B [under construction]
3 Heads radiate.
4 Rays yellow, orange, or red (sometimes with some brown, maroon, or purple coloration as well) ........ Key C [under construction]
4 Rays white, cream-colored, or pale pink or lavender ................................................................................ Key D [under construction]
2 Leaves either alternate (not opposite even at lower nodes of the stem) or basal only (the heads on scapiform stems).
6 Heads liguliflorous (composed of ligulate florets); sap usually milky................................................................................ Key E
7 Heads discoid, disciform, radiant, or radiate; sap usually clear.
   8 Heads discoid or disciform ............................................................................................................... Key F [under construction]
7 Heads radiate or radiant ................................................................................................................ Key F [under construction]

**Key D – herbaceous composites with opposite or whorled leaves and discoid or disciform heads (lacking ray florets)**

1 Plant a shrub or woody vine, definitely with woody growth well above ground level................................................................. Key A
1 Plant an annual, biennial, or perennial, lacking woody growth above ground level.
2 Leaves opposite or whorled, at least on the lower stem nodes (the leaves higher on the stem sometimes alternate).
3 Heads discoid or disciform................................................................................................................ Key B [under construction]
3 Heads radiate.
4 Rays yellow, orange, or red (sometimes with some brown, maroon, or purple coloration as well) ........ Key C [under construction]
4 Rays white, cream-colored, or pale pink or lavender ................................................................................ Key D [under construction]
2 Leaves either alternate (not opposite even at lower nodes of the stem) or basal only (the heads on scapiform stems).
6 Heads liguliflorous (composed of ligulate florets); sap usually milky................................................................................ Key E
7 Heads discoid, disciform, radiant, or radiate; sap usually clear.
   8 Heads discoid or disciform ............................................................................................................... Key F [under construction]
7 Heads radiate or radiant ................................................................................................................ Key F [under construction]

**Key E – herbaceous composites with opposite or whorled leaves and discoid or disciform heads (lacking ray florets)**

1 Plant a shrub or woody vine, definitely with woody growth well above ground level................................................................. Key A
1 Plant an annual, biennial, or perennial, lacking woody growth above ground level.
2 Leaves opposite or whorled, at least on the lower stem nodes (the leaves higher on the stem sometimes alternate).
3 Heads discoid or disciform................................................................................................................ Key B [under construction]
3 Heads radiate.
4 Rays yellow, orange, or red (sometimes with some brown, maroon, or purple coloration as well) ........ Key C [under construction]
4 Rays white, cream-colored, or pale pink or lavender ................................................................................ Key D [under construction]
2 Leaves either alternate (not opposite even at lower nodes of the stem) or basal only (the heads on scapiform stems).
6 Heads liguliflorous (composed of ligulate florets); sap usually milky................................................................................ Key E
7 Heads discoid, disciform, radiant, or radiate; sap usually clear.
   8 Heads discoid or disciform ............................................................................................................... Key F [under construction]
7 Heads radiate or radiant ................................................................................................................ Key F [under construction]
ASTERACEAE

1 Disc florets yellow.
2
2 Acmella
Flaveria
Pulicaria
Dittrichia
Inula

1 Disc florets white, pink, purplish.
6
6 Ambrosia
Xanthium
Iva
Cyclachaena
Melanthera
Lagasca
Palafaxia
Eupatorium
Euthrochium
Conoclinium
Ageratum
Brickellia
Hartwrightia
Fleischmannia
Chromolaena
Mikania
Chevreulia
Sclerolepis

Key C – herbaceous composites with opposite leaves and radiate heads,
the rays predominantly yellow, orange, or red

Key D – herbaceous composites with opposite leaves and radiate heads,
the rays predominantly white, cream or pale lavender or pink

Key E – herbaceous composites with leaves alternate or basal,
liguliflorous heads (composed of ligulate florets), and sap usually milky

1 Cypselas (at least of the inner florets of the head) beaked.
2 Heads solitary and terminal at the end of a stem unbranched to its base.
3 Leaves basal and cauline, grasslike (untoothed and unlobed); stem leafy .............................................................. Tragopogon
4 Pappus of bristles .................................................................................................................. Taraxacum

4 Pappus either of outer scales and inner bristles or entirely of aristate scales.
5 Pappus of outer scales and inner plumose bristles; leaves oblanceolate to oblong; plants annual or perennial .......... Leontodon
5 Pappus of aristate scales; leaves linear to narrowly lanceolate; plants annual ......................................................... Uropappus

2 Heads several per stem, in various corymbiform, umbrelliform, spiciform, or paniculiform arrays (rarely solitary and terminal in the
smallest and most depauperate individuals in a population.
6 Achenes distinctly flattened.................................................................................................................. Lactuca
6 Achenes terete or prismatic.
7 Pappus of plumose bristles, at least the inner series; plant an annual or biennial.
8 Receptacles lacking paleae .............................................................................................................. Helminthotheca
8 Receptacles with paleae .............................................................................................................. Hypochaeris
7 Pappus of simple capillary bristles; plant an annual, biennial, or perennial.
9 Beak of the cypsela with a ring of soft white reflexed hairs at the summit (just below the pappus) ....................... Pyrrophappus
9 Beak of the cypsela lacking a ring of hairs as described.
10 Pappus of 80-150 barbellulate bristles; plant an annual or biennial ......................................................... Crepis
10 Pappus either of 40-50 (or more) smooth bristles or of 20-30 barbellulate bristles; plant a perennial
11 Pappus of 40-50 (or more) smooth bristles ....................................................................................... Chondrilla
11 Pappus of 20-30 barbellulate bristles ............................................................................................... Ixeris
1 Cypselas beakless.
12 Leaves basally disposed (stem leaves few or none generally smaller in size than the basal leaves, which are persistent into flowering and
fruiting); corollas yellow, orange, or red.
13 Pappus absent or of both scales and barbellulate bristles ........................................................................ Krigia
13 Pappus of bristles only (these barbellulate or plumose).
14 Pappus of plumose bristles (these somewhat flattened at their bases) ................................................................ Oporinia
ASTERACEAE

14 Pappus of barbellate bristles.
15 Leaves with entire margins; plants perennials, either from long to short rhizomes or from a short caudex with fibrous roots.

| 15 Leaves coarsely toothed or pinnately lobed; plants annuals, from a taproot. |
| 16 Involucre 5-12 mm high; achenes usually > 2.5 mm long; pappus bristles distinct, 3-7 mm long. |
| 16 Involucre 3-5 mm high; achenes 1.5-2.5 mm long; pappus bristles basally connate, 2.5-3.5 mm long. |

12 Leaves basal and cauline (plant often beginning with a basal rosette, but by flowering bearing well-developed stem leaves about as large as the basal leaves, the basal rosette often withering prior to flowering and fruiting); corollas yellow, orange, red, blue, pink, white, or lavender.

17 Pappus absent or of scales.
18 Corollas pale blue (rarely pink or white).
19 Stem winged and spiny; leaves spiny-margined; receptacle with paleae.

| 19 Stem not winged or spiny; leaves not spiny-margined; receptacle lacking paleae. |
| 20 Cypselas 1.2-2.8 mm long; heads borne single at the ends of scapiform stems that are unbranched (rarely few-branched near the base); plants to 7 dm tall. |
| 20 Cypselas 3-5 mm long; heads borne in corymbiform or thyrsiform arrays; plants to 15 dm tall. |

17 Pappus of numerous smooth or barbellate bristles.

Acanthospermum Schrank 1820 (Paraguay Bur)

A genus of about 6 species, herbs, of tropical America. References: Strother in FNA (2006c); Cronquist (1980)=SE.

1 Stems erect and rooting at the nodes; bur 7-9 mm long, slightly compressed, strongly 5-7-ribbed. A. australis
1 Stems erect; bur 2-6 mm long, obviously compressed, obscurely ribbed or 3-ribbed. A. humile

2 Leaves 1-3 (-4.5) cm long, petiolate, the petiole 4-18 mm long; bur unarmed or nearly so on the side faces, the prickles along the ribs and around the tip. A. hispidum
2 Leaves (2-) 4-12 (-15) cm long, sessile or subsessile; bur with prickles on all surface. A. humile


Achillea Linnaeus 1753 (Yarrow, Milfoil, Thousand-leaf)


1 Leaves pinnately dissected into linear segments; [section Achillea].
1 Leaves serrate to almost entire; [section Patrma].

Achillea millefolium Linnaeus, Yarrow, Thousandleaf. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): grassy balds, roadsides, disturbed areas; common (rare in FL). April-November. Circumboreal (as here broadly treated). A taxonomically very complex entity, with races of different ploidies, and apparently both introduced and native genotypes in e. North America. It would be desirable to treat the variation, but a workable treatment has not yet been produced. Ramsey, Robertson & Husband (2008) have recommended treating native North American races as A. borealis, but it is not clear what (if any) eastern North American races are native. [= RAB, FNA, SE; > A. millefolium ssp. millefolium – C, G; > A.


\* Achillea filipendulina Lamarck, Fern-leaf Yarrow. Cp (DE): [habitat]; uncommon. [= FNA, K] [not yet keyed; add to synonymy]

Acmella L.C. Richard ex C.H. Persoon 1807 (Spotflower)

A genus of about 30 species, herbs, primarily of tropical distribution. References: Jansen (1985)=Z; Strother in FNA (2006c); Cronquist (1980)=SE.

1 Leaves linear to lanceolate; petioles 2-4.5 mm long; outer series of phyllaries narrowly to broadly ovate, the apex acute; heads radiate or discoid.......................................................... A. pusilla

1 Leaves narrowly to broadly ovate; petioles (3-) 5-43 mm long; outer series of phyllaries lanceolate, the apex acuminate; heads radiate or discoid.......................................................... A. repens

\* Acmella pusilla (Hooker & Arnott) R.K. Jansen, Argentine Spotflower. Cp (FL, GA, NC, SC): lawns, disturbed areas (especially around old seaports); rare, native of South America. May-September. Known from scattered locations in the se. United States (NC, SC, GA, FL), associated with old seaports, such as Wilmington, NC, Savannah, GA, Pensacola and Apalachicola, FL, and perhaps not well-established at some of the reported locations. Reported as naturalized and “locally common” at a site in Chatham County, GA (Carter, Baker, & Morris 2009). [= FNA, K, WH, Z]

Acmella repens (Walter) L.C. Richard in Persoon, Creeping Spotflower. Cp (FL, GA, NC, SC), Pd (NC, SC): floating vegetation mats, roadsides, streambanks, other moist, open, habitats; common (uncommon in GA, rare in NC, SC). July-December. Se. NC south to s. FL, west to e. TX, north in the Mississippi Embayment to w. TN and s. MO. Jansen (1985) treats this as var. repens of A. oppositifolia, the typic var. oppositifolia widely distributed from c. Mexico south through Central America into n. South America, stating that var. repens "can be easily separated from var. oppositifolia by its lanceolate, acuminate phyllaries and short double hairs on the achene margins." Jansen also states that "four factors have caused extreme difficulties in delimiting taxa at the specific and infraspecific level within this group: very close morphological similarity; polyploidy; hybridization, especially between different ploidy levels; and asexual reproduction." In his more statistical taxonomic analyses, his var. repens (tetraploid, and the only taxon out of 39 native to North America) separates rather well from A. oppositifolia (diploid, tetraploid, and hexaploid). Given the morphological distinctiveness and substantial allopatry of the two taxa, I prefer not to associate this taxon as a variety of the complex A. oppositifolia. [= FNA; = Spilanthes americana (Mutis ex Linnaeus f.) Hieronymus var. repens (Walter) A.H. Moore – RAB, F; < Spilanthes americana – C, G, GW, S, SE; = Acmella oppositifolia (Lamarck) R.K. Jansen var. repens (Walter) R.K. Jansen – K, WH, Z]

Acroptilon Cassini 1827 (Russian Knapweed)


\* Acroptilon repens (Linnaeus) de Candolle, Russian Knapweed. Reported for VA (FNA), but there is apparently no documentation for its occurrence there; this serious invasive weed is widespread in western North America, east to OH, KY, and AR. [= FNA, K; = Centaurea repens Linnaeus – C, F, G; = Rhaponticum repens (Linnaeus) Hidalgo – Z]

Ageratina Spach 1847 (Milk-poison, White Snakeroot)

A genus of about 250-290 species, American. The separation of Ageratina from Eupatorium is clearly warranted, on morphological, karyological, and molecular grounds. References: Nesom in FNA (2006c); Clewell & Wooten (1971)=Z; Cronquist (1980)=SE. Key based in part on Z and SE.

1 Leaves subcoriaceous in texture; leaves crenate or crenate-serrate; leaf blades 3-7 (-10) cm long, 2-5 cm wide; [primarily of xeric or submesic sites].

2 Larger leaf blades >5× as long as the petiole; leaf margins crenate; corolla lobes densely long-pubescent; achene glabrous; [widespread in our area] .................................................. A. aromatica

2 Larger leaf blades (1-) 2-4× as long as the petiole; leaf margins crenate, dentate, or incised; corolla lobes glabrous or sparsely short-pubescent; achenes usually short-pubescent, at least near the apex; [of e. GA southward] ................................................. A. jucunda

1 Leaves membranaceous in texture; leaves serrate or coarsely dentate; leaf blades 6-18 cm long, 3-12 cm wide (at least the larger on a given plant usually more 8 cm long); [primarily of mesic sites].

3 Leaves delicately membranaceous, coarsely dentate; larger leaf blades 1.0-1.4× as long as the petiole; [of seepage and waterfall splash zones associated with sandstone rockhouses and cliff bases] ................................................. A. luciae-brauniae

3 Leaves membranaceous, of a "typical" herbaceous character, coarsely serrate; larger leaf blades 1.4-5× as long as the petiole; [of a wide variety of mesic habitats, especially moist forests and forest openings].
**Eupatorium urticifolium** possibly ne. AL. [= FNA, K, Z; Appalachian Milk-poison. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): moist forests, such as cove forests; common (uncommon in Coastal Plain south of DE). Late July-October. Var. urticifolium ranges from QC west to se. ND, south to Panhandle FL and e. TX. Var. angustata (A. Gray) Clewell & Wooten ranges from IL and e. KS south to LA and e. TX. This species has been shown to be the cause of the "milk sickness" of pioneer days; the plants contain a poison which is transmissible to humans through cow milk. [= FNA, K; < Eupatorium rugosum Houttuyn – RAB, G, W; = E. rugosum Houttuyn var. rugosum – C, SE; > E. rugosum var. rugosum – F; > E. rugosum var. chlorolepis Fernald – F; > E. rugosum var. tomentellum (B.L. Robinson) Blake – F; = Eupatorium urticifolium Reichard – S; < A. altissima var. altissima (also see A. luciae-brauniae) – WH, Z]

**Ageratina altissima** King & H.E. Robinson var. roanensis (Small) Clewell & Wooten, Appalachian White Snakeroot, Appalachian Milk-poison. Mt (GA, NC, SC, VA): moist forests, often abundant at high elevations; common. August-October. Endemic to moderate to high elevations of the Southern Appalachians, from nw. VA south to s. SC, e. GA, c. W.V. and possibly ne. AL. [= FNA, K, Z; < Eupatorium rugosum Houttuyn – RAB, G, W; = Eupatorium rugosum var. roanensis (Small) Fernald – C, F, SE; = Eupatorium roanensis Small – S]

**Ageratina aromatica** (Linnaeus) Spach, Small-leaved White Snakeroot, Wild-hoarhound. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA, WV), Mt (GA, NC, SC, VA, WV): woodlands and forests, usually xeric, and often fire-maintained, also woodland edges; common (uncommon in Piedmont and Mountains, rare in DE and WV). Late August-October. MA, NY, and OH, south to ne. FL, Panhandle FL, and e. LA (Florida parishes). Two varieties have been delineated, both of them occurring in our area. Var. incisa (A. Gray) C.F. Reed is described as differing from var. aromatica in having the leaves cuneate (vs. truncate to rounded), acuminate (vs. acute), sharply toothed (vs. bluntly toothed, thin in texture (vs. thick), and the petioles slender and 0.5-2 cm long (vs. less slender and 0.1-1.5 cm). It is supposed to be Southeastern in range, from se. VA south to FL, on the Coastal Plain. The validity of this variety needs further assessment. [= FNA, WH, Z; = Eupatorium aromatica Linnaeus – RAB, C, G, SE; W; > Eupatorium aromatica var. aromatica – F; > Eupatorium aromatica var. incisum A. Gray – F; > A. aromatica var. aromatica – K; > A. aromatica var. incisa (Gray) C.F. Reed – K; > Eupatorium latidens Small – S; > Eupatorium aromatica Linnaeus – S]

**Ageratina jucunda** (Greene) Clewell & Wooten, Hammock Snakeroot. Cp (FL, GA): sandhills, dry pinelands, and subxeric hardwood hammocks; common (uncommon in GA). Se. GA south to s. FL, west to e. Panhandle FL. [= FNA, K, WH, Z; = Eupatorium jucundum Greene – S, SE]

**Amblyolepis** Small – S; **Ambrosia** Linnaeus 1753 (Ragweed)


**Amblyolepis** A.P. de Candolle 1836 (Huisache-daisy)


**Ambrosia** Linnaeus 1753 (Ragweed)

1 Leaves either undivided, with 2 lateral teeth, or palmately 3-5-lobed.
2 Leaves sessile to clasp ing, 2.5-7 cm long, undivided, with 2 teeth near the base .......................................................... A. bidentata
2 Leaves petiolate, 7-30 cm long, (1-) 3 (-5) lobed .................................................................................................. A. trifida var. trifida
1 Leaves 1- to 2-pinnatifid.
3 Annual, with fibrous roots; fruiting involucre with short, sharp spines .............................................................. A. artemisiifolia
3 Perennial, with deep-seated, creeping roots; fruiting involucre with bumps ......................................................... A. psilostachya


**Ambrosia bidentata** Michaux. Pd (VA), Mt (GA, NC, WV); [SC]: mafic woodlands; uncommon (rare in WV). August-November. CT, NY, and MN south to Panhandle FL and TX. Widely scattered throughout TN, east to e. TN (Chester, Wofford, & Kral 1997) and in nw. GA (Jones & Coile 1988). [= RAB, C, FNA, G, K, S, SE]  

**Ambrosia psilostachya** A.P. de Candolle, Perennial Ragweed. Cp (FL, GA, NC, SC), Pd (VA): loamy sandy soil of flats and slight depressions in periodically burned longleaf pine uplands, also in disturbed areas; uncommon. September-November. MI west to MT, south to LA and NM; also scattered along eastern seaboard states (ME, NH, NY, NC, SC, GA, FL), where perhaps some of the distribution is adventive. Apparently first collected in VA in 2000. [= C, FNA, G, K, SE, WH; > A. psilostachya – RAB; > A. rugelii Rydberg – RAB, S; > A. psilostachya var. coronopifolia (Torrey & Gray) Farwell – F]

**Amphelaster** Nesom 1995 (Climbing-aster)  


**Amphichyris** (A.P. de Candolle) Nuttall 1840 (Broomweed)  

* **Amphichyris dracunculoides** (A.P. de Candolle) Nuttall, Prairie Broomweed, Broom Snakeroot. Mt (VA), Cp (SC): disturbed areas over calcareous rocks, wool-combing mill waif (Nesom 2004d); rare, presumably adventive from further west. August-September. This species is common and weedy in disturbed cedar glade habitats in the Nashville Basin of c. TN, where apparently native (Chester, Wofford, & Kral 1997). [= FNA, K, S; = Gutierrezia dracunculoides (A.P. de Candolle) Blake – F, G, SE; = Xanthocephalum dracunculoides (A.P. de Candolle) Shinners]

**Anaphalis** A.P. de Candolle 1838 (Pearly-everlasting)
A genus of about 35 to 110 species, herbs, of tropical and temperate areas, with a center of diversity in Asia. References: Nesom in FNA (2006a); Arriagada (1998)=Z; Cronquist (1980)=SE.

**Anaphalis margaritacea** (Linnaeus) Bentham & Hooker f., Pearly-everlasting. Mt (NC*, VA, WV), Pd (DE, VA): dry open places, probably persistent from cultivation in NC, seemingly native in DE and VA; uncommon (rare in DE, NC, and VA). July-September. Interruptedly circumboreal, in North America from NL (Labrador) and NL (Newfoundland) west to AK, south to NC, TN, OK, TX, NM, CA, and Baja California. Very abundant and weedy in large parts of n. and w. North America, sometimes grown for ornament (especially dried arrangements) in our area. [= C, FNA, G, K, S, SE, W, Z; > A. margaritacea var. angustior (Miqueil) Nakai – F; > A. margaritacea var. intercedens Hara – F]

**Antennaria** Gaertner 1791 (Pussytoes)
A genus of about 70 species, herbs, of temperate and subtropical areas. Of our species, *A. neglecta*, *A. solitaria*, *A. virginica*, and *A. plantaginifolia* are sexual diploids. *A. parlinii* is of multiple hybrid origin, includes sexual and asexual populations, and is derived from *A. plantaginifolia*, *A. racemosa*, *A. virginica*, and *A. neglecta* (Bayer 1985). For reasons discussed in Bayer & Stebbins (1982) and parallel to those applied in this work to allopolyploid taxa in *Eupatorium*, the treatment of Bayer (1985) and Bayer & Stebbins (1993, 1982) is preferable to Cronquist's treatments, used in most of the floras covering or approaching our area. Much remains to be learned about the relative habitats and distributions of the various taxa in our area. References: Bayer in FNA (2006a); Bayer & Stebbins (1993)=Z; Bayer & Stebbins (1982)=Y; Arriaga (1998)=X; Cronquist (1980)=SE; Bayer (1985); Bayer & Stebbins (1987); Bayer (1984). Key closely adapted from Z, Y.

1. Flowering stalks with 1 head
2. Flowering stalks with 2 or more heads
3. Pistillate involucres 5-7 mm high; pistillate corollas 3-4 mm high; staminate corollas 2-3.5 mm high; basal leaves tomentose on the upper surface; young stolons mostly ascending; staminate and pistillate plants equally common
4. Pistillate involucres 7-10 mm high; pistillate corollas 4-7 mm high; staminate corollas 3.5-5 mm high; basal leaves tomentose or glabrous on the upper surface; young stolons mostly decumbent; sexual and apomictic populations present.
5. Basal leaves prominently 3-5-nerved, mostly > 1.5 cm wide.
6. Largest basal leaves > 6.0 mm wide and > 20 mm long; pistillate involucres 4.5-7 mm high; species sexual, populations consisting of both pistillate and staminate plants;
7. Middle and upper cauline leaves tipped with flags; mature basal leaves glabrous, young basal leaves pubescent; species apomictic or sexual.
8. Basal leaves spathulate, with a distinct petiolo; stolons mostly 5-8 cm long, with leaves along the stolon almost equal in size to those of the terminal rosette.
Anthemis Linnaeus 1753 (Chamomille)

A genus of about 175-210 species, herbs, mainly Eurasian. References: Watson in FNA (2006a); Cronquist (1980)=SE; Arriagada & Miller (1997)=Z. Key adapted from C. [also see Chamaemelum, Cota]

1 Rays yellow .......................................................................................................................... [see Cota tinctoria]
1 Rays white.
2 Rays sterile and usually neutral; receptacle chaffy only toward the middle..............................................................A. cotula
2 Rays pistillate and fertile; receptacle chaffy throughout.
3 Achenes not tuberculate; leaves not glandular-punctate beneath .............................................................................A. arvensis
3 Achenes tuberculate; leaves glandular-punctate beneath ..........................................................[A. secundiramea]


* Anthemis secundiramea Bivona-Bernardi. Cp (VA): railroad embankment; rare, native of Mediterranean Europe, probably merely a waif and not established. [= C, F, FNA, K, SE]

Aphanostephus A.P. de Candolle 1836 (Doze-daisy)


Aphanostephus skirrobasis (Alphonse deCandolle) Trelease var. thallasius Shinners, Dune Doze-daisy. Cp (FL): dunes, disturbed coastal sands; rare. S. LA west to coastal TX and Tamaulipas; scattered in n. FL, both Panhandle FL (Bay and Escambia counties) and ne. FL (St. Johns County) (Wunderlin & Hansen 2004). [= FNA, K, SE, WH; = A. skirrobasis – S, orthographic variant]

Arctium Linnaeus 1753 (Burdock)


1 Inner phyllaries constricted above the middle, widened toward the truncate (or rarely acuminate) apex..........................[A. tomentosum]
1 Inner phyllaries never constricted above the middle, gradually narrowing toward the acute to acuminate apex.
2 Petiole of the basal leaves solid; heads in the upper part of the inflorescence on peduncles > 2.5 cm long; heads corymbose arranged on the main branches ..............................................................................................................A. lappa
2 Petiole of the basal leaves hollow (at least toward its base); heads in the upper part of the inflorescence on peduncles < 2 cm long; heads racemose arranged on the main branches.
3 Heads 1.1-2.4 cm in diameter; heads on terminal branches sessile or pedunculate; middle phyllaries < 1.8 mm wide; corolla with glandular hairs .........................................................................................................................A. minus
3 Heads 1.9-2.9 cm in diameter; heads on terminal branches sessile; middle phyllaries (1.6-) 1.7-2.5 mm wide; corolla glabrous .............[A. nemorosum]

**Arctotis** Linnaeus 1753 (African-daisy, Arctotis)

A genus of about 60 species, annual and perennial herbs, native of South Africa. References: Norlindh (1965)=Z; Mahoney in FNA (2006a); McKenzie et al. (2006).


**Arnica** Linnaeus 1753 (Arnica)


**Arnoglossum** Rafinesque 1817 (Indian-plantain)


1 Larger leaves palmately veined, cordate at the base, either strongly toothed or lobed.
2 Leaves glaucous beneath; stem glaucous and conspicuously grooved .......................................................... *A. atriplicifolium*
3 Leaves green beneath; stem green and conspicuously grooved ................................................................. *A. reniforme*
4 Basal and lower cauline leaves linear to lanceolate, green to slightly glaucous below; plants 0.5-2.5 m tall; [usually of pine savannas, se. NC south to s. FL, west to e. TX] .............................................................. *A. ovatum* var. lanceolatum
5 Basal and lower cauline leaves ovate to ovate-lanceolate, glaucous beneath; plants 1.5-2.5 m tall; [usually of shaded, moist to bottomland habitats, e. GA west to e. LA] .......................................................... *A. ovatum* var. ovatum
6 Phyllaries not wing-keeled; stem terete.
7 Basal and low-cauline leaves truncate or subcordate at the base; larger leaves irregularly angulate-lobed or toothed, often somewhat hastate at the base; corolla usually pale lavender .............................................................................................................. *A. diversifolium*
8 Basal and low-cauline leaves cuneate at the base; larger leaves entire, crenate, sinuate, but not lobed or hastate; corolla creamy yellow (or greenish or tinged with pink).
9 Phyllary wings highest towards the base; phyllary wings chalky white, erose; leaves with main lateral veins running with the midrib for 2-4 cm into the blade before diverging; [of FL Panhandle] .................................................................................................................. *A. album*
10 Phyllary wings uniform or highest towards the tip; phyllary wings pale green, entire; leaves with main lateral veins diverging from the midrib at or very near the base of the blade, not concurrent; [collectively more widespread].
11 Involucres 12-15 mm high; corollas (9-)11-12 mm long .................................................................................. *A. floridanum*
12 Involucres 8-14 mm high; corollas 7-11.5 mm long.
13 Involucres (9.5-)10-12 (-13) mm high; corollas 5-8 (-9) mm long; leaves usually with 3-5 main parallel veins; mid-stem leaves petiolate, with rounded bases) .................................................................................. [A. plantagineum] / *A. sulcatum*
14 Involucres (9.5-)10-12 (-13) mm high; corollas 6-8 (-9.5) mm long; leaves usually with 3-5 main parallel veins; mid-stem leaves sessile, with broadly cuneate bases .................................................................................................


Arnoglossum floridanum (A. Gray) H.E. Robinson. Cp (FL): sandhills; uncommon. Ne. FL and e. FL Panhandle south to c. peninsular FL. [= FNA, K, WH, Z; = Cacalia floridana (A. Gray) SE, U; = Mesadenia floridana (A. Gray) Greene – S]

Arnoglossum ovatum (Walter) H.E. Robinson var. lanceolatum (Nuttall) D.B. Ward, Savanna Indian-plantain. Cp (FL, GA, NC, SC): wet savannas, especially over coquina limestone ("marl"); rare. Late July-October. SE. NC to s. FL, west to e. TX. [= Q; = Arnoglossum ovatum – FNA, GW, K, WH, Y, Z; = Cacalia lanceolata Nuttall – RAB; = Cacalia ovata Walter – SE, U; = Mesadenia lanceolata (Nuttall) Rafinesque – S; = Mesadenia lanceolata var. lanceolata – V; = Mesadenia lanceolata var. virens (Harper – V; = Cacalia lanceolata var. lanceolata – X)

Arnoglossum ovatum (Walter) H.E. Robinson var. ovatum, Broadleaf Indian-plantain. Cp (FL, GA), Pd (GA): bottomlands, bay forests, moist or wet forests; uncommon. Late July-October. E. GA west to e. LA. The division of A. ovatum into two taxa (species or, as done here, varieties) needs additional study. [= Q; < Arnoglossum ovatum – FNA, GW, K, WH, Y, Z; = Cacalia ovata Walter – SE, U; = Mesadenia ovata R.M. Harper – S; = Mesadenia maxima R.M. Harper – S; = Cacalia lanceolata var. elliptii (Shinners) Kral & Godfrey – X]

Arnoglossum reniforme (Hooker) H.E. Robinson, Great Indian-plantain. Mt (GA, NC, VA, WV): cove forests, other mesic forests; common (uncommon in WV, rare in VA). June-October. The very large, reniform leaves (sometimes up to 80 cm across) are conspicuous in rich cove forests. PA and MN, south to GA, MS, and OK. [= FNA, Y, Z; = Arnoglossum muehlenbergii (Schultz 'Bipontinus') H.E. Robinson – K; = Cacalia muehlenbergii (Schultz 'Bipontinus') Fernald – RAB; = Cacalia reniformis (Hooker) Rafinesque – S]


Arnoglossum plantagineum Rafinesque. Reported for sc. SC, in the unpublished flora of the Savannah River Site by Batson, Angerman, and Jones. It is known definitely from the Nashville Basin of c. TN (Chester, Wofford, & Kral 1997), AL, MS, LA, and KY. [= FNA, K, Y, Z; = Cacalia tuberosa Nuttall – G; = Mesadenia tuberosa (Nuttall) Britton – S; = Cacalia plantaginea (Rafinesque) Shinners – SE, U]

Artemisia Linnaeus 1753 (Wormwood, Mugwort, Sage)

If defined (as here) to include the segregate genus Seriphidium, a genus of about 500 species, shrubs and herbs, north temperate, boreal, and arctic. References: Shulz in FNA (2006a); Ling Yeou-Ruenn (1995)=Z; Cronquist (1980)=SE; Arriaga & Miller (1997)=Y. Key based primarily on C.

1 Disk flowers fertile, with abortive ovaries; plant not aromatic when fresh; [subgenus Dracunculus] ............................................................... A. caudata
2 Disk flowers fertile, with normal ovaries; plant variously aromatic or not when fresh.
3 Leaves tomentose on the lower surface, densel y so in many species; perennials from a branched rhizome or woody caudex; plants lacking nonflowering shoots.
4 Inflorescence obviously paniculate, the branches evident, the heads on slender peduncles; involucres 1-2 mm high and 1-2 mm wide; fresh plants not aromatic. ............................................................... A. annua
5 Principal leaves entire to 2-pinnatifid, the terminal segments > 2 mm wide; plant an herb (sometimes somewhat woody at the base).
6 Leaves 2-pinnatifid; leaves with 1-2 stipule-like lobes at the base ............................................................... A. ludoviciana
7 Leaves 2-pinnatifid; leaves with 1-2 stipule-like lobes at the base ............................................................... A. vulgaris


* Artemisia annua Linnaeus, Sweet Annie, Sweet Wormwood, Annual Mugwort. Cp (DE, SC, VA), Pd (DE, VA), Mt (VA, WV), {NC?}; road sides, disturbed areas, waste areas around wool-combing mills (Nesom 2004d); common (uncommon in NC, SC, VA, and WV), native of Asia and e. Europe. August-November. [= C, F, FNA, G, K, S, SE, Y, Z]
* Artemisia biennis* Willdenow var. *biennis*, Biennial Wormwood. Cp (DE, SC), Pd (DE), Mt (WV): disturbed areas, waste area around wool-combing mills; rare, native of the w. United States. Reported for SC by Nesom (2004d); also reported to be naturalized as far east as TN and WV (Hardy County). [= C, K; < *A. biennis* – F, FNA] [synonymy incomplete]


* Artemisia ludoviciana* Nuttall, White Sage, Prairie Sage. Pd (DE, NC, SC, VA), Cp (DE, FL, NC, VA), Mt (VA), {GA}: roadsides, disturbed areas; common (rare in FL), native of western North America. Late August-November. [= WH; > *A. ludoviciana* – RAB, Z; = *A. ludoviciana* var. *ludoviciana* – C, G, SE; > *A. ludovicana* Nuttall var. *gnaphalodes* (Nuttall) Torrey & A. Gray – F; > *A. ludoviciana* var. *ludoviciana* – F; = *A. ludoviciana* ssp. *ludoviciana* – FNA, K]

* Artemisia pontica* Linnaeus, Roman Wormwood, Green-ginger. Cp (DE), Pd (DE), Mt (WV): disturbed areas, old fields, woodland edges, roadsides, ditches; rare, native of Europe. Naturalized at least as far south as DE, se. PA (Rhoads & Klein 1993), and KY. [= C, F, FNA, G, K]

* Artemisia stelleriana* Besser, Beach Wormwood, Dusty Miller, Hoary Mugwort. Cp (DE, NC, VA), Pd (DE), Mt (WV): sandy roadsides, dunes, other disturbed areas; uncommon (rare in NC and VA), native of Japan and ne. Asia. May-September. This plant is reported (with documenting photograph) as naturalized and spreading in Nags Head (Dare County, NC) (Graetz 1973). [= C, F, FNA, G, K, SE, WH, Z; = *A. stelleriana* – Y, orthographic variant]


*Aster* Linnaeus 1753 (Aster)

It is now abundantly clear that the traditional, broad circumscription of *Aster*, as a genus of some 250 species of North America and Eurasia, is untenable. All of our native asters have affinities elsewhere than with Old World Aster; most are now placed in Symphyotrichum and Eurybia, with fewer species in Ampelaster, Doellingeria, Ionactis, Ocleomena, and Seriocarpus. These changes will undoubtedly cause uproar. It may be worth noting for those that consider the dissolution of *Aster* as radical, that most of the segregate genera were recognized in the 19th century, and many have been widely recognized for much of the time since. For instance, Seriocarpus and Doellingeria were both segregated from *Aster* in the early 1830's, and were frequently recognized as distinct, including by Small (1903, 1913, 1933); Seriocarpus was in fact usually regarded as a good genus until sunk by Cronquist. References: Brouillet in FNA (2006b); Semple & Brouillet (1980a, 1980b); Jones (1980a, 1980b); Brouillet & Semple (1981); Reveal & Keener (1981); Jones & Young (1983); Jones (1984); Semple, Chmielewski, & Lane (1989); Nesom (1997); Xiang & Semple (1996). [also see Ampelaster, Doellingeria, Eurybia, Ionactis, Ocleomena, Seriocarpus, Symphyotrichum]


*Astranthium* Nuttall 1840 (Western-daisy)


*Astranthium integrifolium* (Michaux) Nuttall. Mt (GA, WV): limestone glades; rare. Nc. KY south through c. TN to nw. GA and ne. AL (primarily in the Interior Low Plateau); disjunct in c. MS and also disjunct in nc. WV, where perhaps introduced. The related *A. ciliatum* (Rafinesque) Nesom of the Ozarkian region and Texas is sometimes treated as a variety, subspecies, or unnamed component of *A. integrifolium*, but see Nesom (2005a) for rationale for recognition at the specific rank. The report for NC by Kartesz (1999) is erroneous; the cited documentation does not mention NC. [= FNA, Z; = *A. integrifolium* var. *integrifolium* – C; = *A. integrifolium* ssp. *integrifolium* – K, Y; < *A. integrifolium* – F, G, SE, W]

*Baccharis* Linnaeus 1753 (Silverling, High-tide Bush, Mullet Bush, Groundsel Tree)

A genus of about 350-450 species, shrubs, perennial herbs, and trees, of tropical, subtropical, and warm temperate America. References: Sundberg & Bogler in FNA (2006b); Nesom (2000b); Cronquist (1980)=SE. Key based in part on SE.

1 Leaves linear, 1-3 mm wide, entire.................................................................................................................. *B. angustifolia*

1 Leaves obovate, oblongellate, or elliptic, the larger > 7 mm wide and generally coarsely toothed toward the tip.

2 Leaves entire, spatulate-obovate, 1.5-3 (-3.5) cm long (including the petiole)............................................. *B. dioica*
**ASTERACEAE**

2 Leaves (at least the larger) with coarse teeth and > 3.5 cm long (including the petiole).
3 Most of the heads sessile (a few pedunculate), the glomerules scattered along leafy branches in the axils of well-developed leaves; [strictly of the outer Coastal Plain, not spread inland as a weed] .................................................. Baccharis angustifolia
3 Most of the heads pedunculate (a few sessile), the glomerules grouped into terminal paniculiform inflorescences; [of the outer Coastal Plain and also spread extensively inland as a weed] .................................................. Baccharis halimifolia

**Baccharis angustifolia** Michaux, False-willow. Cp (FL, GA, NC, SC): interdune swales, wet hammocks, marsh edges; uncommon (rare in GA, NC, SC). September-October. Ne. NC (Dare County) south to s. FL, west to LA; Bahamas. [= RAB, FNA, GW, K, S, SE, WH]

**Baccharis glomeruliflora** Persoon. Cp (FL, GA, NC, SC): wet hammocks, marsh edges, interdune swales; common (rare in GA, NC, SC). October-November. Se. NC (Brunswick County) south to s. FL, west to MS; West Indies. [= RAB, FNA, GW, K, S, SE, WH]

**Baccharis halimifolia** Linnaeus, Silverling, High-tide Bush, Mullet Bush, Groundsel Tree. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC): fresh and brackish marshes, marsh borders, hammocks, moist abused land, roadsides, ditches, old fields, and a wide variety of disturbed areas; common (rare in Mountains and VA Piedmont). September-October. Se. MA south to s. FL, west to TX, AR, and OK; West Indies. *B. halimifolia* is becoming increasingly common inland, and can be an aggressive invader in sunny sites after silvicultural disturbance. [= RAB, C, F, FNA, G, K, S, SE, WH]

_Baccharis dioica_ Vahl, Broombush False-willow. Dunes and shores. S. AL; s. FL; West Indies. [= FNA, K, S, SE, WH]

**Balduina** Nuttall 1818 (Honeycomb-head, Balduina)


**Identification notes:** The common name alludes to the honeycomb-like texture of the receptacle, made up of connected receptacular bractlets which surround the achenes. This condition is diagnostic of the genus, and can be seen even when the plant is in flower by stripping the flowers from the receptacle. Superficially, the perennial species resemble some *Helenium* (particularly *H. pinnatifidum* and *H. vernale*), but these bloom months earlier. The punctate leaves are very distinctive.

1 Plant an annual or biennial; cauline leaves numerous, linear, 0.5-1.9 mm wide; outer involucral bracts 0.6-1.7 mm wide, lanceolate, acuminate; disk 0.6-1.5 mm wide; pappus scales obovate-oblong, 0.2-0.6 mm long .................................................. Baccharis angustifolia
1 Plant a perennial; cauline leaves few, linear-spatulate, 2-7 mm wide; outer involucral bracts 1.7-3.1 mm wide, ovate, acute; disk (10-) 15-25 mm wide; pappus scales lanceolate, 1.1-2.1 mm long .................................................. Baccharis halimifolia
2 Disk corollas purple; basal leaves linear-spatulate, (7-) avg. 14 (-32) cm long, about 20× as long as wide; cauline leaves 3.8-6.2 cm long; outer phyllaries 2.9-5.4 mm long; inner phyllaries 4.5-7.6 mm long; ray flower ligules 2.3-4.7 mm wide at apex .......... *B. atropurpurea*
2 Disk corollas yellow to reddish-orange; basal leaves spatulate, (5-) avg. 7.5 (-10.5) cm long; about 8× as long as wide; cauline leaves 2.7-4.3 cm long; outer phyllaries 4.7-7.2 mm long; inner phyllaries 5.1-11 mm long; ray flower ligules 3.2-8.6 mm wide at apex ...... *B. uniflora*

**Balduina angustifolia** (Pursh) B.L. Robinson. Cp (FL, GA): sandhills and other dry, sandy soils; common. GA south to s. FL, west to s. MS; it should be sought in s. SC. [= FNA, K, SE, WH; Z = Actinospermum angustifolium (Pursh) Torrey & A. Gray – S]

**Balduina atropurpurea** R.M. Harper, Bog Honeycomb-head, Purple Honeycomb-head, Purple Balduina. Cp (FL, GA, NC, SC): peaty seepage bogs and wet pine savannas; rare. Late August-early November; October-December. A southeastern Coastal Plain endemic, very rare and disjunct in se. NC and nc. SC (where not recently seen), primarily in ne. to sc. GA and ne. FL. [= RAB, FNA, GW, K, SE, Z = Endorima atropurpurea (R.M. Harper) Small – S]

**Balduina uniflora** Nuttall, Savanna Honeycomb-head, Yellow Balduina. Cp (FL, GA, NC, SC): wet pine savannas and flatwoods; common (uncommon in GA and NC, rare in SC). Late July-September. A southeastern Coastal Plain endemic: se. NC and immediately adjacent ne. SC (apparently absent from much of SC), and from extreme sc. SC south to ne. FL, FL Panhandle, and west to e. LA. [= RAB, FNA, GW, K, SE, Z = Endorima uniflora (Nuttall) Rafinesque – S]

**Bellis** Linnaeus 1753 (English Daisy)

A genus of about 8 species, herbs, of Europe. References: Nesom (2000b); Brouillet in FNA (2006b); Cronquist (1980)=SE.


**Berlandiera** A.P. de Candolle 1836 (Green-eyes)


1 Leaves mainly cauline; leaves unlobed; disk flowers red to maroon; [of ne. SC south to n. FL, west to TX] ................. *B. pumila var. pumila*
### ASTERACEAE

**Bidens Linnaeus 1753** (Beggar-ticks, Bur-marigold)

A genus of about 240 species, herbs, cosmopolitan. Recent molecular studies suggest that the relationship between *Bidens* and *Coreopsis* is complex, and that changes in taxonomy will be needed to more accurately reflect relationships (Kim et al. 1999; Crawford & Mort 2005). References: Strother & Weedon in FNA (2006c); Cronquist (1980)=SE; Sherff & Alexander (1955)=Z; Ballard (1986)=Y. Key based on FNA.

**Identification notes:** The involucre of phyllaries is subtended by an additional series of bracteal structures, the *calyculus*.

<table>
<thead>
<tr>
<th>Key</th>
<th>Statement</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Plant aquatic, the leaves finely divided into segments &lt; 0.5 mm wide; pappus awns 13-25 (-40) mm long</td>
<td><em>B. beckii</em></td>
</tr>
<tr>
<td>2</td>
<td>Leaves 2-3× dissected, primary lobes &gt; 20, the ultimate segments rounded to acute, 2-10 mm wide; ray florets yellowish</td>
<td><em>B. pinnata</em></td>
</tr>
<tr>
<td>3</td>
<td>Leaves mostly once-pinnate, primary lobes 3-7, the ultimate segments serrate and acute, 8-50 mm wide; ray florets white or absent</td>
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<tr>
<td>4</td>
<td>Ray florets 5-8, the ligule 5-16 mm long; cypsela 2-awned, the awns 1-2 mm long; outer phyllaries (8-) 12 (-16)</td>
<td><em>B. alba var. radiata</em></td>
</tr>
<tr>
<td>5</td>
<td>Most leaves simple, the margins dentate to serrate or incised (with 3-7 lobes)</td>
<td></td>
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<tr>
<td>6</td>
<td>Leaves (except sometimes the lower) sessile; heads usually nodding, at least in age</td>
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<tr>
<td>7</td>
<td>Rays absent, or present and 2-15 (-18) mm long; pales (receptacular bracts) with tan or yellow tips; outer cypsela 3-5-6+ mm long</td>
<td><em>B. cernua</em></td>
</tr>
<tr>
<td>8</td>
<td>Rays present, (10-) 15-25 (-30) mm long; pales (receptacular bracts) with orange or red tips</td>
<td><em>B. lavis</em></td>
</tr>
<tr>
<td>9</td>
<td>Involucres campanulate to hemispheric or broader; disc florets (5-) 20-60 (-150+)</td>
<td><em>B. comosa</em></td>
</tr>
<tr>
<td>10</td>
<td>Cypselas (at least inner) usually ± 4-angled and 4-awned, the faces usually smooth or tuberculate</td>
<td></td>
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<tr>
<td>11</td>
<td>Ray florets 0 (or if a few present, the ligule &lt; 3 mm long); cypsela (5-) 8-15 mm long, the margins not notably thickened or winged</td>
<td><em>B. pilosa</em></td>
</tr>
<tr>
<td>12</td>
<td>Calyculus bractlets (3-) 4 (-5), seldom ciliate; disc florets usually 10-20</td>
<td><em>B. discoidea</em></td>
</tr>
<tr>
<td>13</td>
<td>Calyculus bractlets (5-) 8 (-10); leaves usually 3 (-5)-foliolate</td>
<td><em>B. frondosa</em></td>
</tr>
<tr>
<td>14</td>
<td>Calyculus bractlets 10-16 (-21); usually laciniate or pinnatisect</td>
<td><em>B. comnata</em></td>
</tr>
<tr>
<td>15</td>
<td>Ray florets 5-8, the ligule 1-4 cm long</td>
<td><em>B. mitis</em></td>
</tr>
<tr>
<td>16</td>
<td>Cypselas 2.5-4.5 mm long, the margins not barbed or ciliate</td>
<td><em>B. pilosa var. radiata</em></td>
</tr>
<tr>
<td>17</td>
<td>Rays absent or 2-5 (-12) mm long; cypsela 6-13 mm long</td>
<td><em>B. connata</em></td>
</tr>
<tr>
<td>18</td>
<td>Cypselas (at least inner) usually ± 4-angled and 4-awned, the faces usually smooth or tuberculate</td>
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<tr>
<td>19</td>
<td>Disc corollas 4-lobed, light yellow; anthers usually pale</td>
<td></td>
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<tr>
<td>20</td>
<td>Calyx flattened, sometimes weakly 3-4-angled and 3-4-awned, the faces usually smooth, seldom notably barbed; disc corollas 4-lobed, light yellow; anthers usually pale</td>
<td><em>B. comosa</em></td>
</tr>
<tr>
<td>21</td>
<td>Most leaves either 1-pinnately compound, the 3-5 (-7) leaflets petiolulate, or 1-2× pinnately lobed</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Ray florets 0, or rays 1-3, the laminae 2-3.5 mm long.</td>
<td><em>B. trichosperma</em></td>
</tr>
<tr>
<td>23</td>
<td>Calyculus bractlets 3-4 (-5), seldom ciliate; disc florets usually 10-20</td>
<td><em>B. mitis</em></td>
</tr>
<tr>
<td>24</td>
<td>Cypselas 2.5-4× as long as wide</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Cypselas 1.5-2 (-2.5)× as long as wide</td>
<td></td>
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<tr>
<td>26</td>
<td>Cypselas 4-5-8 mm long, the margins not winged, barbed, or ciliate</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Calyculus bractlets 8-12 (-16), these 4-5-7 (-12) mm long</td>
<td><em>B. aristosa</em></td>
</tr>
<tr>
<td>28</td>
<td>Calyculus bractlets 12-21, these 6-8-12 (20) mm long</td>
<td><em>B. polyepsis</em></td>
</tr>
</tbody>
</table>
IL, and MO south to FL and TX (and adventive farther north). [= RAB, C, FNA, G, GW, S, SE, W; > B. aristosa var. aristosa – F, S, Z; > B. aristosa var. frietchyi Fernald – F, Z; > B. aristosa var. matica (A. Gray) Gattinger – F, S, Z; < B. aristosa – K (also see B. polylepis)]

**Bidens bidentoides** (Nuttall) Britton. Cp (DE), Pd (DE): tidal shores and mudflats; rare. NY south to se. PA, DE, and e. MD. July-October. [= C, FNA, G, K; > B. bidentoides – F; > B. mariana Blake – F; > B. bidentoides var. bidentoides – Z; > B. bidentoides var. mariana – Z]


**Bidens connata** (A. Gray) Wiegand. Strawstem Beggar-ticks. Cp (DE, VA), Pd (DE, VA), Mt (VA, WV), {NC, GA, SC, NC}; marshes, bogs, wet meadows, disturbed areas; common. August-October. NL (Newfoundland) and BC south to GA, TX, and CA. Closely related to, and sometimes included in, the Eurasian *B. tripartita*. [= conosoma (A. Gray) Wiegand – C, F, G, S; < B. tripartita – RAB, FNA, K; > B. tripartita ssp. conosoma (A. Gray) A. Haines]


**Bidens mitis** (Michaux) Sherff, Coastal Plain Tickseed-sunflower. Cp (DE, FL, GA, NC, SC, VA), Pd (GA), Mt (NC): brackish marshes, fresh marshes, bogs (inland); uncommon (rare in Mountains, rare in DE). July-October. NJ south to FL, west to TX, primarily Coastal Plain, rare and scattered inland. [= RAB, C, F, FNA, G, GW, K, S, SE, W, WH, Z; > B. mitis var. lephtyphalla (Nuttall) Small – S; < B. mitis var. mitis – S]

* Bidens pilosa Linnaeus. Cp (FL, GA?, NC, SC?): waste areas near wool-combing mill, ballast, other disturbed areas; rare, native of tropical America. Reported for NC (Kartesz 1999), perhaps based on confusion with *B. alba*; known from ballast in se. PA (Rhoads & Klein 1993). [= K, WH; > B. pilosa – FNA; > B. pilosa var. pilosa – Z; > B. pilosa Linnaeus var. bimucronata (Turczaninov) Schultz “Bipontinus” – Z]


**Bidens beckii** Torrey ex Sprengel, Water-marigold, Water Beggar-ticks. South to e. PA and NJ. July-October. This species is sometimes treated in the monotypic genus *Megalodon*; this is contradicted by molecular evidence, which shows *B. beckii* as a component of *Bidens* (Ganders 2000). [= C, FNA, G; > Megalodon beckii (Torrey ex Sprengel) Greene – F, K; > Megalodon beckii var. beckii – Z]

* Bidens tripartita Linnaeus. Eurasian; not known to be in our area. [= combined distribution of *biconus*, *connuata*, and *triptaria*: Mt (GA, NC, SC, VA), Pd (NC, SC, VA), Cp (VA): marshes, swamps] [= B. tripartita – F, G, W, Z; < B. conosoma (A. Gray) Wiegand – C, F, G, S; < B. tripartita – FNA, K; < B. tripartita – RAB, GW (also see B. conosoma and B. conosoma)] [not keyed]

**Bigelowia** A.P. de Candolle 1836 (Rayless-goldenrod)


1 Basal leaves many, 1-2 mm wide; plants strongly rhizomatous and colonial; [of dry clayey or rocky places] .......................... *B. nutfallii* .......................... *B. nutfallii*

2 Basal leaves few, 2-14 mm wide; plants cespitose, or weakly rhizomatous; [of wet to mesic pine savannas and flatwoods] .......................... *B. nudata var. australis* .......................... *B. nudata var. australis*
**Boltonia L'Heritier 1789** (Doll's-daisy)

*(contributed by John F. Townsend and Alan S. Weakley)*


1 Achenes with pappus reduced to a short ring of bristles or to 0.15 mm long or with occasional slender awns to 0.6 mm; achene wings lacking or up to 0.1 mm wide; faces of achenes glabrous.

2 Phyllaries 0.2-0.5 mm wide, whitened throughout or with greenish tip, midrib relatively prominent (25-35% phyllary width); heads 4.3-6.1 mm wide, peduncles 0.25-0.5 mm in diameter; ray corollas white fading to pinkish in age; bracteal leaves narrowly oblong-cuneate to linear; [of Coastal Plain and Piedmont of VA southwards] = *B. asteroides* var. *latisquama*.

3 Phyllaries linear-subulate to lanceolate; inflorescence various.

4 Phyllaries spathulate, oblong-cuneate, or linear-oblong-cuneate, apices cuspidate, pappus awns 2/3 or more as long as the achenes; inflorescence diffusely branched, with numerous heads.

5 Inflorescence more or less leafy-bracteate.

6 Phyllaries linear-filiform; peduncles 0.2-0.5 mm wide; faces of achenes glabrous.

7 Inflorescence diffusely branched, heads relatively numerous, phyllaries (0.2-) 0.3-0.4 (-0.5) mm wide, (1.3-) 1.4-1.8 (-2.1) mm long, pappus awns 0.3-0.8 mm long; [of Coastal Plain and Piedmont of VA southwards] = *B. asteroides* var. *latisquama*.

8 Plants reproducing vegetatively by basal offsets, culms ascending, leaves elliptic to obovate with rounded or blunt apices, held at various angles from culm and inflorescence branches, plants with weak apical dominance; [of the Susquehanna River of MD and PA] = *B. asteroides* var. *recoginta*.

9 Plants reproducing vegetatively by elongate stolons, culms more strictly erect, leaves lanceolate with acute apices, the leaves oriented at an acute angle to the culm and inflorescence branches, plants with relatively strong apical dominance; [more widespread in our area] = *B. asteroides* var. *glastifolia*.

**Boltonia apalachicolensis** L.C. Anderson, Apalachicola Doll’s-daisy. Cps (FL): floodplain forests; rare. August-October. Panhandle FL, s. MS, west to LA. = [F; K, WH; < Boltonia sp. – GW]

**Boltonia asteroides** (Linnaeus) L’Heritier var. asteroides, Susquehanna Doll’s-daisy. Riverbanks. Along the Susquehanna River, MD and PA. = [Y; < *B. asteroides* var. *asteroides* – C, FNA, G, K, SE, X; Z; = *B. asteroides* var. *asteroides* – F]

**Boltonia asteroides** (Linnaeus) L’Heritier var. glastifolia (Hill) Fernald, Eastern Doll’s-daisy. Cps (DE, FL, NC, SC, VA), Mt (NC), {GA}: marshes, ditches; common (rare in Mountains, rare in FL and VA). August-October. NJ south to Panhandle FL, west to LA, mostly on the Coastal Plain, but with a few disjunct occurrences inland, such as Henderson County, NC. = [F; < *B. asteroides* – RAB, W, WH; Y; < *B. asteroides* var. *asteroides* – C, FNA, G, K, SE, X; Z; = Boltonia sp. – GW]

**Boltonia asteroides** (Linnaeus) L’Heritier var. recognita (Fernald & Griscom) Cronquist. MI, OH, KY, TN west to SK and OK. = [C, FNA, G, K; = Boltonia recognita (Fernald & Griscom) G.N. Jones] [synonym incomplete]

* Boltonia asteroides* (Linnaeus) L’Heritier var. *latisquama* (A. Gray) Cronquist, Midwestern Doll’s-daisy. Cps (NC, VA); ditches; rare, native of mw. United States. August-October. WI west to ND, south to MS and OK; disjunct (presumably introduced) in NC and se. VA. = [C, FNA, G, K, SE, X; > *B. latisquama* var. *latisquama* – F; > *B. latisquama* var. *recognita* Fernald & Griscom – F; < Boltonia sp. – GW]

**Boltonia caroliniana** (Walter) Fernald, Carolina Doll’s-daisy. Cps, Pd (NC, SC, VA), {GA}: bottomlands, ditches, roadsides, prairies; common (rare in GA and VA). August-October. Se. VA south to s. SC (and GA according to Kartesz 1999),
primarily on the Coastal Plain and Piedmont. [= C, FNA, G, K, SE, X, Y; < B. caroliniana – RAB (also see B. diffusa var. diffusa); > B. caroliniana – F; > B. ravenelii Fernald & Griscom; F; < Boltonia sp. – GW; = B. diffusa var. caroliniana – Z]

**Boltonia diffusa** Elliott var. diffusa, Southern Doll's-daisy. Cp (FL, GA, SC), Pd* (NC*, VA*): clay-based Carolina bays, road sides, powerline rights-of-way, and other artificially open areas; uncommon (rare in NC, SC, VA). August-October. Se. SC south to s. FL, west to e. TX, inland in the interior to c. TN, s. IL, s. MO, AR, and se. OK; disjunct in the Bahamas (Mangrove Cay of Andros Island). See Sorrie & LeBlond (2008) for comments on distribution and nativity. [= FNA, K, Z; < B. caroliniana – RAB; < B. diffusa – C; < Boltonia sp. – GW]

**Boltonia diffusa** Elliott var. interior Fernald & Griscom. KY and TN west to IL, OK, and LA. [= FNA, K; < B. diffusa – C; < Boltonia sp. – GW] [synonymy incomplete]


**Borrichia** Adanson 1763 (Seaside Oxeye)

A genus of 2 species, shrubs, of se. United States and West Indies. References: Semple in FNA (2006c); Cronquist (1980)=SE.

**Borrichia frutescens** (Linnaeus) A.P. de Candolle, Seaside Oxeye. Cp (FL, GA, NC, SC, VA): salt and brackish marshes; common. May-September. DC and e. VA south to s. FL, west to TX and Mexico; also in Bermuda. This species often forms nearly pure stands of many hectares, conspicuous from the fleshy, gray leaves. [= RAB, C, F, FNA, G, K, SE, WH]

**Brickellia** Elliott 1823 (False-boneset)


1 Leaves cuneate at base; upper stem leaves (at least) linea r-lanceolate; pappus whitish, of 20-25 bristles; [widespread in our area] .......................... **B. cordifolia**

1 Leaves cuneate at base; upper stem leaves (at least) linear-lanceolate; pappus whitish, of 20-25 bristles; [widespread in our area] .......................... **B. eupatorioides** var. eupatorioides

**Brickellia cordifolia** Elliott, Flyr's False-boneset. Cp (FL, GA): mesic pine-hardwood or oak-hickory woods of upland hammocks; rare. Late August-late October. Sw. GA (Jones & Coile 1988; Carter, Baker, & Morris 2009) and AL south to Panhandle FL and n. peninsular FL. [= FNA, K, SE, WH; = Coleosanthes cordifolius (Elliott) Kuntze – S]

*Brickellia eupatorioides* (Linnaeus) Shinners var. *corymbulosa* (Torrey & Gray) Shinners, Midwestern False-boneset. Var. *corymbulosa* (Torrey & Gray) Shinners ranges as far east as IN, IL, MO, and AR (and allegedly to KY) and has larger heads than var. *eupatorioides* (9-15 mm high, with mostly 15-35 florets, vs. 7-11 mm high, with mostly 6-15 florets). [ ] {investigate; add synonymy; add to key}

*Brickellia eupatorioides* (Linnaeus) Shinners var. *eupatorioides*, Eastern False-boneset. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (FL, GA, NC, SC, VA): dry slopes, shale barrens, dry woodlands, thickets; common (uncommon in Mountains, uncommon in VA Piedmont, rare in VA Coastal Plain). June-October. NJ west to IN, south to c. peninsular FL and se. TX. In addition to var. *eupatorioides*, *B. eupatorioides* includes several other varieties, of more southern or western distribution. Var. *floridana* (R.W. Long) B.L. Turner [= B. mossieri Small] has all leaves linear and is apparently restricted to s. FL; previous references to its occurrence further north (as by SE) are now interpreted as being based on narrow-leaved forms of *B. eupatorioides* var. *eupatorioides*. Var. *texana* (Shinners) Shinners [= var. ozarkana (Shinners) Shinners] has the outer phyllaries prolonged into setae, nearly or fully as long as the inner phyllaries, and should be considered a possibility for our area, in dry open habitats with prairie or midwestern affinities; it is known from as far eastward as AR and MO. [= FNA, K, X, Z; < Kuhnia eupatorioides Linnaeus – RAB, S, W; = Kuhnia eupatorioides var. eupatorioides – C, F, G, SE; < Brickellia eupatorioides – WH; = Kuhnia eupatorioides var. pyramidalis Rafinesque – Y]

**Brintonia** Greene 1895 (Brintonia)


**Brintonia discoidea** (Elliott) Greene, Brintonia, Rayless Mock-goldenrod. Cp (FL, GA): rich bluff forests; rare. August-October. A Southeastern Coastal Plain endemic: sw. GA and Panhandle FL west to LA. [= FNA, S, SE, WH; = Solidago discoidea Elliott – K]

**Calotis** R. Browne 1820

**Calypocarpus** Lessing 1832 (Straggler-daisy, Lawnflower)


**Carduus** Linnaeus 1753 (Plumeless Thistle)

A genus of about 90 species, herbs, of temperate Old World. References: Keil in FNA (2006a); Cronquist (1980)=SE. [also see Cirsium]

1 Phyllaries 2-8 mm wide; heads mostly noding (declined at least slightly from the vertical) ................................................................. C. nutans
1 Phyllaries 1-2 mm wide; heads erect.
2 Involucres cylindrical or narrowly ellipsoid................................................. C. pycnocephalus ssp. pycnocephalus
2 Involucres spherical or hemispherical.
3 Involucre 14-20 mm high, 25-35 mm across (excluding the flowers); leaves glabrate to glabrous beneath; plants very spiny; stem tough. ................................................................. C. acanthoides ssp. acanthoides
3 Involucre 12-17 mm high, 15-20 (-25) mm across (excluding the flowers); leaves cottony-tomentose beneath, at least when young, plants not very spiny; stem brittle ................................................................. C. crispus


* Carduus nutans* Linnaeus, Musk Thistle, Nodding Thistle. Mt (VA, WV), Pd (GA, NC, VA), Cp (DE, SC, VA): fields, roadsides, disturbed areas; uncommon (rare in DE, NC, and SC), native of Eurasia. Late May- November. C. nutans in its native range consists of a complex of taxa variously treated at specific, subspecific, and varietal rank; the application of these taxa to North American material is problematic and unresolved (see FNA for discussion). [= RAB, C, F, FNA, G, SE, W; > Carduus nutans Linnaeus ssp. macrolepis (Petermann) Kazmi – K]


* Carduus tenatifolius* W. Curtis. Known from ballast collections from se. PA from 1877-1879 (Rhoads & Klein 1993) and from NJ (Kartesz 1999). [= FNA, K] [not keyed]

**Carphephorus** Cassini 1816

A genus of 4 species, herbs, endemic to the Southeastern Coastal Plain of North America. The merger of Trilisa and Litrisa into Carphephorus has been questioned (Schmidt & Schilling 2000) and Schilling (2011) provides evidence that both Trilisa and Litrisa should be maintained as separate genera. The only species of this complex not occurring in our area is Cardiaca pycnocephalus Small (of c. peninsular FL). References: Nesom in FNA (2006c); Schilling (2011)=V; Correa & Wilbur (1969)=Z; DeLaney, Bissett, & Weidenhamer (1999)=Y; Orzell & Bridges (2002)=X; Cronquist (1980)=SE.

**Identification notes:** Trilisa can be distinguished from Carphephorus by its smaller heads (involucres 3.5-6 mm high vs. 6-15 mm high) and fewer phyllaries (6-12 vs. 15-40). When vegetative, Trilisa lacks shining resin dots on the leaves, while Carphephorus has numerous resin dots.

1 Stem glabrous or nearly so, the pubescence (if present) short and appressed; surfaces of the basal leaves glabrous; inflorescence corymiform.
2 Stem glabrous; heads mostly noding (declined at least slightly from the vertical) ................................................................. C. nutans
2 Stem leaves few, most of the stem exposed; basal leaves 4-20 cm long, 0.5-2.5 cm wide, dull, minutely punctate-pitted, fairly thick in texture, but not succulent; stems 1-5 dm tall, (1-) 2-5 per plant; [se. VA south to e. GA] ................................................................. C. bellidifolius
2 Stem leaves numerous, densely clothing the stem at least below; basal leaves 9-50 cm long, 2-10 cm wide, shiny, succulent, not glandular-punctate; stems 6-20 dm tall, 1 per plant; [se. NC south to FL, west to e. LA] ................................................................. [Trilisa odoratissima]
3 Leaves linear, the widest 1-3 mm wide; [sw. GA west through the East Gulf Coastal Plain] ................................................................. C. pseudoliatris
3 Leaves oblancolate, the widest 7-40 mm wide; [collectively widespread in the Coastal Plain of our area].
4 Inflorescence thyrsoid-paniculate; florets 4-10 per head; basal leaves glabrous, minutely and inconspicuously punctate, lacking resin droplets; phyllaries in 1-2 (-3) series, scarcely overlapping

4 Inflorescence corymbiform; florets 15-30 per head; leaves generally conspicuously pubescent (sometimes glabrate or with a few long hairs on the upper surface), not punctate, copiously beset with resin droplets; phyllaries in 3-6 series, closely imbricate.

5 Phyllaries glabrate on the back; phyllaries subacute to rounded, entire to erose; phyllaries mostly 15-20

5 Phyllaries viscid-pubescent on the back; phyllaries acute to subacute, entire and often callus-tipped; phyllaries 20-40

.......................................................... C. tomentosus

Carphophorus bellidiformis (Michaux) Torrey & A. Gray, Sandhill Chaffhead. Cp (GA, NC, SC, VA): xeric sandy forests and woodlands, primarily in sandhills; common (rare in GA and VA). August-October. Se. VA to extreme e. GA. The leaf apices are generally blunt, giving the leaves a nearly spatulate shape. Although often occurring with other species of Carphophorus, C. bellidiformis ranges into drier habitats than its congeners. [= RAB, C, F, FNA, G, K, S, SE, V, Z]

Carphophorus corymbosus (Nuttall) Torrey & A. Gray. Cp (FL, GA, SC): wet flatwoods; common (rare in GA and SC). August-October. Se. SC south to s. FL. This species was reported as far north as NC by Small (1933); Correa & Wilbur (1969) considered the northern limit of the species to be e. GA, but it is now known from Jasper County, SC. [= RAB, FNA, K, S, SE, V, WH, Y, Z]


Carphophorus tomentosus (Michaux) Torrey & A. Gray. Cp (NC, SC, VA): savannas, flatwoods, and sandhills; common (rare in VA). August-October. Se. VA south to s. GA. The specific epithet is somewhat misleading; C. tomentosus is highly variable in its pubescence, ranging from glabrate to densely hirsute. [= RAB, C, FNA, G, GW, K, S, SE, V, Z; > C. tomentosus var. tomentosus – F; > C. tomentosus var. walteri (Elliott) Fernald – F]

Carthamus Linnaeus 1753 (Distaff-thistle)

A genus of 14 species, annual and perennial herbs, of the Mediterranean region. Closely related to Centaurea, and perhaps to be included there. References: Keil in FNA (2006a).


Centaurea Linnaeus 1753 (Star-thistle, Knapweed)

A genus of about 500 species, herbs, native of Eurasia and n. Africa. References: Keil & Ochssmann in FNA (2006a); Cronquist (1980)=SE. Key adapted from C, SE, and FNA. [also see Acroptilon, Carthamus, and Plectocephalus]

1 Phyllaries evidently spine-tipped.

2 Leaf bases not decurrent on the stem, the stem merely angled; pappus absent; corollas purple

3 Central spines of the principal phyllaries 10-25 mm long................................. C. calcitrapa

3 Central spines of the principal phyllaries 1-3 mm long...................................... [C. diffusa]

2 Leaf bases decurrent on the stem as wings (only shortly so in C. benedicta); pappus present in at least the central flowers in the head; corollas yellow.

4 Heads sessile, closely subtended and partially concealed by large foliar bracts................................................. C. benedicta

4 Heads obviously pedunculate, lacking large foliar bracts subtending the head.

5 Larger spines of the middle and outer phyllaries 5-9 mm long; marginal and central flowers of the head with pappus .......... C. melitensis

5 Larger spines of the middle and outer phyllaries 11-22 mm long; marginal flowers of the head lacking pappus .............. C. solstitialis

1 Phyllaries not spine-tipped.

6 Plant an annual; flowers pale to medium blue, flowering April-June ................................................................. C. cyanus

6 Plant a perennial; flowers pink to purple, flowering June-October.

7 Phyllary appendages tapering to long, often recurved, pectinately dissected, filiform tips........................................ C. phrygia

7 Phyllary appendages obuse to acute, erect or ascending.

8 Involucres 10-13 mm high................................................................. C. stoebes ssp. micranthos

8 Involucres 15-25 mm high.

9 Phyllary appendages evidently uncurled along phyllary margins ........................................................................ C. scabiosa

9 Phyllary appendages not or only slightly uncurled along phyllary margins.

10 Phyllary appendages roundish (seldom triangular), scarious, light to dark brown, undivided to irregularly lacerate ........ C. jacea

10 Phyllary appendages more-or-less triangular, brown to black, more-or-less wholly pectinate-margined.

11 Heads discoid (the peripheral florets not expanded and showy); pappus blackish, < 1 mm long; green parts of phyllaries nearly or completely covered by black appendages, the involucres thus appearing totally black................................. C. nigra

11 Heads radiate (the peripheral florets expanded and showy); pappus absent or rudimentary (when present usually not black); green part of phyllaries sometimes evident, or the appendages light to dark brown.

12 Heads relatively broad, the pressed involucres usually as wide as or wider than long; green parts of phyllaries usually covered by brown, variously pectinate fimbriate appendages, the involucres thus light to dark brown .......... C. ×moncktonii
12 Heads relatively narrow, the pressed involucres usually longer then wide; green parts of phyllaries not fully covered by black appendages, the involucres black and green. ................................. C. nigrescens


* Centaurea × moncktonii C.E. Britton, Meadow Knapweed.  Mt (VA), Pd (VA): roadsides, disturbed areas; rare, native of Europe.  July-October.  [= FNA; = C. pratensis Thuiiller – C; ? C. nigra var. radiata A.P. de Candolle – F; ? C. debeauxii Godron & Grenier ssp. thuilliieri Dostal]

* Centaurea nigra Linnaeus, Black Knapweed, Spanish-buttons.  Mt (WV), Pd (DE, VA), Cp (DE): roadsides, disturbed areas; uncommon (rare in VA), native of Europe.  July-October.  [= C, F, G, K, S, SE]

* Centaurea nigrescens Willdenow, Tyrol Knapweed, Short-fringed Knapweed.  Mt (VA, WV), Pd (DE, VA): roadsides, disturbed areas; uncommon (rare in DE and VA), native of Europe.  July-October.  This species is increasing rapidly in the n. VA Piedmont.  C. transalpina Schleicher ex de Candolle was also reported for VA by Kartesz (1999).  [= FNA; = C. dubia Suter – C, SE, W (not a valid name); > C. vochinensis Bernhardi ex Reichenbach – F; > C. dubia ssp. vochinensis (Berhardi ex Reichenbach) Hayek – G; > C. nigrescens – K; > C. transalpina Schleicher ex de Candolle – F, K]

* Centaurea phylgia Linnaeus, Wig Knapweed.  [VA].  Reported for VA in FNA.  [= FNA, K; > Centaurea austriaca Willdenow]


* Centaurea stoebbe Linnaeus ssp. micranthos (S.G. Gmelin ex Gugler) Hayek, Spotted Knapweed, Bushy Knapweed.  Mt (NC, SC, VA, WV), Pd (NC, SC, VA), Cp (DE, FL, VA): roadsides, disturbed areas; common (rare in FL and SC), native of Europe.  Late June-December.  [= FNA, WH; = Centaurea biebersteinii A.P. de Candolle – K; = C. maculosa Lamarck – RAB, C, F, G, SE, W, misapplied]

* Centaurea diffusa Lamarck, Tumble Knapweed.  Naturalized in Davidson County, TN (Chester, Wofford, & Kral 1997); also in KY (FNA).  [= C, F, G, K; = Acosta diffusa (Lamarck) Sojak]

* Centaurea scabiosa Linnaeus, Greater Knapweed, Hardheads.  Naturalized in KY, PA, NJ (FNA), MD (Kartesz 1999), and other states in e. North America.  [= FNA, C, F, G, K]

Chaetopappa A.P. de Candolle 1836 (Least-daisy)


Chamaemelum P. Miller 1754 (Chamomile)

A genus of 2 species, herbs, of the Mediterranean region.  References:  Cronquist (1980)=SE.  [also see Cladanthus]

1 Rays white with a yellow base; plant an annual ........................................................................................................................................ [see Cladanthus mixtus]

1 Rays white; plant a perennial ................................................................................................................................................. C. nobile

* Chamaemelum nobile (Linnaeus) Allioni, Garden Chamomile.  Pd (NC): persistent from cultivation in gardens; rare, native of Europe.  [= FNA, K; = Anthemis nobilis Linnaeus – C, F, G, S, SE]

Chaptalia Ventenat 1802 (Sunbonnets)
A genus of about 60 species, herbs, of warm temperate, subtropical, and tropical America. The remainder of the genus is distributed in the West Indies, Central America, and South America. References: Nesom in FNA (2006a); Vuilleumier (1969)=Z; Nesom (1995a)=Y; Cronquist (1980)=SE.

Identification notes: The basal leaves are distinctive, the underside permanently and tightly white floccose, the upper surface floccose when young but glabrate in age, and the margins with obscure dentations.

**Chaptalia tomentosa** Ventenat, Sunbonnets, Pineland Daisy, Night-nodding Bog-dandelion, Woolly Sunbonnets. Cp (FL, GA, NC, SC): savannas, sandhill seeps, pine flatwoods; common. February-May. A Southeastern Coastal Plain endemic: e. NC south s. FL and west to e. TX. [= RAB, FNA, GW, K, S, SE, WH, Y, Z]

*Chevreulia Cassini 1817*


**Chondrilla Linnaeus 1753 (Skeleton-weed)**


**Chromolaena A.P. de Candolle 1836**


**Chrysanthemum Linnaeus 1753 (Chrysanthemum)**


* Chrysanthemum indicum Linnaeus, Garden Chrysanthemum, is persistent or perhaps naturalized as far south as se. PA (Rhoads & Klein 1993). [= Dendranthema ×grandiflorum Kitam. – K; ? Dendranthema morifolium (Ramat.) Tzvelev; ? Chrysanthemum morifolium Ramat.; Dendranthema indicum × japonicum]

**Chrysogonum Linnaeus 1753 (Green-and-gold)**


1 Plants occurring individually, not producing stolons; earliest flowering stems leafless, later flowering stems leafy; leafy flowering stems mostly 15-35 (-50) cm high; [of e. VA, sc. PA, and se. OH south to se. NC, ne. SC, nw. NC, and sw. VA].................................................................

1 Plants colonial, forming mats by stolons; flowering stems leafless or leafy; leafy flowering stems (if present) 15-25 cm high; [of ne. SC, se. NC, nw. NC, ne. TN. and se. KY southward].

2 Earliest flowering stems leafless, mostly 2-10 cm high; later flowering stems leafy, 15-25 cm high; longest stolon internodes 2-6 cm long; [of ne. SC, sc. NC, nw. NC, sw. VA, ne. TN. and se. KY south to e. GA, c. GA, and ec. AL]...................................................C. virginianum var. virginianum

2 Earliest flowering stems leafless, 2-10 cm high; later flowering stems leafless as well, 2-10 cm high; longest stolon internodes 12-60 cm long; [of sc. and sw. GA west to e. LA]..................................................................C. virginianum var. brevistolon

and sw. GA west to e. LA.  [= FNA, WH, Z; < C. virginianum var. australae – RAB, K, SE, W (also see var. brevistolon); < C. australae Alexander ex Small – S (also see var. brevistolon)]


**Chrysogonum virginianum** Linnaeus var. virginianum, Northern Green-and-gold, Virginia Green-and-gold.  Cp (NC, SC, VA), Pd (NC, VA), Mt (VA, WV): moist to fairly dry woodlands and forests; common (uncommon in WV).  Late March-early June.  E. VA, sc. PA, and se. OH south to se. NC, nc. SC, nw. NC, and sw. VA.  [= RAB, C, FNA, K, SE, W, Z; = C. virginianum – S]

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**Chrysoma** Nuttall 1834 (Woody Goldenrod)


**Chrysoma pauciflosculosa** (Michaux) Greene, Woody Goldenrod.  Cp (FL, GA, NC, SC): xeric sands of very barren, open, white-sand sandhills, in our area primarily on fluvial dunes, and less commonly in the fall-line Sandhills; uncommon (rare north of FL).  Late July-October.  S. NC south to n. FL and west to s. MS.  **Chrysoma** has a growth habit unlike any other shrub in our flora.  From a trunk-like base, numerous branches ascend, forming a flat-topped shrub 3-5 dm tall.  Each branch has a cluster of evergreen leaves restricted to its terminal few cm, the internodes very short (a few mm at most).  In summer, some of the woody branches produce terminal, deciduous, flowering branches, which elongate rapidly, the leaves widely spaced, reaching a height of a meter or more.  Following flowering and fruiting, the deciduous branches die back to the summit of the woody branches.  The leaves are gray-green, rather thick-textured, and finely reticulate, the reticulations giving an appearance rather like anole skin.  The midrib is prominent below, almost invisible on the upper surface.  Godfrey (1988) has an excellent drawing and description of this distinctive shrub.  [= FNA, K, S, SE, WH; = Solidago pauciflosculosa Michaux – RAB; = Chrysoma solidaginoides Nuttall]

**Chrysopsis** (Nuttall) Elliott 1823 (Golden-aster)

A genus of about 10 species, herbs, of se. North America, Mexico, and the Bahamas.  This remains a difficult and rather poorly understood group.  The appropriate taxonomic status of many of the entities remains unclear; for the moment, I am recognizing a number of entities at the specific level that should perhaps be recognized at lower taxonomic levels; in some cases, the appropriate nomenclatural combinations are not already available.  References:  Semple in FNA (2006b); Semple (1981)=Z; Harms (1974)=Y; Semple (1996)=X; Cronquist (1980)=SE; Nesom (2000b); DeLaney, Wunderlin, & Semple (2003).  Key adapted from Semple (1981).  [also see Heterotheca and Pityopsis]

1 Stem, leaves, and phyllaries sparsely to densely pubescent with spreading non-glandular hairs as well as having minutely glandular pubescence; annuals with taproots; [section Broduria].................................................................................................................................C. pilosa

1 Stems, leaves, and phyllaries various but lacking spreading non-glandular hairs; biennials or perennials, either fibrous-rooted or with a mostly short and quickly disintegrating taproot; [section Chrysopsis].

2 Peduncles and phyllaries glabrous or the outer phyllaries basally with a few stipitate glands; achenes usually with raised yellow-red translucent ribs.

3 Stems erect; leaf margins serrate-ciliate, the surfaces sparsely pubescent to glabrous; all phyllaries glabrous.......................C. hyssopifolia

3 Stems decumbent to ascending; leaf margins entire, either eciliate and glabrous, or sometimes ciliate with glabrate to sparsely woolly surfaces; phyllaries either glabrous and glandular punctate or the outer basally stipitate-glandular.

4 Stem leaves glabrous and eciliate (but rosette leaves densely woolly), lower stem leaves absent at flowering; outer phyllaries with a few stipitate glands basally, the involucre otherwise glabrous.................................................................C. cruiseana

4 Stem leaves eciliate or ciliate, the surfaces glabrous or sparingly pubescent, the hairs often only or mostly near the margin, lower stem leaves usually present at flowering; phyllaries glabrous, glandular-punctate..................................................................................C. trichophylla

{Add linearifolia under 2a}

2 Peduncles and phyllaries evidently stipitate-glandular or woolly-hairy, or both; achenes with or without raised yellow-red translucent ribs.

5 Upper stem leaves woolly-hairy; not stipitate-glandular; peduncles and involucres sparsely pubescent to woolly, sometimes stipitate-glandular as well.

6 Stems decumbent; inflorescence loosely corymbose-cymose, buds not nodding; peduncles stipitate-glandular or not, ligules 7-12 mm long; achenes sparsely to moderately striate, usually with raised yellow-red translucent ribs; [of se. VA to FL].........................C. gossypina

6 Stems decumbent to ascending; inflorescence corymbose, buds nodding; peduncles densely stipitate-glandular, ligules 10-15 mm long; achenes densely striate, lacking raised yellow-red translucent ribs; [of barrier islands of w. FL Panhandle]...............C. godfreyi

5 Upper stem leaves arachnoid to glabrate or densely stipitate-glandular; peduncles and involucres stipitate-glandular but otherwise glabrous.

7 Upper stem leaves lacking stipitate glands, either arachnoid to glabrate, or woolly..............................................................C. marniana

7 Upper stem leaves densely stipitate-glandular, not woolly.

8 Stems decumbent to ascending; leaves lanceolate; inflorescence compactly corymbose; involucres 9-12 mm long; phyllaries acute to attenuate; ligules 10-15 mm long.................................................................C. godfreyi

8 Stems erect; leaves linear-elliptic; inflorescence open flat-topped corymbose; involucres 6-9 mm long; phyllaries obtuse; ligules 6-8 mm long ..................................................................................................................C. scabrella

{Add lanuginosa & latisquamea under 2b}
**Chrysopsis cruiseana** Dress. Cp (AL, FL): coastal sand dunes. October-December. FL Panhandle and s. AL. [= Chrysopsis gossypina (Michaux) Elliott ssp. cruiseana (Dress) Semple – FNA, K, WH, Z] [add synonymy]

**Chrysopsis godfreyi** Semple. Cp (AL, FL): coastal sand dunes. November-December. FL Panhandle and s. AL. Plants with densely stipitate-glandular, non-woolly upper stem leaves have been treated as forma viridis (Semple 1981). [= FNA, K, WH, Z] [add synonymy]


**Chrysopsis hyssopifolia** Nuttall. Cp (FL): dry sands; uncommon. October-December. N. FL peninsula west to FL Panhandle, s. AL, s. MS, and se. LA. [= SE = Chrysopsis gossypina (Michaux) Elliott ssp. hyssopifolia (Nuttall) Semple – FNA, K, WH, Z; > Chrysopsis gigantea Small – S; > Heterotheca hyssopifolia (Nuttall) Harms – Y]

**Chrysopsis mariana** (Linnaeus) Elliott. Mt (GA, NC, SC, VA): dry forests and woodlands, roadsides, other dry habitats; common. Late June-October. Se. NY west to se. OH, e. KY, w. TN, south to c. peninsular FL and se. TX. [= C, FNA, G, K, S, SE, W, WH, Z; = Heterotheca mariana (Linnaeus) Shinners – RAB; Y; > Chrysopsis mariana var. mariana – F; > C. mariana var. macradenia Fernald – F]


**Chrysopsis trichophylla** (Nuttall) Elliott. Cp (GA?, NC, SC): sandhills, sandy roadsides, coastal dunes; rare (NC Watch List). The taxon treated by many authors as C. trichophylla was reduced to a form by Semple (1981), as C. gossypina ssp. gossypina f. trichophylla (Nuttall) Semple. He suggests, though, that varietal status may be warranted. Plants in SC previously identified as C. cruiseana are referable to C. trichophylla. [= SE = Heterotheca trichophylla (Nuttall) Shinners – RAB; < Chrysopsis gossypina ssp. gossypina – FNA, K, Z; < C. gossypina – C, G; > C. trichophylla – S; < C. arenicola Alexander – S; < C. pilosa – S, misapplied; < Heterotheca gossypina (Michaux) Shinners – Y]

**Chrysopsis lanuginosa** Small, Lynn Haven Goldenaster. Cp (FL): dry pinelands; rare. Endemic to FL Panhandle. [= FNA, K, WH, Z; < Chrysopsis scabrella Torrey & A. Gray – SE; not yet keyed; synonymy incomplete]

**Chrysopsis latisquamea** Pollard. Cp (FL): sandhills; uncommon. Ne. FL south to c. peninsular FL. [= FNA, K, SE, WH; = Heterotheca latisquamea (Pollard) V.L. Harms] [not yet keyed; synonymy incomplete]

**Chrysopsis linearifolia** Semple. Cp (FL): scrub, sandhills; uncommon. Endemic to FL Panhandle. [= Chrysopsis linearifolia ssp. linearifolia – FNA, K, WH, Z] [not yet keyed; synonymy incomplete]

**Chichorium Linnaeus 1753** (Chicory)


**Cirsium P. Miller 1754** (Thistle)

A genus of about 250 species, herbs, north temperate. References: Keil in FNA (2006a); Cronquist (1980)=SE. Key adapted in part from SE.

1 Plant colonial from creeping rhizomes; heads 13-20 (-25) mm high; phyllaries all lacking spine tips, or the outermost tipped with spines < 1 mm long; plant perennial; [alien weeds, generally in disturbed habitats] .............................................................. C. arvense

1 Plant not colonial; heads 25-50 mm high (as small as 15-25 mm in C. carolinianum, C. mutillii, C. muticum, and C. virginianum); phyllaries mostly spine-tipped, with at least some of the spines > 1 mm long (except sometimes mostly or entirely spine free in C. muticum); plant biennial (to weakly perennial); [native (except C. vulgare), in natural or some species also in disturbed habitats]

2 Leaves decurrent onto the stem below, the decency extending as a wing at least several cm down the stem, and often to the leaf below; leaves scabrous-hispid above; phyllaries lacking a glutinous dorsal ridge; [alien weed] .............................................................. C. vulgare

2 Leaves not decurrent as a conspicuous wing, or the decency extending < 1 cm (sometimes more decurrent in C. lecontei); leaves not scabrous-hispid above; [native, sometimes in disturbed habitats]

3 Phyllaries lacking spine tips (the outermost sometimes with a weak spine-tip to 0.5 mm long); leaves deeply lobed, to 55 cm long and 20 cm wide .............................................................. C. muticum

3 Phyllaries (at least the outer and middle) with well-developed spine-tips > 1 mm long; leaves lobed or merely toothed, generally < 30 cm long and < 10 cm wide (except in C. altissimus).
4 Heads immediately subtended by several spiny-toothed leaves (appearing as a leafy involucre); flowers yellow, white, or purple.
5 Involucres more-or-less densely tomentose; stems densely tomentose; [of the Coastal Plain and Piedmont].............................................. ................. ................................................................................................................................. C. horridulum var. horridulum
6 Involucres glabrous; stems glabrous or sparsely tomentose; [of the Coastal Plain].............................................................. C. horridulum var. megacanthum
7 Leaves spinescent to deeply pinnatifid; main spines mostly 5-10 mm long; [widespread in the Coastal Plain] .............. C. horridulum var. vittatum
8 Heads pendunculate (rarely with 1 or 2 reduced leaves below); flowers pink, purple, lavender, or white.
9 Lower surface of the leaves densely white-tomentose beneath; persistent and entirely obscuring the green surface.
10 Heads 15-25 mm high; plants 4-15 dm tall; larger leaves < 5 cm wide.
11 Cauline leaves mostly 10-30; plants flowering April-June; [of dry soils of the Piedmont] ................................................. C. carolinianum
12 Cauline leaves mostly 10-30; plants flowering August-October; [of moist to dry soils of the Coastal Plain (and rarely the lower Piedmont in association with other Coastal Plain species, such as Pinus palustris)] ................. C. virginianum
13 Plants generally with well-developed, persistent basal leaves; cauline leaves with internodes usually > 2 cm; [of various habitats, mostly inland from the Coastal Plain].[.......................... C. pumilum
14 Plants lacking well-developed basal leaves; cauline leaves with internodes mostly 0.5-2 cm long; [of dry pinelands of the Coastal Plain].[.......................... C. repandum

Cirsium altissimum (Linnaeus) Hill, Tall Thistle. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (FL, GA): pastures, woodlands, thickets; uncommon (rare in DE, FL, and VA). September-November. MA west to ND, south to Panhandle FL (Jackson County) and TX. [= C, F, FNA, G, K, S, SE, W, WH; = Carduus altissimus Linnaeus – RAB]
* Cirsium arvense (Linnaeus) Scopoli, Canada Thistle, Field Thistle. Mt (NC, VA, WV), Pd (DE, Cp (DE): pastures, disturbed areas; common (uncommon in NC and VA), native of Europe. July-November. Two varieties are often recognized: var. arvense, with leaves shallowly undulate-lobe and with only a few fine marginal prickles, and var. horridum, with leaves strongly simulate-pinnatifid and with numerous well-developed marginal prickles. [= FNA, K, S, W; = Carduus arvensis (Linnaeus) Robson – RAB; > C. arvense var. arvense – C, G, SE; > Cirsium arvense var. horridum Wimmer & Gräbner – C, G, SE; > Cirsium arvense var. mite Wimmer & Gräbner – F; > Cirsium arvense var. arvense – F, misapplied; = Breea arvense (Linnaeus) Lessing]
Cirsium carolinianum (Walter) Fernald & Schubert, Carolina Thistle, Spring Thistle. Pd (GA, NC, SC, VA), Mt (GA): prairies, open woodlands over mafic, ultramafic, or calcareous rocks; rare. April-June (-July). N. VA west to S. OH and MO, south to w. SC, n. GA, AL, and TX. In our area, C. carolinianum seems to be restricted to prairies and woodlands (or maintained powerline or road rights-of-way) over circumneutral rocks and soils, in situations which were oak savannas or even prairies prior to fire suppression. [= C, F, FNA, G, K, S, SE, W; = Carduus carolinianus Walter – RAB; > Cirsium flavicium Small – S; > Cirsium virginianum – S, misapplied]
Cirsium discolor (Muhlenberg ex Willdenow) Sprengel, Field Thistle. Mt (NC, SC, VA, WV), Pd (DE, GA, NC, VA), Cp (DE, VA): pastures, woodlands, thickets; common. August-November. QC west to MB, south to NC, MS, LA, and KS. [= C, F, FNA, G, K, S, SE, W; = Carduus discolor (Muhlenberg ex Willdenow) Nutall – RAB]
Cirsium horridulum Michaux var. horridulum, Common Yellow Thistle. Cp (DE, FL?, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC): roadsides, woodlands, pine savannas; common (rare in DE and VA Piedmont, rare in Mountain). Late south to FL, west to TX, mostly on the Coastal Plain and adjacent provinces; also in Mexico. [= C, K, SE; = Carduus spinosissimus Walter – RAB; < Cirsium horridulum – F, G, WH; < Cirsium horridulum complex – GW; = Carduus horridulum – S]
Cirsium horridulum Michaux var. megacanthum (Nutall) D.J. Keil, Bigspine Thistle. Cp (AL, FL): moist ground; uncommon. AL and Panhandle FL west to TX and OK. [= FNA; < Cirsium horridulum complex – GW; > Cirsium horridulum var. vittatum – K, SE; > Cirsium vittatum – S; < Cirsium horridulum complex – WH]
Cirsium horridulum Michaux var. vittatum (Small) R.W. Long, Southern Yellow Thistle. Cp (FL, GA?, NC, SC): wet pine savannas; uncommon. May-July. Se. NC south to s. peninsular FL and Panhandle FL. [= Carduus smallii (Britton) Ashles – RAB; < Cirsium horridulum complex – GW; > Cirsium horridulum var. vittatum – K, SE; > Cirsium smallii Britton – S; > Cirsium vittatum Small – S; < Cirsium horridulum – WH]
Cirsium muticum Michaux, Swamp Thistle. Cp (DE, FL, NC, SC, VA), Mt (GA, NC, VA, WV), Pd (DE, NC, VA): swamps, wet thickets, woodlands, seepage slopes, wet prairies, meadows; uncommon (rare in DE, FL, and GA, VA Piedmont and Coastal Plain). August-November. NL (Newfoundland) west to SK, south to DE, NC, TN, and MO, and less commonly south to FL, AL (Diamond & Woods 2009), and TX. [= C, FNA, G, GW, K, S, SE, W, WH; = Carduus muticus (Michaux) Persoon – RAB; > Cirsium muticum var. muticum – F]
**ASTERACEAE**


*Cirsium pumilum* (Nuttall) Sprengel, Pasture Thistle. Pd (DE, NC, VA), Cp (DE, VA), Mt (VA, WV): pastures, thickets, and woodlands, perhaps especially over mafic rocks; uncommon (rare in Coastal Plain south of DE). Late May-July. S. ME west to w. NY, south to DE, and w. NC. [= C, F, G, K, SE; = Carduus pumilus Nuttall – RAB; = Cirsium pumilum var. pumilum – FNA; = Carduus odoratum (Muhlenberg ex W. Bart.) Petrak – S]

*Cirsium repandum* Michaux, Sandhill Thistle. Cp (GA, NC, SC, VA): sandhills, other dry sandy habitats; common (rare in VA). May-July. Se. VA south to e. GA, nearly endemic to the Carolinas. Similar in distribution to *Vaccinium crassifolium*, *Carpephorus bellidifolius*, and *Baptisia cinerea*, which are all locally abundant endemic indicators of Carolina pinelands. [= C, FNA, G, K, S, SE; = Carduus repandum (Michaux) Persoon – RAB]


*Cladanthus Cassini 1816*


*Conoclinium* A.P. de Candolle 1836 (Mistflower)


*Conoclinium coelestinum* (Linnaeus) A.P. de Candolle, Mistflower, Ageratum. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA, WV): moist to wet disturbed areas, especially ditches; common (uncommon in DE Piedmont, native in Europe. Late July-October. NJ west to IL, c. MO, se. KS, and OK, south to s. FL and c. TX; also in Cuba, and scattered further north (as in NY, n. OH, and n. IN) probably as escapes from cultivation. See Wooten & Clewell (1971) for further discussion of this species. [= FNA, K, WH; = Eupatorium coelestinum Linnaeus – RAB, C, F, G, SE, W, WV]

*Conyza* Lessing 1832 (Horseweed)

A genus of about 60 species, herbs, shrubs, and trees, of temperate, subtropical, and tropical regions. Recent molecular studies have indicated the likely polyphyly of *Conyza* and its close relationship with *Erigeron*; the ultimate circumscription of these genera is in doubt (Nesom 2000b, Noyes 2000). References: Strother in FNA (2006b); Cronquist (1980)=SE; Nesom (2000b). Key based in part on SE.

1 Plants diffusely branched from the base and throughout; plants 1-2.5 (-3) dm tall .......................... *C. ramosissima*

2 Plants with a well-developed central axis, sparingly branched (unless mowed or otherwise injured); plants 1-15 dm tall.

3 Involucre 4-6 mm high, densely pubescent; pistillate flowers (50-) 70-200 or more per head .................... *C. bonariensis*

4 Involucre 3-4 mm high, glabrous or very sparingly pubescent; pistillate flowers mostly 25-45 per head.

5 Stem coarsely spreading-hirsute; leaves ciliate, the larger generally with a few to many coarse teeth; phyllaries green-tipped ................................................................. *C. canadensis var. canadensis*

6 Stem glabrous or with widely scattered, appressed hairs; leaves with a few cilia toward the base, generally entire; phyllaries purple-tipped .................................................................................................................................................................................. *C. canadensis var. pusilla*


* Conyza floribunda* Kunth. Reported as introduced in GA, AL, and MS by Kartesz (1999), probably on the basis of confusion with *C. bonariensis*. [= FNA, K] [rejected; not keyed]

**Conyza ramosissima** Cronquist. Weedy situations. Oh west to MN, south to KY, ec. TN (Chester, Wofford, & Kral 1997), ne. AL, LA, and TX. [= C, FNA, G, K, SE; = *Erigeron divaricatus* Michaux – F; = *Leptilon divaricatum* (Michaux) Rafinesque – S]

**Coreopsis** Linnaeus 1753 (Coreopsis, Tickseed)

[contributed by Alan S. Weakley and Bruce A. Sorrie]

A genus of about 50 species, herbs, of America. Recent molecular studies suggest that the relationship between *Bidens* and *Coreopsis* (as traditionally circumscribed) is complex, and that changes in taxonomy will be needed to more accurately reflect relationships (Kim et al. 1999; Crawford & Mort 2005). References: Strother in FNA (2006c); Smith (1976)=Z; Sherff & Alexander (1955)=Y; Cronquist (1980)=SE. Key adapted from Y and Z.

1 Disk flowers with 4 corolla lobes and 4 anthers; ray flowers usually apically 3-lobed.
2 Leaves pinnately or bipinnately lobed into linear segments or narrowly lanceolate segments; [section *Calliopsis*] .......................................................... ..........................................................
3 All of the major cauline leaves opposite (except in *C. linifolius* the lowermost few leaves may be alternate).
4 Ray flowers pink (white); plant rhizomatous .......................................................................................................................... *C. rosea*
5 Ray flowers yellow; plant fibrous-rooted.
6 Ray flowers yellow; leaves with an expanded blade.
7 Outer phyllaries deltoid and very short, less than 0.3× as long as the inner phyllaries; flowering late September-January; [endemic to FL] .......................................................................................................................... *C. floridana*
8 Basal/lower leaves present at anthesis; leaves rapidly reduced upwards such that mid-cauline leaves are narrow or slender; achene awns various; [wet savannas, seepage slopes, pitcher-plant bogs, streamhead ecotones, pocosin ecotones, collectively widespread].
10 Leaves without auricles; achene wing narrow, < ½ the width of the achene body; achene awns averaging 1.5 mm long; leaf texture thick and leathery; flowering mid August-early November; [se. NC south to c. FL and west to s. MS; also rarely inland in GA, NC, SC, off the Coastal Plain] ............................................................................. *C. gladiata*
11 All of the leaves simple or the plant with a mixture of simple leaves and leaves with 1-2 (-4) basal auricles or leaflets, these distinctly smaller than the terminal lobe or leaflet.
12 Leaves all simple, 4-12 cm wide, the margins coarsely serrate (some of the lower leaves sometimes pinnately lacerate basally); [section *Silphidium*] .......................................................... ..........................................................
13 Stems with 1-5 (-8) nodes between the first node > 1 cm above the basal leaves and the first head.
14 Plants spreading by elongate stolons; leaf blades (or terminal leaflets) 1-2.2× as long as wide .................. *C. auriculata*
15 Leaf blades (or terminal leaflets) more or less broadly elliptical, ca. 1.5-4 cm wide, acute; stem (and often also the leaves) rather densely hairy (to glabrate). .................................. *C. pubescens* var. *pubescens*
16 Leaf blades (or terminal leaflets) narrowly elliptical to oblanceolate, ca. 0.6-2 cm wide, acuminate; stem and leaves glabrous ....... *C. pubescens* var. *robusa*

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8 Basal/lower leaves present at anthesis; leaves rapidly reduced upwards such that mid-cauline leaves are narrow or slender; achene awns various; [wet savannas, seepage slopes, pitcher-plant bogs, streamhead ecotones, pocosin ecotones, collectively widespread].
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16 Leaf blades (or terminal leaflets) narrowly elliptical to oblanceolate, ca. 0.6-2 cm wide, acuminate; stem and leaves glabrous ....... *C. pubescens* var. *robusa*
11 Most or all of the leaves deeply lobed or dissected into distinct leaflets or divisions, the leaflets or divisions 3-20 or more, if only 3, then the lateral leaflets nearly or fully as large and well-developed as the terminal.

16 Leaves sessile or with a short subpetiolar base < 2 mm long, the initial division of the leaves palmate into 3 leaflets (these sometimes further divided), giving the 2 opposite leaves the superficial appearance of a whorl of 6 leaves; [section Gyrophyllum].

17 Leaves palmately compound, the leaflets simple to lobed or pinnatifid, the total number of leaflets or divisions 3-5,2-5.5, the middle leaflet of median leaves 0.5-7 mm wide.

19 Leaflets usually lobed (rarely simple), the total number of leaflets or divisions 3-5,11 (-15) per leaf, the segments of median leaves 1.5-7 (-9) mm wide .......................................................... C. delphinifolia

19 Leaflets pinnatifid, the total number of leaflets or divisions 11-25 or more per leaf, the segments of median leaves 0.2-1.2 mm wide .......................................................... C. verticillata

16 Leaves, at least the lower, distinctly petioled on petioles 5-50 mm or more long.

20 Ray flowers not toothed terminally (or rarely with a few with inconspicuous and irregular teeth); mid-cauline leaves palmately 3-foliolate, the terminal leaflet sometimes again 3-5-foliolate (sometimes giving an appearance of a pinnately 5-7-foliolate leaf), the leaflets 6-35 mm wide, 3-15× as long as wide; [section Gyrophyllum] ................................................. C. tridentis

20 Ray flowers apically with 2-4 5-10 teeth; mid-cauline leaves pinnately 5-11-foliolate, the leaflets either 3-15 mm wide and about 1-3× as long as wide, or 0.5-2 mm wide and > 20× as long as wide; [section Coreopsis].

21 Disk flowers reddish; ray flowers usually with a basal red mark; leaflets of mid-cauline leaves 3-15 mm wide and about 1-3× as long as wide .......................................................... C. baicalis

21 Disk flowers yellow; ray flowers yellow; leaflets of mid-cauline leaves 0.5-6 (-10) mm wide and > 10× as long as wide.

22 Achenes wings fimbriate; [of granitic outcrops of the Piedmont of GA and AL] ................................................. C. grandiflora var. saxicola

22 Achenes wings entire; [collectively more widespread].

23 Divisions of the midstem and upper cauleine leaves with 1-3 divisions; plants reclining; flowering late June-July; [of dolomite glades in c. AL] .......................................................... [C. grandi flora var. inclinata

23 Divisions of the midstem and upper cauleine leaves with > 5 divisions; plants erect; flowering May-late June; [of granite outcrops and disturbed areas].

24 Larger divisions of midstem and upper leaves 2-6 (-10) mm wide .......................................................... C. grandiflora var. grandiflora

24 Larger divisions of midstem and upper leaves 0.5-1.5 mm wide .......................................................... C. grandiflora var. harveyana


* Coreopsis baicalis (A. Dietrich) Blake, Texas Coreopsis. Cp (FL, GA, NC, SC), Pd (GA): sandy roadsides and fields; common (uncommon in FL), native of farther west. May-July. Probably native only to e. TX, now distributed across the Coastal Plain from TX east to FL and north to NC. [= RAB, C, F, FNA, G, K, S, SE, WH, Z; > C. baicalis var. baicalis – Y]

Coreopsis delphinifolia Lamarc, Larkspruce Coreopsis. Cp (GA, SC, VA), Pd (GA, NC, SC), Mt (GA): dry woodlands; uncommon (rare north of GA). May-July. The species ranges from e. VA and s. NC south to c. GA, and se. TN (Polk County) (Chester, Wofford, & Kral 1997), and reputedly AL. Smith (1976) indicates that the species is an allopolyploid derivative (at 4x, 6x, and 8x) of < C. major, C. triperis, and C. verticillata. Its range extends south well beyond the range of C. verticillata. [= FNA, K; < C. major var. stellata – RAB; = C. delphinifolia – F, G, S, SE (an orthographically variant); > C. delphinifolia var. delphinifolia – Y; > C. delphinifolia var. chloioea Sheff – Y; > C. major Walter var. linearis Small – Y; = C. <delphinifolia – Z>

Coreopsis falcata Boynton, Pool Coreopsis. Cp (GA, NC, SC, VA), Mt (SC): peat bogs, very wet savannas, ditches and borrow pits in savannas; common (rare in VA). Early-May-late July (rarely later, perhaps in response to growing season fire). The species is endemic to the Coastal Plain of se. VA (City of Chesapeake), e. NC, e. SC, and e. GA; disjunct in Oconee County, SC. First reported for VA by Wieboldt et al. (1998). C. falcata should not be included (as in Cronquist in C and SE) in C. gladiata; the two species are distinctive in ecological preferences, morphology, phenology, and distribution. [= RAB, GW, K, S, Y, Z; < C. gladiata var. gladiata – C, SE; < C. gladiata – FNA, WH]


Coreopsis gladiata Walter, Swamp Coreopsis. Cp (FL, GA, NC, SC), Mt (GA, NC, SC): swamp forests; rare (SC Rare). Mid-August-early November. Sc. NC south to c. FL and west to s. MS; scattered inland as a disjunct in montane NC, SC, and GA. See C. helianthoides and C. linifolia for further discussion of the taxonomy of this group of species. [= RAB, S, Z; < C. gladiata var. gladiata – C, G, SE (also see C. falcata); < C. gladiata – FNA, GW, K, WH (also see C. helianthoides); > C. gladiata – Y; > C. longifolia var. gladiata – Y; > C. longifolia Small var. longifolia – Y; > C. longifolia Small var. godfreyi Sheff – Y]

Coreopsis grandiflora Hogg ex Sweet var. grandiflora, Large-flowered Coreopsis. Pd (GA, SC): in thin soils of rock outcrops, especially granitic flatrocks; rare. Late May-late June. Var. grandiflora ranges from c. GA and w. SC west to e. TX and e. OK, very scattered in distribution; it differs from var. harveyana in having the leaf divisions 2-6 mm wide (vs. 0.5-2 mm wide). [= F, K, Z; < C. grandiflora – RAB, FNA, G, S, W; < C. grandiflora var. grandiflora – C, SE (also see var. harveyana); > C. grandiflora var. grandiflora – Y; > C. grandiflora var. pilosa Sheff – Y]

* Coreopsis grandiflora Hogg ex Sweet var. harveyana (A. Gray) Sherff, Large-flowered Coreopsis. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (NC, SC, VA, WV): disturbed areas; rare, native of farther west. Late May-late June. As treated by Smith (1976), the species consists of 4 varieties. Var. harveyana is the most abundant variety, probably originally endemic to AR, n.
the tetraploid could be an allotetraploid (though likely an autotetraploid), and the allopatric ranges of the two races, specific
the existence of morphologic characters, the failure of Smith's attempted hybridizations of the two "races," his speculation that
nomenclatural recognition." Fernald, however, named
\[ \texttt{C. linifolia} \texttt{recognition is plausible. Further study is needed. Cronquist (in C, G, SE) does not recognize} \]
this taxon and its relatives remains unclear. Smith (1976) interpreted
the leaf), with small dark dots when backlit, and very thick (ca. 1 mm) and stiff in texture. The proper taxonomic treatment of

LA, ne. TX, OK, e. KS, and s. and c. MO, but now scattered eastward to IN, NC, and SC. Var. \texttt{longipes} (Hooker) Torrey & Gray
is endemic to e. TX. See Crawford & Smith (1984) for additional discussion of the varieties. [= F, K, Y, Z; \(< \texttt{C. grandiflora} = \texttt{RAB, \texttt{FNA, G, S, W, WH}; \lt \texttt{C. grandiflora var. grandiflora} = \texttt{C, SE,}} \]
Coreopsis grandiflora Hogg ex Sweet var. \texttt{saxicola (Alexander) E.B. Smith, Stone Mountain Coreopsis. Pd (GA): granitic
outcrops; uncommon. As interpreted by Smith (1976) and Cronquist (1980), this variety is endemic to granite outcrops in c. GA
and ec. AL and to sandstone outcrops in nc. AR; the AR plants, differing in morphology, phenology, karyotype, and distribution,
may well warrant separate status. [= K, SE, Z; \(< \texttt{C. grandiflora} = \texttt{Hogg ex Sweet – FNA}; \lt \texttt{C. saxicola Alexander = S}; \gt \texttt{C. saxicola var. saxicola – Y}; \gt \texttt{C. saxicola var. duncanii Sherff – Y} \]
Coreopsis helianoides Beadle, Beadle's Coreopsis. Cp (GA, NC, SC), Mt (NC), Pd (GA): swamp forests, swamp edges, and
bogs; rare. September-October. Se. NC south to c. and w. FL and west to s. MS, with a disjunct occurrence in sw. NC. The
validity of this taxon is controversial. Smith (1976) includes it in \texttt{C. gladiata}, considering it merely a pubescent form. Cronquist
(in SE) regards it as distinct at the species level, despite his serious over-lumping of all its close relatives into a single species
with two varieties: \texttt{C. gladiata var. gladiata} (including \texttt{C. falcata} and \texttt{C. gladiata}), and \texttt{var. linifolia} (including \texttt{C. oniscicarpa}
and \texttt{C. linifolia}), \([= \texttt{RAB, S, SE, Y, Z}; \lt \texttt{H. gladiata} = \texttt{FNA}; \lt \texttt{C. gladiata = Aiton – S} \]
Coreopsis integrifolia Poirét, Chipola Dye-flower. Cp (GA, SC): banks and floodplains of small blackwater streams
(especially over limestone), edges of swamp forests bordering longleaf pinelands or bordering brackish marshes; rare (GA
Special Concern). Mid August-early November. Se. SC south to FL Panhandle, apparently uncommon throughout its range. It
is related to \texttt{C. helianoides} and \texttt{C. linifolia}; the leaves are cauline and opposite, the petioles are ciliate. [= \texttt{FNA, GW, K, S, SE, WH, Y, Z} \]
Coreopsis lanceolata Linnaeus, Longstalk Coreopsis. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC,
SC, VA, WV): disturbed areas; common (uncommon in DE, rare in Mountains). April-June. S. MA, MI and WI south to c.
peninsular FL, e. TX, and NM. Often spread from cultivation, its original range obscure. [= \texttt{RAB, C, FNA, K, SE, W, WH, WV, Z}; \gt \texttt{C. lanceolata var. lanceolata – Y}; \gt \texttt{C. lanceolata var. villosa} Michaux – F, G, Y; \gt \texttt{C. heterogyna Fernald – F}; \gt \texttt{C. lanceolata – S}; \gt \texttt{C. crassifolia Aiton – S} \]
Coreopsis latifolia Michaux, Broadleaf Coreopsis. Mt (GA, NC, SC): in rich, moist, cove forests and slopes at medium
elevations, primarily from 500 m in the Blue Ridge Escarpment to nearly 1500 m; rare (though often locally abundant). (July-)
August-September. A Southern Appalachian endemic: sw. NC and se. TN (Polk County) (Chester, Wofford, & Kral 1997) south
into nw. SC and ne. GA. This species is treated by Smith (1976) in a monotypic section (section Silphidium) of \texttt{Coreopsis}, and,
indeed, it does not closely resemble our other species. Smith (1976) considered it a primitive species, with its closest relatives in
Mexico, and all of his attempts to hybridize it with other southeastern \texttt{Coreopsis} failed. Flowering appears to be triggered by
canopy tree-fall light gaps. It often occurs with \texttt{Helianthus glaucophyllus}. [= \texttt{RAB, FNA, K, S, SE, W, Y, Z}; \lt \texttt{Leiodon latifolius}
(Michaux) Shuttleworth] \]
Coreopsis linifolia Nuttall, Savanna Coreopsis. Cp (FL, GA, NC, SC, VA): savannas, sandhill seeps, sandhill-pocosin
ecotones; common (rare in VA). Early July-late October. Se. VA south to ne. and Panhandle FL, west to e. TX. Basal rosettes of
this species are abundant in wet savannas and can be distinguished readily by the distinctive leaves: very long-petiolate, about
1 cm across, the pinnate venation very neat (the main lateral veins straight and parallel to the other laterals on the same side of
the leaf), with small dark dots when backlit, and very thick (ca. 1 mm) and stiff in texture. The proper taxonomic treatment of
this taxon and its relatives remains unclear. Smith (1976) interpreted \texttt{C. linifolia} to range from se. VA south and west along the
Coastal Plain to e. TX (with a few inland disjunctions) and to consist of two chromosome races, a diploid Gulf Coast race (w. FL
to se. TX) and a tetraploid Atlantic Coast race (s. GA to se. VA), "not differing sufficiently morphologically to justify
nomenclatural recognition." Fernald, however, named \texttt{C. oniscicarpa} (the tetraploid) based on morphologic characters. Given
the existence of morphologic characters, the failure of Smith's attempted hybridizations of the two "races," his speculation that
the tetraploid could be an allotetraploid (though likely an autotetraploid), and the allotropic ranges of the two races, specific
recognition is plausible. Further study is needed. Cronquist (in C, G, SE) does not recognize \texttt{C. oniscicarpa} as distinct from \texttt{C. linifolia}, and reduces \texttt{C. linifolia (sensu lato)} to a variety of \texttt{C. gladiata}, also including \texttt{C. falcata} in the typic variety of \texttt{C. gladiata}. The abundant morphologic, phenologic, and ecologic differences between \texttt{C. gladiata}, \texttt{C. linifolia}, and \texttt{C. falcata} render such an approach undesirable. [= \texttt{GW, K, W, Y, Z}; \lt \texttt{C. angustifolia Aiton = RAB, possibly misapplied}; \lt \texttt{C. gladiata var. linifolia (Nuttall) Cronquist – C, G, SE}; \lt \texttt{C. oniscicarpa Fernald var. oniscicarpa – F}; \lt \texttt{C. oniscicarpa var. simulans Fernald – F}; \lt \texttt{C. gladiata – FNA}] \]
Coreopsis major Walter var. major, Woodland Coreopsis. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV):
woodlands; common (rare in GA, NC, SC, VA). May-July. W. VA, s. OH, and KY south to SC, GA, w. FL, s. AL, and s. MS. How to treat the "\texttt{Coreopsis major complex}" (here including \texttt{C. major var. major}, \texttt{C. major var. rigida}, \texttt{C. delphinitifolia}, and \texttt{C. verticillata}) is not clear. The group apparently includes diploids and a variety of allopolyploids and autoployploids (at various
ploidy) variously derived from \texttt{C. major var. major} and \texttt{C. verticillata}. [= \texttt{RAB, C, F, G, SE, W, Y}; \lt \texttt{C. major – FNA, K, S, WH, Z} \]
Coreopsis major Walter var. rigidia (Nuttall) F.E.Boynton, Stirrleaf Coreopsis. Mt (GA, NC, SC, WV), Pd (GA, NC, SC),
Cp (GA, NC, SC), \[\texttt{YA}; \] dry woodlands and forests; common (rare in WV). June-August. VA, WV, and KY south to w. FL, s.
AL, s. MS, and se. LA. The recognition of varieties is problematic and controversial. [= \texttt{C, SE, Y}; \lt \texttt{C. major var. stellata (Nuttall)
B.L. Robinson – RAB, WV}; \lt \texttt{C. major var. stellata – F, G, Y}; \lt \texttt{C. major var. rigidia – F, Y}; \lt \texttt{C. major – FNA, K, S, WH, Z} \]
Coreopsis nudata Nuttall. Cp (FL, GA): seasonally flooded pineland depressions, either herbaceous-dominated or under a
canopy of \texttt{Taxodium ascendens}; uncommon. E. GA (in close proximity to SC) south to ne. FL and Panhandle FL, west to e. LA.
[= \texttt{FNA, GW, K, S, SE, WH, Y, Z} \]
Coreopsis pubescens Elliott var. pubescens, Common Hairy Coreopsis. Mt (NC, VA, WV), Pd (GA, NC), Cp (NC):
forests, woodlands, and rock outcrops; common, rare in Piedmont and Coastal Plain (rare in VA and WV). July-September.
The species as a whole is largely centered in the Southern Appalachians and Ozarks-Ouachitas, with scattered outlying occurrences;

ASTERACEAE
895
var. *pubescens* has essentially the range of the species, from s. VA, s. KY, s. IL, and s. MO south to nw. FL, MS, and LA. Var. *robusta*, of the Southern Appalachians, is discussed below. [= F, GW, K, Y, Z, < *C. pubescens* – RAB, C, FNA, G, S, SE, W, WH, WV]  


**Coreopsis rosea** Nuttall. Cp (DE, GA, SC): upland depression ponds in the Inner Coastal Plain, drawdown zones on banks of blackwater rivers in the Outer Coastal Plain; rare. July-September. Coastal Plain of s. NS, MA, RI, NY (Long Island), NJ, DE, MD, e. SC, and e. GA, where it occurs on shores with fluctuating water levels, primarily on Coastal Plain pond shores, but also on river banks. It occurs in Horry County, SC, in the drawdown zone on the banks of the Waccamaw River; it should be sought in NC. It is immediately distinguishable from all our species by its pink to white ray flowers; another pink-rayed species, *C. nudata* Nuttall, ranges in the Coastal Plain from GA west to e. LA and has linear, terete, "juncoid" leaves. [= FNA, GW, K, S, SE, Y, Z]  

**Coreopsis species 1.** Cp (NC): calcareously influenced acid savannas; rare. September-October. Known from a single site on the Onslow-Pender county line, where growing with *Thalictrum cooleyi*, *Allium species 1*, and *Scleria species 1*.  


**Coreopsis tripteris** Linnaeus, Tall Coreopsis. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (FL, GA, NC, VA): rich, moist woodlands and woodland borders, primarily over calcareous or mafic rocks or on nutrient-rich alluvium; common (uncommon in FL, GA, NC, SC, and VA). July-early September. MA, s. ON, and WI south to Panhandle FL and TX. [= RAB, C, FNA, G, KW, K, S, SE, W, WH, WV, Z; > *C. tripteris var. deumii* Standley – F; > *C. tripteris var. smithii* Sherff – F, Y; > *C. tripteris var. tripteris* – F, Y]  

**Coreopsis verticillata** Linnaeus, Threadleaf Coreopsis. Pd (NC, SC, VA), Cp (NC, SC, VA), Mt (NC, SC, VA, WV): dry sandy, rocky, or clacey woodlands and woodland borders; common (uncommon in Coastal Plain and Mountains, rare in WV Mountains). May-July. Smith (1976) indicates that the species consists of two chromosome races, a diploid, ranging in the Piedmont and Mountains from e. SC and NC north to ne. WV, and s. MD, and an allotetraploid, limited to the Coastal Plain of ne. NC and se. VA. The finely-divided leaves are attractive and the plant is cultivated horticulturally; scattered occurrences outside the ranges indicated above are escapes from cultivation. [= RAB, C, F, FNA, G, K, S, SE, W, WV, Y, Z]  

**Coreopsis grandiflora** Hogg ex Sweet var. *inclinata* J. Allison, Ketona Tickseed, Ketona Coreopsis, is endemic to dolomitic Ketona glades of c. AL (Allison & Stevens 2001). [<C. grandiflora – FNA]  

**Coreopsis leavenworthii** Torrey & Gray. AL and FL. (= FNA, K; > *C. leavenworthii* var. – Y) [not yet keyed; synonymy incomplete]  

**Coreopsis pubescens** Elliott var. *debilis* (Sherff) E.B. Smith. Cp (FL): {habitat}; rare. C. TN south through AL and ne. MS to w. FL, s. AL, s. MS, and se. LA; it has very narrow leaf blades or terminal leaflets. [= GW, K, Z; < *C. pubescens* – FNA, S, SE; > *C. cornissularis* Sherff – Y; > C. *debilis* Sherff – Y] [not yet keyed]  

**Coreopsis pulchra** F.E. Boynton, Lookout Mountain Coreopsis. Nw. GA and ne. AL. [= FNA, K, S, SE, Y, Z] [not yet keyed]  

**Coreopsis atkinsoniana** Douglas ex Lindley. Mt (GA): roadsides; rare, apparently introduced eastward in nw. GA from a distribution in the w. North America. [= K; < *C. tinctoria* – FNA, SE; > C. *atkinsoniana* Douglas ex Lindley – Y] [not yet keyed; synonymy incomplete]  

**Cosmos** Cavanilles 1791 (Cosmos)  


1 Rays pink or white; ultimate leaf segments mostly ca. 1 mm wide or less ............................................................................ *C. bipinnatus*  
1 Rays orange, yellow, or red; ultimate leaf segments mostly > 2 mm wide ............................................................................ *C. sulphureus*  

* *Cosmos bipinnatus* Cavanilles, Common Cosmos. Cp (DE, NC, SC, VA), Pd (DE, NC, SC, VA), Mt (NC, WV): garden edges, roadsides, disturbed areas, commonly cultivated, sometimes escaped; uncommon (rare in NC, SC, VA, and WV), native of Mexico. August-October. [= RAB, C, F, FNA, G, K, S, SE, WV; > *C. bipinnatus var. bipinnatus* – Z]  

* *Cosmos sulphureus* Cavanilles, Orange Cosmos. Cp (GA, NC, SC, VA), Mt (WV): garden edges, roadsides, disturbed areas; commonly cultivated, rarely escaped, native of tropical America. August-November. [= C, F, FNA, G, K, S, SE; > *C. sulphureus var. sulphureus* – Z]  

**Cota J. Gay ex Gussone 1845 (Golden Marguerite)**  

Cypselas narrowed toward the summit, but not distinctly beaked. To C. peninsular FL and west to C. TX, inland to SE OK and S AR. [= FNA, K; NC, SC, VA]: Sandy soils of fields, roadsides, and sandhill woodlands; common (rare in VA). August-November. SE VA south to N GA (Nesom 2004d). [= FNA, K].


1 Stems hairy; leaf blades 2-3 × pinnately lobed; annual .......................................................... C. australis
1 Stems glabrous; leaf blades entire or with a few teeth or lobes; perennial .......................................................... C. coronopifolia

Cotula Linnaeus 1753 (Brassbuttons)

A genus of about 200 species, herbs, of the Northern Hemisphere, South America, and southern Africa. References: Bogler in FNA (2006a); Cronquist (1980)=SE. Key adapted from C and SE. [also see Youngia]

1 Cypselas (at least the inner in the head) with a distinct narrow beak
2 Cypselas dimorphic, the inner beaked .................................................................................. C. foetida
2 Cypselas monomorphic, all beaked.
3 Stems coarsely setose, the setae yellowish; bracts subtending the phyllaries 10-14, not reflexed. [C. setosa]
4 Stems variously pubescent, not with viscid with stipitate glands; phyllaries glabrous on both the inner and outer surfaces; cypselas 1.5-7 mm long. [.C. pulchra]
5 Inner surface of the inner phyllaries pubescent; outer surface stipitate-glandular and with 2 rows of black setae; cypselas 1.5-2.5 mm long .[C. capillaris]
6 Cypselas 4-7 mm long, yellowish- or reddish-brown, with 13-20 ribs; pappus 5-7 mm long; biennial .......... C. biennis
6 Cypselas 3-4 mm long, reddish- or purplish-brown, with 10 ribs; pappus 4-5 mm long; annual ............... C. tectorum


* Crepis tectorum Linnaeus. Mt (NC), Cp (VA): disturbed areas; rare, perhaps not established, native of Europe. June-July. [= C, F, FNA, G, K, S]

* Crepis vecaria Linnaeus ssp. taraxacifolia (Thuillier) Thellung. Mt (NC): lawns; rare, native of Mediterranean and w. Europe. Late May-July. [= RAB, C, FNA, K, SE; ? Crepis vecaria Linnaeus ssp. haensis (Boiss. ex A.P. de Candolle) P.D. Sell]


* Crepis foetida Linnaeus, Stinking Hawksbeard. [NC] native of Eurasia. April-September. [= FNA, K]

* Crepis setosa Haller f., Bristly Hawksbeard. Reported for Polk County, TN by Chester, Wofford, & Kral (1997) and from s. PA by Rhoads & Klein (1993). [= C, FNA, K] [not yet keyed]

Croptilon Rafinesque 1837 (Scratch-daisy)


**Cyclachaena Frensenius 1838**


**Diaperia Nuttall 1840 (Dwarf Cudweed)**


1 Heads ellipsoid to cylindrical, 3.5-4.5 mm high, 2-3× as high as wide; capitular leaves visible between and surpassing the heads; cypselas 0.7-0.9 mm long.

1 Heads campanulate to spherical, 2-3.3 mm high, about 1× as high as wide; capitular leaves more-or-less hidden between and surpassed by the heads; cypselas 0.9-1.2 mm long.

2 Pistillate paleas individually visible through thin, silky pubescence; heads spherical, the largest 2.5-3.3 mm high

.............................................................................................................................

[D. verna var. drummondii] 

* Diaperia verna (Rafinesque) Morefield var. verna, Cotton-rose, Bighead Pygmy-cudweed. Cp (*SC): disturbed areas, waste areas around wool-combing mill; mild, introduced from farther south and west (Nesom 2004d). May-June. MO west to MT, south to LA and TX; disjunct eastwards in the Black Belt prairies of AL and MS. [= FNA; = Filago prolifera (Nuttall ex de Candolle) Britton – Y, Z; = Evax verna Nuttall ex A.P. de Candolle – K, SE] 


**Ditrichia W. Greuter 1973**


* Ditrichia graveolens (Linnaeus) W. Greuter. Cp (SC): waste area around wool-combing mill; rare, native of Mediterranean Europe, but quite possibly introduced into SC by wool from Australia (Nesom 2004d). [= FNA, K] [add to synonymy]

* Ditrichia viscosa (Linnaeus) Greuter. Cp (FL): disturbed areas, on ballast; rare, native of Mediterranean Europe. Collected as a ballast weed in Pensacola, Escambia County, FL, and elsewhere in eastern North America, in the late 1800s; it does not appear to be naturalized. [= FNA, WH; = Cupularia viscosa (Linnaeus) Godron & Grenier – S; = Inula viscosa (Linnaeus) Ation – SE] [not keyed]

**Doellingeria Nees 1832 (Flat-topped Aster)**

A genus of about 7 species, herbs, of e. North America and e. Asia. This group of species has long been recognized as distinctive, sometimes given status as the genus Doellingeria (first by Nees in 1832), or as subgenus Doellingeria of Aster. Nesom (1993d) argues that Doellingeria should be separated from Aster, as its affinities seem to be at least as strongly to Solidago and its relatives, an assertion supported by molecular evidence (Noyes & Rieseberg 1999). References: Semple & Chmielewski in FNA (2006b); Nesom (1993d)=Z; Cronquist (1980)=SE; Nesom (2000b).

1 Disk flowers 4-14 per head; ray flowers 2-7 per head; leaves mostly 1.5-4× as long as wide; [of sandhill ecotones and streamhead pocosins of the Coastal Plain (primarily fall-line sandhills) from sc. NC southward]........................................................................................................... D. sericocarpoides

1 Disk flowers 16-40 per head; ray flowers 5-14 per head; leaves 2-6× as long as wide; [collectively widespread in our area].

2 Plants with stems solitary or several from a crown, to 11 dm tall; leaves mostly 2-4 (-5)× as long as wide............................ D. infirma

2 Plants with stems scattered from creeping rhizomes (forming clonal patches), to 20 dm tall; leaves mostly 4-6× as long as wide...................

............................................................................................................................. D. umbellata
**Doellingeria infirma** (Michaux) E. Greene, Appalachian Flat-topped White Aster. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), C (DE, FL, NC, VA): woodland borders, dry or dry-mesic woodlands, glades; common (rare in DE and FL). Late June-September. MA west to KY, south to SC, GA, Panhandle FL (Gadsden County), AL, and W. TN. [= FNA, K, WH, Z; = Aster infirma Michaux – RAB, C, G, SE, W, WH; > Doellingeria humilis – S, in part]

**Doellingeria sericocarpoides** Small, Pocosin Flat-topped Aster. C (FL, GA, NC, SC): sandhill ecotones and streamhead pocosins; uncommon. Sc. NC south to ne. FL and Panhandle FL, west to AL; also in AR, OK, and TX. [= FNA, K, S, WH, Z; = Aster sericocarpoides (Small) K. Schumann – SE; = A. umbellatus var. laevisula; A. Gray – GW; < Doellingeria humilis (Wildenow) Britton – S, in part, misapplied]


**Dracopis** Cassini 1825 (Coneflower)


**Dracopis amplexicaulis** (Vahl) Cassini. C (FL, SC*), Pd* (GA*): prairies, calcareous bottomlands, dry open areas, disturbed areas, waste areas near wool-combing mill; rare, introduced at least in part in our area. Native to prairie-like areas and calcareous bottomlands from GA (?) and AL west to KS and TX; reported for ne. GA (Jones & Coile 1988) and introduced in SC (Nesom 2004d). [= FNA, K, SE, WH; = Rudbeckia amplexicaulis Vahl – F, FNA]

**Dyssodia** Cavanilles 1802


**Echinacea** Moench 1794 (Purple Coneflower)

A genus of 4-9 species, herbs, endemic to e. and c. North America. There has been considerable medicinal use of extracts from many of the species, and collection of plants from the wild to meet the demand of the herbal trade has extirpated many populations, particularly in c. United States. Foster (1991) presents a lengthy and detailed discussion of medicinal uses of *Echinacea*, along with considerable information on the biology, conservation needs, taxonomy, and nomenclatural history of the genus. Binns, Baum, & Arnason (2002) provide no rationale for their approach of recognizing the same number of taxa as McGregor, but treating them as 4 species and 10 varieties; the entities seem to be distinct at the specific level. References: Urbatsch, Neubig, and Cox in FNA (2006c); Baskin, Snyder, & Baskin (1993)=Z; Foster (1991)=Y; Cronquist (1980)=SE; Binns, Baum, and Arnason (2002)=X; McKeown (1999); Gaddy (1991); McGregor (1968).

1 Leaves lanceolate to ovate, the larger > 5 cm wide, the stem leaves well-developed, though smaller than the basal.
2 Leaves glabrous on both sides, or scabrous above; chaffy bracts (pales) ca. 9 mm long, the awns about a fourth as long as the body of the pales and with incurved tips; rays 3.5-8 cm long, strongly drooping. ......................................................... E. laeavigata
3 Leaves pubescent or scabrous on both sides; chaffy bracts (pales) 10-13 mm long, the awns about half as long as the body of the pales and with straight tips; rays 2.5-5.5 cm long, horizontal to slightly drooping. ............................................ E. purpurea
1 Leaves lanceolate to linear, the larger < 5 cm wide, stem leaves few and poorly developed, the basal leaves predominant.
3 Rays curved upward, medium pink, 2.5-3.2 cm long; [endemic to calcareous glades in c. TN].............................. [E. tennesseensis]
4 Fresh pollen white ......................................................................................................................................................... E. pallida
4 Fresh pollen pale to bright yellow ................................................................................................................................. E. simillata

**Echinacea laeavigata** (C.L. Boynton & Beadle) S.F. Blake, Smooth Purple Coneflower. Pd (NC, VA), M (GA, SC, VA), C (SC): open woodlands and glades over mafic or calcareous rocks, such as diabase, limestone, and dolostone, rarely in oak-pine savannas of the upper Coastal Plain over circumneutral clay sediments; rare. Late May-July. The species is an eastern sibling of *E. purpurea*. In NC, this attractive, medicinal plant is now limited to a few populations in Durham, Granville, and Rockingham counties. Extensive populations occur over Elbrook Dolomite in Montgomery, VA. Populations of this species in sandy soils of the Coastal Plain of SC have been variously interpreted as native or introduced (Nelson & Kelly 1997). [= RAB, C, F, FNA, K, S, SE, W, X, Y; = E. purpurea var. laeavigata (C.L. Boynton & Beadle) Cronquist – G]
**Echinacea pallida** (Nuttall) Nuttall, Pale Purple Coneflower. Pd (GA, NC?, VA), Mt (VA), Cp (GA): roadsides; rare, perhaps introduced in part from c. US (GA Special Concern, NC Watch List). June-July. ON west to MI, WI, and NE, south to IN, LA, and TX; disjunct eastwards in TN, AL, GA, SC, NC, and VA, where probably but uncertainly native. Some at least of the eastern populations considered to be *E. pallida* are actually the closely related *E. simulata*; additional work is needed to disentangle the relative distributions of these two species in our area. [= RAB, FNA, K, Y, Z; < *E. pallida var. pallida* – C, SE; < *E. pallida* – F, G, W; = *E. pallida var. pallida* – X]

**Echinacea purpurea** (Linnaeus) Moench, Eastern Purple Coneflower. Mt (NC, VA*, WV*), Pd (NC, VA*), Cp (FL): open woodlands, roadsides, some of the occurrences persistent or spread from cultivation; rare. OH, WI, and IA south to FL and TX; introduced more broadly as in ne. United States and ON, the exact limits of the native distribution unclear. [= RAB, C, F, FNA, K, SE, W, WH, X, Y; = *E. purpurea var. purpurea* – G]

**Echinacea simulata** R.L. McGregor, Prairie Purple Coneflower. Mt (GA!, VA*?), Pd (NC!, VA*?), Cp (NC!): prairies, roadsides; rare. June-July. IN, IL, and MO south to KY and TN; some of the more eastern disjunct populations previously considered to be *E. pallida* are actually *E. simulata*; additional work is needed to disentangle the relative distributions of these two species in our area. GA native populations (Floyd Co.) are *E. simulata*. [= FNA, K, Y, Z; < *E. pallida var. pallida* – C, SE; < *E. pallida* – F, G, W; = *E. pallida* (Nuttall) Pallid var. simulata (McGregor) Binns, B.R. Baum, & Arnason – X]


**Echinops Linnaeus (Globe-thistle)**

A genus of about 120 species, herbs, of temperate and subtropical Europe, Asia, and Africa. References: Keil in FNA (2006a).


**Eclipta Linnaeus 1753**

A genus of 4 species, herbs, of temperate, subtropical, and tropical regions. References: Strother in FNA (2006c); Cronquist (1980)–SE.

**Eclipta prostrata** (Linnaeus) Linnaeus, Yerba-de-tajo. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): moist or wet disturbed areas, ditches, shores, disturbed bottomlands; common (uncommon in Mountains). June-November. MA west to WI, south to s. FL and TX, and southward into the tropics. [= C, FNA, K, WH; = *E. alba* (Linnaeus) Hasskarl – RAB, F, G, GW, SE, W, WV; = Verbesina alba Linnaeus – S]

**Elephantopus Linnaeus 1753** (Elephant's-foot)

A genus of about 12-30 species, of tropical, subtropical, and warm temperate regions. References: Strother in FNA (2006a); Jones (1982)–Z; Cronquist (1980)–SE.

**Identification notes**: The acaulescent species are easily and often confused with *Vernonia acaulis*, especially when sterile. *Vernonia* has leaves scabrous above and sparsely pilose to glabrate beneath; *Elephantopus* has leaves sparsely pilose above, densely pilose or tomentose below. *Vernonia* leaves tend to have a more acute apex, and the veins above are more strikingly differentiated in their color (white or pink) from the adjacent leaf tissue. When in flower, the presence of subtending foliaceous bracts below the compound glomerule of heads in *Elephantopus* (versus the absence of foliaceous bracts below the simple head in *Vernonia*) is diagnostic.

1 Leaves cauline, the stem with well-developed leaves over 10 cm long................................. *E. carolinianus*
2 Leaves basal, the stem scapose or with a few leaves much smaller than the basal, usually < 8 cm long.
3 Longest phyllaries 10-13 mm long; pappus 6-8 mm long; basal leaves 5.5-10.5 cm wide, usually at least some on a plant > 7 cm wide; leaves pubescent on the midrib below with spreading or reflexed hairs; [of the Coastal Plain, Piedmont, and rarely the Mountains].......................... *E. elatus*
4 Longest phyllaries 6-9 mm long; pappus 3-4.5 mm long; basal leaves 1.5-7.5 cm wide, rarely any on a plant > 7 cm wide; leaves pubescent on the midrib below with appressed or spreading hairs; [of the Coastal Plain, and rarely the lower Piedmont].
5 Phyllaries densely villous with white hairs (0.3-) 0.5-1.0 mm long, the punctate glands obscured; cypselas 3-3.5 mm long; [of e. SC southward]................................................................. *E. nudatus*
6 Phyllaries punctate-glandular, also sparsely pubescent with hairs 0.05-0.3 (-0.5) mm long; cypselas 2.5-3.0 mm long; [widespread in our area].................................................................................. *E. obtusifolius*
**ASTERACEAE**


_Elephantopus elatus_ Bertolini, Southern Elephant's-foot. Cp (FL, GA, SC): pine barrens; common (rare in GA and SC). Late August-September. E. SC south to s. FL, west to se. LA, on the Coastal Plain. [= RAB, FNA, K, S, SE, WH, Z]

_Elephantopus nudatus_ A. Gray, Coastal Plain Elephant's-foot. Cp (DE, FL, GA, NC, SC, VA), Pd (NC, SC, VA): woodlands and woodland borders, usually fairly dry; common (rare in Piedmont, rare in DE). Late July-September. DE south to n. peninsular FL, west to e. TX and AR, primarily on the Coastal Plain; south into n. South America. [= RAB, C, F, FNA, G, GW, K, S, SE, WH, Z]

_Elephantopus tomentosus_ Linnaeus, Common Elephant's-foot. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): woodlands and woodland borders, usually fairly dry; common (rare in Mountains). August-November. MD south to Panhandle FL, west to e. TX, north in the interior to w. NC, KY, and south to Chiapas, Mexico. [= RAB, C, F, FNA, G, K, S, SE, WH, Z]

**Emilia** Cassini 1817 (Tasselflower)

A genus of 50-100 species, of the Old World. References: Barkley in FNA (2006b); Cronquist (1980)=SE.

1 Leaves well-distributed along the stem, with at most few and shallow lobes; corollas salmon or red-orange; involucre 1-2 (-3)× as high as wide..............................................................................................................................................................................................................E. fosbergii

1 Leaves mostly on the lower portion of the stem, the larger lyrate-pinnatifid; corollas lilac; involucre 3-4× as high as wide.................................E. sonchifolia var. sonchifolia


* _Emilia sonchifolia_ (Linnaeus) A.P. de Candolle var. sonchifolia, Lilac Tasselflower. Cp (FL, SC), Pd (GA): disturbed areas, native of the Old World tropics. The occurrence of this species in SC was first reported by Nelson & Kelly (1997); it is unclear how well established _Emilia_ is in the northern part of our area. See Anderson (2007) for FL Panhandle record. [= FNA, K; < _E. sonchifolia_ – S, SE, WH]

**Erechtites** Rafinesque 1817 (Fireweed)

A genus of about 12-15 species, American and Australian. Barkley in FNA (2006a) points out that the genus should be treated as masculine gender. References: Barkley in FNA (2006b); Cronquist (1980)=SE. Key based in part on C and FNA.

1 Denuded receptacle 5-8 mm in diameter; achenes 2-3 mm long, with 10-12 ribs............................................................................................E. hieraciifolius

1 Denuded receptacle 9-12 mm long; achenes 4-5 mm long, with 16-20 ribs............................................................................................_E. megalocarpus_

_Erechtites hieraciifolius_ (Linnaeus) Rafinesque ex de Candolle, Fireweed. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): in disturbed soil in nearly all habitats except the extremely xeric, present in most parts of the modern (beat-up) landscape at least as seedlings, liable to turn up at the smallest disturbance (such as small tree-fall tip-up mounds or campfires, even in large natural areas), most abundant in areas extensively disturbed or scarified by timber-harvest, bulldozing, or severe fire; common. Late July-November. NL (Newfoundland) west to SK, south to s. FL and e. TX; West Indies; tropical America. Ecologically filling something of the same role in the south as the other (unrelated) "fireweed" in the north, _Epilobium angustifolium_. The only other species in our area as adept at appearing (seemingly from nowhere) at small soil disturbances in forests are _Phytolacca americana_ and the moss _Atrichum angustatum_ (Brid.) BSG. [= _E. hieraciifolius_ var. _hieraciifolius_ – C, G, K, SE; < _E. hieraciifolius_ – RAB, GW, S, W, WV; > _E. hieraciifolius_ var. _hieraciifolius_ – F; > _E. hieraciifolius_ var. _intermedia_ Fernald – F; > _E. hieraciifolius_ var. _praedulta_ (Rafinesque) Fernald – F; = _E. hieraciifolius_ var. _hieraciifolius_ – FNA; < _E. hieraciifolius_ – WH]

_Erechtites megalocarpus_ (Fernald) Cronquist. Coastal marshes (brackish or salty) from MA to NJ and should be sought in our area, especially in VA. As the differences between this and _E. hieraciifolius_ consist of multiple, non-overlapping morphological characters, the presumption should be to treat the two as specifically distinct. [= _E. hieraciifolius_ var. _megalocarpa_ – C, G, K; = _E. megalocarpus_ Fernald – F, orthographic variant; = _E. hieraciifolius_ var. _megalocarpus_ – FNA]

**Erigeron** Linnaeus 1753 (Daisy Fleabane)

A genus of about 150 species, nearly cosmopolitan. References: Nesom in FNA (2006b); Cronquist (1980)=SE; Allison & Stevens (2001)=Z. Key adapted from those references. [also see _Conyza_]
**ASTERACEAE**

1. Stem leaves sessile; pappus of the pistillate (ray) flowers consisting of a few short, slender scales, < 1 mm long (visible at 20× magnification); annual or perennial (rarely biennial).

2. Stem leaves many, mostly toothed, the larger > 1 cm wide; pubescence of the mid-stem long and spreading………………………………………. **E. annuus**

3. Phyllary hairs flattened, 0.5-1.2 mm long; stem hairs appressed to spreading, 0.5-1.0 mm long………………… **E. strigosus** var. **septentrionalis**

4. Plants annual (rarely biennial), lacking rhizomes; [of various, often weedy, habitats]………………… **E. strigosus** var. **strigosus**

5. Plants perennial, rhizomatous; [of plants of shallow soil over calcareous rock].

6. Basal leaves obovate to narrowly obovate or spatulate, (3.2-) 3.8-15 (-21) mm wide; cauline leaves glabrous, except along the midvein and the ciliate margins; [of limestone glades and barrens of c. TN, nw. GA, and n. AL]………………… **E. strigosus** var. **calcicola**

7. Basal leaves linear-obovate, f-3.5 (-6) mm wide; cauline leaves sparsely to moderately stipitate; [of dolomite glades of c. AL (Bibb Co.)]…………………………………………………………………………………..**E. strigosus** var. **dolomitica**

1. Stem leaves relatively large and clasping, or small and sessile (in **E. vernus**); pappus of the pistillate (ray) flowers of elongate capillary bristles (sometimes also with scales); plants biennial or perennial.

6. Plants trailing or ascending, rooting at the nodes, and with stolons ………………………………………………………………..**E. procumbens**

7. Stem leaves not clasping; basal leaves fleshy; rays 25-40, white, 0.5-1.3 mm wide; [of moist to wet habitats of the Coastal Plain]………...

8. Plants erect (sometimes the shoots curved at the base but ultimately vertical).

9. Stem leaves relatively large and clasping, or small and sessile (in **E. vernus**); pappus of the pistillate (ray) flowers of elongate capillary bristles (sometimes also with scales); plants biennial or perennial.

Stem leaves clapping; basal leaves herbaceous; rays 50-400, pink, blue, purplish, or white, either 0.3-0.5 mm wide (in **E. philadelphicus** var. **philadelphicus**, **E. quercifolius**, and **E. tenuis**) or 0.8-1.2 mm wide (in **E. pulchellus** var. **pulchellus**); [of more general distribution and habitat].

8. Disk corollas 4-6 mm long; rays 50-100, 0.8-1.2 mm wide.

9. Stems and leaves glabrous ……………………………………………………………………………………………………………………………………………………………………………………..**E. pulchellus** var. **brauniae**

10. Involute 4-6 mm high; rays 150-400, white to deep pink, 5-10 mm long……………………………………… **E. philadelphicus** var. **philadelphicus**

10. Involute 2.5-4 mm high; rays 60-250, blue-lavender (rarely white to pink), 2.5-5 (-6) mm long.

11. Pappus simple; stem spreading pubeatent in the upper third only; rays 100-250………………… **E. quercifolius**

11. Pappus double, with short outer setae in addition to the long slender bristles; stem appressed pubeatent in at least the upper half; rays 60-120………………… **E. tenuis**


**Erigeron philadelphicus** Linnaeus var. **philadelphicus**, Philadelphia-daisy. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): roadides, meadows, disturbed areas; common (uncommon in FL, NC, SC, and VA Coastal Plain). April-August. NL (Newfoundland) west to BC, south to FL and TX. Var. **scutariola** Fernald, of bluffs along the James River in VA, seems to be merely an extreme form. Other varieties [var. glaber Henry and var. provancheri (Victonir & Rouss.) Boivin] may have more merit. [= FNA, K; < E. philadelphicus – Rab, C, G, GW, S, SE, W, WH, WH; > E. philadelphicus var. **philadelphicus** – F; > E. philadelphicus var. **scutariola** Fernald – F]

**Erigeron pulchellus** Michaux var. **brauniae** Fernald. Mt (WV): sandy woodlands and forests, riverbanks; uncommon. April-June. MD, WV, and s. OH south to KY. [= C, F, FNA, G, K, WV]

**Erigeron pulchellus** Michaux var. **pulchellus**, Robin's-plantain. Mt (DE, GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist slopes, coves, limestone bluffs, trail margins, roadbanks; common (uncommon in Coastal Plain, rare in FL). April-early June. ME west to MN, south to Panhandle FL (Jackson County), GA, and TX. In addition to the widespread var. **pulchellus**, and the Alleghenian var. **brauniae**. **E. pulchellus** has an additional local variety, var. tolsteadii Cronquist, of se. MN. [= C, FNA, G, K, SE, WV; < E. pulchellus – Rab, GW, S, WH, WH]

**Erigeron quercifolius** Lamarck, Oak-leaved Fleabane. Cp (FL, GA, NC, SC, VA): sandy roadsides, disturbed areas; common, rare in VA. April-June. Se. VA south to s. FL, west to TX, north in the interior to TN; Bahamas. [= Rab, C, F, FNA, G, K, SE, WH]

**Erigeron strigosus** Michaux ex Willdenow var. **calcicola** J. Allison, Cedar Glade Daisy Fleabane. Mt (GA): limestone glades; rare. (April-) May-October. Central basin of TN (Allison & Stevens 2001), nw. GA (GANHP) and n. AL. [= FNA, Z]


**Erigeron tenius** Torrey & A. Gray, Midwestern Fleabane. Cp (FL): disturbed areas; rare. FL Panhandle (Okaloosa County) and AL west to KS, OK, and TX. Reported for w. NC (Nesom 1980); but later discounted (Nesom in FNA 2006b). Mid March-May (sporadically later). [= FNA, K, SE, WH]


**Erigeron procumbens** (Houstoun ex Miller) Nesom, Corpus Christi Fleabane. Moist to dry coastal areas, including marsh edges. S. MS (?), LA, TX, Tamaulipas, Veracruz. [= FNA, K; < E. myriacanthus Small – S, SE]

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**Erigeron strigosus** var. **septentrionalis** Boivin may have more merit. [FNA, K; = FNA, K; < FNA, K; < E. myriacanthus Small – S, SE]
**Eupatorion Linnaeus 1753** (Eupatorium, Thoroughwort, Dog-fennel)

A genus of about 40 species, herbs, of e. North America and Eurasia (after the exclusion of Ageratina, Chromolaena, Conoclinium, Eutrochium, Fleischmannia, and other genera). I have differed considerably from Cronquist's treatments, as for example in SE, regarding the rank at which to recognize taxonomic entities in *Eupatorium*. In the Southeastern United States, *Eupatorium is* a reticulately evolved complex, including diploids, triploids, and tetraploids; derivatives of hybridization produce sterile pollen but in some cases reproduce vigorously via agamospermous production of seeds. In some cases, these entities form separate populations from their presumed parental species, with distinctive ranges and habitats and more-or-less distinctive morphology. Cronquist treats morphologically highly distinctive entities, such as *E. pinnatifidum*, as full species, while stating that they are "not long-persistent." He treats morphologically more subtle entities as varieties of one of the two presumed parental species, such as *E. album* var. *vaseyi* ("very probably derived by hybridization of *E. album* var. *album* and *E. sessilifolium*"). Other entities, difficult to distinguish morphologically from another species, he does not recognize, as for example *E. saltuense*, included as a synonym under *E. altissimum* ("*E. saltuense* may reflect hybridization between *E. altissimum* and some other species such as *E. album*, or possibly between *E. hyssopifolium* and *E. album*").

A species concept that stresses ecological, biological, and distributional independence seems preferable. When plants of a putative hybrid occur in substantial populations, reproducing independently of one or both alleged parents, and in geographically and/or ecologically distinctive situations they should be treated as a separate species. Only field observations and studies can provide the necessary information. I have seen no evidence that *E. pinnatifidum* (though morphologically strikingly distinctive) occurs independent of its parents; thus I treat it as a hybrid (see below). *E. vaseyi* regularly occurs without one or both of its presumed parents, forms fertile achenes, occurs in large populations, and (in NC) is distributionally more limited than its presumed parents (Sullivan 1978). Biologically, it is best treated as an allopolyploid species; its treatment as a variety leads to conceptual and nomenclatural problems (reflected in the synonymy above): of which species should it be a variety? Sullivan (1978) considered that *E. saltuense* was derived from hybridization of *E. album* and *E. lecheifolium* (= *hyssopifolium*), but found it to be a triploid, growing in association with triploid (and pollen-sterile) *Conoclinium, Eutrochium, Fleischmannia* (and other genera).  I have differed considerably from Cronquist's treatments, as for example in SE, regarding the rank at which to recognize taxonomic entities in *Eupatorium*. In the Southeastern United States, *Eupatorium is* a reticulately evolved complex, including diploids, triploids, and tetraploids; derivatives of hybridization produce sterile pollen but in some cases reproduce vigorously via agamospermous production of seeds. In some cases, these entities form separate populations from their presumed parental species, with distinctive ranges and habitats and more-or-less distinctive morphology. Cronquist treats morphologically highly distinctive entities, such as *E. pinnatifidum*, as full species, while stating that they are "not long-persistent." He treats morphologically more subtle entities as varieties of one of the two presumed parental species, such as *E. album* var. *vaseyi* ("very probably derived by hybridization of *E. album* var. *album* and *E. sessilifolium*"). Other entities, difficult to distinguish morphologically from another species, he does not recognize, as for example *E. saltuense*, included as a synonym under *E. altissimum* ("*E. saltuense* may reflect hybridization between *E. altissimum* and some other species such as *E. album*, or possibly between *E. hyssopifolium* and *E. album*").

### Key A – leaves pinnatifid or pinnate into linear or capillary segments (Dog-fennel)

| 1 | Leaves generally in whorls of 3-7 (very rarely all of them opposite), most of them > 2 cm wide; involucre 6.5-9 mm high, the flowers pale pink to purple.................................................................[see Eutrochium] |
| 2 | Leaves pinnate or pinnatifid, divided into linear or capillary segments, 0-5 mm wide.................................................................Key A |
| 3 | Leaves simple. |
| 4 | Leaves long-petiolate, the petioles of larger leaves > 10 mm long. |
| 5 | Leaf blades deltate or rhombic, held vertically; [of FL]....................................................................................................................E. mikanoides |
| 5 | Leaf blades lanceolate, held horizontally; [widespread]....................................................................................................................E. serotinum |
| 4 | Leaves sessile or short-petiolate, the petioles < 9 mm long. |
| 6 | Florets (3-)5 (-7) per head.........................................................................................................................................................E. perfoliatum |
| 7 | Leaf bases fused.............................................................................................................................................................................Key B |
| 7 | Leaf bases tapering to a cuneate base............................................................................................................................................E. resinosum |

### Key B

| 1 | Stem glabrous throughout, or short-pubescent in the lower portion only; inflorescence paniculate, the panicle branches recurved, the heads secondarily arranged....................................................................................................................................................E. leptophyllum |
| 2 | Leaves bright green, glabrous, sparsely glandular-punctate, segments of the basal leaves 1-1.5 mm wide, segments of the upper leaves 0.2-0.5 mm wide ....................................................................................................................................................E. capitellifolium |
| 2 | Leaves grayish-green, pubescent, densely glandular-punctate, segments of the basal leaves 2-5 mm wide, segments of the upper leaves 1-2.5 mm wide........................................................................................................................................E. compositifolium |
1 Phyllaries acuminate to attenuate.

2 Larger leaves 0.2-1.3 cm wide; stems puberulent; involucre 3.5-7 mm high.

3 Rhizome absent to < 2 cm long; leaves usually reflexed-spreading to spreading-ascending, the larger (5-) 6-13 mm wide; leaf margins and surfaces moderately to densely strigose; involucre 5-8 mm long; pappus (3.3-) 3.9-5.0 mm long; corolla:pappus length ratio 0.63-0.89; mature achene 2.2-3.5 mm long. ......................................................... 

4 Leaves with few or no resin-glands; phyllaries glabrous, lacking resin-glands; [of the Coastal Plain of GA, Panhandle FL, AL, and MS] .......................................................... E. petalotium

5 Leaves 3-nerved from the base; leaves 4-7 cm long, 10-20 mm wide; [of DC, DE, NJ, and NY] ........................ E. album var. subvenosum

6 Leaves pubescent, the pubescence short to long; phyllaries generally attenuate (rarely acuminate); leaves (2.5-) 3-6× as long as wide; leaf apices obtuse; teeth obtuse or rounded ......................................................... E. album var. album

7 Leaf bases broadly cuneate, truncate, or subcordate, the leaves generally distinctly convex-curved near the base.

8 Leaves (2.5-) 3-6 (-7)× as long as wide; plants glabrous below the inflorescence.

9 Leaves subopposite, the larger ones 8-18 cm long, 3-6 cm wide, averaging about 3× as long as wide. ................................................................................................................. E. sessilifolium var. brittonianum

10 Leaves pinnately veined .......................................................................................................................... E. godfreyanum

11 Leaves averaging (1.5) 2-2.5× as long as wide, usually with a purple border; upper leaves and main inflorescence branches usually alternate ............................................................................................................. E. pilosum

12 Leaf base broadly rounded, cordate-clasping; leaves very densely pubescent, the pubescence often harsh; larger leaves usually 4-10 cm long; principal pair of lateral veins diverging from the midrib 2-10 mm above the base of the leaf; tooting of leaf often irregular and coarse ............................................................................................................. E. cordigerum

13 Leaves mostly 1-1.5 (-1.7)× as long as wide, tending to be obtuse (the apex usually 90º or more), the teeth generally rounded (the 2 sides of each tooth usually distinctly convex-curved, the end of the tooth therefore rounded), the principal pair of lateral veins diverging directly from the base of the midrib ......................................................... E. rotundifolium

14 Leaves broadly cuneate to broadly rounded, thin in texture, the pubescence rather soft and long (and also often sparse), the leaf blade not twisted at base, not borne in a vertical plane, up to 10 cm long and 6.5 cm wide ......... E. pubescens

15 Plants from conspicuously tuberous-thickened (ca. 1 cm in diameter) horizontal rhizomes; leaves deflexed, spreading, or ascending.

16 Leaves 15-30 mm wide, spreading or ascending. ............................................................................................................. E. anomalum

17 Leaves 2-12 mm wide, deflexed to erect-ascending.

18 Stems 3-6 (-7) dm tall, often erectly branching from near the base; involucres 3-4 mm high, the bracts with rounded apices ................................................................. E. recurvans

19 Leaves distinctly cuneate, firm in texture, the pubescence rather harsh and short, the leaf blade twisted at the base, thus borne in a vertical plane, up to 5.5 cm long and 3 cm wide ............................................................... E. scabridum

20 Plants generally simple below the middle, the axillary shoots of the lower nodes not elongating (except in response to injury of the main stem); leaves 3-12 cm long, lanceolate or linear.

21 Leaves mostly 6-40× as long as wide, the larger ones usually < 10 mm wide, ranging from 1-12 mm wide, whorled or opposite (rarely alternate above).
22 Leaves linear to narrowly lanceolate, the principal leaves 2-7 cm long, 1-5 mm wide, 10-40× as long as wide, entire. 
23 Involucre 2.5-4 mm high; leaves obtuse to acute, elliptic to elliptic-oblanceolate, the 2 main lateral veins separating from the midrib about 1 cm above the base; leaves commonly 3 per node ............... E. semiseratrum
24 Leaves 3-5 cm long, 5-13 mm wide; leaf surfaces generally glabrous; [of AL westward] .........................[E. lancifolium]
25 Leaves 5-12 cm long, 5-20 mm wide; leaf surfaces short or long puberulent; [widespread] .......................
26 Leaf surfaces glandular-punctate, densely puberulent on the surfaces and veins, the hairs fairly long and curling or twisted (as seen with at least 10× magnification); stem densely puberulent; leaves entire to serrate, the teeth varying from obscure to sharp, generally about 1 mm long (measured on the side toward the leaf apex), rarely to 3 mm long, generally forward-pointing; leaves acuminate to acute, the terminal portion not strongly attenuated, and about as likely to have teeth as the rest of the margin .......................................................... E. altissimum
27 Leaf surfaces densely glandular-punctate, sparsely puberulent (mainly on the veins), the hairs short; stem sparsely puberulent; leaves serrate to pinnatifid, the teeth often 1-5 mm long (measured on the side toward the leaf apex), often salient or divergent; leaves attenuate-acuminate, the terminal 1/3 extended and generally entire ......................E. saltuense

Eupatorium album Linnaeus var. album. White-bracted Thoroughwort. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): dry woodlands; common (rare in Mountains, uncommon in Piedmont). Late June-September. CT, NY, OH, and TN, south to FL and LA. Var. glandulosum is alleged to differ from var. album in having the involucres with copious dark glands (vs. glandless or nearly so). The distinction is dubious; variation seems essentially continuous in our area, with frequent intermediates, and there seems to be little correlation between morphology and habitat/range. [= FNA; < E. album – RAB, S, WH; < E. album var. album – C, K, SE, W (also see E. petaloideum); > E. album var. album – F, G, WV; > E. album var. glandulosum (Michaux) A.P. de Candolle – F, G, WV]

Eupatorium altissimum Linnaeus, Tall Thoroughwort. Pd (GA, NC, VA), Mt (GA, VA, WV), Cp (FL): woodlands, old fields, woodland borders, and openings over mafic rocks (such as diabase) or calcareous rocks (such as limestone and calcareous sandstone); common (uncommon in WV, rare south of VA, rare in Coastal Plain). Late August-October. CT, NY, QC, MN, and NE, south to Panhandle FL and TX, primarily in the midwest, especially on limestone substrates, and uncommon east of the mountains. [= RAB, F, G, S, W, WV; < E. altissimum – C, FNA, K, SE, WH (also see E. saltuense)]

Eupatorium anomalous Nash, Anomalous Eupatorium. Cp (FL, GA, NC, VA): moist savannas, moist interdune swales; rare. August-October. E. anomalous is believed to be a triploid and tetraploid, apomictic derivative of the hybrid E. mohrii × serotinum. Se. VA south to c. peninsular FL and west to s. AL. Inasmuch as it is now a separate lineage (as evidenced by a distinct distribution, more-or-less recognizable morphology, and phenologic separation), treatment as a separate taxon seems warranted. [= FNA, GW, K, SE; < E. recurvans – RAB; < E. anomalous – S (also see E. mohrii); = E. * anomalous – WH]

* Eupatorium cannabinum Linnaeus, Hemp-agrimony. Cp, Pd (VA): disturbed areas; rare, perhaps merely a waif or garden remnant, native of Europe. July-September. The documentation for VA is an 1899 specimen from Fairfax County and a record from Westmoreland County. [= FNA, K]


Eupatorium compositifolium Walter, Coastal Dog-fennel, Yankeweeds. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): sandy disturbed areas; common. September-December. S. VA, KY, and OK south to s. FL and TX. This species, like E. capillifolium, is an excellent indicator of soil disturbance. At its northern limit, in se. VA, this species occurs on riverbanks, in the seasonally exposed drawdown zone (Fleming & Ludwig 1996). [= RAB, FNA, GW, K, S, SE, W]
Eupatorium leptophyllum A.P. de Candolle, Limesink Dog-fennel. Cp (FL, GA, NC, SC): limesink depression ponds (dolines) in the outer Coastal Plain and clay-based Carolina bays in the inner Coastal Plain; common (rare in GA, NC, SC). September-November. A Southeastern Coastal Plain endemic, ranging from SE NC south to FL and west to s. GA and s. AL; also in the Bahamas and Cuba. [= E. capillifolium var. leptophyllum (A.P. de Candolle) Ahles – RAB]

Eupatorium leucoploes (A.P. de Candolle) Torrey & Gray, Savanna Eupatorium. Cp (DE, FL, GA, NC, SC, VA), Pd (VA), Mt (VA, WV): savannas, seepage bogs, depression ponds; common; uncommon in DE and VA, rare in Piedmont and Mountains. August-October. Primarily of the Southeastern Coastal Plain, ranging from NY south to n. peninsular FL, Panhandle FL, and west to LA; disjunct in Coffee County, TN (Chester, Wofford, & Kral 1997). This species is often confused with members of the E. recurvans-mohrii-anomalum complex. The following differences are useful: E. leucoploes has phyllaries acuminate to attenuate (vs. acute to obtuse), leaves of the uppermost 2-15 nodes below the inflorescence alternate, and leaves generally longitudinally folded (vs. generally planar). The plants formerly called E. leucoploes var. novae-angliae Fernald and endemic to freshwater ponds in MA and RI apparently represent a distinct allopolyploid species, E. novae-angliae (Fernald) V.I. Sullivan ex A. Haines & Sorrie, and should not be treated as a variety of E. leucoploes. [= W; = E. leucoploes var. leucoploes – C, F, G; < E. leucoploes – RAB, GW, S, SE, WH; < E. leucoploes var. leucoploes – FNA, K]

Eupatorium linearifolium Walter, Narrowleaf Bushy Eupatorium. Cp (FL, GA, NC, SC, VA): sandhills; uncommon. Late July-October. Se. VA south to FL and west to LA. The appropriate treatment of this taxon is unclear; it may be a derivative of the hybrid E. cuneifolium × hyssopifolium; it is more widespread than E. recurvans sensu stricto. Inasmuch as it is now a separate lineage (as evidenced by a distinct distribution, more-or-less recognizable morphology, and phenologic separation), treatment as a separate taxon seems warranted. [= GW; < E. recurvans – RAB, F, G (also see E. anomalum and E. recurvans); < E. mohrii – C, F, G, S, SE, WH (also see E. recurvans); < E. leucoploes; < E. leucoploes – FNA, K]

Eupatorium mikanioides Chapman, Semaphore Thoroughwort. Cp (FL): saline and brackish flats, seasonally ponded freshwater wetlands, wet flatwoods; rare. Endemic to FL, primarily in the peninsula, but also along the coast of the eastern Panhandle (Bay, Franklin, Gulf, Taylor, and Wakulla counties). July-September. [= FNA, GW, K, S, SE, WH]

Eupatorium mohrii Greene, Mohr's Eupatorium. Cp (FL, GA, NC, SC, VA): moist savannas, other wet habitats; common (uncommon in VA). August-October. Se. VA south to s. FL and west to TX. This is by far the most abundant of the E. recurvans-anomalum-mohrii complex in our area. Like E. anomalum, E. mohrii is believed to be a triploid and tetraploid, apomictic derivative of the hybrid E. recurvans × rotundifolium; it is more widespread than E. recurvans sensu stricto. Inasmuch as it is now a separate lineage (as evidenced by a distinct distribution, more-or-less recognizable morphology, and phenologic separation), treatment as a separate taxon seems warranted. [= GW; < E. recurvans – RAB, F, G (also see E. anomalum and E. recurvans); < E. mohrii – C, F, G, S, SE, WH (also see E. recurvans); < E. leucoploes; < E. leucoploes – FNA, K]


Eupatorium perfoliatum Linnaeus, Boneset. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA); marshes, swamps, bogs, wet pastures, and other wet habitats; common (uncommon in FL). August-October. NS west to MB, south to n. peninsular FL and TX. [= RAB, FNA, GW, G, WH, WV; = E. perfoliatum var. perfoliatum – C, F, G, K, S, SE; ? E. cuneatum Engelm. – S (actually a hybrid)]


Eupatorium pilosum Walter, Ragged Eupatorium. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): savannas, bogs, other moist areas; common (uncommon in Piedmont, rare in Mountains). August-October. MA south to c. peninsular FL, west to KY, c. TN, and MS. This species is clearly distinct; it should not be treated as a variety of E. rotundifolium. [= RAB, C, F, FNA, GW, K, WH, WV; = E. verbenaefolium Reichard – S; = E. rotundifolium var. saundersii (T.C. Porter) Cronquist – G, SE, W]

Eupatorium pubescens Muhlenberg ex Willdenow, Inland Roundleaf Eupatorium. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, NC, SC, VA): forests and woodlands, woodland edges, roadbanks; common (uncommon in Mountains, uncommon in Coastal Plain south of DE). July-September. The distribution, abundance, and phenology of E. pubescens in our area need additional study. Where growing together, E. pubescens apparently flowers about a month earlier than E. rotundifolium. Primarily in the Appalachians and adjacent provinces, ranging from ME south to n. GA and n. AL. This taxon appears to be a stabilized polyploid complex originating from hybridization of E. rotundifolium and (perhaps) E. sessilifolium; in that it now functions as a more-or-less independent evolutionary lineage, with distinctive morphology, habitat, and distribution, it is here treated as a species. [= F, WV; < E. rotundifolium var. ovatum (Bigelow) Torrey – RAB (also see E. corderi); = E. rotundifolium var. ovatum var. Bigelowii Torrey – C, FNA, G, K, S, W; < E. rotundifolium var. Bigelowii – GW; < E. pubescens – S (also see E. corderi); = E. rotundifolium Linnaeus sp. ovatum (Bigelow) Montgomery & Fairbrothers]

Eupatorium recurvans Small, Recurved Eupatorium. Cp (FL, GA, NC, SC): moist savannas; rare (NC Watch List). August-October. Se. NC south to GA and s. FL. The diploid sexual E. recurvans (sensu stricto) is rare in our area; GW gives its range as se. and sc. GA and FL. E. mohrii is believed to be a triploid and tetraploid, apomictic derivative of the hybrid E. recurvans × rotundifolium; it is more widespread. [= GW, S; < E. recurvans – RAB, WH (also see E. anomalum and E. mohrii); < E. mohrii – C, FNA, K, SE]

Eupatorium resinosum Torrey ex A.P. de Candolle, Resinous Boneset, Pinebarren Eupatorium. Cp (DE, NC, SC): seepage bogs, beaver ponds, frequently burned streamhead pocosins, in the Sandhills and inner Coastal Plain of sc. NC; rare. August-
October. A "bimodal endemic," known from the NJ, DE (formerly), and (formerly) NY, thence disjunct to the Sandhills and upper Coastal Plain of NC and SC. [= RAB, C, FNA, G, GW, K, SE; > E. resinosum var. resinosum – F]


**Eupatorium scabridum** Elliott, Roughleaf Eupatorium. Cp (FL, GA, SC): savannas, wet pinelands; uncommon. Late July-October. SC south to n. FL, west to AR, LA, and OK. This plant is believed to be an allopolyploid derivative of the hybrid *E. rotundifolium × semiserratum*. In some areas it apparently consists only of short-lived diploids, but in others (according to GW especially in SC, AR and LA) to occur as populations of polyploid amopics. It resembles *E. rotundifolium*, but has cuneate leaves with a less prominent pair of lateral veins, narrower leaves, and is more likely to have 3-whorled leaves (as *E. semiserratum* often does). [= GW, S; = E. rotundifolium var. scabridum (Elliott) A. Gray – FNA, K, SE; < E. rotundifolium – WH]

**Eupatorium semiserratum** A.P. de Candolle. Cp (FL, GA, NC, SC, VA): swamp forests, seepage bogs, savannas, clay-based Carolina bays, other wetlands; uncommon. Late July-October. Se. VA south to ne. FL, Panhandle FL, west to TX and AR; disjunct in sc. TN. This species often has 3 leaves per node; most similar species rarely or never have whorled leaves. [= RAB, C, FNA, G, GW, K, S, SE, WH; = E. cuneifolium var. semiserratum (A.P. de Candolle) Fernald & Griscom – F]

**Eupatorium serotinum** Michaux, Late Eupatorium. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): interdune swales, fields, open forests, powerline rights-of-way, tidal marshes, disturbed areas; common (uncommon in DE). Late August-October. MA, NY, MI, WI, MN, and NE south to s. FL, LA, and TX. This species was apparently largely or strictly coastal in our area, but has spread inland similarly to *Baccharis halimifolia*. [= RAB, C, F, FNA, G, GW, K, S, SE, WH, WH, WV]

**Eupatorium sessilifolium** Linnaeus var. brittonianum Porter, Britton's Eupatorium. Mt (NC, WV): circumboreal soils of woodlands at moderate elevations; rare. August; September. NH and MN, south to NJ, PA, MD, w. NC, KY, and MO. The only collection from NC known to me is from Cedar Cliff, Buncombe County, in 1897. I disagree with Cronquist's equation of this taxon with *E. godfreyanum*. [= F, K, WV; < E. sessilifolium var. sessilifolium – RAB; < E. sessilifolium – C, FNA, G, S, SE, W]

**Eupatorium sessile** Linnaeus var. sessile Eupatorium. Pd (DE, GA, NC, VA), Mt (GA, NC, VA, WV), Cp (DE, VA): open upland woodlands and woodland borders, especially calcareous or mafic; common (uncommon in VA Piedmont, rare in VA Coastal Plain, rare in DE). July-October. S. NH west to se. MN, south to n. GA, n. AL, n. MS, n. AR, and e. KS. Grubbs, Small, & Schilling (2009) discuss the genetics of *E. sessilifolium*; most of the species' distribution consists of agamospermous triploids, with sexual diploids only known from two disjunct areas of the southern Appalachians (w. VA, and W.NC-e. TN). There may be merit to the taxonomic recognition of the diploids and the triploids. [= F, K, WV; < E. sessilifolium var. sessilifolium – RAB (also see var. brittonianum); < E. sessilifolium – C, FNA, G, S, SE, W]

**Eupatorium vaseyi** T.C. Porter, Vasey's Eupatorium. Mt (GA, NC, VA, WV), Pd (NC, VA), Cp (DE): moist to dry woodlands and openings; uncommon (rare in upper Piedmont). July-October. MD, DE, and VA south to se. TN (Chester, Wofford, & Kral 1997), n. GA, and n. AL. This species is apparently a tetraploid derivative of *E. album × sessilifolium*. It is sometimes treated as a variety of *E. album*, but seems better regarded as a species of hybrid origin. [= E. album var. vaseyi – RAB, W (also see E. godfreyanum); = E. album var. vaseyi (T.C. Porter) Cronquist – C, FNA, SE; = E. album var. monardifolium (Fernald) – F; < E. vaseyi – G; = E. sessilifolium var. vaseyi (Porter) Fernald & Griscomb – K, WV, ? E. fernaldii Godfrey]

**Eupatorium album** Linnaeus var. subvenosum A. Gray. Cp (DE): pine barrens, open woodlands; rare. DC, DE, NJ, NY. July-September. [= C, F, FNA, K, SE; [add to synonymy]]

**Eupatorium lancefolium** (Torrey & A. Gray) Small. Prairies, open woodlands. AL west to s. AR and TX. [= FNA, GW, K, S, SE; = E. semisserratum A.P. de Candolle var. lancefolium (Torrey & A. Gray)

**Eupatorium × pinnatifidum** Elliott. E. VA south to Panhandle FL. It is variously considered a species (as by S), a species of hybrid origin (as by SE), or a hybrid (as by GW and K). The parents are variously listed as *E. capillifolium × pinnatifidum* (as by K) or *E. capillifolium × compositifolium × pinnatifidum* (as by GW and SE). I have seen the plant in Pender County, NC, where it appears to be a first-generation hybrid, growing with *E. capillifolium* and *E. pinnatifidum*. Until and unless additional evidence appears that it reproduces itself and exists in independent populations I am inclined to treat it as a hybrid rather than a species of hybrid origin. It is recognizable by its pinnatifid or bipinnatifid leaves (the segments broader than in the dog-fennel) and its corymbose-paniculate inflorescence. [= FNA, K, WH; = E. pinnatifidum Elliott – GW, S, SE]

**Eurybia** (Cassini) Cassini 1820 (Wood-aster)

1 Basal and lower cauline leaves both distinctly petiolate and with a cordate or subcordate blade; [subgenus Eurybia, section Eurybia].

2 Outer phyllaries squarrose-reflexed; rhizomes short or absent, the plants not forming extensive clonal colonies; [of rich slopes an

3 Involucre 10-11 (-13) mm tall; phyllaries 36-50, ovate, elliptic, or lanceolate, acute to acuminate at the apex, squarrose in life, often

4 Ray flowers white; branches of the inflorescence glandular-pubescent, often remaining so in dried specimens, the reflexed portion herbaceous with a narrow hyaline margin or none at all; ray florets (7-)

5 Plants with basal leaves on well-developed shoots separate from the flowering shoots; larger leaves with 15-30 teeth per side ............

6 Longest peduncle in inflorescence > 1.5 cm long; involucre 6.5-9 (-10) mm tall; ray florets (8-) 12-16 (-20), the ray portion (10-)

7 Leaves linear, up to about 10 mm wide; leaves strongly basally disposed.

8 Involucre flat-topped (corymbiform); [subgenus Heleastrum, section Heleastrum].

9 Pappus fine, the bristles not thickened above; ray florets 8-15 (-25); [of the Piedmont and low Mountains of GA, SC, and possibly sw.

10 Stem spreading-hairy throughout; ray florets 25-60, white or pinkish; disc florets; [ endemic of FL Panhandle and adjacent sw. GA];

11 Upper stem glabrous, upper stem variously hairy; ray florets 8-30, deep lavender or purple; [collectively widespread]

12 Leaves obviously veined beneath, usually toothed, hairy on the undersurface; [subgenus Eurybia, section Radulini].

13 Larger leaves > 4.0 cm wide; rays white to pale purple; [of the Cumberland Plateau of KY and n. TN] .......... E. saxicastelli

14 Ray florets 9-14; rays 5-15 mm long. .................................................................................................................. E. radula

15 Phyllaries glandular-pubescent on the back and also glandular-ciliate; involucre 8-16 mm high ......................... E. spectabilis

16 Involucre (10-) 11-13 mm tall; phyllaries 36-50, ovate, elliptic, or lanceolate, acute to acuminate at the apex, squarrose in life, often

17 Leaves broader, the largest on a plant over 15 m wide; leaves somewhat basally disposed, the lowermost sometimes withering before

18 Involucre (10-) 11-13 mm tall; phyllaries 36-50, ovate, elliptic, or lanceolate, acute to acuminate at the apex, squarrose in life, often

19 Plants without basal leaves on well-developed shoots separate from the flowering shoots; larger leaves with 5-20 teeth per side.

20 Longest peduncle in inflorescence < 1.5 cm long; involucre (3.5-) 4.2-6 (-7.5) mm tall; ray florets 5-10 (-12), the ray portion (5-)

21 Basal and lower cauline leaves not as above.


24 A diploid species (2n=18).  [= FNA, K, X; Eurybia chlorolepis (E.S. Burgess) Nesom, Blue Ridge White Heart-leaved Aster. Mt (GA, NC, SC, VA, WV?): northern hardwood forests, spruce-fir forests; common (rare in VA). August-October. A Southern Appalachian endemic: sw. VA south through w. NC and e. TN to nw. SC and n. GA (Lamboy 1992); also reported for scattered locations in WV (Harmon, Ford-Wernitz, & Graffon 2006). Lamboy (1992) has shown that Eurybia chlorolepis is a species distinct from Eurybia divaricata. E. chlorolepis is tetraploid (2n=36) and hexaploid (2n=54); E. divaricatus is diploid (2n=18). = FNA, K, X; = Aster chlorolepis E.S. Burgess – G, S, Y; = A. divaricatus Linnaeus var. chlorolepis (E.S. Burgess) Ahles – RAB, C, SE, W; < A. divaricatus – F, WV]

25 A diploid species (2n=18).  [= FNA, K, X; Eurybia divaricata (Linnaeus) Nesom, Common White Heart-leaved Aster. Mt (GA, NC, SC, VA, WV); Pd (DE, GA, NC, SC, VA), Cq (DE, NC, VA): moist to fairly dry forests and woodlands; common (uncommon in VA Coastal Plain, rare in DE Coastal Plain). August-October. N. NH west to s. ON, sw. QC, and n. OH, south to e. SC, n. GA, and c. AL. The many species described by Burgess and here treated as synonyms may deserve further assessment; see S for details. A diploid species (2n=18). = FNA, K, X; = Aster gracilis Nuttall – RAB, C, F, G, S, SE]

26 A diploid species (2n=18).  [= FNA, K, X; Eurybia surculosa (Linnaeus) Nesom, Blue Ridge White Heart-leaved Aster. Mt (GA, NC, SC, VA, WV): northern hardwood forests, spruce-fir forests; common (rare in VA). August-October. A Southern Appalachian endemic: sw. VA south through w. NC and e. TN to nw. SC and n. GA (Lamboy 1992); also reported for scattered locations in WV (Harmon, Ford-Wernitz, & Graffon 2006). Lamboy (1992) has shown that Eurybia chlorolepis is a species distinct from Eurybia divaricata. E. chlorolepis is tetraploid (2n=36) and hexaploid (2n=54); E. divaricatus is diploid (2n=18). = FNA, K, X; = Aster chlorolepis E.S. Burgess – G, S, Y; = A. divaricatus Linnaeus var. chlorolepis (E.S. Burgess) Ahles – RAB, C, SE, W; < A. divaricatus – F, WV]

27 A diploid species (2n=18).  [= FNA, K, X; = Aster avitus Alexander – SE, W]

ASTERACEAE

909


Eurybia macrophylla (Linnaeus) Cassini, Big-leaved Aster. Mt (GA, NC, SC, VA, WV), Pd (VA): moist to dry forests, in NC mostly at moderate to high elevations, particularly in red oak forests on ridgetops; common (uncommon in Piedmont). Late July-September. NB and QC west to MN, south to PA, MD, VA, NC, ne. GA, e. TN, and IN. Aster macrophyllus var. ianthinus [= Aster multiformis] is sometimes recognized. It is alleged to differ in having the stipitate glands of the pedicels with minute heads (vs. broadly capitate), the leaves thin in texture and only slightly sebaceous (vs. thick in texture and strongly sebaceous). Many other varieties have been recognized by Fernald (1950); see F for a key. E. macrophylla is octoploid (2n=72). [= FNA, K, X; = Aster macrophylla Linnaeus – RAB, C, G, SE, W, Y; > Aster macrophylla var. macrophylla – F, WV; > A. macrophyllus var. ianthinus (E.S. Burgess) Fernald – F, WV; > A. macrophyllus var. pinquifolius E.S. Burgess – F; > A. macrophyllus var. pinquifolius E.S. Burgess – WV, missspelling; > A. macrophyllus var. excelsior E.S. Burgess – F, WV; > A. macrophyllus var. velutinus E.S. Burgess – F, WV; > A. macrophyllus var. sejunctus E.S. Burgess – F; > A. macrophyllus var. apriecensis Fernald – F; > A. macrophyllus – S; > A. multiflorus E.S. Burgess – S; > A. viciniatus E.S. Burgess – S]


Eurybia schreberi (Nees) Nees, Schreber's Aster. Mt (VA, WV), Pd (DE, VA): mesic forests and seepage slopes; uncommon (rare in DE). Late June-October. NH west to WI, south to DE, MD, sc. and w. VA, ne. TN (Chester, Wofford, & Kral 1997), AL, and KY. E. schreberi is hexaploid (2n=54). [= FNA, K, X; = Aster schreberi Nees – C, G, SE, W, Y; > A. schreberi – F; > A. glomeratus (Bernhart ex Nees) E.S. Burgess – F]


Euthania (Nutall) Cassini 1825 (Flat-topped Goldenrod)


1 Leaves with numerous slightly raised, pale, translucent, blister-like pustules; leaves transmit light when held up; plant glabrous

2 Major veins on leaf underside 3-5 (if 3 then all 3 veins bold), leaves 5-12 mm wide; heads with 20-50 flowers.

3 Leaves 3-6 (8) mm wide, pectae on leaf upper side bold, flower heads 10-20 flowered

4 Leaf undersides, upper stems, and branches glabrate, often with villous hairs or midrib of leaf underside

5 E. graminifolia var. graminifolia
*Euthamia caroliniana* (Linnaeus) Greene ex Porter & Britton. Cp (DE, FL, GA, NC, SC, VA), Pd (VA), Mt (VA): pine savannas, moist forests, ditches, pastures, disturbed areas; common. September-December. S. ME south to FL and west to se. LA, mainly on the Coastal Plain, extending somewhat into the Piedmont in places (reports from further north or further west are mased on misidentifications or on broader circumscriptions of the taxon). [= FNA, K, WH, V, X; > *Solidago microcephala* (Nuttall) Bush – RAB, F, G; > *Solidago tenuifolia* Pursh – RAB; > *E. tenuifolia* var. *tenuifolia* – C; > *Solidago tenuifolia var. tenuifolia* – F; > *Solidago tenuifolia var. tenuifolia* – G; < *E. tenuifolia* – GW (also see *E. hirtipes*); > *E. minor* (Michaux) Greene - GW, SE; = E. minor – S; > *E. tenuifolia* (Pursh) Nuttall – SE; = E. tenuifolia – W, Z]  

*Euthamia graminifolia* (Linnaeus) Nuttall var. *graminifolia*. Mt (VA, WV), Pd (DE, VA), Cp (DE, SC*, VA): moist to dry weedy situations, riverbanks, bottomlands, bog margins; common (rare in SC). August-September. NL (Newfoundland) and ND south to MD, c. VA, WV, n. KY, TN, and e. IA; a SC Coastal Plain report (Hill & Horn 1997) is probably an introduction. Also introduced on the Gulf Coast (LA and MS?). [= C, V, X, Y, Z; < *E. graminifolia* – S, SE; W; < *Solidago graminifolia* (Linnaeus) Salisbury – RAB; < *Euthamia graminifolia* – FNA; > *Solidago graminifolia* var. *polypephala* Fernald – F; > *S. graminifolia* var. *graminifolia* – F, G; < *E. graminifolia* var. *graminifolia* – K]  

*Euthamia graminifolia* (Linnaeus) Nuttall var. *nuttallii* (Greene) W. Stone. Mt (NC, VA, WV), Pd (DE, VA), Cp (DE, SC*, VA): moist to dry weedy situations, riverbanks, bottomlands, bog margins; common (rare in NC and SC). August-September. NL (Newfoundland) south to se. VA, w.NC, KY, nw. TN and MO. Also introduced on the Gulf Coast (LA and MS?). [= C, V, X, Y, Z; < *E. graminifolia* – S, SE; W; < *Solidago graminifolia* (Linnaeus) Salisbury – RAB; < *Euthamia graminifolia* – FNA; = *S. graminifolia* var. *nuttallii* (Greene) Fernald – F, G; < *E. graminifolia* var. *graminifolia* – K]  

*Euthamia hirtipes* (Fernald) Sieren, Marsh Flat-topped Goldenrod. Cp (DE, FL, GA, NC, SC, VA): brackish marshes, salt marshes, marsh edges, wet hammocks; uncommon (rare in VA). September-December. S. NJ and DE south to c. peninsular FL, west to c. AL. *E. hirtipes* has been variously treated: considered by Fernald to be a hybrid of "*minor*" and "*graminifolia var. nuttallii*" by Sieren to be a species endemic to NC, SC, and VA, by Taylor and Taylor (1983) to be a variety of *E. graminifolia* ranging from se. VA south to FL and west to se. LA, mainly on the Coastal Plain, extending somewhat into the Piedmont in places (reports from further north or further west are mased on misidentifications or on broader circumscriptions of the taxon). [= FNA, K, WH, V, X; > *Solidago microcephala* (Nuttall) Bush – RAB, F, G; > *Solidago tenuifolia* Pursh – RAB; > *E. tenuifolia* var. *microcephala* Nuttall – C; > *E. tenuifolia* var. *tenuifolia* – C; > *Solidago tenuifolia var. tenuifolia* – F; > *Solidago tenuifolia var. tenuifolia* – G; < *E. tenuifolia* – GW (also see *E. hirtipes*); > *E. minor* (Michaux) Greene - GW, SE; = E. minor – S; > *E. tenuifolia* (Pursh) Nuttall – SE; = E. tenuifolia – W, Z]  

*Euthamia graminifolia* var. *minor* (Greene) C. & J. Taylor – K, WH, X, Y]  

*Euthamia leptochephalia* (Torrey & A. Gray) Greene. Mt (GA), Pd (GA): fields, pastures, roadsides, prairies, savannas; uncommon. KY, IL, MO, and OK south to nw. GA (Floyd and Heard counties), AL, and TX. [= C, FNA, GW, K, S, SE, V, Z; = *Solidago leptochephalia* Torrey & A. Gray – F, G]  

*Euthamia gymnosperrmoides* Greene, Texas Goldentop. Prairies, roadsides, and light woodlands. MI, nw. MN, and e. ND south to c. IN, sw. KY (Graves Co), w. TN (Hardeman, Lawrence counties), ec. and c. AR, ne. TX, w. OK, and e. CO.; disjunct in Coffee Co. TN. [= FNA, K, SE, V, Z; < *Solidago gymnosperrmoides* (Greene) Fernald – F, G]  

*Eutrochium* Rafinesque 1838 (Joe-pye-weed)  


1 Florets (4-) 6-9 (12) per head; leaves more or less 3-nerved from the base, rather abruptly contracted to the short petiole, thick in texture, 5-12 (15) cm long, strongly resin-dotted beneath; leaves in whorls of (2-) avg. 3-4 (5); stem generally purple-speckled (sometimes uniformly purple); [primarily of the Coastal Plain]………………………………………………………………………………………………………………………………………..*E. dubbium*  

2 Florets either (8-) 9-22 or 4-7 per head; leaves generally pinnately veined (rarely with a tendency to be 3-nerved), usually cuneate and less abruptly contracted to the petiole, thick or thin in texture, 6-35 cm long, weakly or not at all resin-dotted beneath (except often strongly resin-dotted in *E. maculatum*); leaves in whorls of (2-) 3-7; stem purple-speckled, purple at the nodes, purple throughout, or green; [collectively widespread in our area]  

2 Florets (8-) 9-22 per head; leaves mostly in whorls of (3-) avg. 4-5 (6), 6-20 cm long; inflorescence more or less flat-topped; stem usually speckled with purple (rarely evenly purplish) ………………………………………………………………………………….*E. maculatum* var. *maculatum*  

2 Florets 4-7 per head; leaves in whorls of (2-) 3-7, 8-35 cm long; inflorescence rounded; stem usually purple throughout, purple at the nodes, or lacking purplish pigment.  

3 Stem hollow (with a large central cavity), purple throughout, strongly glaucous when fresh; flowers bright pink-purple; leaves in whorls of (3-) avg. 5 (7); leaves mostly 3.5-5.5× as long as broad………………………………………………………………………………………………………………………………………..*E. fistulosum*  

3 Stem solid (rarely with a slender central cavity), dark purple at the nodes or greenish purple throughout, not glaucous or only slightly so when fresh; flowers pale pink-purple; leaves in whorls of (2-) avg. 3-4 (5); leaves mostly 2.4× as long as broad.  

4 Stem persistently glandular-pubescent throughout; lower surface of leaves glandular-pubescent; leaves mostly 2.2-2.5× as long as wide; stem greenish-purple (or even purple); [of the Mountains] ……………………………………………………………………………………………………………………………………………………..*E. stelei*


Eutrochium purpureum (Linnaeus) E.E. Lamont var. purpureum, Purple-node Joe-pye-weed. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (FL, DE, GA, NC, SC, VA): upland, usually mesic forests; common (rare in Coastal Plain, uncommon in DE Piedmont). July-October. NH west to s. ME, MA, and e. NE, south to SC, GA, Panhandle FL, n. LA, and e. OK; var. holzingeri (Rydberg) E.E. Lamont, differing in having the lower leaf surface densely and persistently pubescent (vs. glabrous or nearly so) is found in the Midwest (Lamont 1990). Eupatorium purpureum var. amoenum is smaller, more slender, with narrower leaves which are nearly glabrous below; it is probably only a form. [<< Eutrochium purpureum var. purpureum – FNA, X; < Eupatorium purpureum Linnaeus var. purpureum – K, Z; < E. purpureum – RAB, C, F, SE, W, WH; < Eupatorium purpureum var. purpureum – G, WV; < Eupatorium trifoliatum Linnaeus – S]  

Eutrochium steelei (E.E. Lamont) E.E. Lamont, Appalachian Joe-pye-weed, Steele's Joe-pye-weed. Mt (NC, VA): cove hardwood and northern hardwood forests, up to at least 1600 m; uncommon. July-October. A Southern Appalachian endemic: c. KY and w. VA south w. NC and e. TN. [= FNA, X; = Eupatoriadelphus steelei (E. Lamont) G.J. Schmidt & Schilling – Y; = Eupatorium steelei E.E. Lamont – Z]  

Facelis Cassini 1819  


Filago Linnaeus 1753 (Cotton-rose, Herba Impia, Rabbit-tobacco)  


1 Inner flowers of the head with a well-developed capillary pappus; heads woolly, but not so densely and completely as to hide the phyllaries...  

1 All flowers of the head lacking a pappus of capillary bristles; heads completely surrounded by wool, the phyllaries hidden......[see Diaperia]  


Flaveria de Jussieu 1789
A genus of about 21 species, herbs and subshrubs, subcosmopolitan in tropical and subtropical areas. References: Yarborough & Powell in FNA (2006c); Cronquist (1980)=SE.

1 Heads borne in axillary glomerules; disc florets 0-1 (-2) .................................................................F. trinervia
1 Heads borne in terminal arrays; disc florets (2-) 3-8.
2 Lower leaves petiolate, 10-25 (-70) mm wide; annual; cypselas 2.0-2.5+ mm long ...........................................F. bidentis
2 Lower leaves sessile, 1-4 (-15) mm wide; perennial; cypselas 1.2-1.8 mm long ................................................F. linearis

* Flavia bidentis (Linnaeus) Kuntze. Cp (FL, GA): disturbed areas; rare, native of tropical America. FL Panhandle, s. FL, AL, GA. [= FNA, K, S, SE, WH]


* Flavia trinervia (Sprengel) C. Mohr, Clustered Yellowtops. Cp (SC, VA): waste areas around wool-combing mill, ore piles, seaport ballast; rare, probably only a waif, introduced from sw. United States (Nesom 2004d). March-December. Also known from ballast at Mobile, AL (Cronquist 1980). [= FNA, K, S, SE, WH]

Fleischmannia Schultz ‘Bipontinus’ 1850


Fleischmannia incarnata (Walter) King & H.E. Robinson, Pink Thoroughwort, Pink Eupatorium. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (FL, GA, NC, SC, VA): nutrient-rich, moist to dry, forests and woodlands over diabase, limestone, coquina limestone, or other basic rocks, or on rich alluvium; rare. Late August-October. Se. VA west to WV, s. OH, s. IN, s. IL, s. MO, and e. OK, south to w. peninsular FL, Panhandle FL, s. TX, and e. Mexico, the distribution fragmented. See Wooten & Clewell (1971) for further information about this species. [= FNA, KH, Z; = Eupatorium incarnatum Walter – RAB, C, F, G, S, SE, W, WV]

Gaillardia Fougeroux 1786 (Blanket-flower, Gaillardia, Fire-wheels)


1 Receptacle naked, lacking well-developed setae (if setae present, < 1 mm long) ...........................................G. aestivalis var. aestivalis
1 Receptacle with well-developed setae 2-3 mm long.
2 Leaves fleshy; perennial or annual, strongly branching, the secondary branches spreading and therefore forming compact, rounded “bushes” .................................................................G. pulchella var. drummondii
2 Leaves herbaceous; annual, with secondary branches ascending .................................................................G. pulchella var. pulchella


Galinsoga Ruiz & Pavón 1794 (Peruvian-daisy, Quickweed)

A genus of about 13 species, herbs, of temperate and subtropical Central America and South America. References: Canne-Hilliker in FNA (2006c); Cronquist (1980)=SE.

1 Rays 0-1.5 (-2) mm long, lacking pappus scales (or with vestigial scales); outer phyllaries 2-4, with scarious margins; inner paleae deeply 3-lobed; pappus scales of the disc florets not awn-tipped; stem usually glabrous or sparsely pubescent with appressed (rarely spreading) hairs; gland-tipped hairs of the peduncles < 0.5 mm long; teeth of leaf margins usually well developed, acute .........................................................G. parviflora var. parviflora
1 Rays 2-3 mm long, with pappus scales about as long as the corolla tube; outer phyllaries 1-2, with green herbaceous margins; inner paleae usually entire; pappus scales of the disc florets awn-tipped; stem usually moderately pubescent with long, spreading hairs; gland-tipped hairs of the peduncles > 0.5 mm long; teeth of leaf margins usually well developed, acute ...........................................................................G. quadriradiata


**Gamochaeta** Weddell 1856 (Cudweed, Everlasting)


1 Leaves concolored or weakly bicolored (abaxial and adaxial faces more or less equally greenish to gray-greenish, indument usually loosely tomentose or arachnose, sometimes subpamnose).

2 Blades of basal and lower cauline leaves 4-16 mm wide; bracts among the inflorescence heads spatulate to oblanceolate, the lowermost (at least) surpassing the heads...............................................................................................................................................................

3 Involucres 2.5-3 mm high, seated in tomentum; capitulescence initially cylindric and uninterrupted, at least distally, the main axis obscured by clustered heads; phyllaries in 3-4 (-5) series, the outer and middle ovate-lanceolate with narrowly to broadly acute apices, the outer 1/3-½ as long as the inner, none with purplish color; flowering May-July .............................................................

4 Basal and proximal cauline leaves present or not at anthesis; stems erect or ascending; plants (30-) 50-85 cm; apices of inner phyllaries acute-acuminate; flowering mostly July-August ....... *G. simplicicaulis* 

5 Upper leaf surfaces glabrous or glabrate; involucres 2.5-3.0 mm high, more-or-less purplish, the bases glabrous; outer phyllaries elliptic-obovate to broadly ovate-elliptic, apices rounded to obtuse; bisexual florets 2-3 ...............................................................................................................................

6 Stems not pinnate (indument whitish, like closely appressed, polished cloth, hairs not individually evident); involucres 3.0-3.5(-4.0) mm high; apices of inner phyllaries acute to acute-acuminate; bisexual florets 2-4; cypselae purple ........................................ *G. chionothes* 

7 Blades of cauline leaves oblongate to oblong-oblong or oblongate-obovate; involucres 3.0-3.5 mm high; laminae of inner phyllaries elliptic-oblong to oblong, apices truncate-rounded or obtuse and apiculate; bisexual florets (3-) 4-6; plants usually fibrous-rooted, rarely taprooted ........................................................................................................... *G. argyrinea* 

8 Blades of cauline leaves oblongate to spatulate (basal cells of hairs on adaxial faces persistent, expanded, glassy); involucres 4.0-4.5 mm high; laminae of inner phyllaries triangular, apices acute (not apiculate); bisexual florets 3-4; plants fibrous-rooted or taprooted ........................................................................................................... *G. purpurea*
Zealand (introduced). [= FNA, X; < Gamochaeta falcatula (Lamarck) Cabrera – K, Z; < Gnaphalium purpureum Linnaeus var. falcatum (Lamarck) Torrey & A. Gray – RAB, C, G, SE; < Gnaphalium calviceps Fernald – F; < Gnaphalium falcatum Lamarck – S; < Gnaphalium purpureum Linnaeus – W]  
* Gamochaeta pensylvanica * (Willdenow) Cabrera, Pennsylvania Everlasting. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA?, NC): fields, roadsides, pastures, disturbed areas; common, probably native of South America. March-July. PA south to s. FL, west to TX, mostly on the Coastal Plain, and widespread in South America and elsewhere. [= FNA, K, WH, X, Z; > < Gnaphalium purpureum Linnaeus var. spathulatum (Lamarck) Baker – RAB; < Gnaphalium purpureum Linnaeus var. purpureum – C, G, SE; > < Gnaphalium peregrinum Fernald – F; > < Gnaphalium spathulatum Lamarck – S; > < Gnaphalium purpureum Linnaeus – W]  
* Gamochaeta purpurea * (Linnaeus) Cabrera, Spoonleaf Purple Everlasting. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA, WV): fields, roadsides, pastures, disturbed areas; common. Late March-September. ME west to MI, south to s. FL and e. TX; apparently disjunct in CA and OR, adventive in w. US, Mexico, South America, and elsewhere. [= FNA, WH, X; < Gamochaeta purpurea (Linnaeus) Cabrera – K, Y, Z; < Gnaphalium purpureum Linnaeus var. purpureum – RAB, C, G, SE; < Gnaphalium purpureum Linnaeus – F, S, W, WV]  

*Garberia* A. Gray 1879 *(Garberia)*  

A monotypic genus, a shrub, of peninsular FL. References: Lamont in FNA (2006c).  


*Glebionis* Cassini 1826 *(Chrysanthemum)*  


1 Leaf blades 2-3-pinnate; rays pale yellow, 15-25 mm long ................................................................................................................. <G. coronaria>  
1 Leaf blades not lobed or coarsely 1-pinnate; rays golden yellow, 8-20 mm long................................................................. <G. segetum>  

*Glebionis coronaria* *(Linnaeus) Cassini ex Spach, Garland Chrysanthemum, Crown-daisy. Cp (FL), {NC, SC}: disturbed areas; rare, native of Eurasia, cultivated and escapes and occurs as waifs in our area. [= FNA, WH; = Chrysanthemum coronarium Linnaeus – K, Z]  
*Glebionis segetum* *(Linnaeus) Fourreau, Corn Marigold, Corn Chrysanthemum. Pd (NC): disturbed areas, trash heaps, field edges; commonly cultivated, rarely escaped, persistent, or as a waif, native of Eurasia. April-May. [= FNA; = Chrysanthemum segetum Linnaeus – RAB, C; F, G, K, S, SE]  

*Gnaphalium* Linnaeus 1753 *(Cudweed, Rabbit Tobacco)*  

A genus of about 40 species (as recircumscribed more narrowly), distributed on most continents. References: Nesom in FNA (2006a); Anderberg (1991)=Z. [also see Gamochaeta and Pseudognaphalium]  

1 Involucre 2-3 mm high; plants to 2.5 dm tall; inflorescence of many, small, axillary and terminal clusters overtopped by subtending leaves.....  
1 Involucre 4-7 mm high; plants generally well over 2.5 dm tall; inflorescence terminal, usually elongate ................. <see Pseudognaphalium>  

*Gnaphalium uliginosum* Linnaeus, Low Cudweed. Mt (VA, WV), Cp* (DE*), Pd* (DE*): high elevation openings, especially in ruts or mud-puddles, rocky places; rare, possibly introduced in North America. July-October. NL (Newfoundland) west to BC, south to VA, WV, OH, IN, MN, CO, UT, and OR. [= C, F, FNA, G, K, S, SE, WV, Z]  

*Grindelia* Willdenow 1807 *(Gum-plant, Tarweed, Rosinweed, Gumweed)*
A genus of about 55 species, herbs and shrubs, of w. North America and South America. References: Strother & Wetter in FNA (2006b); Cronquist (1980)=SE.

1 Phyllaries loose (but not squarrose), only slightly imbricate ............................................. \textit{G. lanceolata} var. \textit{lanceolata}
1 Phyllaries squarrose-reflexed, strongly imbricate................................................................. \textit{G. squarrosa} var. \textit{squarrosa}

\textbf{Grindelia} Cassini in Cuvier 1829 (Niger-seed)

A genus of 6 species, herbs, of Africa. References: Strother in FNA (2006c); Sherff & Alexander (1955)=Z.


\textbf{Gutierrezia} Lagasca y Segura 1816


1 Subshrub; stems minutely hispidulous; ray florets 2-8; disc florets 2-9 ........................................ \textit{G. sarothrae}
1 Annual; stems glabrous; ray florets 5-23; disc florets 7-13 ....................................................... \textit{G. texana} var. \textit{texana}

\textbf{Hartwrightia} A. Gray ex S. Watson 1888 (Hartwrightia)


\textbf{Helenium} Linnaeus 1753 (Sneezeweed, Bitterweed)

A genus of about 32-40 species, herbs, of America. References: Bierner (1989)=Y; Bierner (1972)=Z; Rock (1957); Knox (1987); Rydberg (1915); Cronquist (1980)=SE.

1 Stem leaves very numerous, 0.5-2 (-4) mm wide, not decurrent on the stem or branches; plant a taprooted annual; [section \textit{Amarum}].
2 Disc corollas yellow, the lobes yellow or yellow-brown; lower and basal leaves usually withered at anthesis; lower leaves usually entire (rarely toothed); basal leaves entire to toothed (rarely pinnatifid)........................................ \textit{H. amarum} var. \textit{amarum}
2 Disc corollas yellow, the lobes (and sometimes also the upper portion of the corolla tube) purple; lower and basal leaves often persistent; lower leaves linear to ovate, entire, toothed, lobed or pinnatifid; basal leaves pinnatifid............................................. \textit{H. amarum} var. \textit{badium}
1 Stem leaves few to numerous, at least the larger > 4 mm wide, decurrent on the stems and branches; plant a fibrous-rooted perennial or a taprooted annual.
3 Ray flowers lacking a pistil and style, sterile; [section \textit{Leptopoda}].
4 Disc flowers with lobes brown, red, or purple. 5 Disc flowers 5-lobed and with 5 stamens ................................ \textit{H. brevifolium}
5 Disc flowers predominately 4-lobed and with 4 stamens ...................................................... \textit{H. flexuosum}
4 Disc flowers with lobes yellow.
6 Midstem leaves barely decurrent on the stem, the decurrency < 0.5 cm; basal leaves often pinnatifid (less commonly merely dentate, repand, or entire), the lower portion of the leaf not contracted so as to be petiolate in form; achene pubescent on the ribs; peduncle pubescent; basal leaves (3.0-) 4.5-8.0 (-19.0) cm long, 0.3-1.1 cm wide, averaging ca. 7-10× as long as wide ………………… H. pinnatifidum

6 Midstem leaves decurrent on the stem, the decurrency > 2 cm, and usually extending to the next leaf down; basal leaves usually repand or entire (rarely somewhat lobed or pinnatifid), the lower portion narrowed into a petiolate form which enlarges at its base to more-or-less clasping the stem; achene glabrous, or pubescent on the ribs; peduncle pubescent or glabrous; basal leaves averaging narrower or broader in shape (see below).

7 Peduncle pubeuse to tomentose or lanose between the uppermost leaf and the head; achene pubescent on the ribs; heads 1-4 per plant; basal leaves (2.5-) 4.0-10.5 (-18.0) cm long, (0.8-) 1.2-2.0 (-2.5) cm wide, averaging ca. 4-6× as long as wide ………………… H. brevisilfolium

7 Peduncle glabrous or glabrate between the uppermost leaf and the head; achene glabrous; heads 1 per plant; basal leaves (3.0-) 4.5-17.0 (-25.0) cm long, (0.4-) 0.6-1.0 (-1.5) cm wide, averaging ca. 10-15× as long as wide …………………………… H. vernale

8 Plant a fibrous-rooted perennial; [native species, collectively widespread and common]; [section Helenium].

9 Leaves not basally disposed, the basal leaves usually absent at flowering (if present, mostly < 2 cm long), the stem leaves not progressively reduced upward; pappus scales brownish, 0.3-1.2 mm long (usually < 1 mm long); upper cauline leaves serrate (rarely entire), most often oblanceolate, usually broadest near the midpoint or beyond it, with conspicuous lateral veins apparent on the lower surface: …………………………………………… H. autumnale

9 Leaves basally disposed, the basal rosette usually present at flowering, the basal leaves > 4 cm long, larger than the progressively smaller stem leaves; pappus scales white-biwhiny, 0.9-1.9 mm long (usually < 1 mm long); upper cauline leaves entire, lanceolate, usually broadest at or near the base and rather evenly tapered to the apex, lacking conspicuous lateral veins……………… H. virginicum

Plant a tap-rooted annual or biennial; [alien species, rare waifs of wool-combing mills]; [section Tetrodus].

10 Disc corollas 4-lobed; heads 7-11 (-14) mm high, 6-11 wide (excluding the ray flowers)…………………………………… H. quadridentatum

10 Disc corollas 5-lobed; heads 4-8 mm high, 4-8 mm wide (excluding the ray flowers).

11 Upper leaves entire………………. H. elegans var. elegans………………… H. microcephalum var. microcephalum

* Helenium amarum (Rafinesque) H. Rock var. amarum, Bitterweed. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): roadsides, overgrown pastures, urban areas; common (rare in Mountains), apparently introduced from further west. May–December. Now widespread in e. North America. Biemer (1989) discusses the taxonomy of section Helenium, consisting only of the 2 varieties of H. amarum. Var. amarum is widespread; var. badius (A. Gray ex S. Watson) Waterfall, distinguished in part by its purple disk flowers, occurs in OK, TX, and Mexico. The plant has a very bitter taste and is generally avoided by grazing animals, a point noted by Rafinesque in his original description (in 1817): "the whole plant is odorous and intensely bitter, it gives an abominable taste to the milk of the cows that feed on it in summer." Overgrown areas come to be dominated by H. amarum. In areas where it is frequently mowed, H. amarum appears to evolve a genotype capable of flowering and fruiting when only a few cm tall. [= F, N, K, Z; > H. tenifolium Nuttall – F, S; = H. amarum – RAB, G, W, Z; < H. amarum – SE, WH]


Helenium parviflorum (Nuttall) A. Wood. Cp (GA, NC, VA), Mt (NC, VA), Pd (GA, NC, VA): seepage bogs; rare. May–June. H. parviflorum has a peculiar distribution, reaching its greatest abundance on the Gulf Coastal Plain from Panhandle FL west to e. LA, and occurring at widely scattered disjunct sites in c. and n. AL, wv. GA, c. and w. NC, ec. TN (Chester, Wofford, & Kral 1997), and sw. and se. VA. [= RAB, C, FNA, G, GW, K, SE, W, WH, Z; > H. brevisilfolium – F, S; > H. autumnale – RAB, G, W, Z; < H. autumnale – SE, WH]


Helenium pinnatifidum (Nuttall) Rydberg. Cp (FL, GA, NC, SC): wet savannas and adjacent ditches; rare (NC Rare, SC Rare). April–May. A Southeastern Coastal Plain endemic: se. NC south to s. FL, west to Panhandle FL, sw. GA, and at s. AL. [= RAB, FNA, GW, K, SE, WH, Z; > H. vernale – S, misapplied]

Helenium quadridentatum Labill. (SC): location and habitat unknown; presumably introduced from sc. United States. Reported for SC by Rydberg (1915), Small (1933), and Kartesz (1999); also east to AL (SE). [= F, K, S, SE, Z]


Helenium virginicum S.F. Blake, Virginia Sneezeweed. Mt (VA): seasonal sinkhole ponds and clearings where such ponds once occurred; rare. July–September. H. virginicum is bimodally endemic in VA (Augusta and Rockingham counties, VA, where a series of sinkhole ponds (dolines) on acid colluvium support numerous Coastal Plain disjuncts) and MO (Ozarkian...
2 Stems pubescent; leaf margins often revolute.
3 Plants short, < 1.5 m tall; leaves < 1 cm wide; rhizomes lacking or poorly developed..........................H. angustifolius
3 Plants robust, > 1.5 m tall; leaves > 1 cm wide; rhizomes well developed.................................H. simulans
1 Leaf blades shorter and broader, lanceolate, lance-ovate, deltoid, deltoid-ovate and usually < 5× as long as wide.
4 Phyllaries 1.5-3 mm broad, lanceolate ..........................................................H. floridanus
4 Phyllaries 3-5 mm broad, oblong, ovate, or obovate.
5 Abaxial surfaces of leaves and ligules lacking subsessile glandular trichomes; leaves usually broadly ovate to orbicular and with a petiole > 1 cm long..........................................................H. silphioides
5 Abaxial surfaces of leaves and ligules with subsessile glandular trichomes; leaves usually lanceolate to lance-ovate or rhombic-ovate and with a petiole usually < 1 cm long.
6 Phyllaries oblong-lanceolate, apex acuminate, abaxially usually pubescent........................................H. laetiflorus
6 Phyllaries elliptical to oblong-ovate, apex acute, abaxially glabrate ................................................H. pauciflorus ssp. pauciflorus

Key D – perennial sunflowers with leafy stems and yellow disk flowers
1 Stems below the capitulescence glabrous or nearly so, sometimes glaucous.
2 Leaves whorled at principal nodes, either alternate or opposite at other nodes ..................................H. verticillatus
2 Leaves either alternate or opposite (or both).
3 Leaves grayish-green or bluish green in color, sessile, and abaxially glabrous and glaucous.
4 Rays 10-14; leaves strumose adaxially, rough to the touch; phyllaries 2.5-4.5 mm wide..........................H. eggertii
4 Rays 5-10; leaves glabrous or glabrate adaxially, smooth or only slightly rough to the touch; phyllaries 2.5-3 mm wide ...H. laevigatus
3 Leaves light to dark green, sometimes whitish abaxially, but not grayish or bluish green in color; leaves sessile or petiolate, glabrous or pubescent.
5 Leaves linear-lanceolate, with only a single main vein ..........................................................H. smithii
5 Leaves linear-lanceolate to lanceolate, lance-ovate, or ovate, triplinerved at base.
6 Rays few, usually 5 or 8; heads small, the involucres usually 9 mm broad or less.
7 Leaves abaxially whitish in color and glabrous and glaucous, lacking subsessile glandular trichomes (“resin dots”) ..................H. glaucophyllus
7 Leaves abaxially greenish in color, usually tomentulose (sometimes glabrate), with abundant subsessile glandular trichomes ..................H. microcephalus
6 Rays usually 10 or more in larger heads; heads larger, the involucres usually > 9 mm broad.
8 Leaves sessile, rounded to cordate at base, and trinerved, with the 2 lateral veins diverging from the midrib at the very base of the leaf..........................................................H. divaricatus
8 Leaves sessile to petiolate, but narrowing gradually to base and triplinerved, the 2 lateral veins diverging from the midrib above the base of the blade.
9 Anther appendages yellow.
10 Leave blade lanceolate to lance-ovate, sessile to petiolate but the petiole usually < ½ as long as the blade; phyllaries not conspicuously graduated and imbricate, usually loose and spreading..............................H. grosseserratus
10 Leaf blade ovate to elliptic, with a distinct petiole usually > 2 cm long and ½ as long as blade or longer; phyllaries conspicuously graduated and imbricate, usually appressed, not exceeding disk ............H. occidentalis ssp. occidentalis
9 Antther appendages dark or reddish-brown.
11 Plants producing abundant tubers; leaves sessile, the petioles < 1 cm long; [endemic to the Piedmont of NC and SC]..................H. schweinitzii
11 Plants rizomatosus, but not producing tubers; leaves petiolate, the petioles 1-5 cm long; [collectively widespread in our area].
12 Phyllaries equal to or slightly exceeding disk, apex acute; leaves moderately serrate to entire, with a petiole 1-3 cm long, and abaxially with usually abundant subsessile glandular trichomes (“resin dots”) ..................H. stramosus
12 Longer phyllaries usually exceeding disk by ⅓ their length or more, apex acuminate; larger leaves moderately to conspicuously serrate, with a petiole 2-5 cm long, and abaxially with usually relatively few subsessile glandular trichomes ........H. decapetalus

13 Leaves sessile and cordate, mostly or all opposite ..........................................................H. mullis
13 Leaves petiolate or sessile, but not cordate, and alternate or opposite.
14 Phyllaries attenuate, conspicuously exceeding the disk in length and reflexed, apically with numerous subsessile glandular trichomes (“resin dots”); leaf bases often conical, the basically ovate or lance-ovate blade joined to a broadly winged and gradually narrowed petiole ..........................................................H. resinosus
14 Phyllaries acute to attenuate, but not reflexed, subsessile glandular trichomes present or absent; leaf bases usually attenuate to truncate or rounded, the blade lance-linear or lanceolate, or if ovate or lance-ovate either sessile or with a petiole that is at most narrowly winged.
15 Leaves conduplicate and entire, usually with only a single prominent main vein; inflorescence when well developed spiciform or racemose ..........................................................H. maximilianii
15 Leaves not conduplicate, entire or serrate, triplinerved (with a prominent lateral pair of veins near the base); inflorescence not spiciform or racemose.
16 Phyllaries conspicuously graduated and imbricate, usually appressed.
17 Leaf blades lanceolate to ovate, petiole 1-5 cm long and usually < ⅓ as long as blade; anther appendages with dark pigment; cypselas 4-5 mm, usually sterile ..........................................................H. lactiflorus
17 Leaf blades ovate to elliptic, petiole distinct, > 2 cm and usually > ⅓ as long as the blade; anther appendages yellow;
cypselas 3-4 mm long, fertile ..........................................................................................H. occidentalis ssp. occidentalis
16 Phyllaries not conspicuously graduated and imbricate, usually loose or spreading.

Helianthus angustifolius Linnaeus, Narrowleaf Sunflower. Cp (DE, FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV*), Pd (GA, SC, VA): savannas, ditches, marshes, other wet habitats; common (uncommon in Piedmont of GA, NC, and SC, uncommon in DE Coastal Plain, rare in VA Piedmont, rare in Mountains). (July-) September-October (-frost). Primarily Coastal Plain, from Long Island, NY south to c. peninsular FL west to TX, irregularly inland to OH, IN, and MO. This plant is very showy when in flower on roadsides, especially in October. [= RAB, C, FNA, GW, K, S, SE, WH, WV; > H. angustifolius var. angustifolius – F; > H. angustifolius var. planifolius Fernald – F]


* Helianthus argophyllus Torrey & A. Gray, Silverleaf Sunflower. Cp (FL, NC): dunes and disturbed sandy soil on a barrier island; rare, native of TX. July-October. Native to s. TX. Heiser et al. (1969) noted a collection from NC, but stated their uncertainty as to its establishment. H. argophyllus is well-established near Captain Charlie's on Bald Head Island, Brunswick County, where it has apparently persisted and spread over the last 30 years (at least). [= F, FNA, K, S, SE, WH]

Helianthus atrorubens Linnaeus, Appalachian Sunflower. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (FL, NC, SC, VA): dry soils of rocky, sandy, or clayey woodlands and roadbanks; common (uncommon in VA Mountains, rare in FL). Late July-October. N. VA west to w. TN, and south to c. GA, Panhandle FL, AL, and sc. LA. Related to the Ozarkian H. silphioides Nuttall. [= RAB, C, FNA, G, K, SE, W; > H. atrorubens var. alidades Fernald – F; > H. atrorubens var. atrorubens – F; < H. atrorubens – S (also see H. silphioides Nuttall)]


Helianthus debilis Nuttall spp. tardiflorus (Heiser) Cronquist – SE; < H. debilis spp. cucumerifolius – WH]


Helianthus glaucophyllus D.M. Smith, Whiteleaf Sunflower. Mt (NC, SC), Pd (SC): moist forests, woodlands, and woodland edges, at medium elevations, mostly from 1000-1500 m (but sometimes lower), generally flowering only when in a canopy gap (as caused by a tree-fall) or along banks of narrow roads; rare. July-September. A narrow Southern Appalachian
ASTERACEAE

920


* Helianthus grosseserratus Martens, Sawtooth Sunflower. Pd (DE, GA, NC, VA), Mt (VA, WV), Cp (DE, VA): disturbed areas; uncommon (rare in GA, NC, and VA Coastal Plain, rare in VA Mountains, rare in DE Piedmont), introduced from farther west. The original range of this species was apparently centered in OH, IN, IL, IA, and MO, but its exact extent is obscured by its subsequent spread. Reported for NC by Matthews & Mellichamp (1989). [= C, F, FNA, G, K, W, WV; = H. grosse-serratus – S, SE, orthographic variant]


* Helianthus laetiflorus Persoon. Cp (NC, SC, VA), Pd (NC, SC, VA), Mt (VA, WV): disturbed areas; uncommon, introduced from farther west. Late July-September. Widely scattered in e. and c. North America, believed to be a derivative of the hybrid of H. pauciflorus Nuttall spp. subhomboides (Rydbeger) O. Spring & E. Schilling and H. tuberosus. [= RAB, G, S, SE, WV; = H. laetiflorus Persoon (pro sp.) – C, FNA, K; = H. laetiflorus var. laetiflorus – F]

* Helianthus laevigatus Torrey & A. Gray, Shale-barren Sunflower, Smooth Sunflower. Mt (NC, VA, WV), Pd (NC, SC, VA): on dry, rocky or shaly soils, on roadbanks, powerline rights-of-way, open woodlands, in the Carolinas nearly limited to the Carolina Slate Belt; common in VA, uncommon in WV, rare in NC and SC). August-October. The primary range of H. laevigatus is in the mountains of c. and w. VA and e. WV, from whence it is disjunct to a few places in the Piedmont of NC and SC, most notably the Carolina Slate Belt in Montgomery and Stanly counties, NC. [= RAB, C, F, FNA, G, K, SE, W, WV; = H. laevigatus – S; = H. reindutus (Steele) E.E. Watson – S]

* Helianthus longifolius Pursh, Longleaf Sunflower. Mt (GA, NC*), Pd (GA, CA, VA): sandstone and granite glades and woodlands, loamy to xeric longleaf pine sandhills; rare. August-October. This species is apparently rare, occurring in ne. AL, n. GA (introduced in sw. NC). [= RAB, FNA, K, S, SE]

* Helianthus maximilianiii Schröder, Maximilian Sunflower. Pd (NC, SC, VA), Mt (NC, SC, VA, WV), Cp (NC, VA): moist roadsides and disturbed areas; uncommon, introduced from farther west. September-October. MI and MB west to BC and south to TX; introduced in the East. [= C, SE, W; = H. maximiliani – RAB, F, FNA, G, K, S, orthographic variant]


* Helianthus occidentalis Riddell ssp. occidentalis, Naked-stem Sunflower. Mt (GA, NC, VA, WV), Pd (VA), Cp (FL): rocky or sandy flood-scoured riverbeds, dry hammocks (in FL); rare. July-October. MD and DC west to MN, and south to w. NC, n. GA, Panhandle FL, and TX. Ssp. occidentalis occupies most of the range of the species. Ssp. plantagineus (Torrey & Gray) Shimmers occurs in sw. LA, se. TX, and AR. Var. dawellianum Torrey & Gray, of uncertain status (if valid, then usually treated as a variety under ssp. occidentalis), occurs in the Appalachian portion of the range. The species has been collected only twice in NC, the type collection of H. dawellianus M.A. Curtis, from "near Franklin, Macon Co.,” and in 1897, near Asheville, Buncombe County ("sandy bottoms along the French Broad River near Biltmore"). GAHP reports H. occidentalis as a rare species in the state, from "limestone glades and barrens, rocky or cherty soils" (GAHP 2003); it is uncertain what variety is represented. [= FNA, K; = H. occidentalis Riddell var. dawellianus (M.A. Curtis) Torrey & A. Gray – C, F, SE; = H. occidentalis – RAB, G, S, W, WH, WV; = H. occidentalis – RAB, M.A. Curtis – WV]

* Helianthus pauciflorus Nuttall ssp. pauciflorus, Stiff Sunflower. Mt (GA), Pd (GA*, VA*), Cp (VA*): disturbed areas; rare, native in the more western portion of our area, introduced eastwards. July-September. Reported for VA by Fernald (1950) under the name H. laetiflorus var. rigida; and for nc. GA by Jones & Coile (1988) under the name H. rigida (Cassini) Desf. [= FNA, K; = H. pauciflorus var. pauciflorus (Cassini) Desf. – C; = H. laetiflorus var. rigida (Cassini) Fernald – F; = H. rigida (Cassini) Desfontaines – S; = H. rigida var. rigida – SE]


* Helianthus porteri (A. Gray) Pruski, Confederate Daisy. Pd (GA, NC*, SC): in shallow soils over granite on low-elevation granite domes or flatsrocks; uncommon, native in GA and SC, introduced and vigorously established in NC (SC Rare). August-September. A Piedmont endemic: nw. SC south to GA and ec. AL. The species has often been treated in Viguiera; see Pruski (1998) and Schilling et al. (1998) for discussion of the reasons for treating this species in Helianthus. It is well-established at two sites in NC, on Rocky Face Mountain (Alexander County, NC) and Mitchell Mill Flatrock (Wake County, NC), where it was introduced with soil blocks of Diamorpha smallii as part of a ecological experiment (Mellinger 1972; McCormick & Platt 1964). [= FNA, K; = Viguiera porteri (A. Gray) Blake – SE]

* Helianthus radula (Pursh) Torrey & A. Gray, Roundleaf Sunflower, Rayless Sunflower. Cp (FL, GA, SC): sandhills, dryish savannas, and dry pine flatwoods; common (rare in FL). Late August-October. S. SC south to s. peninsular FL and west
to se. LA. It is readily distinguishable from all other species by its rosette of orbicular to nearly round leaves, borne flat against the ground. [= RAB, FNA, GW, K, S, SE, WH]


**Helianthus schweinitzii** Torrey & A. Gray, Schweinitz's Sunflower. Pd (NC, SC): clayey soils of woodlands and roadides, in areas formerly with post oak-blackjack oak savannas, xeric oak-pine woodlands, or "Piedmont prairies," now primarily on mowed road or powerline rights-of-way; rare. Late August-October. Piedmont of nw. NC and ne. SC, primarily within 100 km of Charlotte, NC. Some earlier reports (as in Heiser et al. 1969) of occurrences in se. NC, e. SC, and c. SC are based on misidentifications. See Matthews, Barden, & Matthews (1997) for an informative discussion about this species. [= RAB, FNA, GW, K, S, SE]

**Helianthus simulans** E. Watson. Cp (FL, GA, NC*, SC), Pd* (GA*, SC*): wet soils, ditches, roadides; uncommon (rare in GA and SC). October-November. Native from SC south to c. peninsular FL, FL Panhandle, and west to LA; now spread more widely by horticultural use. [= FNA, GW, K, S, VE, WH]

**Helianthus smithii** Heiser, Smith's Sunflower. Mt (GA): dry forests and woodlands; rare. August-September. Known from n. GA, e. AL, and se. TN. It has small heads (like *H. microcephalus*, *H. laevigatus*, *H. schweinitzii*), the leaves narrowly lanceolate and subsessile (like *H. schweinitzii* or *H. laevigatus*), the leaves resin-dotted below (like *H. microcephalus*), but nearly glabrous. It may be a hybrid derivative of *H. microcephalus* and *H. strumosus*. [= FNA, K; < *H. microcephalus* – C, SE]


**Helianthus verticillatus** Small, Whorled Sunflower. Mt (GA): seasonally wet to moist calcareous prairies; rare. August-October. Nw. GA, ne. AL, and sc. TN. This taxon is a species, not a hybrid; its morphological characteristics alone (with its unique whorled leaves) make hybrid status implausible. See Matthews et al. (2002) for additional information. [= FNA, S; = *H. ×verticillatus* E.E. Watson (pro sp.) – K; = "a hybrid of *H. angustifolius* with either *H. eggertii* or *H. grosse serratus*" – C, SE]

**Helianthus carnosus** Small, Flatwoods Sunflower. Cp (FL): wet flatwoods, wet prairies; rare. September-November. Endemic to ne. FL (including Clay County in our area). [= FNA, K, S, SE, WH] [not yet keyed]


**Helianthus silphioides** Nuttall. East to se. TN (Chester, Wofford, & Kral 1997) and e. AL. [= C, F, FNA, K, SE; = *H. atrorubens* Linnaeus var. pubescens Kuntze] [synonymy incomplete]

**Heliomeris** Nuttall 1848 (Golden-eye)


* Heliomeris multiflora* (Nuttall) Blake var. multiflora. Golden-eye. Cp (SC): waste areas around wool-combing mill; rare, perhaps only a wafi, native of western United States and Mexico. May. [= FNA, K; = *Viguiera multiflora* (Nuttall) Blake]

**Heliopsis** Persoon 1807 (Sunflower-everlasting, Oxeye)

A genus of about 18 species, herbs, of America. References: Smith in FNA (2006c); Fisher (1957)=Z; Cronquist (1980)=SE. Key adapted in part from Z.

1 Plants 3-8 dm tall; larger leaves on a plant generally 3-8 cm long; heads 1 (-3) per plant; rays 6-10 (-13) per head; rays 1-2 (-2.4) cm long; [of the Coastal Plain] [....][.....][.....][.....] **Helianthoides var. gracilis**

1 Plants (4-) 8-15 dm tall; larger leaves on a plant generally 7-15 cm long; heads (1-) 3-8 per plant; rays (8-) 10-16 per head; rays (1.5-) 2-4 cm long; [widespread in our area, rare in the Coastal Plain].

2 Leaves smooth on both sides (or sometimes sparsely pubescent below and slightly scabrous above); leaves (4.0-) 4.5-6.0 (-12) cm wide; stem glabrous and glaucous below, slightly pubescent above, the hairs generally all slender and ascending. [..............................] .............................. **H. helianthoides var. helianthoides**

2 Leaves moderately to densely scabrous on both sides; leaves 2.0-3.5 (-5.0) cm wide; stem also scabrous with short, broad-based hairs .... [..............................] .............................. **H. helianthoides var. scabra**

**Heliopsis helianthoides** (Linnaeus) Sweet var. gracilis (Nuttall) Gandhi & Thomas, Smooth Oxeye, Pineywoods Oxeye, Coastal Plain Sunflower-everlasting, Coastal Plain Oxeye. Cp (FL, GA, SC): moist calcareous forests; rare. April-July; May-July. A Southeastern Coastal Plain endemic: se. SC (Berkeley, Dorchester, and Charleston counties) south to GA (Jones & Coile
ASTERCACEAE

922


Heliopsis helianthoides (Linnaeus) Sweet var. scabra (Dunal) Fernald, Western Sunflower-everlasting, Rough Oxeye, Western Oxeye. Mt (WV), Pd (VA): dry, open forests and woodlands, woodland borders; uncommon (rare in VA). May-October. NL (Newfoundland) and SK south to VA, WV, KY, GA, LA, TX, and NM. FNA mentions frequent intergradation, and some plants in our area best considered var. scabra do not seem to be “pure.” [= C, F, G, K, SE; = H. scabra Dunal – S, WV; = H. helianthoides ssp. scabra (Dunal) Fisher – Z]

Helminthotheca Zinn 1757 (Oxtongue)


* Helminthotheca (Linnaeus) Holub, Bristly Oxtongue. Cp (VA?): disturbed areas; rare, native of Europe. July-September. Reported from DC and VA; uncertain whether documented from our area. [= FNA; = Picris echioides Linnaeus – C, F, G, K, SE]

Heterotheca Cassini 1817 (Camphorweed, Golden-aster)


1 Ray flowers with pappus; perennial, from creeping rhizomes; upper and lower leaves cuneate to a sessile base...............................................................H. camporum var. glandulissimum

1 Ray flowers without pappus; annual or biennial, taprooted; upper leaves rounded to clasping at the sessile base, lower leaves (deciduous by late in the season) petiolate.

2 Plants erect or decumbent, 0.3-1 m tall; leaves scabrous on both sides or only beneath; phyllaries densely hirsute and glandular on the back; [of coastal dunes] .........................................................................................................................................................................................H. latifolia var. latifolia

2 Plants erect or decumbent, 0.3-1 m tall; leaves scabrous on both sides or only beneath; phyllaries densely hirsute and glandular on the back; [of a variety of weedy habitats, mainly inland]............................................................................................................................H. minor


Heterotheca subaxillaris (Lamarck) Britton & Rusby, Dune Camphorweed. Cp (DE, FL, GA, NC, SC, VA), Pd (GA): coastal dunes and sand-flats; common. July-October (-December). NJ south to FL, west to TX and Mexico, along the coast. This taxon is apparently native in our area, and is a conspicuous component of the flora of ocean dunes. [= Y; = H. subaxillaris (Lamarck) Britton & Rusby var. subaxillaris – X; < H. subaxillaris – RAB, C, F, G, K, S, SE, WH (also see H. latifolia); = H. subaxillaris ssp. subaxillaris – FNA, Q]

Hieracium Linnaeus 1753 (Hawkweed, King-devil)

A genus of 250-1000 species, herbs, primarily temperate. Hieracium is a complicated genus, with many apomictic races sometimes recognized as taxa. Sometimes separated into Hieracium and Pilosella. References: Strother in FNA (2006a); Cronquist (1980)=SE. Key adapted from C.

1 Leaves primarily cauline, the largest leaves definitely on the stem, basal leaves usually absent; [Hieracium s.s.]

2 Florets 8-20 (-30) per head; leaves nearly glabrous, or with a few long hairs on the lower surface; upper stem glabrous......H. paniculatum

2 Florets 30-110 per head; leaves setose, with long hairs on the upper and lower surfaces; upper stem stipitate-glandular, stellate-pubescent, or glabrous.

3 Leaves with entire margins, rounded to obtuse at the tip; [widespread in our area].................................................................H. scabrum

3 Leaves with toothed to laciniate margins, acute to obtuse at the tip; [disjunct at high elevations in WV].........................H. umbellatum

1 Leaves primarily basal, the largest leaves basal, leaves in some species extending onto the lower portion of the stem.
Plants stoloniferous; [aliens of weedy habitats, especially pastures, roadsides, and lawns]; [Pilosella].

4 Plants not stoloniferous; [primarily natives (except \(H. \text{aurantiacum}\) and \(H. \text{piloselloides}\)), of various (mostly dry) habitats].

9 Cypselas 1.5-2 mm long, truncate at the tip; basal leaves mostly 5-12× as long as wide (the petiole included); well-developed basal leaves rarely over 3 cm wide; [-]; [Pilosella].

10 Leaves and stem glaucous; leaves sparsely hairy to nearly glabrous on the upper surface. .......................................................... \(H. \text{piloselloides}\)

11 Leaves not purple-veined.

9 Cypselas 2-4 mm long, usually distinctly narrowed to the tip (except \(H. \text{scabrum}\)); basal leaves mostly 1.5-5× as long as wide (the petiole included); well-developed basal leaves often over 3 cm wide; [native]; [Hieracium s.s.].

13 Inflorescence corymbiform.

14 Cypselas 2-3 mm long, truncate, broadest at the tip; flowers 40-100 per head. ................................................................................. \(H. \text{scabrum}\)

16 Cypselas 2.2-5 mm long, at least the longer achenes narrowed to the tip; flowers 15-40 per head.

17 Stem with several well-developed leaves slightly smaller than the basal leaves; inflorescence corymbiform or tending toward paniculate.

5 Heads (1-) 2-many per plant. .......................................................................................................................... \(H. \text{pilosella}\)

6 Heads (1-) 2-6 per plant, leaves nearly glabrous on the upper surface. ................................................................................. \(H. \text{flagellare}\)

7 Flowers deep orange. .......................................................................................................................... \(H. \text{aurantiacum}\)

8 Flowers yellow.


* \(H. \text{caespitosum}\) Dumortier, Yellow King-devil, Yellow Fox-and-cubs. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA): pastures, fields, roadsides, grassy balds; common (uncommon in DE, rare in VA Coastal Plain), native of Europe. May-July. [= C, FNA, K, SE, W; \(= \text{Pilosella caespitosa}\) (Linnaeus) F. Schultz & Schultz ‘Pilosella flagellaris’]

* \(H. \text{flagellare}\) Willdenow, Whiplash Hawkweed. Mt? (VA), Pd (DE): roadsides; rare, native of Europe. Considered to derive from hybridization between \(H. \text{caespitosum}\) Dumortier and \(H. \text{piloselloides}\) Linnaeus. [= C, F, FNA, SE; \(= H. \times\text{flagellare}\) Willdenow (pro sp.) var. flagellare – K; \(= \text{Pilosella flagellaris}\) (Willdenow) Sell & C. West]

* \(H. \text{floribundum\text{Wimmer \& Grabowski, Glaucous Hawkweed. Mt (VA), Pd (VA): roadsides, pastures; rare, native of Europe. Considered to derive from hybridization between \(H. \text{caespitosum}\) Dumortier and \(H. \text{lactuella}\) Wallroth. [= C, F, G; \(= H. \times\text{floribundum}\) Wimmer & Grabowski (pro sp.) – K; \(= \text{Pilosella floribunda}\) (Wimmer & Grabowski) Arvet-Touvet]


* \(H. \text{marianum}\) Willdenow, Maryland Hawkweed. Cp (NC, SC), Pd (NC, SC), Mt (NC, SC, WV) {GA}: dry forests, woodland margins, roadsides; common (uncommon in WV). May-November. NH west to OH, south to FL and MS. Considered to derive from hybridization between \(H. \text{gronovii}\) Linnaeus and \(H. \text{venosum}\) Linnaeus. There is apparently no definite report from VA. [= F, K, S, WV; \(= H. \times\text{marianum}\) Willdenow (pro sp.) \(\rightarrow RAB, C, SE\]

* \(H. \text{piloselloides}\) Linnaeus, Leafy Hawkweed. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, VA): dry to mesic forests, especially along dirt roads; common. July-October. NS and QC west to MN, south to w. NC, n. GA, and OH. The leafy stem and lack of basal leaves of \(H. \text{piloselloides}\) readily distinguish it from our other species of \(H. \text{aurantiacum}\). In fact, it often puzzles the inexpertified botanist, who may overlook the possibility that this plant is a \(H. \text{aurantiacum}\)!* The milky sap and obscure teeth on the leaves are good corroborative characters. [= RAB, C, F, FNA, G, K, SE, W, WV]


**Hieracium trilinarii** Greene, Shale-barren Hawkweed. Mt (VA, WV), Pd (VA): shale barrens and dry shaley woodlands, other xeric woodlands; uncommon. May-June. Sc. PA south to w. VA and e. WV. [= C, F, FNA, G, SE, W; = H. greenii Porter & Britton – K, S, WV, a preoccupied name]

**Hieracium umbellatum** Linnaeus, Northern Hawkweed. Mt (WV): rocky areas; rare. Circumboreal, south in North America to PA, WV (Spruce Knob), IN, MO, CO, and OR. [= C, FNA, K; > H. canadense Michaux var. fasciculatum (Pursh) Fernald – F, G; > H. canadense var. hirtirameum Fernald – F, G]


* Hieracium lachenalii* K.C. Gmelin, European Hawkweed. Pd (DE), Mt (WV): disturbed areas; uncommon, native of Europe. [= C, K; ? H. vulgatum Fr. – FNA, F, G] [not yet keyed]

Hieracium longilobum Torrey, ON, OH, KY, and TN west to MN, NE, KS, OK, and TX. [= C, F, FNA, G, K, SE]

* Hieracium sabaudum* Linnaeus. Naturalized south to NJ and PA; native of Europe. August-October. May be found in our area. [= C, F, FNA, G, K] [not yet keyed]

Many of our species hybridize, and some of the species listed above are apparently hybrid derivatives. I prefer to treat taxa such as *H. marianum* as species (even if hybridization-derived) because they occur independently of the parental taxa (see above). Other hybrids of native species known in our area include: *H. gronovii × H. paniculatum* (Torrey & A. Gray) B.L. Turner is distributed in the s. Great Plains and adjacent areas, from NE south to TX and Coahuila. [*H. ×scribneri* Small (pro sp.), *H. scribneri* Small (pro sp.)]*

**Hymenopappus** L’Héritier 1788 (Woolly-white)


**Hymenopappus scabiosaeflorus** L’Héritier var. scabiosaeflorus. Cp (FL, GA, SC): turkey oak sandhills and adjacent sandy fields; common (rare in GA and SC). Sc. SC south to n. peninsular FL, west to AR, MO, and OK, and north in the interior to IN, c. and s. IL, and se. MO. Var. corymbosus (Torrey & A. Gray) B.L. Turner is distributed in the s. Great Plains and adjacent areas, from NE south to TX and Coahuila. [= C, FNA, K, SE; < H. scabiosaeflorus – RAB, F, G, S, WH]

**Hymenoxys** Cassini 1825

A genus of about 25 species, herbs, of w. North America, south through Central America to South America. References: Bierner in FNA (2006a); Cronquist (1980)=SE.


**Hypocharis** Linnaeus 1753 (Cat’s-ear)

A genus of about 60 species, herbs, of South America, Europe, Asia, and n. Africa. The controversial spelling of the genus name is now resolved in favor of *Hypocharis*. References: Bogler in FNA (2006a); Cronquist (1980)=SE.

1 Stem with at least a few well-developed leaves, clasping and similar to the basal; pappus of one length, all long and plumose.
2 Flowers yellow; middle and outer phyllaries hispid; heads usually 5-8 mm across at anthesis, the involucre campanulate........... *H. chillensis*
3 Flowers white; middle and outer phyllaries glabrous or puberulent; heads usually 2-4 mm wide at anthesis, the involucre cylindric.......... 

* H. microcephala var. albiflora

1 Stem naked, or only with few and very small bracts; pappus of two lengths, the outer short and barbellate, the inner long and plumose.
2 Plants glabrous or apparently so; plants mostly annual ................................................................. *H. glabra*
3 Plants conspicuously pubescent, as on the hispid leaves; plants mostly perennial ................................................................. *H. radicata*

* Hypochoeris glabra* Linnaeus, Smooth Cat’s-ear. Cp (FL, GA, NC, SC), Pd (NC, SC), Mt (NV): roadsides, fields, disturbed areas; common (rare in NC and WV, uncommon in FL), native of Europe. Early March-July. [= FNA, K, S, WH; = *Hypochoeris glabra* – RAB, C, SE, WV, orthographic variant] 

* Hypochoeris microcephala* (Schultz ‘*Bipontinus*’) Cabrera var. *albiflora* (Kuntze) Cabrera, White-flowered Cat’s-ear. Cp (GA): disturbed areas; rare, native of South America. This species has been found as a naturalized introduction at Fort Pulaski (Chatham County, GA) (T. Govus, pers. comm. 2006) and in Camden County, GA (Carter, Baker, & Morris 2009). [= FNA, K, SE]


**Inula** Linnaeus 1753 (Elecampane)


**Ionactis** Greene 1897 (Stiff-leaved Aster)

A genus of 5 species, herbs, of North America. *Ionactis* has usually been included in *Aster*, but differs in many characters and is more closely related to *Heterotheca* (Nesom & Leary 1992). References: Nesom in FNA (2006b); Nesom & Leary (1992)=Z; Cronquist (1980)=SE.

* Ionactis linariifolia* (Linnaeus) Greene, Stiff-leaved Aster. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): dry savannas, sandhills, pine flatwoods, prairie-like openings, glades, and barrens, high elevation rock outcrops and glades, to at least 1450 m, dry roadbanks, woodland edges, rocky woodlands; common (uncommon in WV, rare in DE). August-November. ME and QC west to WI, south to NE FL, Panhandle FL, and TX. There appears to be substantial variation in *I. linariifolia*, with montane (and northern) populations having considerably longer and broader leaves than Coastal Plain (and southern) populations; additional study is needed. [= FNA, WH, Z; = *I. linariifolia* – K, S, orthographic variant; = *Aster linariifolius* Linnaeus – RAB, C, G, SE, W, WV]

**Iva** Linnaeus 1753 (Marsh-elder)

A genus of about 9 species, shrubs and herbs, of North America and the West Indies, as circumscribed more narrowly by recent authors. References: Turner (2009a)=Z; Cronquist (1980)=SE; Jackson (1960)=Y; Strother in FNA (2006c).

1 Plants annual (perennial in *I. asperifolia*), not fleshy, more-or-less pubescent (at least in the inflorescence); [of mainly inland wetlands or disturbed areas].

2 Outer phyllaries united; [rare waif of disturbed areas and beaches]

3 Leaves 1.5-4.5 (-6.0) cm long, 0.4-1.0 (-1.5) cm wide, 1-3 mm thick when fresh, mostly untoothed; involucres 4-7 mm high; leaves alternate from midstem upward; [mostly of dunes and the upper beach]

4 Larger leaves 6-10 cm long, 2.0-4.0 cm wide, 1.5-4× as long as wide, usually with 8-17 teeth on each side; [of NJ southward]...

5 Involucres 1.5-2 mm high; outer phyllaries distinct, glandular-punctate; leaves 0.5-3 mm wide; pistillate flowers 3 per head

6 Involucres 2.5-3 mm high; outer phyllaries conuate, not glandular-punctate; leaves 1-8 mm wide; pistillate flowers 1 (-2) per head

7 Plants annual, erect, 5-12 dm tall; staminate flowers 1-5 per head
**Iva asperifolia** Lessing, Narrowleaf Marsh-elder. Cp (FL): wet disturbed areas; rare, native of sw. United States and Mexico. August-September. Perhaps *I. asperifolia* and *I. angustifolia* are best treated as only varietally distinct, as done by Turner (2009). [= S, Y; < *I. angustifolia* Nuttall ex Candolle – FNA, K, SE, WH; = *I. asperifolia* var. *asperifolia* – Z]

**Iva annua** Linnaeus, Sumpweed, Rough Marsh-elder. Cp (FL, GA**, SC**, VA*): fields, disturbed places; rare, in the eastern and inland part of area probably introduced by (native Americans) known from further west. September-November. PA, ND, and CO south to FL, NM, and Mexico (the original distribution uncertain). This species was apparently an important crop of native Americans. The so-called var. *macrocarpa* (Blake) R.C. Jackson, known from archeological remains and presumed extinct, is almost certainly a cultivated form, selected for its large seeds. [= RAB, C, FNA, GW, SE, WH, = *I. ciliata* Willdenow – F; = *I. ciliata* Willdenow var. *ciliata* – G; > *I. ciliata* var. *macrocarpa* Blake – G; > *I. annua* var. *annua* – K, Y; > *I. annua* var. *caudata* (Small) R.C. Jackson – K, Y; > *I. annua* var. *macrocarpa* (Blake) R.C. Jackson – K, Y; > *I. ciliata* – S; > *I. caudata* Small – S]


**Iva frutescens** Linnaeus var. *oraria* (Bartlett) Fernald & Griscom, Northern Maritime Marsh-elder. Cp (DE, MD, NC, VA): brackish marshes and marsh edges, normally on the back side of barrier islands; common (uncommon south of MD). Late August-November. NS south to Dare County, NC. The two varieties are morphologically distinct, except in the zone of overlap (NJ south to Dare County, NC), where intermediates will be encountered. Even in the zone of overlap, though, most plants are readily identified to variety. There might be some merit in considering these taxa species, with limited hybridization in a small portion of their total distributions. [= C, F, G, SE; = *I. frutescens* ssp. *oraria* (Bartlett) R.C. Jackson – K, Y; < *I. frutescens* – RAB, FNA, S; = *I. oraria* Bartlett]

**Iva imbricata** Walter, Dune Marsh-elder. Cp (FL, GA, NC, SC, VA): dunes, upper beach, island-end flats; common (rare in VA). Late August-November. SE. VA south to s. FL, west to LA; Bahamas and Cuba. This plant is often the most oceanward perennial plant, often the first perennial to colonize the upper beach or incipient dunes on island-end flats, where it occurs with such upper beach annuals as *Euphorbia polygonifolia*, *Euphorbia bombensis*, *Cakile edentula*, and *Amaranthus pumilus*. [= RAB, C, F, FNA, G, K, S, SE, WH, Y]

**Iva microcephala** Nuttall, Small-headed Marsh-elder. Cp (FL, GA, NC, SC, VA): wet pine flatwoods, flatwood ponds, clay-based Carolina bays; common (rare north of FL). September-October. C. NC south to s. FL, west to se. AL. A seed-banking annual, locally abundant some years and absent others depending on the variable hydrologic conditions of Carolina bays and other seasonally flooded wetlands. [= RAB, FNA, GW, K, S, SE, WH, Y]


**Ixeris** (Cassini) Cassini 1822


* *Ixeris stolonifera* A. Gray, Creeping Lettuce. Established as a weed in lawns, gardens, and plant nurseries in se. PA (Rhoads & Klein 1993) NY (Long Island), and DE (Cronquist 1980). Native of Japan. June-August. [= C, FNA, K, SE; = *Lactuca stolonifera* (A. Gray) Bentham ex Maximowicz – F]

**Jamesianthus** Blake & Sherriff 1940 (Warbonnet)

A monotypic genus, a perennial herb, endemic to c. AL and wc. GA. References: Strother in FNA (2006c).

**Jamesianthus alabamensis** Blake & Sherriff, Alabama Warbonnet. Mt (GA): streambanks over limestone or other calcareous rocks; rare (GA Special Concern). Endemic to stream banks in c. AL and wc. GA. The opposite leaves are squared off at the base in a distinctive manner. [= FNA, K, SE]

**Krigia** Schreber 1791 (Cynthia, Dwarf-dandelion)

ASTERACEAE

Krigia biflora (Walter) S.F. Blake var. biflora, Orange Dwarf-dandelion. Mt (GA, NC, VA), Pd (GA, NC, SC, VA); [add to synonymy] Krigia wrightii (A. Gray) K.L. Chambers ex K.J. Kim, Wright’s Dwarf-dandelion. AR and OK south to LA and TX. [= FNA, K]


Krigia dandelion (Linnaeus) Nuttall, Colonial Dwarf-dandelion. Pd (GA, NC, SC, VA); rocky woodlands, roadsides, disturbed areas; common (uncommon in VA Coastal Plain, rare in GA, NC, SC Coastal Plain). April-May. NJ, IL, and KA, south to Panhandle FL and ne. TX. = RAB, C, F, FNA, G, GW, K, SE, W, WH, Z; = Cynthia dandelion (Linnaeus) A.P. de Candolle – S]


Identification notes: Most species are highly variable in leaf lobing.

Lactuca Linnaeus 1753 (Lettuce)
Lactuca biennis (Moench) Fernald, Tall Blue Lettuce. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE): pastures, roadsides, forest edges, thickets; common (uncommon south of DE). August-November. NY, MB and MN south to s. FL and TX. [RAB, F, G, K; SE, WH; W, WV; > Mulgedium spicatum (Lamarck) Small var. spicatum – S; > Mulgedium latifolia (Raven) Small – S]


Lactuca hirsuta Muhlenberg ex Nuttall, Downy Lettuce. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (NC, SC, VA, WV): forests and forest edges; uncommon (rare in Piedmont and Mountains, rare in GA Coastal Plain). Late May-November. NS and ON south to n. FL and TX. [RAB, C, F, G, K; SE, WH; WV; > L. hirsuta var. hirsuta – F, G, K; > L. hirsuta var. sanguinea (Bigelow) Fernald – F, G, K]


Lactuca ludoviciana (Nuttall) Riddell, Louisiana Lettuce. MB and BC, south to IN, KY, MS, LA, TX, and CA. [C, F, G, K, S, SE]

Lactuca virosa Linnaeus, Bitter Lettuce. Reported for DC and AL (Kartesz 1999; FNA); no specimens have been seen that document this distribution. [FNA, K] {not keyed}

Lagosceae Cavanilles 1803

A genus of 8 species, herbs and shrubs, of sw. United States, Mexico, and Central America, not pantropical by introduction. References: Harris in FNA (2006c); Stuessy (1978)=Z.

Lapsesa mollis Cavanilles, Silkleaf. Cp (FL): disturbed areas (on ballast); rare (not recently collected), native of Mexico (but now pantropical). Collected at Apalachicola, Franklin County, FL by A.W. Chapman and previously in FL by Rugel. [FNA, WH, Z] {not keyed}

Lapsana Linnaeus 1753 (Nipplewort)

A monotypic genus (after the removal of most members to Lapsanastrum), an annual herb, of temperate Eurasia. References: Bogler in FNA (2006a); Cronquist (1980)=SE.
A genus of about 30 species, herbs, primarily of temperate Eurasia. Samuel et al. (2006) show that *Leontodon* subgenus *Oporinia* should be recognized as a separate genus from *Leontodon* sensu stricto. References: Samuel et al. (2006); Bogler in FNA (2006a); Cronquist (1980) = SE. [also see *Oporinia*]

<table>
<thead>
<tr>
<th>1</th>
<th>Heads (solitary-) several; scapes usually scaly-bracted above; pappus of plumose bristles</th>
<th>1 Head solitary; scapes usually naked; pappus type mixed, at least the outer pappus of the outer florets in each head of scales.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Pappus type mixed on each cypsela (with the scales outward and the plumose bristles inwards; phyllaries densely and coarsely hispid or hirsute)</td>
<td>2 Pappus type mixed in each head (the outer cypsela with scales, the inner cypsela with plumose bristles; phyllaries glabrate to coarsely hirsute)</td>
</tr>
</tbody>
</table>

*Leucanthemum* P. Miller 1754 (Oxeye Daisy)


<table>
<thead>
<tr>
<th>1</th>
<th>Leaves larger near or slightly below mid-stem; leaves toothed only</th>
<th>Leaves larger toward the base of the plant; leaves usually at least partly lobed or pinnatisect, as well as toothed</th>
</tr>
</thead>
</table>

*Liatis* Schreber 1791 (Blazing-star, Gayfeather)


| 1 | Pappus plumose, the barbels mostly 0.5-1.0 mm long. | 2 Inner phyllaries with apices prolonged, loosely spreading, slightly dilated, and petaloid (white to yellow, pink, or purplish); heads 3-5 mm in diameter, with 4-6 flowers per head; corolla lobes glabrous within; [of the Coastal Plain from SC southward]. |
| 2 | Heads sessile; petaloid phyllary apices lavender, pink, or magenta, recurved, the petaloid portion short relative to the green phyllary bases | 3 Heads pedunculate on short peduncles; petaloid phyllary apices light yellow or cream (rarely pale lavender), divergent with tips ascending, the petaloid portion elongate relative to the green phyllary bases |
| 3 | *Leucanthemum elegans* var. *elegans* | *Leucanthemum elegans* var. *kralii* |
| 4 | 2 Inner phyllaries not prominently petaloid; heads 10-20 mm in diameter, with 10-60 flowers per head; corolla lobes coarsely hairy within; [collectively widespread]. | 4 Outer phyllaries as long as or (more usually longer than) the inner phyllaries, spreading or reflexed, the spreading portion typically > 2 mm long. |
| 5 | Outer phyllaries shorter than the inner phyllaries, erect-appressed to spreading or reflexed, the spreading portion 0-2 mm long. | 5 Stems and leaves usually glabrous; inner phyllaries apically rounded to truncate, apiculate, all essentially erect and appressed, usually with a narrow hyaline border, [L. simplicifolium] |
| 6 | 5 Stems and leaves hirsute to hirsute-pilosae; inner phyllaries apically acute-acuminate, all usually spreading to reflexed on the distal 1/3 (outer) to 1/5 (inner), usually without a hyaline border | 6 Pappus barbellate, the barbels 0.1-0.3 (-0.4) mm long. |
| 7 | Heads mostly 1-7 (-10) in a subcorymbiform arrangement; [of Bibb Co., AL] | Heads usually > 10 in a spiciform or racemiform arrangement; [collectively widespread]. |
ASTERACEAE

7 Leaves 3-5-veined.

8 Basal and lower cauline leaves (2-) 4-8 mm wide, cauline usually abruptly reduced in size at ca. midstem, continuing distally as linear, bract-like leaves; heads in a densely (-to-loosely) spiciform arrangement; involucres 7-9 mm, purplish to greenish; florets 5-6 (-8) per head; [mainly of the Coastal Plain] .........................................................L. spicata var. resinosa

8 Basal and lower cauline leaves 4-10 (-20) mm wide, cauline usually gradually reduced in size distally; heads in a densely to loosely spiciform arrangement; involucres (7-) 8-11 mm, usually greenish; florets (4-) 6-8 (-12) per head; [of the Mountains and Piedmont] .........................................................L. spicata var. spicata

7 Leaves 1-veined.

9 Mid and inner phyllaries either acutely or rounded-acute and minutely involute-cuspidate to apiculate.

10 Stems hirtellous with spreading to slightly deflexed hairs or variously puberulent to hirsute.

11 Stems hirsute to puberulent to strigose-puberulent .................................................................................................................L. gracilis

11 Stems hirtellous with spreading to slightly deflexed hairs.

12 Heads sessile, relatively crowded in a cylinder arrangement, rigidly ascending, appressed to the rachis and to each other, densely overlapping; [e. NC south to Panhandle FL and AL] .................................................................L. chapmanii

12 Heads sessile to short-pedicunculate, in a relatively loose, spiciform, racemoid, or paniculate, commonly second arrangement; [e. GA south through ne. FL to c. peninsular FL] .................................................................L. pauciflora

10 Stems glabrous.

13 Phyllaries acutely entirely hairs, minutely involute-cuspidate to apiculate; corolla tubes glabrous within.

14 Stems and basal leaves glabrous; basal leaves mostly coming from congested nodes at very base of plant, (1-) 2-6 (-9) mm wide, abruptly reduced in size distally, surfaces minutely white-dotted by stomates, not glandular-punctate ........L. laevigata

14 Stems and basal leaves glabrous to very sparsely pilose, leaves usually with a few, spreading cilia near insertion; basal and lower cauline leaves arising from numerous, separated nodes on proximal part of stem, 1-2 (-5.5) mm wide and relatively even-sized, surfaces glandular-punctate .................................................................L. tenuifolia

13 Phyllaries acutely entire; corolla tubes pilose within.

15 Heads in a second arrangement or not; involucres 6-15 mm; phyllaries ovate-triangular to generally oblanceolate; florets 4-10 (-12).

16 Heads densely arranged, on internodes 1-2 (-5) mm long, often secund; phyllary apex sharply acuminate-acute, distinctly involute, lamina relatively thin, glands consistently present and superficial at least on proximal portion; florets 4-7 (-9); basal and lower cauline leaves 2-5 mm wide, gradually reduced in length distally; .........................L. cokeri

16 Heads loosely arranged, on internodes 6-15 (-20) mm long, not secund; phyllary apex acutely sharp to obtuse-angled with a thickened apiculum, not markedly involute, lamina relatively thick, usually with evidently sunken punctate glands, without superficial glands; florets 7-10 (-12); basal and lower cauline leaves 4-9 (-12) mm wide, quickly reduced in width and length distally .................................................................L. virgata

17 Heads densely arranged, on internodes 2-5 (-10) mm; peduncles 0-2 (-7) mm; involucres 6-8 mm; phyllaries in 3-4 (-5) series ......................................................................................L. elegans

17 Heads loosely arranged, on internodes 2-5 (-10) mm; peduncles 0-2 (-7) mm; involucres 6-8 mm; phyllaries in 3-4 (-5) series ......................................................................................L. elegans

18 Stems glabrous (rarely sparsely hirtellous); leaves and phyllaries distinctly punctate-glandular to weakly punctate; pappus bristles as long as the corolla tubes .................................................................................................................L. microcephala

19 Involucres 6-10 mm; florets (6-) 7-13 (-17); corolla tubes internally pilose; pappus bristles as long as the corolla tubes (shorter in some populations of L. helleri).

20 Stems 15-55 cm; leaves and phyllaries weakly or not at all punctate; pappus bristles 1/3-2/3 to equal the corolla tube length; montane .................................................................................................................L. helleri

20 Stems 40-120 cm; leaves and phyllaries distinctly punctate-glandular to weakly punctate; pappus bristles equal the corolla tube length; coastal plain and piedmont. .........................L. pauciflora

21 Stems glabrous; heads loosely arranged, on internodes 2-5 (-10) mm; peduncules 0-2 (-7) mm; involucres 6-8 mm; phyllaries in 3-4 (-5) series ......................................................................................L. elegans

21 Stems glabrous to sparsely or moderately pilose; heads densely arranged, on internodes 1-2 (-5) mm; peduncules 0-10 (-17, -80 in proximal part of capitulescence) mm; involucres (7-) 8-10 mm, phyllaries in (3-) 4-5 (-6) series ..............L. pilosa

18 Stems puberulent to strigose.

22 Involucres 2.5-7 mm wide; florets 3-12.

23 Stems and peduncles puberulent to pilose-puberulent or strigose-puberulent; heads usually on ascending peduncles 2-10 (-12) mm; involucres 2.5-4 (-5) mm wide; phyllaries acutely rounded or obtuse to acute or acuminate; florets 3-6 (-9) ...L. gracilis

23 Stems and peduncles stiffly short-strigose with closely ascending hairs; heads on divergent, arcuate-ascending peduncles 10-25 (-30) mm; involucres 5-7 mm wide; phyllaries acutely rounded to nearly flat; florets 7-12 .........................................................L. patens

24 Heads usually on peduncles usually 8-50 mm (rarely subsessile); phyllaries erect, not reflexing; florets ca. 30-80 (19-33 in L. scariosa); corolla tubes glabrous or pilose within.

25 Leaves or leafy bracts 20-85 below the heads, cauline usually abruptly reduced above the basal; florets 19-33; [plants of the Central and Southern Appalachian] .................................................................L. scariosa var. scariosa

25 Leaves or leafy bracts 20-85 below the heads, usually continuing relatively even-sized upward above the basal; florets ca. 30-80; [plants of WV and PA northward] .................................................................L. scariosa var. newfoundlandii

26 Heads usually less strongly subsessile on peduncles 1-8 mm (rarely more); at least outer phyllaries usually reflexing; florets 11-26 (-30); corolla tubes pilose within.

26 Phyllaries glabrous, bullate, with broad, conspicuous, often erose to lacerate or irregular, hyaline border ........................................L. aspera

26 Phyllaries glabrous to puberulent or puberulent-hirtellous, essentially flat (not bullate), without hyaline border or border narrow and inconspicuous ..................................................................................................L. squarrulosa

Liatris chapmanii Torrey & A. Gray, Chapman's Blazing-star. Xeric sands of scrub. August-October. Sw. GA, s. AL, south to s. FL. [= FNA, K, SE, WH; > Lacinaria chapmanii (Torrey & A. Gray) Kuntze – S] {synonymy incomplete}

Liatris cokeri Pyne & Stucky, Sandhills Blazing-star. Sandhills. (August-) September-October. Sc. and se. NC south to ne. SC. [= FNA; > Liatris regimontis (Small) K. Schumann – RAB, SE, W, Y, misapplied; > Liatris cokeri – K; > Liatris regimontis – K]

Liatris cylindracea Michaux, Barreled Blazing-star. Limestone glades, prairies, rarely escaped from cultivation eastwards. July-September. NY, ON, and MN south to se. TN (Ridge and Valley) (Chester, Wofford, & Kral 1997), nw. GA, and c. AL (Bibb County), and OK. [= C, F, FNA, G, K, SE] {synonymy incomplete}


Liatris elegantula (Greene) K. Schumann. Cp (FL, GA): sandhills; uncommon. August-October (-November). GA south to n. peninsular FL, west to MS. [= FNA, WH; > Liatris graminifolia Willdenow var. elegantula (Greene) Gaiser – Z; > Lacinaria elegantula (Greene) Gaiser – Z; > Lacinaria elegantula (Greene) Kuntze – S; > Liatris graminifolia – SE] {synonymy incomplete}

Liatris gholsonii L.C. Anderson, Gholson’s Gayfeather. Mesic sandy sites. (July-) August-October (-November). Endemic to Liberty and Leon counties, FL. [= FNA, WH] {not yet keyed; add to synonymy}

Liatris gracilis Pursh, Slender Blazing-star. Sandhills, dry pine flatwoods. (July-) August-October (-November). SC south to s. FL, west to MS. [= RAB, FNA, K, SE, WH; > Lacinaria laxa Small – S; > Lacinaria gracilis (Pursh) Kuntze – S]


Liatris hirsuta Rydberg. Glades, and prairies. IA and NE south to MS, LA, and TX; disjunct eastward in nw. GA. [= FNA; > Lacinaria squarrosa (Linnaeus) Hill – S; > Lacinaria squarrosa (Linnaeus) Michaux var. hirsuta (Rydberg) Gaiser – C, F, G, K, SE, Y, Z; > Liatris squarrosa – W] {add to synonymy}


Liatris patens Nesom & Kral, Georgia Blazing-star. Longleaf pine sandhills and dry flatwoods. Late August-early November. SC south to e. Panhandle FL. See Kral & Nesom (2003) for detailed information. [= FNA, WH]

Liatris pauciflora Pursh, Few-flower Blazing-star. Xeric sands of scrub. August-October. GA (Tatnall Co.) south to c. peninsular FL; alleged by Small (1933) to extend to SC. [= Liatris pauciflora – K, SE (also see L. secunda); > Lacinaria pauciflora (Pursh) Kuntze – S; > Liatris pauciflora var. pauciflora – FNA, WH]

**Liatris provincialis** R.K. Godfrey. Sandhills, scrub, dunes. (August–) September-October. Endemic to FL Panhandle (Franklin and Wakulla counties). [= FNA, WH] {not yet keyed; add to synonymy}

**Liatris pycnostachya** Michaux var. *lasiophylla* Shinners. [= FNA; < *Lacinaria pycnostachya* (Michaux) Kuntze – S; < *Liatris pycnostachya* – C, F, G, SE] {not yet keyed; add to synonymy}

**Liatris pycnostachya** Michaux var. *provincialis*. [= FNA; < *Lacinaria pycnostachya* (Michaux) Kuntze – S; < *Liatris pycnostachya* – C, F, G, SE] {not yet keyed}


**Liatris squarrosula** Michaux. Diabase barrens, other glades and barrens, prairies, open woodlands. August-October (-November). S. WV, KY, IL, and MO south to GA, Panhandle FL, AL, and TX. Highly variable and needing additional study to determine if multiple taxa should be recognized. [= C, FNA, K, SE, W, WH; > *Liatris earlei* (Greene) Schumann – F, RAB, Y, Z; > *Liatris squarrosula* – G; > *Liatris squarrosula* (Greene) K. Schumann – F, G; > *Lacinaria ruthii* Alexander – S; > *Lacinaria shortii* Alexander – S; = *Liatris scariosa* var. *squarrosula* – Y, Z]

**Liatris tenuifolia** Nuttall. Longleaf pine sandhills. August-November. SC south to s. FL, west to AL. [= FNA, RAB; = *Liatris tenuifolia* Nuttall var. *tenuiifolia* – K, SE, WH; < *Lacinaria tenuifolia* (Nuttall) Kuntze – S] {also see *Liatris laevigata*}

**Asteraceae**

Ligularia Cassini 1816 (Ligularia)

A genus of 125 species (or more), perennial herbs, natives of temperate Eurasia. References: Barkley in FNA (2006b).

* Ligularia dentata (A. Gray) H. Hara. Commonly cultivated horticulturally in ne. North America, locally established or persistent, as in MD; native of China and Japan. [= FNA, K; = Senecio elivorum (Maximowicz) Maximowicz – C, SE]

Lygodesmia D. Don 1829 (Rush Pink, Skeletonplant)


Lygodesmia aphylla (Nuttall) Torrey & A. Gray, Flowering Straws, Rose-rush. Xeric sandhills. C. GA south to s. FL and west to c. Panhandle FL. [= FNA, K, S, SE, WH, Z]

**Madia** Molina 1782 (Tarweed)

A genus of about 10 species, of w. North America and Chile. References: Baldwin & Strother in FNA (2006c); Cronquist (1980)=SE.

* Madia sativa Molina, Tarweed. Disturbed areas, scattered occurrences (perhaps only waifs) in eastern North America, including GA, NC, PA; variously considered native of Chile or w. North America (see FNA). [= K; M. capitata Nuttall; > M. sativa var. sativa – SE; > M. sativa var. congesta Torrey & A. Gray – SE]

**Marshallia** Schreber 1791 (Barbara's-buttons)

A genus of about 11 species, perennial herbs, of the se. United States. Marshallia ranges from sc. VA, sw. PA, WV, s. KY, s. MO, and c. OK, south to c. peninsular FL, and sw. TX. References: Channell (1957)=Z; Watson in FNA (2006c); Watson & Estes (1990)=Y; Cronquist (1980)=SE; Watson, Elisen, & Estes (1991); Watson, Jansen, & Estes (1991); Beadle & Boynton (1901)=X.

<table>
<thead>
<tr>
<th>1</th>
<th>Leaves not basally disposed, the leaves all about the same size; plants glabrous throughout; plants colonial by persistent rhizomes; internodes 10-25 (and leaves 2-5× as long as wide) ................................................................................................................................................ M. trinervia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leaves basally disposed, either all of the leaves below the midpoint of the stem, or the upper leaves markedly smaller than the lower stem and basal leaves (the basal leaves sometimes withered); plants pubescent at least below the heads; plants producing lateral offsets which are separated from the parent in less than a year; internodes 1-12 (and leaves 3-15× as long as wide) or 10-35 (and leaves 8-20× as long as wide).</td>
</tr>
<tr>
<td>2</td>
<td>Phyllaries with acuminate-subulate tips; paleae (receptacular bracts, interspersed with the flowers) with acuminate-subulate tips; plants usually with 2 or more heads; flowering late July-mid October.</td>
</tr>
<tr>
<td>3</td>
<td>Lower stem leaves (and basal leaves) erect, narrowly lanceolate to linear-lanceolate, with attenuate or long-acuminate apices, relatively thick in texture, the 2-4 lateral nerves (parallel to the midnerve) prominent; caudex with fibrous remnants of the previous year's leaves (if not burned off); phyllaries thick, ovate-attenuate; [NC, SC, and extreme e. GA] ............................................................................................. M. graminifolia</td>
</tr>
<tr>
<td>4</td>
<td>Heads 2-10 (-20) (rarely solitary on depauperate plants).</td>
</tr>
<tr>
<td>5</td>
<td>Leaves 6-10 cm long, 8-23 mm wide, mostly 3-10× as long as wide; heads 2-5 (-10), 22-37 mm in diameter; [sandstone, limestone, and dolostone glades of nw. GA and c. AL] ................................................................................................................. M. mohrii</td>
</tr>
</tbody>
</table>
| 6 | Leafy portion of the stem 0-20 (-30) cm long, the naked peduncle 1.5-10× (or more) as long as the leafy portion of the stem; stem leaves (if present) not reduced upward, the uppermost > 1/2 as long and wide as the largest leaves on the plant; basal leaves obovate

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**Ligularia** Cassini 1816 (Ligularia)

A genus of 125 species (or more), perennial herbs, natives of temperate Eurasia. References: Barkley in FNA (2006b).

* Ligularia dentata (A. Gray) H. Hara. Commonly cultivated horticulturally in ne. North America, locally established or persistent, as in MD; native of China and Japan. [= FNA, K; = Senecio clivorum (Maximowicz) Maximowicz – C, SE]
to oblanceolate, the apex obtuse to rounded (often emarginate); outer well-developed phyllaries with obtuse to rounded apex; corollas white to very pale pink; plants flowering late April-May (~early June).

7 Plant with 3-10 leaves on the lower stem, extending (5-) 8-20 (~30) cm up the stem; pappus scales (0.5-) 1.0-1.5 mm long; plant (2-) 3-5 (~7) dm tall; [of the Piedmont from sc. VA southward] .................................................. M. obovata var. obovata

7 Plant scapose (all of the leaves basal) or nearly scapose, with 1-5 leaves extending 1-5 (~10) cm up the stem; pappus scales (1.0-) 1.5-2.5 (~3.0) mm long; plant (0.5-) 1.5-3.5 (~5.0) dm tall; [of the Coastal Plain from NC southward] ........................................ M. obovata var. scaposa

6 Leafy portion of the stem 23-50 cm long, the naked peduncle 0.4-1.2× as long as the leafy portion of the stem; stem leaves reduced upward, the uppermost < 1/3 as long and wide as the largest leaves on the plant; basal leaves obovate to oblanceolate, the apex obtuse to acute or acuminate; outer well-developed phyllaries with acute to obtuse apex; corollas medium pink; plants flowering late June-July.

8 Basal and lower cauline leaves (2-) 3-13 (~20) cm long (including the petiole), (5-) 10-20 (~30) mm wide, averaging about 6× as long (including the petiole), the apex obtuse to rounded; pappus scales ca. 2 mm long; plants (2-) 3-5 (~8.5) dm tall; achenes without resin-dots between the ridges; [of the Mountains] .................................................. M. grandiflora

8 Basal and lower cauline leaves (8-) 15-25 (~32) cm long (including the petiole), (3-) 7-12 (~15) mm wide, averaging about 10× as long as wide (including the petiole), the apex acute to acuminate; pappus scales ca. 1.2 mm long; plants (4-) 6-9 (~10) dm tall; achenes with copious resin-dots between the ridges; [of the Piedmont] .................................................. M. species 1

**Marshallia graminifolia** (Walter) Small, Grassleaf Barbara's-buttons. Pine savannas. Late July-mid October. Ne. NC south to se. SC, and rarely to e. GA (Emanuel County) (Sorrie 1998b). Closely related to *M. tenuifolia* Rafinesque, which differs in having a well-developed horizontal rosette of thin-textured spatulate leaves, which do not leave fibrous remains (vs. with firm, ascending, linear-lanceolate basal leaves, which leave fibrous remains). [= GW, RAB, SE, Z; < *M. graminifolia* – FNA, = *M. graminifolia* var. *graminifolia* – K; > *M. graminifolia* var. *graminifolia* – X]

**Marshallia grandiflora** Beadle & F.E. Boynton, Appalachian Barbara's-buttons, Large-flowered Barbara's-buttons. Sandy or rocky riverbanks, bog margins, dry slopes over mafic rocks. June-August. Sw. PA south to sw. NC, e. TN (Cumberland Plateau) (Chester, Wofford, & Kral 1997), and se. KY. [= C, F, FNA, G, K, S, SE, W, WV, X, Y, Z; < *M. grandiflora* – RAB (also see *M. species 1*)]

**Marshallia mohrii** Beadle & F.E. Boynton, Coosa Barbara's-buttons. Sandstone, limestone, and dolostone glades, calcareous prairies. Nw. GA and n. and c. AL. It somewhat resembles *M. grandiflora*, but typically has 2-10 heads per plant (or solitary in depauperate individuals). [= FNA, K, S, SE, X, Y, Z]


**Marshallia obovata** (Walter) Beadle & F.W. Boynton var. scaposa Channell. Pine savannas. Late April-May. E. NC south to se. AL, in the Coastal Plain. [= K, RAB, SE, Y, Z; = *M. obovata* var. obovata – F, X, misapplied; < *M. obovata* – FNA, S]

**Marshallia ramosa** Beadle & F.E. Boynton, Pineland Barbara's-buttons, Southern Barbara's-buttons. Pinelands, Altamaha Grit outcrops, woodlands over ultramafic rocks. Coastal Plain from e. GA south to ne. FL and Panhandle FL. It somewhat resembles *M. graminifolia* in its linear leaves, but differs in the phyllaries acute (vs. subulate-acuminate), and flowering period (late May-June vs. July-mid-October). [= FNA, K, S, SE, WH, X, Y, Z]

**Marshallia species I** Oak Barrens Barbara's-buttons. Diabase barrens and fire-maintained woodlands over greenstone. Late June-July; August-September. This species is known from three extant and one extirpated population, in Granville County, NC and Halifax Co. VA, where associated with numerous rare and disjunct taxa of prairie or barren affinities: *Solidago phlomoides*, *Solidago rigidoides* var. glabrata, *Symphyotrichum depauperatum*, *Echinacea laevigata*, *Silphium terebinthinaceum*, *Baptisia australis* var. aberrans, *Linum sulphatum* var. sulphatum, *Carex meadii*, *Eryngium yuccifolium* var. *yuccifolium*, *Scutellaria leonardii*, *Lithospermum canescens*, and others. [= *M. graminifolia* – RAB]


**MATRICARIA** Linnaeus 1740 (Mayweed)


1 Heads with evident white rays (very rarely lacking rays); plant chamomile-scented; disc flowers 5-lobed................................. *M. chamomilla*
1 Heads discoid (lacking rays); plant pineapple-scented; disc flowers 4-lobed................................................................. *M. discoidea*

* Matricaria chamomilla* Linnaeus, German Chamomile, False Chamomile, Scented Mayweed. Roadsides; native of Europe. July-September. [= F, FNA, G, SE; = Matricaria recutita Linnaeus – C, K, Z; = Chamomilla recutita (Linnaeus) Rauschert]


**MELAMPODIUM** Linnaeus 1753


* Melampodium divaricatum* (Richard) DC. Disturbed areas; native of tropical America. [= FNA, K, WH]

**MELANTHERA** Rohr 1792


**Melanthera nivea** (Linnaeus) Small. Calcareous outcrops, sandy woodlands. June-October. E. SC south to s. FL, west to LA; also widespread in the West Indies, Mexico, Central America, and northern South America (Colombia, Ecuador, Peru, and Venezuela). [= FNA, K, SE, WH, Z; > M. hastata Michaux – RAB, S]

**MIKANIA** Willdenow 1803 (Climbing Hempweed)

A genus of about 430-450 species, vines, perennial herbs, and shrubs, primarily pantropical in distribution, but with extensions into temperate areas (Holmes 1995). References: Holmes in FNA (2006c); Cronquist (1980)=SE.

1 Involucre 6.5-8 mm; achenes 3.5-4.5 mm long; pubescence of the stems, leaves, and involucres spreading; [of se. SC southward] .......................................................... *M. cordifolia*
1 Involucre 4.5-5.5 (-6) mm high; achenes 1.5-2.5 (-2.7) mm long; pubescence of the stems, leaves, and involucres puberulent or nearly smooth; [widespread in our area] ........................................................................................................ *M. scandens*

**Mikania cordifolia** (Linnaeus f.) Willdenow, Heartleaf Climbing Hempweed. Bottomland hardwood forests, mesic hammocks near the coast, margins of tidal marshes. Se. SC (Beaufort and Colleton counties) (P. McMillan, pers. comm. 2005), e. GA (Bryan & Camden counties) (Carter, Baker, & Morris 2009), south to s. FL, west to s. LA. [= K, S, SE, WH]

**Mikania scandens** (Linnaeus) Willdenow, Climbing Hempweed. Marshes, swamp forests, wet thickets, seepages. July-October. ME to s. ON, south to s. FL and e. TX, south into the tropics. [=C, G, GW, K, RAB, S, SE, W, WH; > M. scandens var. pubescens (Nuttall) Torrey & A. Gray – F; > M. scandens var. scandens – F]
Oclemena E.L. Greene 1903 (Aster, Nodding-aster)

A genus of 3 species, perennial herbs, of e. North America. There now appears to be strong evidence (morphologic and molecular) and something approaching a consensus for the recognition of Oclemena as distinct from Aster. It appears that Oclemena is most closely related to Ionactis, and that these two genera are more closely related to Solidago and Heterotheca than to Aster (in a narrower sense). References: Brouillet in FNA (2006b); Nesom (1994)=Z; Semple, Heard, & Xiang (1996)=Y; Cronquist (1980)=SE; Nesom (1997).

1 Leaves 30-100 or more per plant, 1-8 mm wide ...................................................................................................................................
   Oclemena nemoralis

1 Leaves 11-30 per plant, 10-50 mm wide.

2 Leaves obovate, acuminate at the tip, thin in texture; [of the Mountains] ......................................................................................
   Oclemena acuminata

2 Leaves narrowly elliptic, acute to obtuse at the tip, coriaceous in texture; [of the Coastal Plain, from se. SC southward] ...........
   Oclemena reticulata


Oclemena nemoralis (Aiton) Greene, Leafy Bog Aster, Bog Nodding-aster. Peaty bogs. NL (Labrador) and ON south to nc. PA, MD, DE (formerly), and NJ. [= FNA, K, Z; = Aster nemoralis Aiton – C, F, G]

Oclemena reticulata (Pursh) Nesom, Pinet-barren Aster. Wet pine flatwoods. Late April-early June. Se. SC south through e. GA to c. peninsular FL. [= FNA, K, WH, Z; = Aster reticulatus Pursh – GW, RAB, SE; = Doellingeria reticulata (Pursh) Greene – S]

Onopordum Linnaeus 1753 (Scotch Thistle, Cotton-thistle)

A genus of about 60 species, herbs, of the Mediterranean region and w. Asia. References: Keil in FNA (2006a); Cronquist (1980)=SE.


Oporinia D. Don 1829 (Fall-dandelion)

A genus of about 20 species, herbs, primarily of temperate Eurasia. Samuel et al. (2006) show that Leontodon subgenus Oporinia (including L. autumnalis among the species treated below) should be recognized as a separate genus from Leontodon sensu stricto. References: Samuel et al. (2006), Bogler in FNA (2006a); Cronquist (1980)=SE.

* Oporinia autumnalis (Linnaeus) D. Don, Fall-dandelion. Roadsides, fields; native of Europe. June-October. [= Leontodon autumnalis Linnaeus – FNA, SE, WV; > Leontodon autumnalis Linnaeus var. autumnalis – C, F, G; > L. autumnalis ssp. autumnalis – K]

Packera Á. & D. Löve 1976 (Ragwort)

A genus of about 64 species, annual and perennial herbs, of subtropical, temperate, and arctic North American, with a few species in Siberia. These species have usually been considered part of Senecio, and have often been given informal status as "the Aureoid group". According to recent interpretations, this group warrants generic status, asPackera (Bremer 1994). References:
1 Plant an annual (rarely a biennial); leaf with lateral lobes broadly rounded, resembling the terminal lobe; [of wet soil of swamps and wet fields] ................................................................. P. glabella

1 Plant a perennial (rarely a biennial); leaf with lateral lobes absent, or distinctly narrower than the terminal lobe; [of dry to mesic soils, but not generally as above].

2 Principal leaves (especially the basal) 2-3-pinnatifid, the segments mostly 1-3 mm wide ................................................. P. millefolium

2 Principal leaves entire, toothed, or irregularly and raggedly 1-pinnatifid.

3 Plants densely tomentose or floccose when young, remaining visibly tomentose throughout the growing season on the leaves (these appearing grayish because of the persistent tomentum); basal leaves entire, obscurely crenate, or serrate (rarely lobed).

4 Basal leaves (including petioles) mostly 10-25 cm long, held in a vertical posture; [Coastal Plain and Piedmont of NC, SC, and VA, and Mountains of SC] .............................................................................. P. tomentosa

4 Basal leaves (including petioles) mostly 3-10 cm long, arching or prostrate; [Mountains].

5 Tomentum of leaf blades very fine and tight; [shale barrens and woodlands, w. VA and WV north to w. MD and we. PA] .............. P. antennariifolia

5 Tomentum of leaf blades coarser, looser; [calcareous, mafic, or ultramafic cliffs, barrens, and woodlands, w. VA and e. VA southward to w. NC and e. TN] ................................................................. P. paupercula var. appalachiana

3 Plants glabrate to sparsely floccose when young, becoming glabrous to glabrate later in the growing season, though some species with some persistent floccose tomentum near the base or in the leaf axils (the leaves appearing green); basal leaves serrate or lobed.

6 Basal leaves ovate, orbicular, or reniform, the blade 0.8-2× as long as wide; leaf blades cordate, truncate, or abruptly narrowed at the base.

7 Basal leaves reniform, strongly cordate at the base. ........................................................................................................ P. aurea

7 Basal leaves obovate to orbicular, truncate or abruptly narrowed at the base ................................................................. P. obovata

6 Basal leaves oblanceolate, narrowly elliptic, the blade 2-8× as long as wide; leaf blades cuneate at the base (truncate to cordate in P. Schweinitziana); plants usually not forming clonal patches by stolons or widely creeping rhizomes.

8 Basal leaves with truncate to cordate bases (and typically oblique); [high elevation grassy balds] ........................................... P. schweinitziana

8 Basal leaves cuneate at the base; [collectively widespread and of various habitats].

9 Heads many, generally 20-100; basal leaves (including petioles) up to 30 cm long and 3.5 cm wide ........................................ P. anemona

9 Heads few, generally 5-20; basal leaves (including petioles) up to 12 cm long and 2 cm wide ........................................ P. paupercula var. paupercula and P. crawfordii


Packera aurea (Linnaeus) Á. & D. Löve, Golden Ragwort, Heartleaf Ragwort. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, FL, VA): moist forests, bottomland forests, bogs, stream banks; common (rare in FL). Late March-June. NL (Labrador) west to MN, south to NC, ne. SC, n. GA, n. AL, and c. AR; disjunct in Panhandle FL. This species is variable, and some of the more striking variants have been named; some may well warrant formal taxonomic recognition, but additional study is needed. [= FNA, K, WH, Y; = Senecio aureus Linnaeus – C, G, GW, RAB, SE, WV, X; > Senecio aureus var. aureus – F; > Senecio aureus var. intercursa Fernald – F; > Senecio aureus var. gracilis (Pursh) Hooker – F; > Senecio aureus – S; > Senecio gracilis Pursh – S]

Packera crawfordii (Britton) A.M. Mahoney & R.R. Koval ined. Mt, Cp (NC): bogs and fens; rare. NJ, PA, and s. IN south to e. NC, w. NC, and TN. [= Senecio paupercula Michaux – RAB, C, G, GW, S, SE, X; = Senecio crawfordii (Britton) G.W. & G.R. Douglas – F; < Packera paupercula (Michaux) Á. & D. Löve – FNA]


Packera millefolium (Torrey & A. Gray) W.A. Weber & Á. Löve, Blue Ridge Ragwort, Yarrowleaf Ragwort. Mt (GA, NC, SC, VA): granitic domes, cliffs, and rocky woodlands, over granite, gneiss, schist, and amphibolite, and in calcareous glades (in sw. VA); rare. Late April-early June. Endemic to sw. NC, nw. SC, and ne. GA; disjunct in sw. VA (Lee Co.). The hybrid with Packera anonymous (= Senecio × memmingeri Britton [pro sp.]) occurs with the parents. The epithet in Packera is often spelled “millefolia,” ignoring that this epithet is a noun in apposition based on the pre-Linnaean genus name Millefolium (for Achillea)...

[= Senecio millefolium Torrey & A. Gray – C, F, S, RAB, SE, X; = Packera millefolia – FNA, K, Y; orthographic variant]
Packera obovata (Muhlenberg ex Willdenow) W.A. Weber & Á. Löve, Roundleaf Ragwort, Running Ragwort. Nutrient rich forests and woodlands (dry or moist), usually over calcareous or mafic rocks. April-June. VT west to KS, south to Panhandle FL and TX. [=FNA, KH, Y; = Senecio obovatus Muhlenberg ex Willdenow – C, RAB, S, SE, X; > Senecio obovatus var. obovatus – F, G, GV; > Senecio obovatus var. elliotii (Torrey & A. Gray) Fernald – F, G, GV; > Senecio obovatus var. rotundus Britton – F; > Senecio obovatus var. – S; > Senecio rotundus (Britton) Small – S]

Packera pauperculá (Michaux) Á. & D. Löve var. pauperculá, Balsam Ragwort, Northern Meadow Groundsel. Thickets, meadows, glades, generally over circumneutral soils derived from calcareous or mafic rocks. April-May. NL (Labrador) west to AK, south to GA, Panhandle FL (Bay County), AL, and OR. [< Packera pauperculá (Michaux) Á. & D. Löve – FNA, KH, X; < Senecio pauperculá Michaux – C, G, GW, RAB, SE, S; > Senecio pauperculá var. pauperculá – F; > Senecio pauperculá var. balsamae (Muhlenberg ex Willdenow) Fernald – F; > Senecio pauperculá var. praelongus (Greenman) House – F]

Packera pauperculá (Michaux) Á. & D. Löve var. pseudotomentosa (Mackenzie & Bush) R.R. Kowal. [habitats]; rare. [ ] [not yet keyed; add to synonymy]

Packera schweinitziana (Nuttall) W.A. Weber & Á. Löve, New England Ragwort. Grassy balds (in deep soil), at high elevations, in our area generally over metagabbro or amphibolite. May-July. NS and QC south to n. NY; disjunct to a few locations in w. NC and e. TN, notably on grassy balds on Roan Mountain, Snake Mountain, Rich Mountain, and Big Bald. [= FNA, KH; = Senecio schweinitzianus Nuttall – C, SE, X; = Senecio rotundus Oakes ex Rusby – F, G, RAB, S; = Packera schweinitzianus – Y, orthographic variant]

Packera tampicana (de Candolle) C. Jeffery, Great Plains Ragwort. AR and KS south and east to e. LA (Florida parishes) or s. MS (SE), and south to TX and Mexico. [= FNA; = Senecio imparipinnatus Klatt – SE] [not yet keyed]

Packera tomentosa (Michaux) C. Jeffrey, Woolly Ragwort. Sandy roadsides, sandy woodlands and forests, granitic flatrocks, granite domes. April-early June. S. NJ south to GA, west to TX, primarily on the Coastal Plain, but extending inland in the Piedmont and Mountains in thin sandy soils around rock outcrops, and as a roadside weed. [= FNA, KH, Y; = Senecio tomentosus Michaux – C, F, G, GW, RAB, SE, X; > Senecio tomentosus – S; > Senecio alabamensis Britton – S]

Palafoxia Lagasca y Segura 1816 (Palafoxia)


1 Perennial suffrutescence herb or shrub, 3-15 dm tall; phyllaries unequal, the longer inner phyllaries 8-11 mm long; pappus scales of the inner cypselas 4-7 mm long; [longleaf pine sands and sandy scrub, of sc. GA and FL] ................................................................. P. integrifolia

1 Annual herb, 2-8 dm tall; phyllaries equal, 3-10 mm long; pappus scales of the inner cypselas either 0.3-1 or 2-6 mm long.

2 Phyllaries 3-5 mm long; corollas 5-6 mm long; leaves 1-4 mm wide; pappus scales of the inner cypselas 0.3-1 mm long; [of calcareous prairies and glades, of MS westward] ................................................................. P. callosa

2 Phyllaries 5-8 mm long; corollas 7-10 mm long; leaves 5-20 mm wide; pappus scales of the inner cypselas 2-6 mm long; [in alien in our area, of disturbed sites] ................................................................. P. texana var. ambigua

Palafoxia callosa (Nuttall) Torrey & A. Gray, Small Palafoxia. Blackland prairies. MO, AR, and OK south to c. TX and Coahuila; disjunct in c. MS. [= FNA, KH, Z]


Panphalea Lagasca y Segura 1811

ASTERACEAE

* * Parthenium heterophyllum* Lessing. Waste areas around wool-combing mill; perhaps merely a waif, native of South America. April. See Pruski (2004) and Nesom (2004d).

Parthenium Linnaeus 1753 (Wild Quinine)

A genus of about 16 species, herbs and shrubs, of North America and the West Indies. Mears (1975) does not seem to me to be a fully satisfactory explanation of the variation within the genus. Morphologically and ecologically, *P. auriculatum* seems worthy of specific status, and I have not followed Mears's reduction of it to varietal status. *P. integrifolium* var. *mabryanum*, and var. *integrifolium* serve to describe real patterns of variation, but are disturbingly confluent morphologically, ecologically, and geographically. References: Mears (1975)=Z; Cronquist (1980)=SE; Strother in FNA (2006c).

1 Leaves pinnatifid to bipinnatifid, the primary sinuses extending 9/10 or more of the way to the midrib; leaves thin in texture; pappus of 2 petaloid scales; [alien annual] ................................................................. *P. hysterophorus*

**Parthenium auriculatum** Britton, Glade Wild Quinine. In shallow, xeric, circumneutral soil of glades, barrens, and woodlands, over calcareous rocks (such as dolostone) or mafic rocks (such as diabase). Mid May-August. Ne. WV south to c. NC and n. AL, west to c. TN. As indicated by the confusion over its taxonomy, the relationships and appropriate taxonomic treatment of this taxon are unclear. It is clearly a close relative of the Ozarkian *P. radfordii*, and perhaps not readily distinguished from it; some, at least, of our material has creeping rhizomes and heads over 7 mm in diameter, supposed to be serving to describe real patterns of variation, but are disturbingly confluent morphologically, ecologically, and geographically.

2 Stems glabrous or with short, appressed pubescence <1 mm long; cauline leaves only rarely auriculate-clasping, the upper cauline leaves sessile or petiolate, the lower cauline leaves petiolate, the petioles winged or not; blades of basal leaves (4-) 6-21 (-27) cm long, (1.4-) 2-12 (-13.5) cm wide.
3 Blades of basal leaves ovate-lanceolate, (4-) 6-12 (-20) cm long, (3-) 4-8 (-9.5) cm wide, never undulately lobed; heads (18-) 90-180 (-400) per inflorescence ................................................................. *P. integrifolium* var. *integrifolium*
3 Blades of basal leaves linear-lanceolate to ovate-lanceolate, (6-) 7-12 (-13.5) cm long, (1.4-) 2-4 (-4.5) cm wide, sometimes undulately lobed throughout their length; heads (30) 40-75 (-85) per inflorescence ................................................................. *P. integrifolium* var. *mabryanum*

**Parthenium integrifolium** Linnaeus, Santa Maria, Feverfew. Disturbed areas; native of tropical America, including the West Indies. July-November. [= C, FNA, G, K, S, SE, WH]


**Parthenium integrifolium** Linnaeus var. *mabryanum* Mears, Mabry's Wild Quinine. Sandhills and other dry soils, in forest openings or woodlands. Late May-November (blooming strongly in response to fire). Ne. SC, e. NC, and se. VA, barely extending into the e. Piedmont of NC in dry sandy soils around granitic flatrocks or in (formerly) fire-maintained communities. Var. *mabryanum* is the characteristic variety of *P. integrifolium* in the Sandhills of NC. Mears named a new species, *P. radfordii* Mears, to accommodate sinuate-lobed *Parthenium* from the fall-line sandhills of NC and SC, which he also believed to be later-blooming (August-November) than other *Parthenium*. Extensive observations in the Sandhills of NC show that "*P. radfordii*" consistently co-occurs in mixed populations with *P. integrifolium* var. *mabryanum*, and that flowering is triggered by fire. These sinuate-lobed plants are best considered a form of var. *mabryanum*. [= K; < *P. integrifolium* var. *integrifolium* – RAB; < *P. integrifolium* – C, F, FNA, G, S, SE, W; > *P. integrifolium* var. *mabryanum* – Z; > *P. radfordii* Mears – Z]

*Pascalea* Ortega 1797


* *Pascalea glauca* Ortega, Beach Creeping Oxeye. Coastal dunes, disturbed areas; native of South America, perhaps only a waif. Reported for FL, GA, and AL. [= FNA, K, S, WH; = Wedelia glauca (Ortega) O. Hoffmann – SE]
**Pectis** Linnaeus 1759


* **Pectis prostrata** Cavanilles. Roadsides, mowed areas, other dry disturbed areas; native of tropical America (probably including s. FL). July-November. Reported for NC (Basinger, pers. comm. 2006) and GA (Carter, Baker, & Morris 2009); likely to be in AL and SC. Spreading northward along roadsides. [= FNA, WH]

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**Peripleura** (N.T. Burbidge) Nesom 1994

* **Peripleura arida** (N.T. Burbidge) Nesom. Waste areas around wool-combing mill; perhaps only a waif, native of Australia. See Nesom (2004d). [= **Vittadinia arida** N.T. Burbidge]

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**Petasites** P. Miller 1754 (Butterbur)


* **Petasites hybridus** (Linnaeus) P.G. Gaertner, B. Meyer, & Scherbius, Butterbur, Butterfly-dock. Disturbed areas, frequently cultivated, rarely naturalized or persisting, native of Europe. Introduced and naturalizing south to DE, WV, and se. PA. [= C, F, FNA, G, K, SE]

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**Phoebanthus** S.F. Blake 1916


1 Leaves 3-5 mm wide; phyllaries appressed; [of ne. FL south to s. peninsular FL] ................................................................. **P. grandiflorus**
1 Leaves 1.2 mm wide; phyllaries spreading; [of Panhandle FL and s. AL] ........................................................................... **P. tenuifolius**

**Phoebanthus grandiflorus** (Torrey & A. Gray) S.F. Blake. Sandhills. March-November. Ne. FL (Clay County) south to c. peninsular FL. [= FNA, K, SE, WH; = *P. grandiflora* – S, orthographic variant]

**Phoebanthus tenuifolius** (Torrey & A. Gray) S.F. Blake. Sandhills and flatwoods. May-September. Endemic to s. AL and Panhandle FL. [= FNA, K, SE, WH; = *P. tenuifolia* – S, orthographic variant]

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**Picris** Linnaeus 1753 (Bitterweed, Oxtongue)

A genus of about 40 species, of the Old World, particularly the Mediterranean region. References: Strother in FNA (2006a); Cronquist (1980)=SE. [also see **Helminthotheca**]

1 Phyllaries in 2 series; phyllaries 3.5-8 mm wide; inner phyllaries 12-20 mm long; plant annual or biennial .... [see **Helminthotheca echioides**]
1 Phyllaries imbricate; phyllaries <3 mm wide; inner phyllaries 11-13 mm long; plant biennial to perennial................................. **P. hieracioides**

* **Picris hieracioides** Linnaeus, Hawkweed Oxtongue, Cat's-ear. Disturbed areas; native of Europe. May-October. [= RAB, C, F, FNA, G, SE, W; > **Picris hieracioides** Linnaeus ssp. hieracioides – K]
A genus of about 8 species (and numerous infraspecific taxa), herbs, of se. North America south to Central America. *Pityopsis* is taxonomically and nomenclaturally a difficult genus. The problems include nomenclatural issues involving typification and application (and frequently misapplication) of a plethora of names at specific and varietal level, disagreement over whether to include *Pityopsis* within an inclusive *Chrysopsis*, whether then to include *Chrysopsis* within an even more inclusive *Heterotheca*, and differences in species concepts in a morphologically and cytologically diverse group. References: Semple in FNA (2006b); Semple & Bowers (1985)=Z; Ward (2004c)=Y; Cronquist (1980)=SE.

1 Basal leaves shorter than the stem leaves; middle and upper stem leaves similar in size to one another.
2 Leaves and stems silky pubescent; disc 2-7 mm wide; [of se. TN, or of s. NJ northward, or of FL Panhandle].
3 Peduncles and phyllaries moderately to densely stipitate-glandular; [plants of the Mountains of TN]...............................[P. ruthii]
4 Stems straight; involucres 5-8 mm high; [plants of sandy places, from s. NJ northward]....................................................P. falcata
5 Peduncles flexuous; involucres (7-11 mm high, equaling the pappus; [plants of Panhandle FL] ..............................P. flexuosa
1 Basal leaves much longer than the stem leaves; stem leaves strongly reduced upward, the upper stem leaves much smaller than middle stem leaves.
5 Heads < 10; cauline leaves few, generally 2-7; [of sw. GA westward and southward]. ..................................................P. oligantha
5 Heads > 10; cauline leaves many; [collectively widespread in our area].
6 Peduncles and upper stem densely glandular-hairy (stipitate-glandular); phyllaries densely glandular-hairy; involucres 4.5-8 mm high; lower leaves < 10 mm wide.
7 Stems straight; involucres 5-8 mm high; middle and upper stem leaves similar in size to one another.
8 Involucres 14-18 mm high; disc florets 25-30; phyllaries densely glandular, involucres 12-14 mm high; lower leaves up to 20 mm wide.
9 Peduncles and phyllaries not stipitate-glandular (or only sparsely and minutely so); [plants of the Coastal Plain].
10 Inner phyllaries densely stipitate-glandular; at least distally; involucres 5-14 mm high; lower leaves up to 20 mm wide.
9 Involucres 8-14 mm high; disc florets > 30
10 Involucres 8-12 mm high; ray florets 10-16; disc corolla throats and lobes glabrous to short pilose (never long pilose); [widespread].........................................................P. graminifolia var. latifolia
9 Involucres 12-14 mm high; ray florets 13-25; disc corolla throats and lobes sometimes long-pilose; [of FL Panhandle].................P. graminifolia var. tracyi
8 Involucres 5-8 mm high; disc florets 15-29
10 Inner phyllaries densely stipitate-glandular, at least distally..................................................P. graminifolia var. tenuifolia
10 Inner phyllaries eglandular to sparsely glandular.........................................................................................P. graminifolia var. tenuifolia

**Pityopsis aspera** (Shuttleworth ex Small) Small var. *adenolepis* (Fernald) Semple & Bowers. Dry woodlands, forests, and disturbed places, apparently in the NC Mountains only in the Escarpment. Late June-October. E. and c. VA south to n. FL and west to s. MS. *P. adenolepis* includes 2 chromosome numbers (2n = 18 and 36), which "account, in part, for the range of variation in involucre, floret, and fruit size" (Semple & Bowers 1985). [= FNA, K, Z; < *Heterotheca adenolepis* (Fernald) Ahles – RAB; < *Heterotheca graminifolia* (Michaux) Shinners – RAB, misapplied; < *Chrysopsis graminifolia* (Michaux) Elliott var. *aspera* (Shuttleworth ex Small) A. Gray – C, G, SE, W; = *Chrysopsis graminifolia* (Michaux) Elliott – F, misapplied; = *P. adenolepis* (Fernald) Semple; < *Pityopsis aspera* – S, WH; < *Heterotheca aspera* (Shuttleworth ex Small) Shinners]

**Pityopsis aspera** var. *adenolepis* (Small) var. *adenolepis* (Fernald) Semple & Bowers. Dry woodlands, forests, and disturbed places, apparently in the NC Mountains only in the Escarpment. Late June-October. E. and c. VA south to n. FL and west to s. MS. *P. adenolepis* includes 2 chromosome numbers (2n = 18 and 36), which "account, in part, for the range of variation in involucre, floret, and fruit size" (Semple & Bowers 1985). [= FNA, K, Z; < *Heterotheca adenolepis* (Fernald) Ahles – RAB; < *Heterotheca graminifolia* (Michaux) Shinners – RAB, misapplied; < *Chrysopsis graminifolia* (Michaux) Elliott var. *aspera* (Shuttleworth ex Small) A. Gray – C, G, SE, W; = *Chrysopsis graminifolia* (Michaux) Elliott – F, misapplied; = *P. adenolepis* (Fernald) Semple; < *Pityopsis aspera* – S, WH; < *Heterotheca aspera* (Shuttleworth ex Small) Shinners]

**Pityopsis graminifolia** (Michaux) Nuttall. Stable dunes (NJ), further north in sandplain grasslands, coastal heathlands, pitch pine-scrub oak barrens. Sc. MA south through RI, CT, and NY (Long Island) to s. NJ; found once as a rare introduction in w. Pennsylvania (Pinellas County – Wunderlin & Hansen 2003). [= FNA, K, Z; = *Chrysopsis falcata* (Pursh) Elliott – C, F, G]

**Pityopsis graminifolia** var. *microcephala* (Michaux) Nuttall var. *graminifolia*. Sandhills. July-October. As interpreted here, *P. graminifolia* includes 5 varieties "that intergrade and hybridize, when the ploidy level is the same" (Semple & Bowers 1985). Var. *graminifolia* ranges from se. NC south to c. pensular FL, and west to e. LA; in our area it is known only from the outer Coastal Plain. Two of the varieties do not reach our area, being restricted to Pensacola FL: var. *aequilifolia* Bowers & Semple and the hexaploid (2n = 54) var. *tracyi* (Small) Semple. [= FNA, K, Z; < *Heterotheca nervosa* (Willdenow) Shinners var. microcephala (Small) Shinners ex Ahles – RAB; < *Chrysopsis graminifolia* (Michaux) Elliott var. *graminifolia* – C; < *Pityopsis microcephala* (Small) Small – S; < *Chrysopsis graminifolia* (Michaux) Elliott var. *microcephala* (Small) Cronquist – SE; < *Pityopsis graminifolia* – WH]
**Pityopsis graminifolia** (Michaux) Nuttall var. *latifolia* Fernald. Sandhills, dry woodlands and forests (such as ridgetop pine/heath communities in the Mountains), roadbanks. June-October. *Var. latifolia* is the most widely distributed variety of *P. graminifolia*, ranging from DE (formerly), s. OH, and c. AR south to s. FL and e. TX; Bahamas; and in Mexico (Tamaulipas, Vera Cruz, Oaxaca, Chiapas) and Central America (Belize, Guatemala, Honduras). [= FNA, K, Z; > *Heterotheca nervosa* (Wildenow) Shinners var. nervosa – RAB; > *Heterotheca correllii* (Fernald) Ahles = RAB = *Chrysopsis graminifolia* (Michaux) Elliott var. *latifolia* Fernald – C, W; > *Chrysopsis nervosa* (Wildenow) Fernald var. *nervosa* – *F*; < = *Chrysopsis graminifolia* (Michaux) Elliott var. *graminifolia* – SE, misapplied; = *Chrysopsis graminifolia* (Michaux) Elliott var. *graminifolia* – WH.

**Pityopsis graminifolia** (Michaux) Nuttall var. *tenuifolia* (Torrey) Semple & Bowers. Sandhills, sandy woodlands, savannas, pine flatwoods. July-October. *Var. tenuifolia* ranges from se. NC south to s. FL and west to e. TX (north inland to c. AR and e. OK); apparently disjunct in se. VA. [= FNA, K, Z; < *Heterotheca nervosa* (Wildenow) Shinners var. *microcephala* (Small) Shinners ex Ahles – RAB (also see *P. graminifolia* var. *graminifolia*); < *Pityopsis microcephala* (Small) Small – S (also see *P. graminifolia* var. *graminifolia*); < *Chrysopsis graminifolia* (Michaux) Elliott var. *microcephala* (Small) Cronquist – SE (also see *P. graminifolia* var. *graminifolia*); < *Pityopsis graminifolia* – WH; ? *Pityopsis nervosa* var. *nervosa* – Y).

**Pitopyis graminifolia** (Michaux) Nuttall var. *tracyi* (Small) Semple. Sandhills. October-December. Endemic to Panhandle FL; reports of it in n. AL are probably based on aberrant individuals of *P. graminifolia*. [= FNA, K, Z; = *P. tracyi* Small – S; < *Chrysopsis graminifolia* – SE; < *Pityopsis graminifolia* – WH; = *Pityopsis nervosa* (Willdenow) Dress var. *tracyi* (Small) D.B. Ward]

**Pityopsis oligantha** (Chapman ex Torrey & A. Gray) Small, Narrow-leaved Goldenaster. Wet flatwoods and pitcherplant bogs. Sw. GA and Panhandle FL west to s. AL (alleged reports from further west seem to be in error). [= FNA, K, S, WH, Z; = *Chrysopsis oligantha* Chapman ex Torrey & A. Gray = *Heterotheca oligantha* (Chapman ex Torrey & A. Gray) Harms]

**Pityopsis pinifolia** (Elliott) Nuttall, Sandhill Goldenaster. Sandhills, sandy roadsides. August-October. This species is locally abundant (and often weedy) but very local in distribution, limited to (apparently) scattered counties in the Sandhills (rarely middle Coastal Plain) of s. NC, SC, GA, and c. AL. [= FNA, K, S, Z; = *Heterotheca pinifolia* (Elliott) Ahles – RAB; = *Chrysopsis pinifolia* Elliott – SE]

**Pityopsis ruthii** (Small) Small. Flood-scoured rocks along rivers. Restricted to rocks within the flood zone of the Hiwassee and Ocoee rivers, Polk County, TN; it should be sought in adjacent sw. NC. [= FNA, K, S, Z; = *Chrysopsis ruthii* Small – SE; = *Heterotheca ruthii* (Small) V.L. Harms]

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**Plectocephalus** D. Don in R. Sweet 1830 (Basketflower)


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**Pluchea** Cassini 1817 (Marsh-fleabane)


1 Stems winged by decurrent leaf bases .................................................................................................................................................... *P. sagittalis*
1 Stems not winged by decurrent leaf bases.
2 Leaves petiolate or narrowly cuneate at the base; [section *Pluchea*].

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A list of sources for the references is provided in the document. Further details about the distribution and identification of each species are included in the text.
3 Phyllaries glandular on the outer surface (the outer bracts also somewhat pubescent); inflorescence paniculiform, the lateral branches not reaching or exceeding the central branches; plants to 20 dm tall; [in freshwater habitats, widespread in the Coastal Plain and Piedmont] ............................................................ P. camphorata

3 Phyllaries short-pubescent with several-celled glandular-tipped hairs; inflorescence more-or-less cymiform and flat-topped, some of the lower lateral branches elongate and reaching or exceeding the central branches; plants to 10 (-15) dm tall; [mainly in salty or brackish habitats, restricted to the outer Coastal Plain] .............................................................. P. odorata

2 Leaves sessile, and either rounded, truncate, or clasping at the base; [section Amplexifolium].

4 Leaves mostly 8-20 cm long and 3-7 cm wide; involucre 9-12 mm high; middle phyllaries 2.5-3 mm wide ......................... P. longifolia

4 Leaves mostly 3-10 cm long and 1-3 cm wide; involucre 5-10 mm high; middle phyllaries 1-1.5 mm wide.

5 Stems and leaves glandular, otherwise nearly glabrous; involucre 4-5 mm wide ......................................................... P. yucatanensis

5 Stems and leaves puberulent or arachnose as well as glabular; involucr 5-12 mm wide.

6 Corollas pink or purple; heads 4-6 mm high, 5-9 mm wide; phyllaries usually arachnoid and commonly also with dense, thick, viscid hairs; outer phyllaries acuminate; nutlets black, 0.5-1 mm long, densely pubescent; [flowering June-July] .............. P. baccharis

6 Corollas creamy white; heads 6-10 mm high, 6-12 mm wide; phyllaries thinly arachnoid, with sessile glands; outer phyllaries obtuse or obtuse-apiculate; nutlets pinkish, ca. 1 mm long, pubescent on the angles; [flowering late July-October].

7 Plants 3-11 dm tall; inner phyllaries 4-6 mm long; [widespread in our area] ................................................................. P. foetida var. foetida

7 Plants 9-25 dm tall; inner phyllaries 6-7 mm long; [in the Coastal Plain of SC southward] ............................................. P. foetida var. imbricata


Pluchea camphorata (Linnaeus) A.P. de Candolle, Camphorweed, Camphor Pluchea. Bottomland sloughs, clay flatwoods, other freshwater wetlands. August-October. DE (formerly) and MD south to n. peninsula FL, west to TX and OK, north in the interior to s. OH and e. KS. [= RAB, C, F, FNA, G, GW, K, SE, WH, X, Y; = P. petiolata Cassini – S]

Pluchea foetida (Linnaeus) A.P. de Candolle var. foetida, Stinking Fleabane. Seasonally wet areas, ditches, various other freshwater wetlands. Late July-October. S. NJ south to s. FL, west to e. TX; West Indies (?). [= K; < P. foetida – RAB, C, F, FNA, G, GW, SE, WH, X, Y; > P. foetida – S; > P. tenutifolia Small – S]

Pluchea foetida (Linnaeus) A.P. de Candolle var. imbricata Kearney. Freshwater wetlands. Late July-October. SC south to FL Panhandle. The validity and distribution of this taxon need additional study. [= K; < P. foetida – RAB, C, FNA, GW, SE, WH, X, Y; = P. imbricata (Kearney) Nash – S]

Pluchea longifolia Nash. Brackish and fresh marshes and swamps, ditches, canals. Ne. FL and eastern FL Panhandle (Wakulla and Taylor counties) south to c. peninsular FL (Wunderlin & Hansen 2008). [= FNA, SW, S, WH]

Pluchea odorata (Linnaeus) Cassini, Saltmarsh Fleabane. Salt and brackish marshes. August-October. MA and MI south to s. FL and TX (mostly on the Coastal Plain), also in w. United States, Central America, and South America. Two varieties are sometimes recognized, the widespread and more robust, but small headed var. odorata (involucre 4-6 (-7) mm across the disk, with 6-13 (19) functionally staminate flowers; plants 2-8 (-20) dm tall; of VA southward), and the northeastern North American and less robust but large-headed var. succulenta (involucre 7-8 (-10) mm across the disk, with (14-) 21-34 functionally staminate flowers; plants 2-6 dm tall, of NC northward). Additional study is needed to warrant recognition of the varieties. [= GW, WH, X, Y; = P. purpurascens (Swartz) A.P. de Candolle – RAB; > P. odorata var. odorata – C, FNA, K, SE; > P. odorata (Linnaeus) Cassini var. succulenta (Fernald) Cronquist – C, FNA, K, SE; > P. purpurascens (Swartz) A.P. de Candolle var. purpurascens – F, G; > P. purpurascens (Swartz) A.P. de Candolle var. succulenta Fernald – F, G; > P. camphorata – S, misapplied]

* Pluchea sagittalis (Lamarck) Cabrera, Wing-stem Camphorweed. Disturbed areas, probably only a waif, known from older collections (1891-1901) from Pensacola, FL, and Mobile, AL; native of South America. July-August. [= FNA, WH; = P. quitoc de Candolle – S; = P. suaveolens (Vell.) Kuntze – SE] [synonymy incomplete]

* Pluchea yucatanensis Nesom, Yucatan Camphorweed. Brackish marshes; native of Mexico and Belize. Introduced in s. AL and s. MS. [= FNA]

Polyommia Linnaeus 1753

**Prenanthes** Linnaeus 1753 (Rattlesnake-root)


**Identification notes**: The species cannot be reliably identified in sterile condition. "Principal phyllaries" are the inner, well-developed, excluding the few smaller and poorly-developed outer phyllaries.

1 Principal phyllaries 12–15; florets 15–38 per head; [entering our area in WV from the north and west].
   1 Principal phyllaries 4–10; flowers mostly 4–19 per head; [collectively widespread in our area].
   2 Phyllaries evidently (though sometimes sparsely) pubescent with long coarse hairs (1.5–3 mm long).
   3 Inflorescence corymbiform to paniculiform, many of the branches well-developed.
   4 Phyllaries densely setose; principal leaves usually evidently lobed.
   5 Heads ascending or nearly erect; principal phyllaries (6–)8 (–10); flowers (8–)11–14 (–19) per head; [WV, KY, TN, nw. AL, MS and westwards].
   6 Principal phyllaries (4–)5 (–6); flowers 4–6 per head.
   7 Inflorescences narrow and elongate (virete); flowers pink to purple.
   8 Pappus cinnamon-brown; corolla whitish to pinkish.
   9 Pappus straw-colored to light brown; corolla pale yellow.

**Prenanthes alba** Linnaeus, Northern Rattlesnake-root. Forests. August-November. ME west to MB, south to NC, w. NC, WV, and MO. Reported for GA (GANHP). Reports of *P. alba* from the Coastal Plain of NC and perhaps VA are based on *P. alba* ssp. *pallida*, which is invalidly published; additionally, specimens attributed to this taxon appear to be better attributed to *P. trifoliolata*. [= C, F, FNA, G, K, SE, W, Z; = *P. alba* ssp. *alba* – RAB; = *Nabalus albus* (Linnaeus) Hooker – S]


**Prenanthes aspera** Michaux, Rough Rattlesnake-root. Prairies, glades, and barrens. August-September. PA, OH, WI, MN, and SD south to c. TN, MS, LA, and OK. [= C, F, G, K, SE; = *Nabalus asper* (Michaux) Torrey & A. Gray – S; = *Nabalus asperus*, orthographic variant]

**Prenanthes autumnalis** Walter, Slender Rattlesnake-root. Pocosins, pine savannas, forest edges. September-November. NJ south to ne. FL, a Southeastern Coastal Plain endemic. [= C, F, FNA, G, K, RAB, SE, WH, Z; = *Nabalus virgatus* (Michaux) A.P. de Candolle – S; = *Nabalus species 1*]

**Prenanthes barbata** (Torrey & A. Gray) Milstead, Barbed Rattlesnake-root, Flatwoods Rattlesnake-root. Limestone glades and barrens. C. TN (Western Highland Rim) (Chester, Wofford, & Kral 1997), nw. GA, and n. AL. west to se. AR, e. TX and w. LA. [= FNA, K, SE; < *Nabalus integriformis* Cassini – S, misapplied; = *P. serpentina* Pursh var. *barbata* Torrey & A. Gray; = *Nabalus barbatus* (Torrey & A. Gray) A. Heller]

**Prenanthes roanensis** (Chickering) Chickering, Roan Rattlesnake-root, Appalachian Rattlesnake-root. Mountain forests, grassy balds, at high elevations. August-October. Sw. VA south to w. NC and e. TN. Fusiak & Schilling (1984) studied *P. roanensis* and related species. Additional characters (other than those explicitly used in the key above) useful in separating *P. roanensis* from *P. altissima* are: phyllary tips usually black (vs. usually green), flowers 5-8 per head (vs. 4-6), and inflorescence usually narrow and thyrsoid (vs. usually conspicuously branched). = C, FNA, K, RAB, SE, W, Y, Z; > *P. cylindrica* (Small) Braun – G; > *Nabalus roanensis* Chickering – S; > *Nabalus cylindricus* Small – S


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**Pseudognaphalium** Kirpicznikov 1950 (Rabbit-tobacco)


1 Involucre 3-7 mm high; plants 15-100 cm tall; inflorescence terminal, elongate, clustered, or corymbose. ................................................................................................................................................................................................. [see *Gnaphalium uliginosum*]

1 Leaves distinctly (but shortly) decurrent 1-10 mm and adnate-aunculicate on the stem.

2 Upper surface of the leaves coarsely glandular-hairy; heads in corymbose arrays................................................................. *Ps. macounii*

2 Upper surface of the leaves loosely tomentose, not glandular; heads in terminal glomerules

3 Involucres 3-4 mm high; bisexual florets 5-10 (corollas evenly yellowish, not red-tipped); cypselae with papilliform hairs ................................................................. *Ps. lutealbum*

3 Involucres 4-6 mm high; bisexual florets mostly 18-28 (corollas evenly yellowish, not red-tipped); cypselae glabrous................................................................. *Ps. stramineum*

4 Leaves sessile, not decurrent or adnate-aunculate.

5 Stem white-woolly or arachnoid with matted white hairs, the stem surface generally obscured (sometimes glandular-pubescent at the base of the stem only). ................................................................................................. *Ps. obtusifolium*

5 Stem glandular-pubescent or glandular-puberulent, the hairs at right angles to the stem, the stem surface plainly visible.

6 Stems glandular-villos, the stipitate glands (0.1-) 0.3-1.0 mm high, prominently visible in height on any portion of the stem, with a stalk broadened toward the base and about equal the gland width; pistillate florets 83–107, bisexual florets 9–15; leaves mostly oblong-lanceolate, 2.5–7 cm long, 4–20 mm wide, 4–8 times longer than wide; plant 4-10 dm tall ......................... *Ps. helleri*

6 Stems glandular-puberulent, the stipitate glands 0.1-0.2 mm high, relatively even in height on any portion of the stem, with a filiform stalk of even width and narrower than the gland width; pistillate florets 47–78; bisexual florets (7–) 11–20; leaves linear to linear-lanceolate or linear-oblanceolate, 1.5–5.5 cm long, 1.5–10 mm wide, 6–10 times longer than wide; plant 3-7 dm tall.............. *Ps. micradenium*

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**Pseudognaphalium helleri** (Britton) A. Anderberg, Heller's Rabbit Tobacco. Dry woodlands and openings (especially over mafic rocks), sandhills. September-October. Sc. VA south to Panhandle FL, s. AL, west to AR, LA, and ne. TX. = FNA, X; = *Gnaphalium helleri* Britton var. *helleri* – Z; < *Gnaphalium helleri* – C, G, RAB, SE, W (also see *Ps. micradenium*); = *Gnaphalium obtusifolium* var. *helleri* (Britton) Blake – F, Y; = *Pseudognaphalium helleri* (Britton) A. Anderberg ssp. *helleri* – K; < *Pseudognaphalium helleri* – WH

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**Nabalus roanensis** Chickering – S; > *Nabalus cylindricus* Small – S

**Nabalus crepidineus** (Michaux) A.P. de Candolle – S

**Nabalus serpentarius** (Pursh) Hooker – S

**Nabalus trifoliatus** Cassini – S
Pseudognaphalium luteoalbum (Linnaeus) Hilliard & B.L. Burtt, Red-tipped Rabbit Tobacco. Mowed rights-of-way; native of Eurasia. April-June. [= FNA, K] [add synonymy]

Pseudognaphalium macounii (Greene) Kartesz, Clammy Cudweed, Winged Cudweed, Clammy Everlasting. Dry fields, pastures, and woodland edges at high elevations. July-September. QC west to BC, south to w. VA, WV, TN, and Mexico. [= FNA, K; = Gnaphalium macounii Greene – C, F, S, WV; < Gnaphalium viscosum – SE, Y, misapplied; < Pseudognaphalium viscosum (Kunth) W.A. Weber, misapplied]

Pseudognaphalium micradenium (Weatherby) Nesom, Small Rabbit Tobacco. Dry woodlands and openings. September-October. Se. ME west to WI, south to e. SC, c. GA, se. TN, and s. MO. Nesom (2001a) discusses the distinctiveness of this taxon and its treatment as a species, rather than variety. [= FNA, X; = Gnaphalium helleri Britton var. micradenium (Weatherby) Mahler – Z; > Gnaphalium helleri – C, G, RAB, S, SE, W; = Gnaphalium obtusifolium var. micradenium Weatherby – F, Y; = Pseudognaphalium helleri (Britton) A. Anderberg ssp. micradenium (Weatherby) Kartesz – K]

Pseudognaphalium obtusifolium (Linnaeus) Hilliard & Burtt, Fragrant Rabbit Tobacco. Openings, woodlands, coastal dunes, sandy pinelands, disturbed areas. August-October. NL (Newfoundland) west to ON, south to s. FL and TX. [= FNA, WH, X; = Gnaphalium obtusifolium Linnaeus – RAB, S, SE, W, WV; > G. obtusifolium var. obtusifolium – F; > Gnaphalium obtusifolium Linnaea var. praecox Fernald – F; = Gnaphalium obtusifolium var. obtusifolium – C, G, Y; > Pseudognaphalium obtusifolium ssp. obtusifolium – K; > Pseudognaphalium obtusifolium ssp. praecox (Fernald) Kartesz – K; ? Gnaphalium polycephalum Michaux]

Pseudognaphalium stramineum (Kunth) A. Anderberg. Sandy fields, roadsides, disturbed places; native of TX south through Mexico and into South America. Late May-August. [= FNA, K; = Gnaphalium stramineum Kunth – C; ? G. chilense Sprengel – RAB, SE, Y]

Pterocaulon Elliott 1823 (Blackroot)


Identification notes: Pterocaulon is an unmistakable plant, the stems and leaf undersurfaces creamy-white floccose-tomentose, the leaf bases deciduous down the stem, the heads in oblong, terminal spikes, the tip nodding before anthesis.

Pterocaulon pycnostachyum (Michaux) Elliott, Blackroot, Wingstem. Sandhills, dry pinelands, pine flatwoods. May-June. Se. NC south to s. FL and west to s. AL. [= RAB, FNA, GW, K, SE, WH, Z; = P. undulatum (Walter) C. Mohr – S]

Pulicaria Gaertner 1791 (False-fleabane)

A genus of 100 or more species, herbs (rarely shrubs), of Europe, Asia, and Africa. References: Preston in FNA (2006a).

* Pulicaria arabica (Linnaeus) Cassini. Disturbed areas (on ballast); perhaps just a waif (not recently collected), native of Africa. [= FNA, SE, WH; = Vicoa auriculata Cassine – S (misapplied)] [not keyed]

Pyrrhopappus A.P. de Candolle 1838 (False-dandelion)


1 Outer phyllaries mainly 1/3-2/3 as long as the inner phyllaries; lower and middle stem usually glabrous; leaf margins usually glabrous; upper cauline leaves usually pinnately (3-) 5-7 (-9)-lobed.................................................................................................................................P. carolinianus

1 Outer phyllaries mainly < 1/3 as long as the inner phyllaries; lower and middle stem usually sparsely to densely pilose; leaf margins usually ciliate; upper cauline leaves usually unlobed or pinnately 1-5-lobed.................................................................................................................................P. pauciflorus

Pyrrhopappus carolinianus (Walter) A.P. de Candolle, False-dandelion. Dry and moist forests, roadsides, meadows, fields. March-June (and sometimes later). DE, se. PA, and MD south to c. peninsular FL, west to IL, MO, and TX; he pre-Columbian range is uncertain. [= C, F, FNA, G, K, WH, WV, > P. carolinianus var. carolinianus – RAB, SE; > P. carolinianus var. georgianus (Shinners) Ahles – RAB, SE; = Sittilias multicaulis (A.P. de Candolle) Greene – S; = P. multicaulis A.P. de Candolle – SE]
ASTERACEAE

A genus of about 7 species, herbs, of North America. References: Urbatsch & Cox in FNA (2006c); Richards (1968)=Z; Cronquist (1980)=SE. Key adapted from SE.

1 Disks columnar, 2-4.5× as long as thick; plant a tap-rooted perennial; rays < 2 (-2.5) cm long; achenes ciliate and winged, crowned by a pappus consisting of 1 or more awn-teeth ................................................................. R. columnifera
1 Disks ellipsoid-globular, 1-1.6× as long as thick; plant a fibrous-rooted perennial from a woody rhizome or caudex; rays 2.5-3.5 (-4.5) cm long; achenes smooth, lacking a pappus ................................................................................................................. R. pinnata

* Ratibida columnifera (Nuttall) Wooton & Standley, Columnar Prairie Coneflower. Dry disturbed areas, established around nurseries or plantings, waste areas near wool-combing mills; introduced from further west. May-August. ON west to AB, south to TX, Mexico, and AZ; introduced at scattered sites eastward, including e. NC, e. SC, and c. TN (Chester, Wofford, & Kral 1997). [= C, F, FNA, G, K, SE, WH, WV, Z; = R. columnaris (Sims) D. Don – S]

Ratibida pinnata (Ventenat) Barnhart, Globular Prairie Coneflower, Grey-headed Coneflower. Prairie-like glades and oak savannas over gabbro (usually in Iredell soils) or calcareous rocks, cedar glades, calcareous (black belt or chalk) prairies, disturbed areas (naturalized from cultivation). June-August. S. ON west to MN and SD, south to w. PA, e. TN, nw. GA, Panhandle FL, MS, OK, and ne. TX (Singhurst, Mink, & Holmes 2010); disjunct in nc. SC. A characteristic plant of midwestern prairies and limestone glades, remarkably disjunct to "Piedmont prairie" remnants in SC (Nelson 1993). [= C, F, FNA, G, K, S, SE, W, WH, WV, Z]

Rudbeckia Linnaeus 1753 (Yellow Coneflower, Black-eyed Susan)


Identification notes: This treatment needs considerable additional work in the herbarium, and will likely be substantially modified.

1 Leaves grasslike, linear-lanceolate, > 10× as long as wide, the basal with blade 10-20 cm long and < 1 cm wide; [of Coastal Plain, of s. GA southward and westward].
2 Plant with 1 head; rays red, orange, or maroon, 1.0-1.5 cm long; plant pubescent ........................................................................ R. graminifolia
2 Plant with several heads; rays yellow, 1.5-3.5 cm long; plant glabrous ................................................................................ R. mohrii
1 Leaves broader, lanceolate, ovate, or pinnately-cleft, < 10× as long as wide; [collectively widespread].
3 Leaves (at least some of the largest and generally more basal) 3-lobed or more divided.
  4 Disc flowers yellow or yellowish-green; achenes 3.5-6.0 mm long.
   5 Basal and lower stem leaves 1-5-pinnatifid; plants 0.5-2 m tall.
      6 Heads small, the disc mostly 1.0-1.5 cm wide; rays usually 5 or 8; [of the Coastal Plain and Piedmont, VA south to FL, west to LA] ................................................................. R. laciniata var. digitata
      6 Heads larger, the disc mostly 1.5-2.0 cm wide; rays usually 8 or 13; [of high elevations of the Appalachians, VA and KY south to NC and TN] ................................................................. R. laciniata var. humills
  5 Basal and lower stem leaves 1-5-pinnatifid, with 5-many lobes; plants 1-3 m tall.
   7 Achenes 3.5-4.0 mm long; pappus > 0.7 mm long; [of DE, MD, and PA northward] ................................................................. R. laciniata var. bipinnata
   7 Achenes 4.2-6.0 mm long; pappus < 0.7 mm long; [widespread in our area] ................................................................. R. luciniata var. laciniata
  4 Disc flowers purple-brown; achenes 1.9-3.5 mm long.
   8 Pales acute, hairy near the tip; rays 20-40 mm long ........................................................................................................ R. subtomentosa
   8 Pales cuspidate, with awn-like tips ca. 1.5 mm long, glabrous; rays 8-30 mm long.
9 Cauline leaves 1-3-lobed (at least some on a plant 3-lobed).
10 Ray blades 8-17 mm long; discs 10-15 mm across; [widespread in our area]...\textit{R. triloba} var. triloba
10 Ray blades 18-30 mm long; discs 15-20 mm across; [at moderate to high elevations in the Appalachians]...\textit{R. triloba} var. rupesiris
9 Cauline leaves 1-7-lobed (at least some on a plant 5-7-lobed).
11 Phyllaries > 9 mm long; [of the Mountains of NC, VA, and TN]...\textit{R. triloba} var. bealdei
11 Phyllaries < 7 mm long; [of the Coastal Plain of s. AL and Panhandle FL]...\textit{R. triloba} var. pinnatifolia

3 Leaves simple, unlobed, toothed (or not).
12 Pales (bracts of the receptacle) glabrous or nearly so (except sometimes for a minutely ciliate margin).
13 Pales obverse to acute.
14 Larger leaves < 2 cm wide...\textit{[R. missouriensis]}
14 Larger leaves > 2 cm wide.
15 Plants 2-3 m tall; stem leaves strongly auriculate-clasping...\textit{R. auriculata}
15 Plants 0.5-1.3 m tall; stem leaves petiolate or sessile, but not auriculate-clasping.
16 Basal leaves with bases cuneate to broadly cuneate.
17 Basal leaves with blades 2.5-3.5× as long as wide; plants villous-hirsute...\textit{R. fulgida} var. fulgida
17 Basal leaves with blades < 2× as long as wide; plants glabrous to sparsely hairy.
18 Basal leaves attenuate-cuneate at the base; rays 15-25 mm long; upper stem leaves notably reduced in size from the lower stem leaves...\textit{R. fulgida} var. spathulata
18 Basal leaves broadly cuneate at the base; rays 20-40 mm long; upper stem leaves not typically reduced in size from the lower stem leaves...\textit{R. fulgida} var. speciosa
16 Basal leaves with bases rounded to cordate.
19 Upper stem leaves not typically reduced in size from the lower stem leaves...\textit{R. fulgida} var. sullivantii
19 Upper stem leaves notably reduced in size from the lower stem leaves.
20 Basal leaves with bases rounded; rays 20-40 mm long...\textit{R. fulgida} var. speciosa
20 Basal leaves with bases broadly rounded to cordate; rays 10-30 mm long...\textit{R. fulgida} var. umbrosa

12 Pales densely pubescent near the tip.
21 Plants glabrous or with scattered inconspicuous hairs.
22 Stem very sparsely spreading-villous (to more conspicuously hairy, and then keyable under 21b); disc to 15 mm high...\textit{R. heliopsidis}
22 Stem glabrous; disc elongating in fruit, ultimately 12-60 mm high.
23 Leaves strongly blue-green and glaucous; flowering plants 1-2.5 m tall; largest leaves 7-16 cm wide; [cultivated in our area and rarely persisting or spreading]...\textit{R. maxima}
23 Leaves green; flowering plants 0.5-1.3 m tall; largest leaves < 6.5 cm wide; [native of pitcher-plant bogs and wet flatwoods of e. GA and ne. FL west to s. AL]...\textit{R. nitida}
21 Plants conspicuously hirsute or pilose.
24 Plants perennials from a woody rhizome; pappus a low crown; style appendages short, blunt.
25 Disc 10-15 mm across; rays 6-12, mostly spreading, 15-25 mm long; leaves not folded longitudinally...\textit{R. heliopsidis}
25 Disc 15-25 mm across; rays 12-25, mostly reflexed, 15-25 mm long; leaves folded longitudinally.
26 Stem hairy only on the upper stem, the hairs ascending and < 0.5 mm long...\textit{[R. grandiflora var. alismaefolia]}
26 Stem hairy throughout, the hairs spreading on the lower stem, ascending on the upper stem and ca. 1.0 mm long...\textit{[R. grandiflora var. grandiflora]}
24 Plants annuals, biennials, or perennials from fibrous roots; pappus lacking or a low crown to 0.1 mm high; style appendages elongate, subulate (\textit{R. hirta}) or short, acute to obtuse (\textit{R. mollis}).
27 Stems and leaves softly pilose to woolly; style branches short, acute to obtuse; [plants of dry sands of the Coastal Plain of SC southward]...\textit{[R. mollis]}
27 Stems and leaves leafy mainly towards the base, branched mainly near the middle; peduncles usually ½ the height of the plants; [of the Coastal Plain]...\textit{R. hirta} var. angustifolia
28 Stems leafy mainly towards the base, branched mainly near the middle; peduncles usually ½ the height of the plants; [collectively widespread].
29 Basal leaves broadly elliptic to ovate, 2.5-7 cm wide, mostly ca. 2× as long as wide, with coarsely serrate margins; [primarily Appalachian and westward, mostly of undisturbed habitats]...\textit{R. hirta} var. hirta
29 Basal leaves lanceolate to oblanceolate 1-2.5 (-5) cm wide, mostly 3-5× as long as wide, with entire to serrate margins; [widespread and weedy]...\textit{R. hirta} var. pulcherrima

\textbf{Rudbeckia auriculata} (Perdue) Kral, Swamp Black-eyed Susan. Cp (FL, GA); pitcherplant bogs, wet roadssides and powerline rights-of-way, seepages; rare (GA Special Concern). Sw. GA and Panhandle FL (Walton County) west to c. and s. AL. See Diamond & Boyd (2004) for detailed information. [= FNA, Sw. KE, SE, WH; = \textit{R. fulgida} \textit{Aiton} var. auriculata Perdue]


\textbf{Rudbeckia fulgida} \textit{Aiton} var. \textit{spathulata} (Michaux) Perdue. Cp (VA), [FL, GA, NC, SC, VA]; bottomlands, bogs; uncommon? August-October. VA, WV, and TN south to FL and AL. [= FNA; < \textit{R. fulgida} – RAB, WH; = \textit{R. spathulata} Michaux – F, S; < \textit{R. fulgida} var. fulgida – K].

\textbf{Rudbeckia hirta} \textit{Aiton} var. \textit{speciosa} (Wendroth) Perdue. Mt (WV), Cp* (DE*) [GA, VA]; moist forests and woodlands; uncommon (rare in GA and WV). August-October. QC and WI south to GA, AL, and AR. [= C, FNA, K, Z; < \textit{R. fulgida} – RAB, GW, W; = \textit{R. speciosa} Wendroth \textit{var. speciosa} – F; > \textit{R. speciosa} Wendroth – WV]}


**Rudbeckia grandiflora** (Sweet) A.P. de Candolle var. *grandiflora*, Largeflower Coneflower. Mt (GA): limestone glades and barrens; rare. MO and KS south to LA and TX; disjunct in nw. GA. [=F, K, SE, Z; = R. *grandiflora* – S]


* Rudbeckia maxima* Nuttall, Giant Coneflower. Cp (SC): disturbed ground; rare, cultivated and rarely persistent, native of se. United States (AR and OK south to LA and TX). [=F, FNA, K, S, SE]

**Rudbeckia mollis** Elliott, Woolly Coneflower. Cp (FL, GA, SC): longleaf pine / turkey oak sandhills; uncommon (rare in SC). Late August-October. SC south to n. peninsular FL, FL Panhandle, west to s. AL. [=RAB, FNA, K, SE, WH, Z]


**Rudbeckia octopus** Elliott, Woolly Coneflower. Cp (FL, GA, SC): longleaf pine / turkey oak sandhills; uncommon (rare in SC). Late August-October. SC south to n. peninsular FL, FL Panhandle, west to s. AL. [=RAB, FNA, K, SE, WH, Z]


**Rudbeckia triloba** Linnaeus var. *beadlei* (Small) Fernald, Chauncey's Coneflower. Mt (NC, VA): seepy mafic or limestone cliffs; rare. July-October. A Southern Appalachian endemic: sw. VA and KY south to w. NC and TN. It is not at all clear that this taxon is distinct. [< R. *triloba* var. *beadlei* – F; < R. *triloba* var. *pinnatloba* Torrey & A. Gray – C, FNA, G, K, SE, Z (defined broadly to include "R. *beadlei*"; < R. *triloba* – RAB, W; < R. *triloba* – RAB, W; > R. *triloba* – WH] synonymy incomplete, etc.]


**ASTERACEAE**


**Rugelia** Shuttleworth ex Chapman 1860 (Rugelia, Rugel's Ragwort)

A monotypic genus, an herb, endemic to the Great Smoky Mountains of w. North Carolina and e. Tennessee. Treated variously as *Senecio* or *Cacalia* in most recent North American floras (see synonymy), this species is anomalous in both and is best treated as a monotypic genus (Bremer 1994). References: Barkley in FNA (2006b); Bremer (1994)=Z; Barkley (1999)=Y; Pippen (1978)=X; Cronquist (1980)=SE.

**Rugelia nudicaulis** Shuttleworth ex Chapman, Rugelia, Rugel's Ragwort, Winter-well. High elevation forests and openings, primarily in spruce-fir forests, but extending in places downslope into northern hardwood forests. June-August. The genus and species is endemic to the Great Smoky Mountains of w. NC and e. TN, all known populations within Great Smoky Mountains National Park. Where it occurs, it is usually locally abundant, often even the dominant herb. The basal rosettes are evergreen, and are conspicuous in all seasons.  [= FNA, K, Y, Z; *Senecio rugelia* Gray – RAB, S; *Cacalia rugelia* (Gray) Barkley & Cronquist – SE, W, X]

**Santolina** Linnaeus 1753


* Santolina chamaecyparissus* Linnaeus, Holy-flax, Lavender-cotton, Cypress Lavender-cotton. Disturbed areas; native of Mediterranean Europe. March-October. This species is introduced in e. and w. NC (Fox, Godfrey, & Blomquist 1952). Graetz (1973) recommended it for planting in barrier island areas of the Carolinas.  [= C, K]

**Sclerolepis** Cassini 1816 (Sclerolepis)


**Sclerolepis uniflora** (Walter) Britton, Sterns, & Poggenburg, Sclerolepis. In shallow water (later sometimes stranded on shore by dropping water levels) of clay-based Carolina bays, natural lake shores, blackwater stream shores and swamps, in seepage wetlands including sea-level fens. May-August; July-October. NH south to c. peninsular FL, west to sw. AL (very rare north of NC); slightly disjunct in s. MS and se. LA (Sorrie & LeBlond 2008).  [= RAB, C, F, FNA, G, GW, K, SE, WH]

**Scolymus** Linnaeus 1753 (Golden Thistle)


1 Stem wings and leaf blades with margins little or not whitened and thickened; pappus of several scales; plant a biennial or perennial..............
   ..............................................................................................................................................................................................................
   ..............................................................................................................................................................................................................
   ..............................................................................................................................................................................................................
1 Stem wings and leaf blades with margins white and thickened; pappus absent; plant an annual.........................................................
   ..............................................................................................................................................................................................................
   ..............................................................................................................................................................................................................

1 S. hispanicus

**Scolymus hispanicus** Linnaeus, Golden Thistle, Spanish Salsify. On ballast at seaports (at least formerly); native of Europe. AL.  [= FNA, K]

**Scolymus maculatus** Linnaeus, Golden Thistle. On ballast at seaports (formerly); native of Europe. Small (1933) states that *Scolymus* "has been found on ballast on the seacoast of N.C.", the site was likely the port of Wilmington.  [= FNA, K, S]

**Senecio** Linnaeus 1753 (Ragwort, Groundsel)

A genus of very uncertain circumscription, if treated broadly with as many as 1500-2000 species, trees, shrubs, herbs, and vines. The trend is to divide *Senecio* into smaller, more natural genera. Most species traditionally treated as "Senecio" in our flora are
not even part of a broadly defined core group, and have been transferred to Packera and Rugelia. Hasteola (Synosma) has been treated as a small genus of perennial herbs (consisting of Hasteola suaveolens and the FL peninsular endemic, H. robertiorum L.C. Anderson), but Pelser et al. (2007) demonstrate that Hasteola is deeply embedded in Senecio and closely related to a group of New World Senecio; it is so included here. References: Barkley in FNA (2006b); Pelser et al. (2007); Bremer (1994); Cronquist (1980)=SE; Barkley (1999)=Z; Barkley (1978)=Y; Anderson (1994)=X; Pippen (1978)=V. [also see Ligularia, Packera, Rugelia]

1 Leaves ovate, hastate at the base, merely toothed, 10-30 (-40) cm long, 4-20 cm wide......................................................S. suaveolens
1 Leaves ovate to oblanceolate, tapered at the base, pinnatifid (or at least strongly toothed), 2-10 cm long, 0.5-2 (-4) cm wide ..........S. vulgaris

*S. brasiliensis* (Sprengel) Lessing var. *triparitus* (A.P. de Candolle) Baker, Hempleaf Ragwort. Disturbed areas (on ballast); rare (not collected since 1894, Pensacola, Escambia County, FL), native of South America. [= FNA, WH; = S. cannabinifolius Hooker & Arnott] [not keyed]

*S. suaveolens* (Linnaeus) Elliott, Sweet Indian-plantain. Sandy bottomlands and riverbanks. MA, NY, n. OH, n. IN, c. WI and se. MN, south to n. VA, sw. VA, sw. NC, wc. TN (Chester, Wofford, & Kral 1997), and se. MO; apparently rare through much of its range. This species has not been seen in NC in recent years. [= Hasteola suaveolens (Linnaeus) Pojarkova – FNA, K, X; = Caacilia suaveolens Linnaeus – RAB, C, F, G, GW, SE, V, W, WV, Y; = Synosma suaveolens (Linnaeus) Rafinesque ex Britton – S]


**Sericocarpus** Nees 1832 (White-topped Aster)

A genus of 5 species, herbs, of North America. This group of species, traditionally treated as *Sericocarpus*, was transferred to *Aster* by Cronquist, a treatment followed by most (but not all) recent floristic works. It now appears, based on morphological and molecular studies, that the traditional treatment as a separate genus is far superior. Nesom (1993a) argues that a variety of characters indicate that *Sericocarpus* is more closely allied to *Solidago, Euthamia, Bigelowia, Chrysoysia*, and *Gutierrezia* than it is to *Aster*. Noyes & Rieseberg (1999) provide strong support for this contention, based on molecular evidence. See Nesom (1993a), Jones (1980), Semple & Brouillet (1980), and Noyes & Rieseberg (1999) for further discussion about the affinities of this group. References: Semple & Leonard in FNA (2006b); Leonard, Cook, & Semple (2005)=Y; Nesom (1993a)=Z; Cronquist (1980)=SE.

1 Leaves basally disposed, leaves of the basal rosette much larger than the cauline leaves; leaves (at least the basal) toothed ............S. asteroides
1 Leaves cauline, basal rosette lacking, the mid-cauline leaves the largest; leaves entire (or with 1-2 teeth in *S. tortifolius*).

2 Leaves (2-)4-8 cm long, 0.2-1.2 cm wide, linear to oblanceolate, 6-12× as long as wide, not twisted at the base (the leaf blade in a more-or-less horizontal plane); leaves glabrous (but with a ciliate margin), glandular-punctate; involucres glabrous..................................................S. linifolius
2 Leaves 1.5-4 cm long, 0.6-1.5 (-2.0) cm wide, obovate, 1.5-4× as long as wide, twisted at the base (bringing the leaf blade into a more-or-less vertical plane); leaves puberulent, glandular-punctate, and with prominent resin globules (at 10× magnification); involucres puberulent ..............................................................S. tortifolius

**Sericocarpus asteroides** (Linnaeus) Britton, Sterns, & Poggenburg, Toothed White-topped Aster. Dry woodlands, thin soils around rock outcrops, sandhills, dry pinelands. June-July. S. ME and s. VT west to c. OH, south to e. SC, c. GA, w. Panhandle FL, s. AL, and s. MS. Coastal Plain populations are rhizomatous, while inland populations are not; some taxonomic distinction may be warranted (Nesom, pers. comm.). [= F, FNA, K, S, WH, WV, Y, Z; = Aster paternus Cronquist – RAB, C, G, SE, W]

**Sericocarpus linifolius** (Linnaeus) Britton, Sterns, & Poggenburg, Narrow-leaf White-topped Aster. Dry woodlands, sandhills. June-July. MA west to s. OH and s. IN, south to se. SC, c. GA, s. AL, s. MS, and e. LA (Florida parishes). [= F, FNA, K, S, WV, Y, Z; = Aster solidagineus Michaux – RAB, C, G, SE, W]

**Sericocarpus tortifolius** (Michaux) Nees, Twisted-leaf White-topped Aster. Dry to mesic sandhills. August-October. E. NC south to s. FL, west to e. LA (Florida parishes), more or less restricted to the Coastal Plain, but inland onto hard-rock provinces in nc. GA and nc. AL. [= FNA, K, WH, Y, Z; = Aster tortifolius Michaux – RAB, SE, W; = Sericocarpus bifolius (Walter) Porter – S]

**Silphium** Linnaeus 1753 (Rosinweed)

Identification notes: The number of ray flowers per head is a useful taxonomic character in Silphium; since only ray flowers are fertile, the number of ray flowers can also be determined by the number of achenes in freshly fruiting material. The key and taxonomic treatment is provisional.

1 Leaves basally disposed, the basal leaves large and persistent, the stem with very few to many leaves, but these definitely reduced upward in size; leaves entire to toothed, to deeply cut; plants with definite taproots (except S. brachiatum, S. mohrii, and S. wasiotense).

2 Stem relatively leafy, with 4-5 nodes or more, the stem leaves smaller than the basal, but not merely bracteal.

3 Leaves deeply pinnatifid to bipinnatifid ......................................................... S. laciniatum

3 Leaves merely nearly entire to coarsely toothed (but not pinnatifid).

4 Leaves cuneate to rounded at the base; rays pale (sulfur) yellow; phyllaries acuminate, hispid ........................................ S. mohrii

4 Leaves subcordate, cordate, to truncate-sagittate at the base; phyllaries glabrous, obtuse to acute.

5 Stem glabrous; pedicel glabrous; phyllaries acute; leaves truncate-sagittate at the base .................................................... S. brachiatum

5 Stem hispid; pedicel hispidulous with hairs ca. 1 mm long; phyllaries obtuse; leaves cordate to subcordate at the base .................. S. wasiotense

2 Stem nearly naked, bearing only one or a few bracteal (very reduced) leaves.

6 Heads relatively large (involucre 13-25 mm high, disk 15-25 mm wide), with 14-40 ray flowers; [of calcareous or mafic glades or woodlands].

7 Principal leaves deeply pinnatifid (or, if entire, definitely lanceolate and with the base tapering to the petiole) .............. S. pinnatifidum

7 Principal leaves toothed (or subentire), cordate or truncate at the base (rarely abruptly narrowed) .......................................... S. terebinthinaceum

6 Heads relatively small (involucre 6-11 mm high, disk 8-15 mm wide), with 6-12 ray flowers; [of a wide range of mostly dry, often acidic habitats].

8 Blades of basal leaves unlobed (or with a single obscure basal lobe on each side), reniform, usually wider than long, often > 25 cm wide; leaves usually puberulent beneath; achene shorter than the phyllaries at maturity; [of the upper Piedmont and Mountains] ...... S. reniforme

8 Blades of basal leaves divided or shallowly to deeply lobed, with several lobes on each side, about as wide as long, or longer than wide; < 25 cm wide; leaves usually glabrous (or sparingly scabrous) beneath; achenes longer than (or as long as) the phyllaries at maturity; [collectively widespread].

9 Involucre mostly 1.0-1.5 cm wide; achenes 6-9 mm long at maturity; achene wings < 1 mm wide, the wing tips long acute to acuminate, the sinus between the wing tips V-shaped; [of the Coastal Plain and lower Piedmont from SC south to extreme e.

10 Achene wing tip obtuse, the sinus between the wing tips narrowly U-shaped; leaf blade usually longer than wide; petiole short, as long as or shorter than the leaf blade (midrib); [of se. SC south to e. peninsular FL and FL Panhandle] ...... S. compositum var. ovatifolium

10 Achene wing tip acute to acuminate, the sinus between the wing tips V-shaped; leaf blade usually as long as wide; petiole long, as long as or longer than the leaf blade (midrib); [of se. NC south to se. GA and FL Panhandle] ...... S. compositum var. venosum

1 Leaves primarily on the stem, basal leaves usually absent or soon withering, the stem with many leaves, these similar in size; leaves entire or toothed; plants fibrous-rooted from a crown, rhizome, or caudex.

11 Stem terete; leaves not connate.

12 Pales eglandular, scabrous to puberulent (in addition to the eglandular pubescence).

13 Basal and lower cauline leaf blades cordate, sagittate, or truncate at the base, and on well-developed petioles ............... S. brachiatum

13 Basal and lower cauline leaf blades either rounded or cuneate at the base, or sessile.

14 Plants mostly 8-15 dm tall, with usually 6 or 7 nodes below the inflorescence; glandular hairs of the stems and leaves longer than the eglandular hairs; rays (8-) 12-14 (-16) per head; [of dolomite or limestone in Bibb County, e. AL] ................. S. glutinosum

14 Plants mostly 15-20 dm tall, with usually 9-12 nodes below the inflorescence; stems and leaves; glandular hairs of the stems and leaves about as long as the eglandular hairs; rays (17-) 19-23 (-33) per head; [of chalk in e. AL] ................. S. perplexum

15 Plants mostly 8-15 dm tall, with usually 6 or 7 nodes below the inflorescence; glandular hairs of the stems and leaves longer than the eglandular hairs; rays (8-) 12-14 (-16) per head; [of dolomite or limestone in Bibb County, e. AL] ................. S. glutinosum

15 Plants mostly 15-20 dm tall, with usually 9-12 nodes below the inflorescence; stems and leaves; glandular hairs of the stems and leaves about as long as the eglandular hairs; rays (17-) 19-23 (-33) per head; [of chalk in e. AL] ................. S. perplexum

16 Leaves both strictly opposite throughout and clasping the stem.

17 Ray flowers 12-22 per head; phyllary surfaces scabrous, hisrate, or hispid ................................................................. S. integrifolium

17 Ray flowers 20-36 (or more) per head; phyllary surfaces glabrous ................................................................. S. speciosum

16 Leaves alternate, opposite, whorled, or combinations of those states (if strictly opposite then not clasping the stem).

18 Ray flowers 20-30 per head (or more) .......................................................................................................................... S. radula

18 Ray flowers 12-20 per head.

19 Leaf surfaces glabrous.

20 Cauline leaves predominately in whorls of 3 ......................................................... S. asteriscus var. trifoliatum

20 Cauline leaves opposite ................................................................................................................................. S. asteriscus var. lantifolium

19 Leaf surfaces scabrous to hispid.

21 Basal leaves persistent at flowering ................................................................................................. S. asteriscus var. simpsonii

21 Basal leaves caducous at flowering.

22 Pales stipitate-glandular ................................................................................................................................. S. asteriscus var. dentatum

22 Pales eglandular, scabrous to puberulent ................................................................................................. S. asteriscus var. asteriscus

Silphium asteriscus Linnaeus var. asteriscus. Cp (FL), {Mt, Pd, Cpa (GA, NC, SC, VA)} VA, KY, and MO south to FL
and TX. [= C, FNA, K1, K2; > S. asteriscus – RAB; > S. dentatum var. gatesii (Mohr) Ahles – RAB; = S. asteriscus – F, G, W; > S. asteriscus


*Silphium compositum* Michaux var. *compositum*. Cp (GA, NC, SC, VA), Pd (NC, SC, VA), Mt (NC, SC): sandhills, other xeric forests; common. May-September. VA south to GA. Perhaps worth dividing further into two taxa: *S. compositum* sensu stricto, restricted to the Coastal Plain and extreme lower Piedmont, and distributed from SE VA through the Carolina Coastal Plain to extreme e. GA, a distribution very similar to those of *Carphophorus bellidifolius*, *Cirsium repandum*, and *Vaccinium crassifolium*; and *S. collim* Greene, with less deeply lobed leaves, and distributed from se. and sc. VA, NC, sw. NC and ne. AL south to sc. SC, c. GA, and ec. AL. [= K1, Y; = C. compositum – F; < S. compositum var. compositum – RAB; > C. compositum – S; > S. orae Small – S; < S. compositum – C, FNA, G, K2, SE, W; = S. compositum ssp. compositum – Z; > S. collin* Greene]


*S. integrifolium* Michaux, Prairie Rosinweed. Prairies, calcareous glades and barrens. July-September. MI, WI, and se. SD south to c. TN, se. AL, s. MS, s. LA, and OK. [= S. integrifolium Michaux var. integrifolium – C, FNA, G, K2, SE; > S. integrifolium var. integrifolium – F, K1, Y; > S. integrifolium var. deamii L.M. Perry – F, K1; > S. integrifolium var. gattingeri L.M. Perry – K1, Y]

*S. lacinatum* Linnaeus, Compass-plant. Prairies, limestone barrens, calcareous glades, also sometimes cultivated (including outside of its native distribution). July-September. S. ON, MI, WI, s. MN, and e. SD south to se. TN, s. AL, c. MS, s. LA, c. TX, and n. NM. [= C, FNA, G, K2, SE; > S. lacinatum var. robinsonii L.M. Perry – F, K1, Y]

*S. mohrii* Small, Shaggy Rosinweed. Mt (GA): prairies; rare. Endemic to c., sc., and se. TN (Chester, Wofford, & Kral 1997) south to nw. GA (Jones & Cole 1988) and nc. AL. [= C, FNA, K1, K2, SE, Y]


*S. pinnatifidum* Elliott. Mt (GA): limestone glades and woodlands; rare. C. and se. TN south to nw. GA and AL. [= K1, S, SE, = S. terebinthinaceum Jacquin var. pinnatifidum (Elliott) A. Gray – F, FNA, K2, Y; < S. terebinthinaceum – G; > S. chickawawenee Canby]

*S. reniforme* Rafinesque ex Nuttall. Mt (NC, SC, VA, WV), Pd (NC, SC, VA): dry forests; uncommon. Sc. VA, c. WV, and e. TN, south to c. sc. GA, and e. AL. Plants with shallowly lobed leaves, with nearly the same distribution as typical *S. reniforme*, have been variously interpreted. [= S; = S. compositum Michaux var. reniforme (Rafinesque ex Nuttall) Torrey & A. Gray – RAB, F, K1, Y; < S. compositum – C, FNA, G, SE, W; < S. compositum – K2; > S. compositum ssp. reniforme (Rafinesque ex Nuttall) Sweeney & Fisher – W, Z]

*S. speciosum* Nuttall. Prairies, calcareous glades and barrens. July-September. MO west to NE, south to OK; disjunct in c. TN. [= F, Y; = S. integrifolium Michaux var. laeve Torrey & A. Gray – C, FNA, G, K1, K2, SE]

*S. terebinthinaceum* Jacquin, Prairie-dock. Mt (GA, VA), Pd (NC, SC): mafic glades, barrens, woodlands, and roadsides (NC, SC), calcareous glades, barrens, and woodlands (GA); rare. July–September. NY, ON, WI, and NE south to nw. GA, MS, and AR; disjunct eastwards in Piedmont of NC and n. SC. *S. ramicifolium* Small refers to plants of limestone in the Ridge and Valley province of e. TN and extreme sw. VA, alleged to differ from *S. terebinthinaceum* in the leaf bases cuneate at the base (vs. cordate or truncate), smaller leaf blades (only to 15 cm long), smaller plants (to 8 dm tall vs. to 30 dm tall), and
ASTERACEAE

954

outer phyllaries broader than long (vs. longer than broad). The distinction of var. luciae-brauniae Steyermark, with leaf blades glabrous above vs. scabrous, is dubious and needs additional study. [= RAB, SE; = S. terebinthinaceum var. terebinthinaceum – F, FNA, K2; < S. terebinthinaceum – G; > S. terebinthinaceum var. terebinthinaceum – K1, Y; > S. terebinthinaceum var. luciae-brauniae Steyermark – K1; > S. terebinthinaceum – S; > S. rumicifolium Small – S, Y]


Silphium brachiatum Gattinger, Cumberland Rosinweed. Endemic to sc. and se. TN (Chester, Wofford, & Kral 1997) and n. AL. And GA? [= F, FNA, G, K1, S, SE, Y]

Silphium radula Nuttall. Mt (GA): rocky hardwood forests; rare (GA Rare). East to nw. GA (Jones & Coile 1988). Not given credence as in our area in FNA and other sources. [= K1, SE; ? S. aspererrimum Hooker – Y, misapplied; ? S. gatesii Mohr – Y?]

Silybum Adanson 1763 (Milk-thistle)

A genus of 2 species, herbs, of the Mediterranean region. References: Keil in FNA (2006a); Cronquist (1980)=SE.


Smallanthus Mackenzie ex Small 1933 (Bearsfoot)


Smallanthus uvedalii (Linnaeus) Mackenzie ex Small, Bearsfoot, Leafcup. Moist forests, bottomland forests, and disturbed places. July-October. NY and IL south to c. peninsular FL and TX; possibly extending through e. Mexico and Central America to Panama, depending on circumscription. [= FNA, K, S, WH, Z; = Polymnia uvedalii Linnaeus – RAB, C, SE, W, WV; > Polymnia uvedalii var. uvedalii – F, G, Y; > Polymnia uvedalii var. densipilis Blake – F, G, Y; > Polymnia uvedalii var. floridana Blake – F, Y]

Solidago Linnaeus 1753 (Goldenrod)

A genus of 90-110 species, herbs, primarily North American, but with a few species in South America, Macaronesia, and Eurasia. The placement of the flat-topped goldenrods has been controversial; they are here included in Solidago rather than being treated as the separate genus Oligoneuron. References: Semple & Cook in FNA (2006b); Nesom (1990); Cronquist (1980)=SE; Morton (1973, 1974); Zhang (1996); Cook & Semple (2004); Nesom (1993b)=Z; Heard & Semple (1988)=Y; Brouillet & Semple (1981)=X; Cronquist (1980)=SE; Braun (1942). Portions of the key adapted (in part) from various sources, especially FNA and SE. [also see Brintonia, Chrysoma, and Euthamia]

Identification notes: Several related genera readily mistaken for (and/or sometimes included in) Solidago are included here as keying “failsafes.”

1 Inflorescence corymbiform, flat-topped or broadly rounded and about as broad as long, or broader; [section Ptarmicoideae, and section Solidago, subsection Multiradiatae]................................................................. Key A

1 Inflorescence a panicle, raceme, thyrse, or in axillary clusters, usually longer than broad, or with either the central branch well-developed and elongate, or with numerous branches elongate and more-or-less secund heads; [section Solidago].

2 Leaves basally disposed, the basal and lower cauline leaves larger, petiolate, and usually persistent, the middle and upper cauline leaves smaller and less petiolate.

3 Inflorescence cylindrical, of axillary clusters subtended by well-developed stem leaves, or a terminal thryse or raceme, the branches not secund (unless the stem is arching and the heads become oriented to the side of the axis); [subsections Glomeruliflorae, Humiles, Maritimae, Squarrosoae].......................................................................................................................... Key B

3 Inflorescence paniculiform, the major branches (at least) recurved with the heads borne secundly; [subsections Argutae, Junceae, Maritimae, Nemorales].......................................................................................................................... Key C
Leaves chiefly cauline, the basal and lower cauline leaves (when not early withering) the same size as or smaller than the middle and upper cauline leaves.

Inflorescence predominantly axillary, with well-developed leaves in at least the lower part of the inflorescence; [ subsections Argutae, Glomeruliflorae, Squarrosose, Thysiflorae ] .................................................................................................................... Key E

Inflorescence a well-developed panicle; [ subsections Triplinervae, Venosae ] .................................................................................................................... Key E

Key A – goldenrods with corymbiform inflorescences

( section Parnicoideae, and section Solidago, subsection Multiradiatae )

1 Plant a woody shrub; leaves with a markedly pebbled surface ........................................................................................................... [ see Chrysoma ]

1 Plant an herb; leaves variously smooth or rugose, but not pebbled.

2 Heads very large, involucre 8-13 mm high; fresh leaves noticeably thick and rubbery in texture; [ subsections Humiles, Solidago, subsection Multiradiatae ] .................................................................................................................... S. siphonacea

2 Heads smaller, involucre < 8 mm high; fresh leaves not thick or rubbery in texture; [ plants collectively widespread ]

3 Rays white; leaves linear-lanceolate to linear-oblancoate, the longer (10-) 15-20× as long as wide; pappus bristles slightly to strongly clavellate-thickened; [ section Parnicoideae ] .................................................................................................................... S. pinnicollis

3 Rays yellow; leaves oblong, elliptic, obovate, or spatulate, 2-8× as long as wide; pappus bristles not clavellate thickened.

4 Larger leaves obovate, 5-10 cm long, 1.5-4 cm wide, with prominent teeth; plants small, 0.5-4 dm tall; [ of high elevation rock outcrops on Grandfather Mountain, Roan Mountain, and Hanging Rock Mountain (Avery, Watauga, and Mitchell counties), NC ] ; [ section Solidago, subsection Multiradiatae ] .................................................................................................................... S. rigid var. glabrata

4 Involucres 7-12 mm high; basal leaves 15-40 mm wide; [ of n. AL, e. TN, and e. KY ] .................................................................................................................... S. rigid var. rigid

4 Larger leaves 0.4-1.6 cm wide, ca. 12.5× as long as wide, acuminate to acute, or serrate with a few salient teeth on either side, with 3+ parallel veins.

5 Achenes pubescent (even when mature); flowering plants 1.5-6 (-8.5) dm tall; inflorescence narrowly cylindrical, averaging 2-4 cm in diameter.

5 Larger leaves 3-6 cm wide, ca. 2-8× as long as wide, acute to obtuse, or serrate to crenate with numerous teeth (sometimes the teeth very obscure), with many pinnate-netted veins; leaves, stems, and peduncles moderately to densely pubescent.

6 Outer series of phyllaries glabrous on the back (glabrous to short-ciliate on the margin); leaf undersurface glabrous to somewhat hispid (0-20 hairs per mm²) (the margins and midrib often more densely pubescent); stems glabrous to somewhat hispid (0-25 hairs per mm²) ............................................................................................................................................... S. rigid var. rigid

6 Outer series of phyllaries pubescent on the back (short-ciliate on the margin); leaf undersurface hispid (7-50 hairs per mm²); stems slightly to strongly hispid (10-70 hairs per mm²) ........................................................................................................................................... S. nitida

5 Larger leaves 0.4-1.6 cm wide, ca. 12.5× as long as wide, acuminate to acute, or serrate with a few salient teeth on either side, with 3+ parallel veins.

7 Rays 1-4 per head; cypselas 2-3 mm long; leaves acute to obtuse, rarely folded along the midvein; [ of prairies and longleaf pine savannas from MS westward on the Coastal Plain ] .................................................................................................................... S. nitida

7 Rays 7-9 per head; cypselas 1.5-2.2 mm long; leaves acuminate, often folded along the midvein; [ of wet prairies and fens of interior physiographic provinces ] .................................................................................................................... S. riddellii

Key B – goldenrods with basally disposed leaves and elongate, non-seed inflorescences

( section Solidago, subsections Glomeruliflorae, Humiles, Maritimae, Squarrosoae )

1 Heads very large, involucre 8-13 mm high; fresh leaves noticeably thick and rubbery in texture; [ subsection Glomeruliflorae ]; [ plants of high elevations of NC and TN ] .................................................................................................................... S. glomerata

1 Heads smaller, involucre < 8 mm high; fresh leaves not thick or rubbery in texture; [ plants collectively widespread ].

2 Phyllaries and phyllarys copiously glandular; [ plants of Coastal Plain sandhills ] .................................................................................................................... S. kralii

2 Phyllaries and phyllarys slightly glandular; [ plants of rocky glades, cliffs, barrens, and river-scoured outcrops, primarily on mafic or calcareous rocks ]

3 Involucres 7-12 mm high; basal leaves 15-40 mm wide; [ of n. AL, e. TN, and e. KY ] .................................................................................................................... S. arenicola

3 Involucres 3-7 mm high; basal leaves (2-) 3-22 (-31) mm wide; [ of sc. NC, w. VA, and n. VA northward ] .................................................................................................................... S. plumosa

4 Achenes glabrous (even when young); flowering plants (3-) 4-10 (-13) dm tall; inflorescence broadly cylindrical, averaging 5-6 cm in diameter; [ of rocky, flood-scoured riversides, known only from the Yadkin River in sc. NC ] .................................................................................................................... S. racemosa

4 Involucres 7-12 mm high; basal leaves 3-8× as long as wide, (4.2-) 6-11.3 (-15.9) cm long, (5-) 10-22 (-31) mm wide, generally sharply toothed; [ of cliffs and barrens, primarily over mafic rocks, from w. VA northward ] .................................................................................................................... S. randii

5 Basal leaves 0.7-2.5 (-5) cm wide; [ south to PA and WV ] .................................................................................................................... S. uliginosa var. uliginosa

5 Basal leaves 0.7-8 cm wide; plants short, 4-10 (-15) dm tall, typically fairly stout; [ of the Mountains and northward ]

9 [ of seepage over sloping rock on granitic domes, of sw. NC, tw. SC, and ne. GA] .................................................................................................................... S. uliginosa var. linoideae

10 Basal leaves 0.7-2.5 cm wide; [ south to PA and WV ] .................................................................................................................... S. uliginosa var. uliginosa

8 Basal leaves 0.7-2.5 (-5) cm wide; plants short to tall, 3-20 dm tall, typically very slender; [ of the Coastal Plain and lower Piedmont and southward ]

11 Leaf margins smooth, entire; ray flowers 8-13 per head; disk flowers 14-25 per head; pappus (2.5-) 3.0-3.5 mm long ...... S. pulchra

11 Leaf margins (of the basal leaves at least) scabrous-margined, also often toothed; ray flowers 2-7 per head; disk flowers 6-16 per head; pappus (3-) 3.5-4.5 (-5.0) mm long.
12 Leaf margins scabrous (or at least tubercululate) throughout; panicle branches often spreading-erect with recurved-second tips; pappus 2.2-4.0 mm long .................................................... S. gracillima

12 Leaf margins tending to become smooth on the upper stem; panicle branches usually stiffly erect; pappus 4.0-4.5 (-5.0) mm long. ................................................................. S. stricta

7 Phyllaries of lower stem leaves not sheathing the stems; [of mesic or drier habitats]; [subsection Squarrosae]. ................................................................. S. squarrosa

8 Plants with slender, stoloniferous rhizomes (in addition to the main, more deeply-seated rhizomes) .............................................................. S. arguta var. boottii

9 Plants lacking slender, stoloniferous rhizomes. ................................................................. S. auriculata

10 Basal and lower cauline leaves with cuneate leaf blades and petioles not cordate-clasping (though leaves may have petioles which sheath the petiole)

11 Achenes strigillose, at least towards the apex. ................................................................. S. speciosa var. speciosa

11 Achenes glabrous. ........................................................................................................... ...............................

12 Blades of lower leaves ovate to lanceolate, acute to obtuse or rounded. ... ................................. S. hispida

13 Petioles of lower stem leaves not sheathing the stems; [of mesic or drier habitats]; [subsection Squarrosae]. ................................................................. S. squarrosa

14 Phyllaries appressed. ........................................................................................................ ...............................

15 Phyllaries linear-lanceolate, attenuate, tapering to pointed or rounded tip. ... ................................. S. roaneensis

16 Proximal to mid stem glabrous; rays mostly 6-9; inner phyllaries usually striate with 2 prominent secondary veins .............. S. hispida

17 Leaves 20-50 (-60) cm long; midstem leaves usually 4-5 cm long; phyllaries attenuate; [of the Mountains and Piedmont (rarely Coastal Plain), of GA northward] ......................................................... S. puberula var. puberula

17 Leaves (20-) 50-120 cm per stem; midstem leaves usually 1-4 cm long; phyllaries acute to acuminate; [of the Coastal Plain from se. VA southward] ......................................................... S. puberula var. pulverulenta

18 Rays white ...................................................................................................................... S. bicolor

19 Leaves and stems sparsely to densely hairy with spreading to appressed hairs ................................................................. S. speciosa var. rigidisscula

20 Inflorescence usually denser, broader, and crowded, sometimes more open in robust plants, or narrow in plants outside range of S. erecta; mid cauline leaves often > 20 mm wide; [of MA to GA, west to SD and scattered south in CO to ne. NM] ................................................................. S. speciosa

21 Mid-stem leaves 0.4-1.5 (-2.0) cm wide; basal leaves 0.8-2.0 cm wide, entire or slightly serrate, present or absent at flowering ................................................................................................. S. speciosa var. squarrosa

21 Mid-stem leaves usually > 2 cm wide; basal leaves (2.0-) 3.0-5.5 cm wide, coarsely serrate, present at flowering ...... S. speciosa var. speciosa
ASTERACEAE

15. Rhizomes thin, elongated, creeping; stem leaves usually 3-nerved; [disjunct from west to glades and barrens].

16. Rays 7-13; disc florets 8-12.................................................................S. missouriensis var. fasciculata

17. Upper stem leaves ascending to appressed, usually lacking axillary fascicles; [west of the Blue Ridge] ....S. gattingeri

18. Leaves somewhat fleshy, the stem leaves reduced but not very markedly so; inflorescence almost always with lower branches strongly recurved with second heads; [of coastal or otherwise saline habitats].

19. Involucres 3-4 mm high; rays 7-11; disc flowers ca. 10-16; [of MA south to FL, west to TX and beyond] ...............................................................S. sempervirens var. mexicana

20. Basal leaves 0.7-2.5 (-5) cm wide; plants short to tall, 3-20 dm tall, typically very slender; [of the Coastal Plain and lower Piedmont and southward].

21. Leaf margins smooth, entire; ray flowers 8-13 per head; disk flowers 14-25 per head; pappus (2.5-) 3.0-3.5 mm long; plants to 1 m tall .................................................................S. pulchra

22. Leaf margins scabrous (or at least tuberculate) throughout; panicule branches often spreading-erect with recurved-second tips; pappus 2.2-4.0 mm long.................................S. graciliflora

23. Basal leaves 0.7-8 cm wide; plants short, 4-10 (-15) dm tall, typically fairly stout; [of the Mountains, e. VA, and northward].

24. Basal leaves 3-8 cm wide; [south to NC and TN] .................................................................S. uliginosa var. uliginosa

Key D – goldenrods with cauleine leaves and axillary inflorescences (section Solidago, subsections Argutae, Glomeruliflorae, Squarrosae, Thyrsiflorae)

1. Leaves entire or obscurely few-toothed; achenes glabrous at maturity; outer phyllaries with squarrose tips (tips appressed in S. speciosa var. rigidiuscula).

2. Outer phyllaries appressed; [subsection Squarrosae] .............................................................S. speciosa var. rigidiuscula

3. Leaves oblong-ovate, often short acuminate at the apex; mid-cauline leaves 6-10 cm long, 8-20 mm wide, margins sharply serrate on at least the upper 2/3; [subsection Argutae] .................................................................[S. buckleyi]

4. Stem terete, glaucous.

5. Lower midstem leaves narrowly lanceolate, 5-15 cm long, 0.8-3 cm wide, 5-6x as long as wide; stems strongly arching; [plants widespread in our area] .................................................................S. caesia var. caesia

6. Larger leaf blades on a plant 2-6 cm long; stems with spreading white hairs; [endemic to sandstone rockhuses in the Red River Gorge in Menifee, Powell, and Wolfe counties, KY] .................................................................S. alhophilosa

7. Leaves 1-3 (-5.5)x as long as wide.

8. Leaves (2.2-) 2.5-3 (-3.5)x as long as wide, cuneate to a sessile base; teeth of the leaf margins not notably elongate and narrow, mostly 1-2 (-3) mm long (as measured on the upper side of the teeth) .................................................................S. flavidifolia

9. Leaves 1-2.2 (-2.5)x as long as wide, abruptly contracted to a winged petiole; teeth of the leaf margins elongate and narrow, acuminate, mostly (2-) 3-8 mm long (as measured on the upper side of the teeth) .................................................................S. flexicaulis

10. Leaves 3-10x as long as wide.

11. Involucres (2.5-) 3-5 (-6) mm high; phyllaries 0.7-1 mm wide, 1-nerved; stems 4-9 (-10) dm tall; ray flowers 2-4 (-6); [broadly Appalachian] .................................................................S. curtisii

12. Involucres 4.5-7 mm high; phyllaries 1-1.5 mm wide, 3-10-nerved; stems 6-16 dm tall; ray flowers 5-8; [apparently restricted to high elevations in the Blue Ridge of NC and TN] .................................................................S. lancifolia

Key E – goldenrods with cauleine leaves and well-developed paniculate inflorescences (section Solidago, subsections Nemorales, Triplinervae and Venosae)
### Solidago albopilosa


### Solidago altissima

Linnaeus var. altissima, Tall Goldenrod. Fields, roadsides, disturbed areas. August-October. NS, QC, and SK south to c. peninsular FL, TX, and Mexico; introduced in w. North America. Var. gigavocanescens (Rydberg) Semple, with heads smaller (mainly 2-3 mm high vs. 3-4 mm high) is mainly distributed in the Great Plains. [= FNA; = S. altissima – F, K, W]; = S. canadensis Linnaeus var. scabra Torrey & Gray – C, G, SE, WH; < S. altissima Linnaeus – RAB, GW (including S. canadensis vars. and S. rugosa); – S. hirsutissima P. Miller – S; < S. canadensis – W; = S. gigavocanescens – FNA]

### Solidago arenicola

B.R. Keener & Kral, Black Warrior Goldenrod. Riverside scour areas. September-October. Known from Blount County, AL (Black Warrior River) and on rivers in the Cumberland Plateau of TN and KY (notably Big South Fork of the Cumberland River). See Keener & Kral (2003) for additional information. [= FNA]

### Solidago arguta

Aiton var. arguta, Forest Goldenrod. Woodlands, woodland borders, road margins. August-October. ME and s. ON west to MO, south to NC and TN. [= S. arguta ssp. arguta – C, SE, W; < S. arguta – RAB (also see S. tarda and S. vasyi)]; = S. arguta – F, G, S; = S. arguta ssp. arguta – FNA; < S. arguta var. arguta – K]

### Solidago celtidifolia

1 Mid-stem leaves 3-nerved (obscurely so in S. tortifolia); leaves elliptic, lanceolate, oblanceolate, or linear.
2 Rays 2-6; larger leaves linear to lance-linear, 2-7 (-10) mm wide, twisted at base; plants (3-) 7-13 dm tall; [subsection Triplinervae]..........
3 Rays 4-10 (-11); plants 3-15 dm tall
4 Rays 4-7; plants 3-9 dm tall; stems scabrous to loosely puberulent below; cauline leaves oblong-lanceolate, 7-20 (-30) mm wide, faces slightly to strongly scabrous; involucres 3-5 mm long; ray floret laminae 2-3.5 × 0.2-0.7 mm; disc floret corolla lobes 1 mm long; pappus 3 mm long [of Piedmont and Mountains of KY, NC, SC, GA, and AL, and from IL and KS south to LA and TX]; [subsection Nemorales].................................................................S. tortifolia
5 Stems glabrous and usually also glaucous ..........................................................S. gigantea
6 Stems pubescent (at least the upper portion).
7 Leaves glabrous above and below, or pubescent only on the main veins beneath; midstem leaves serrulate, with 1-10 teeth per side, the largest < 0.5 mm long; [of the Coastal Plain, from NC south to FL and AL]..............................S. leavenworthii
8 Leaves moderately to densely pubescent across the lower surface, and scabrous to puberulent above; midstem leaves entire, serrulate, or serrate; [collectively widespread].
9 Mid-stem leaves entire to serrulate; involucres (2.5-) 3-4.5 mm high...............................S. altissima var. altissima
10 Mid-stem leaves serrate, the teeth 3-10 per side, the largest > 1.5 mm long; involucres 1.7-2.5 (-3.0) mm high.
11 Main leaves ovate to lanceolate, 2-5 (-6) × as long as wide; stem pubescence general and circumferential; [of FL] ..........S. champanii
12 Main leaves lanceolate to linear, (4-) 5-15 (-23) × as long as wide; stem pubescence in lines decurrent down the stem from the margins of the leaf bases; [widespread]..................................................S. odora
13 Mid-stem leaves sessile, somewhat clasping; leaf margins nearly entire to obscurely serrulate; leaves planar............................S. fistulosa
14 Involucres 4-6 mm high; broader phyllaries 0.7-1.2 mm wide; stems glabrous below the inflorescence; mid-stem leaves elliptic (widest near the middle) .................S. latissimifolia
15 Involucres (2-) 2.5-3.5 (4.5) mm high; phyllaries mostly < 0.5 mm wide; stems hairy or glabrous below the inflorescence; mid-stem leaves lanceolate to ovate (widest below the middle).
16 Leaves relatively thin, not very rugose, usually sharply serrate, the apices acuminate, glabrous or soft-hairy on the surfaces.
17 Leaves relatively thick and firm, strongly rugose, usually subentire to bluntly serrate, the apices often only acute, scabrous or stiffly-hairy on the surfaces.
18 Inflorescences narrow, the lower lateral branches only slightly exceeding the subtending leaves; leaves sparsely pubescent; [of the Southern Appalachians]..............................................................S. rugosa var. cronoquistanua
19 Inflorescences broad, the lower lateral branches generally much longer than the subtending leaves; leaves moderately to densely pubescent; [collectively widespread].
20 Upper cauline leaves lanceolate, elliptic, not much reduced relative to leaves lower on the stem.............S. rugosa var. aspera
21 Upper cauline leaves ovate, much reduced relative to leaves lower on the stem..............................S. rugosa var. celtidifolia
Solidago arguta Aiton var. boottii (Hooker) Palmer & Steyermark, Boott's Goldenrod. Dry open woodlands, dry slopes, often in sandy or rocky soils. September-October. C. SC south to s. AL, west to LA, AR, and s. MO, most common in the Ozarks. Reported for n. WV by Harmon, Ford-Werntz, & Grafton (2006), but it seems likely that this is based on different interpretations of the taxa. [= K, SE, W; < S. arguta – RAB (also see S. tarda and S. vaseyi); > S. boottii – F, S, WV; > S. strigosa – F, G, S; = S. arguta ssp. caroliniana (A. Gray) G.H. Morton var. boottii (Hooker) Palmer & Steyermark – FNA; > S. boottii var. boottii – G; = S. arguta Aiton spp. boottii (Hooker) G.H. Morton]


Solidago brachyphylla Chapman, Dixie Goldenrod. Open woodlands, bluff forests. September-November. SC (NC?) south to ne. FL and Panhandle FL, west to s. AL (s. MS?). [= FNA, K, S, SE, WH]

Solidago buckleyi Torrey & A. Gray, Buckley's Goldenrod. Forests, open ridgetop and bluff woodlands. September-October. W. KY, s. IN, s. IL, s. MO; perhaps eastwards in GA and AL (these occurrences controversial as to identification). [= F, FNA, G, K, S, SE; < S. petiolaris – RAB]


Solidago caesia Linnaeus var. zeidia R.E. Cook & Semple, Gulf Coast Axillary Goldenrod. Moist forests. September-October. GA and Panhandle FL west to LA and AR. [= FNA; < S. caesia – K, SE, WH]


Solidago curtissii Torrey & A. Gray, Curtis's Goldenrod. Moist forested slopes, and rarely in mafic woodlands in the Piedmont of VA. September-October. A Central and Southern Appalachian endemic: PA, WV, and MD south to n. GA and n. AL. Var. curtissii, with stem glabrous or slightly puberulent in the inflorescence, and var. pubens (M.A. Curtis) A. Gray, with stem densely puberulent, are sometimes distinguished. They do not appear to be worthy of taxonomic recognition. [= C, SE, W, WV; < S. curtissii var. curtissii – RAB (also see S. lancifolia); > S. curtissii var. curtissii – F, G; > S. curtissii var. pubens (M.A. Curtis) A. Gray – RAB, F, G; = S. curtissii var. curtissii – FNA; < S. curtissii – K (also see S. lancifolia); = S. caesia Linnaeus var. curtissii (Torrey & A. Gray) Wood; > S. curtissii – S; > S. pubens M.A. Curtis – S]
**Solidago delicatula** Small. Possibly east to AL, FL. August-October. [= FNA, SE; = *S. ulmifolia* Muhlenberg ex Willdenow var. microphylla A. Gray – K; < *S. ulmifolia* – S] {not keyed; not mapped}

**Solidago erecta** Pursh. Woodlands, old fields, woodland borders, grassy balds. August-October. NY and CT south to GA, AL, and MS. [= RAB, C, F, FNA, G, K, S, SE, W, WV; < *S. caesia* – RAB, F; = *S. latissimifolia* – S, misapplied; = *S. curtisii* Torrey & A. Gray var. flavicifolia (Small) R.E. Cook & Semple – FNA; = *S. caesia* Linnaeus var. paniculata A. Gray]

**Solidago microphylla** A. Gray – K; [ < *S. ulmifolia* – S] {not keyed; not mapped}

**Solidago erecta** Nuttall var. erecta (Pursh) MacMillan

**Solidago faucibus** Wieboldt, Gorge Goldenrod. Moist forests. Late August-October. S. WV south to sw. VA, and se. KY; disjunct in nw. SC. See Wieboldt & Semple (2003) for additional information. [= FNA]


**Solidago flexicaulis** Linnaeus, Zigzag Goldenrod. Moist wooded slopes, especially over calcareous or mafic rocks. August-October. NS, ON and ND south to GA, AL, MS, and KS. [= RAB, C, F, FNA, G, K, S, SE, W, WV]


**Solidago gigantea** Aiton, Smooth Goldenrod. Old fields, roadsides, streamside meadows, bottomlands. August-September (-October). NS west to SK and MT, south to Panhandle FL (Liberty County), TX, and CO. [= RAB, C, GW, K, W, WH; < *S. gigantea* var. gigantea – F, G, SE, WV; > *S. gigantea* var. serotina (Kuntze) Cronquist – G, SE; > *S. gigantea* var. leiophylla Fernald – F, WV; = *S. serotina* – S]

**Solidago glomerata** Michaux, Skunk Goldenrod. High elevation situations, including grassy balds, rock outcrops, heath balds, northern hardwood forests, and spruce-fir forests. Mid August-October. A narrow Southern Appalachian endemic, restricted to w. NC and e. TN (perhaps reaching its northern limit on Elk Knob, Watauga County, NC). The basal rosettes are evergreen, and are a conspicuous component of the winter flora at high elevations. The plants have a distinctive skunky odor, easily smelled without touching or bruising the plant. [= RAB, FNA, K, S, SE, W]

**Solidago gracillima** Torrey & A. Gray, Southern Bog Goldenrod, Graceful Goldenrod. Wet pine savannas, seepage bogs. August-October. E. VA south to c. Panhandle FL, west to s. AL. Several distinct entities appear to have been referred to this taxon; the number of entities, and the appropriate names to apply to them, are presently obscure. The names *S. perlonga* Fernald, *S. austrina* Small, and *S. simulans* Fernald have been synonymized under *S. gracillima* (as by Cronquist 1980). Cronquist (1980) refers material from WV and high elevation granitic domes of sw. NC (*S. simulans*) to *S. gracillima*, a treatment which is not phytogeographically credible. The distinction between *S. gracillima* s.s and *S. austrina* may prove warranted. They are alleged to differ as follows: *S. austrina*: pappus 2.2-2.8 mm long, ray flowers 2-4, disc flowers 6-8; of the inner Coastal Plain and lower Piedmont; *S. gracillima*: pappus (3.0-) 3.5-4.0 mm long; ray flowers 3-7; disk flowers 9-13; of the Coastal Plain. [= RAB, K, W, WH; < *S. gracillima* – C, SE (also see *S. simulans*); > *S. austrina* Small – F, G, S; > *S. longicaulis* Fernald – F; = *S. stricta* Aiton ssp. gracillima (Torrey & A. Gray) Semple – FNA; > *S. gracillima* – S]

**Solidago harrisii** Steele, Shale-barren Goldenrod. Limestone, dolostone, greenstone, shale, and calcareous siltstone woodlands, barrens, and cliffs. August-September. A Central Appalachian endemic: w. MD south to e. WV and w. VA. [= F, S, W, WV; = *S. arguta* Aiton var. harrisii (Steele) Cronquist – C, K, SE; = *S. arguta* ssp. arguta var. harrisii – FNA; < *S. boottii* var. boottii – G]

**Solidago hispida** Muhlenberg ex Willdenow, Hairy Goldenrod. Dry rocky forests and woodland edges. August-October. NL (Labrador) west to SK, south to nw. GA, AL, AR, IA, and SD. Widespread in e. and c. TN (Chester, Wofford, & Kral 1997) and in nw. GA (Jones & Coile 1988). Also reported for NC and SC by Kartesz (1999). [= C, FNA, S, SE, W, WV; > *S. hispida* var. hispida – F, G, K]


Solidago lancefolia  (Torrey & A. Gray) Chapman, Lanceleaf Goldenrod. Mountain slopes, mostly at high elevations. Late August-September. W. VA and e. WV south to w. NC and e. TN. [= C, FNA, S, SE, W; < S. curtisi var. curtisi – RAB; < S. curtisi – K]

Solidago latissimifolia  P. Miller, Coastal Swamp Goldenrod. Pocosins, swamp forests, sandhill seepages, sandhill-pocosin ecotones. August-October. NS south c. peninsular FL, west to s. AL. [= FNA, WH; > S. elliottii var. ascendens Fernald – F; > S. elliottii var. pedicellata Fernald – F]

Solidago leavenworthii  Torrey & A. Gray, Leavenworth’s Goldenrod. Wet pine savannas, wet pine flatwoods, pond margins, marshes. August-November. Se. NC south to s. FL, west to s. AL. [= RAB, FNA, GW, K, S, SE, WH]


Solidago nitida  Torrey & A. Gray, Shiny Goldenrod. Pine savannas, prairies. (July-) August-October. MS west to s. AR, se. OK, and TX. [= FNA, SE; = Oligoneuron nitidum (Torrey & A. Gray) Small – K, S, Z; = Solidago nitida Torrey & A. Gray – FNA, SE]

Solidago odora  Aiton, Licorice Goldenrod. Meadows, pastures, roadbanks, woodland borders, such as glades, barrens, and ridgetop pine-oak woodlands. July-October. NH, VT, NY, OH, and MO south to FL and TX. [= RAB, F, G, S, W, WV; = S. odora var. odora – C, K, SE, WH; = S. odora ssp. odora – FNA]

Solidago patula  Muhlenberg ex Willdenow var. patula, Northern Roughleaf Goldenrod. Bogs, seepages over mafic rocks, grassy balds (as Whitetop Mountain). August-September (-October). NH and VT west to WI, WI, MI, and IA, south to GA, AL, MS, and MO. Some or all of the coastal records may actually represent ambiguous specimens of S. patula var. strictula. [= RAB, C, F, G, K, SE; = S. patula ssp. patula – FNA; < S. patula – GW, W, WV; = S. rigida – S, misapplied]


Solidago petiolaris  Aiton var. petiolaris. Upland forests and woodlands. Late August-November. The distribution of S. petiolaris (in the broad sense) is peculiar, with an eastern component (NC south to ne. FL and Panhandle FL, west to AL) and a western component (IL, MO, AR, and LA west to NE, CO, and NM). The eastern component is sometimes treated as S. petiolaris (sensu stricto) and the western as S. angusta Torrey & A. Gray. Alternatively these are recognized as the varietal rank (as here), or combined entirely. Var. angusta (Torrey & A. Gray) A. Gray and var. wardii (Britton) Fernald are Ozarkian and more western (Nesom 2008). [= C, F, K, SE; < S. petiolaris – RAB, W, WH (and also see S. buckleyi); = S. petiolaris var. petiolaris – C, F, K, SE; = S. petiolaris – G; > S. milleriana Mackenzie – S; > S. harperi Mackenzie in Small – S]

Solidago plumosa Small, Yadkin River Goldenrod. In crevices of outcrops in rocky, flood-scoured riverbanks. September. Known only from the type locality, the gorge of the Yadkin River in c. NC. Most of the population was lost by construction of two hydropower dams, one at each of the two ends of the gorge, and the flooding of the intervening area. This species is related to the more northern S. racemosa and the newly described and more western S. arenicola. [= FNA, K, S, SE]

Solidago porteri Small, Porter's Goldenrod. Upland forests. So far as known, this species is endemic to the Piedmont of GA; its taxonomic status is very uncertain. [= K, S, SE; < S. erecta – FNA] [not yet keyed]

Solidago ptarmicaoides (Nees) Boivin, White Prairie-goldenrod, Upland White Aster. Prairie-like barrens over mafic, ultramafic, or calcareous rock, serpentine woodlands, prairies. August-October. VT and NY west to SK, south to e. TN (Rhea and Roane counties in the Ridge and Valley) (Chester, Wofford, & Kral 1997), nw. GA (Floyd County), AR, and CO; disjunct in nc. NC (Granville County, and historically in Rowan County) and nc. SC (York County). [= C, FNA, SE, W, X; = Oligoneuron album (Nuttall) Nesom – K, Z; = Aster ptarmicaoides (Nees) Torrey & A. Gray – F, G, S; = Unanima alba (Nuttall) Rydberg; > Aster ptarmicaoides var. georgianus A. Gray (referring to plants of se. US); = Solidago asteroides Semple, superfluous name]

Solidago puberula Nuttall var. puberula. Bogs, wet meadows, and wet pastures, in dry acid soils in VA and WV. August-October. NS west to ON, south to GA and TN. [= RAB, C, F, G, K, SE; = S. puberula ssp. puberula – FNA; = S. puberula – S; < S. puberula – W, WV]


Solidago pulchra Small, Beautiful Goldenrod, Carolina Goldenrod. Wet pine savannas, seepage bogs. July-September. Endemic to a small part of the Coastal Plain of se. NC, where locally common in the few wet savannas remaining. Notable sites include Green Swamp (Brunswick County), Holly Shelter Game Land (Pender County), Camp Lejeune Marine Corps Base (Onslow County), and Croatan National Forest (Carteret County). There is no question of the distinctness of this species from S. stricta and S. gracillima. Once learned, the basal leaves are recognizable at a glance, the petiole very long (often twice as long as the leaf blade), the venation finely netted, the margins smooth and entire, the tip usually acute and prominently mucronate. Even following fire, sterile rosettes typically outnumber flowering plants 100 to 1. [= FNA, K, S, SE; < S. stricta – RAB, GW]

Solidago racemosa Greene, Sticky Goldenrod. Rocky, flood-scoured riversides. ME and QC south to n. VA and WV; plants in the Cumberland Plateau of KY and ne. TN (Churchill & Schell 1992; Chester, Wofford, & Kral 1997) placed here are problematic and may represent another taxon or taxa. This complex remains poorly understood. [= WV; = S. simplex Kunth ssp. randii (Porter) Ringius var. racemosa (Greene) Ringius – C, FNA, K; = S. racemosa Greene var. racemosa – F; = S. spathulata A.P. de Candolle ssp. randii (Porter) Cronquist var. racemosa (Greene) Cronquist – G, SE]

Solidago radula Nuttall, Rough Goldenrod. Dry woodlands over mafic rocks. August-October. IL west to KS, south to LA and TX; disjunct eastward in KY, NC, SC, GA, and AL. [= RAB, C, FNA, G, S, SE, W; > S. radula var. radula – K]

Solidago randii (Porter) Britton, Rand's Goldenrod. Cliffs and barrens, primarily over mafic (such as greenstone and hornblende) or calcareous rocks. NS west to ON and MI, south to w. VA and WV. [= WV; < S. simplex ssp. randii (Porter) Ringius var. monticola (Porter) Ringius – C, FNA; > S. randii – F; > S. maxonii Pollard – F; = S. spathulata A.P. de Candolle ssp. randii (Porter) Cronquist var. randii – G; = S. simplex Kunth ssp. randii (Porter) Ringius var. randii – K]

Solidago riddelli Frank ex Riddell, Riddell's Goldenrod. Wet, calcareous prairies; rare. ON and MB south to OH, IN, IL, AR, and KS; disjunct in w. VA and nw. GA. The specimen from Fort Monroe ("Fortress Monroe, Va." – Fernald 1950) is accurately identified but may be mislabeled. [= C, F, FNA, G; = Oligoneuron riddelli (Frank ex Riddell) Rydberg – K, Z]
**Solidago rigida** Linnaeus var. *glabra* - E.L. Braun, Southeastern Bold Goldenrod. Glades, barrens, and prairie-like areas, over mafic (such as diabase) or calcareous (such as calcareous shale) rocks, and in adjacent disturbed areas, such as roadbanks and powerline rights-of-way. Late August-October. Sc. VA, se. TN, c. OH, and e. MO south to c. SC, sw. GA, and e. TX. This taxon (variously treated as a species, subspecies, or variety) is rare and scattered throughout its range, restricted to prairie-like situations. Var. *glabra* is apparently strictly diploid. [= C, G, SE; = *Oligoneuron rigidum* (Linnaeus) Small var. *glabra* - E.L. Braun] Nesom – K, Z; < *Solidago rigida* Linnaeus – RAB, W; = *Solidago jacksonii* (Kuntze) Fernald – F; = *Solidago rigida* ssp. *glabra* (E.L. Braun) Heard & Semple – FNA, Y; = *Oligoneuron jacksonii* (Kuntze) Small – S]

**Solidago rigidoides** Linnaeus var. *rigida* - Midwestern Bold Goldenrod. Glades, barrens, and prairie-like areas, over mafic or calcareous rocks. August-October. Ri and MA west to NY, s. ON, MI, WI, s. MN and c. NE, south to c. VA. Sc. NC, w. NC, SE, GN, and c. AR, and se. TX. Var. *rigida* is generally rare and restricted to relictual prairie-like situations east of MI, IN, IL, MO, and OK. Var. *rigida* is tetraploid through most of its range, including (apparently) all of our area. A third variety, var. *hamilis* (T.C. Porter) Nesom, is more northern and western, ranging from ON west to AB, south to MI, IN, IL, MO, OK, n. TX, and NM. [= C, G, SE; = *Oligoneuron rigidum* (Linnaeus) Small var. *rigida* – K, Z; < *Solidago rigidoides* Linnaeus – RAB, W; = *Solidago rigidoides* – F; = *Solidago rigidoides* sp. *rigida* – FNA, Y; = *Oligoneuron rigidum* (Rafinesque) Small – S]


**Solidago rugosa** P. Miller var. *spaghaphilosa* Grav. - Peat-loving Goldenrod. Cpe (DE, NC, SC, VA): boggy habitats; common. August-October. NS and ME south to SC. [= < *S. rugosa* var. *rugosa* – RAB; = *S. rugosa* ssp. *spaghaphilosa* Grav. – C, FNA, G, K; < *S. rugosa* – GW; < *S. rugosa* ssp. *rugosa* – W; = *S. aestivalis* E. Bicknell]

**Solidago rugosiflora** Rauli, Riverbank Goldenrod. Rock Goldenrod. Pd (VA), Mt (VA); crevices in rocky, flood-scorched riversides; rare. July-September. PA, OH, and IL south to n. VA and TN. [= C, F, FNA, K, SE; < *S. altissima* – RAB; = *S. canadensis* var. *rugosiflora* (Raufesque) Porter – G; < *S. canadensis* – S]

**Solidago sempervirens** Linnaeus var. *melanica* (Linnaeus) Fernald, Southern Seaside Goldenrod. Cpe (DE?, FL, GA, NC, SC, VA): coastal dunes, dune slacks, maritime wet grasslands, tidal marshes; common (rare in VA). Late August-December (and sporadically until at least January in mild winters). DE (or allegedly MA) south to s. FL, west and south to TX and Mexico; west Indies. [= C, F, G, KW, K, SE; < *S. sempervirens* – RAB, WH; = *S. mexicana* Linnaeus – S; = *S. sempervirens* ssp. *mexicana* (Linnaeus) Semple – FNA]

**Solidago sempervirens** Linnaeus var. *semperflorens*, Northern Seaside Goldenrod. Cpe (DE, VA): coastal dunes, dune slacks, maritime wet grasslands, tidal marshes; common. Late August-November. NL (Newfoundland) south to se. VA along
the coast (and introduced inland in saline situations such as along salted roadways). [= C, F, G, K, SE; = S. sempervirens Linnaeus – S; = S. sempervirens ssp. sempervirens – FNA]

**Solidago shortii** Torrey & A. Gray. Endemic to nc. KY (Fleming, Jefferson, Nicholas, Robertson counties) and s. IN. August-October. See Smith et al. (2004) and Homoya & Abrell (2005) for additional, detailed information. [= C, F, FNA, G, K, SE] [not yet keyed]

**Solidago simulans** Fernald, Granite Dome Goldenrod, Cliffside Goldenrod. Mt (GA, NC, SC): in thin soil mats wetted by periodic seepage on granitic domes and lower elevation montane cedar hardwood woodlands; rare. August-September. Endemic to sw. NC, nw. SC, and ne. GA. [= K, < S. uliginosa – RAB, FNA; = S. gracillima – SE]

**Solidago speciosa** Nuttall var. rigidulicarpa Torrey & A. Gray. Mt (GA): limestone barrens; rare. (August-)September-October. On west to ND and WV, south to TN, LA, and TX; disjunct eastward in glade habitats to nw. GA (GANHP), TN (Chester, Wofford, & Kral 1997), and KY. [= C, G, K, SE; = S. speciosa var. angustata Torrey & A. Gray – F, misapplied; = S. speciosa ssp. speciosa var. rigidulicarpa – FNA; = S. rigidulicarpa (Torrey & A. Gray) Porter – S1 {synonym incomplete}


**Solidago spathulata** Raffinesque, Stout Goldenrod, False Goldenrod Mt (GA, NC, SC, VA, WV), Pd (NC, VA): rock outcrops and dry woods, usually on calcareous or mafic rocks; uncommon. (July-)August-September (-October). C. VA, s. WV, OH, IN, and IL south to GA, AL, and MS. [= RAB, C, F, G, K, SE, W, WV; = Brachychaeta spathulata (Raffinesque) Britton – S]

**Solidago stricta** Aiton, Wand Goldenrod. Cp (DE, FL, GA, NC, SC, VA?): pine savannas, Coastal Plain bogs, pocosins; common (rare in DE). Late August-October. NJ and DE (formerly) south to s. FL, west to TX; West Indies and s. Mexico. [= C, F, G, K, SE, WH; < S. stricta – RAB, GW (also see S. pulchra); = S. petiolata P. Miller – S, misapplied; = S. stricta Aiton ssp. stricta – FNA]

**Solidago tarda** Mackenzie. Cp (DE, FL, GA, VA), Pd (GA, VA): sandhills, other dry pinelands, xeric fluvial sand ridges, Piedmont barrens; rare. September-October. NJ and e. PA south to e. VA, c. and s. GA, AL, and Panhandle FL, in our area primarily in the Coastal Plain; disjunct in Marion County, TN (Chester, Wofford, & Kral 1997). [= C, FNA, S, SE; < S. arguta – RAB; < S. ludoviciana – F, misapplied as to our area; < S. arguta var. arguta – K; < S. arguta var. caroliniana – WH]


**Solidago uliginosa** Nuttall var. linoides (Torrey & A. Gray) Fernald. Mt (WV): bogs; rare. NS and NL (Labrador) west to MB, south to s. PA, e. WV, OH, IN, and IL. [= K; < S. uliginosa – C, FNA; > S. uliginosa var. linoides – F; > S. purshii Porter – F, WV; > S. uliginosa var. percarnea (Fernald) Friesner – G]

**Solidago uliginosa** Nuttall, Northern Bog Goldenrod. Mt (GA?, NC, SC, VA, WV), Cp (DE, VA): bogs, wet meadows, mafic fens, acidic seepage swamps; rare. NL (Labrador) west to Keewatin, south to e. VA, w. NC, ne. TN, IL, and IA (reports from further south need additional evaluation; some material formerly identified as S. uliginosa is actually S. simulans or S. gracillima). [= F, G, K, WV; < S. uliginosa – RAB, C, FNA, SE, W; < S. wilguida (A.P. de Candolle) Porter – S]

**Solidago ulmifolia** Muhlenberg ex Willdenow var. palmeri Cronquist. East to MS and AL?. [= FNA, G, K, SE; < S. ulmifolia – S]

**Solidago ulmifolia** Muhlenberg ex Willdenow var. ulmifolia, Elmleaf Goldenrod. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, FL, VA): rocky forests and woodlands, especially on mafic and calcareous substrates, moist hammocks (in FL); common (rare in DE, FL, GA, NC, SC, rare in VA Coastal Plain, where usually confined to coquina limestone). August-October. NS, ME, ON, and MN, south to FL and TX. [= C, FNA, G, K, SE; < S. ulmifolia – RAB, F, S, WH, WV]

**Solidago verna** M.A. Curtis, Spring-flowering Goldenrod. Cp (NC, SC): moist pine savannas, lower slopes of sandhills, pineland roadbanks; rare. May-June. Sc. NC south to e. SC. [= RAB, FNA, K, S, SE]

**Solidago villosissima** LeBlond, Carolina Maritime Goldenrod. Cp (NC): dry-mesic and mesic hardwood forests (and related disturbed areas), in the outer Coastal Plain; rare. September. Endemic to se. NC (Onslow, Pender, Brunswick, and Craven counties). See LeBlond (2000) for additional information. [= FNA]

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**Solina** Ruiz & Pavón 1794 (Burweed)

A genus of about 8 species, herbs, of South America. References: Watson in FNA (2006a); Cronquist (1980)=R; Arriagada & Miller (1997)=Z. [also see Gymnostyles]
**ASTERACEAE**

965

1 Achenes (1.5-) 2.5-3.0 mm long, usually winged, the wings not transversely ribbed ............................................................................ *S. sessilis*

1 Achenes 1.5-2.2 mm long, winged, transversely ribbed.

2 Leaves mostly basal; leaf blades 3-8 (-15) cm long, 2-3× pinnatifid .................................................................................... *S. arvensis* var. *arvensis*

2 Leaves cauline and basal; leaf blades 1-2 (-3) cm long, 1-2× pinnatifid .................................................................................... *S. tenuifolia*


**Sonchus** Linnaeus 1753 (Sow-thistle, Milk-thistle)

A genus of about 50-60 species, herbs and shrubs, of the Old World. References: Hyatt in FNA (2006a); Cronquist (1980)=SE.

1 Heads 30-50 mm across in flower, the involucre (10-) 15-20 mm high; perennials from creeping rhizomes.

2 Phyllaries and peduncles densely pubescent with glandular hairs; longer phyllaries 14-17 mm long ............... *S. arvensis* var. *arvensis*

2 Phyllaries and peduncles glabrous (but with sessile glands); longer phyllaries 10-15 mm long ..................... *S. arvensis* var. *glabrescens*

1 Heads 15-25 mm across in flower, the involucre 9-13 mm high; annuals.

2 Leaves cauline and basal; leaf blades 1-2 (-3) cm long, 1-2× pinnatifid .......................................................... *S. asper*

2 Leaves base auricles rounded; mature achenes not transversely rugose ............................................................... *S. oleraceus*

2 Leaves base auricles sagittate, the two lobes on either side of the stem coming to a point; mature achenes transversely rugose ...... *S. uliginosus*


**Sonchus arvensis** Linnaeus var. *glabrescens* (Günther) Grabowski & Wimmer, Perennial Sow-thistle. Mt (NC, VA, WV), Pd (VA): disturbed areas; uncommon (rare in NC), native of Europe. June-November. [= C, SE, WV; < *S. arvensis* – RAB, W; = *Sonchus arvensis* ssp. *uliginosus* (Bieberstein) Nyman – FNA, K; > *S. arvensis* var. *glabrescens* – F; > *S. uliginosus* Bieberstein – F; = *S. uliginosus* – G]


*Sphagenticola* O. Hoffmann 1900


**Stokesia** L’Héritier 1789 (Stokesia, Stokes Aster)


**Stokesia laevis** (Hill) Greene, Stokesia, Stokes Aster, Blue Stokesia. Cp (FL, GA, SC), Pd* (NC*): native in pitcherplant bogs and moist pinelands of FL, GA, and SC, rather frequently grown as a garden plant and naturalized from cultivation at least in NC; rare. Late June-August. Native from e. SC south ne. FL, FL Panhandle, west to LA. There seems no reason to question the validity and native status of the early record from SC. A unique tetraploid population found by the Atlanta Botanical Garden in Omega, GA (near Tifton) in the 1990s was distinguished by having distinct upright and long scapes, up to 1 meter in length; the original population has been destroyed, but a selection derived from it was named 'Omega Skyrocket' and introduced into the commercial trade (D. Werner, pers. comm. 2006). [= RAB, FNA, K, S, SE, WH, Z]
A genus of 2 species, endemic to Australia.


**Symphyotrichum** Nees 1833 (American Aster)


1 Basal and lower stem leaves both petiolate and with cordate blades; [subgenus *Symphyotrichum*, section *Heterophylli*]..........................Key A

1 Basal and lower stem leaves not both petiolate and cordate-bladed.

   2 Perennials, from a taproot; [of moist, usually maritime, and usually saline habitats]; [subgenus *Astropolium*].................................Key B

   2 Annuals, from a taproot; [of moist, usually maritime, and usually saline habitats]; [subgenus *Symphyotrichum*]..........................Key C

3 Leaves not fleshy, usually toothed, stems usually variously pubescent.

   4 Leaves either very numerous on the main stem, the internodes < 1 cm long (in some species the leaves of the lower and middle main stem withered or deciduous by flowering season, the internode length then reckonable by leaf scars), the leaves clasping or sessile, or leaves rather numerous on main stem, the internodes > 3.5 cm long, the leaves of the main stem strongly auriculate clasping (*S. georgianum*, *S. phlogifolium*); stem leaves entire, (often scabrous-margined); rays purple, lavender, rose, or blue (or characteristically white in *S. ericoides* and very rarely also in other species); [subgenus *Virgula*]........................................Key D

   4 Leaves less numerous on the main stem, the internodes averaging > 3.5 cm long, the leaves clasping, subclasping, or not clasping; stem leaves toothed (or rarely entire); rays blue, purple, lavender, pink, or white.

   5 Stem leaves clasping to sheathing; rays blue, purple, lavender, pink, or white..........................................................Key E

   5 Stem leaves not clasping; rays blue, purple, lavender, rose, or white..........................................................Key F

**Key A Symphyotrichum** with petiolute, cordate-bladed lower leaves
[of subgenus *Symphyotrichum*, section *Heterophylli*]

1 Disc florets 35-50 (or more); ray florets (13-) 20-30; involucre 3.8-7 mm high; phyllary tips spreading to squarrose ..........*S. retroflexum*

1 Disc florets 8-10-25 (-30); ray florets 8-20 (-25); involucre 3.8-7 mm high (or to 8 mm high in *S. oolentangiense*); phyllary tips appressed (or the outer phyllaries spreading).

2 Cauline leaf blades sessile and cordate-clasping, or petiolute, the petiole strongly dilated to a cordate-clasping base, or both..........................Key B

2 Cauline leaves not cordate clasping; [collectively widespread].

3 Lower stems glabrous; upper stems sparsely hirtellous or pilose.

4 Basal leaves deeply cordate; phyllaries with lanceolate diamond shaped blaze (2-3× as long as wide), purple to greenish purple..........

   5 Phyllaries with short diamond-shaped green blaze (1-1.5× as long as wide)..........................................................*S. lowrieanum*

   5 Phyllaries with linear-lanceolate-shaped green blaze (> 4× as long as wide)..........................................................*S. urophyllum*

3 Lower stems glabrous to sparsely hirsute; upper stems densely hirtellous to hirsute; [mainly west of the Appalachians].

6 Phyllaries with short diamond-shaped green blaze (1-1.5× as long as wide); basal and lower stem leaves mostly crenate to entire; upper stem leaves entire.

7 Plants with only the basal and lower stem leaves cordate or subcordate; phyllary faces glabrous; lower disc florets (15-) 20-25 (-30)..........................*S. oolentangiense var. oolentangiense*

7 Plants with nearly all basal and stem leaves cordate or subcordate; phyllary faces short-pubescent; disc florets 16-23......*S. shortii*

6 Phyllaries with elongate green blaze (> 2× as long as wide); basal and lower stem leaves serrate or crenate; upper stem leaves serrate or crenate (to entire).

8 Plants 4-12 dm tall; cypselae glabrous..........................................................*S. drummondii var. drummondii=S. drummondii texanum=S. texanum*

8 Plants 3-8 dm tall; cypselae strigillose..............................................................................................................................*S. subulatum*

**Key B – annual salt-marsh asters**
[of subgenus *Astropolium*]

1 Heads usually dense in an elongate, pyramidal-paniculate arrangement; inner phyllaries 6-7 mm long, phyllary apices linear-acuminate, distal margins often inrolled/involute, green zone of phyllaries narrowly lanceolate, usually extending the entire length of the phyllary, chartaceous bases short or absent; pappus acrescent, 4-5.5 mm long at maturity and usually longer than coiled ray corollas; [habitats wet, saline]..............*S. subulatum*
1 Heads corymbiform to thyrsiform, diffusely paniculate, or secund to subsecund and paniculiform arrangements or at the tips of long, bracteate branches; inner phyllaries 4-6.5 mm long, phyllary apices acute to acuminate, distal margins inrolled/involute or not, green zone of phyllaries lanceolate to elliptic, chartaceous bases usually conspicuous; pappus not accrescent, 3.5-4 (-5) mm long at maturity, longer or shorter than ray corollas; [habitats moist to wet, rarely saline].

2 Phyllary tips appressed, acute, flat, inner phyllaries with broadly lanceolate, distinctly demarcated, apical green zone, proximal ½ -1/3 white-chartaceous; ray floret laminae erect, often involute along the edges (curling inwardly), rarely coiling back distally (if so, then only ca. 1/2 coil), usually shorter than mature pappus; disc florets (3-) 7-14 ................................................................. \textit{S. squamatum}

2 Phyllary tips loose, linear-acuminate, distal margins often inrolled/involute, inner phyllaries with narrowly lanceolate, often weakly demarcated apical green zone, white-chartaceous bases short, ca. 1/3–1/2 the length of the phyllaries; ray floret laminae not involute along edges, usually coiling back distally in 1–4 or more coils, usually as long or longer than mature pappus; disc florets either (6-) 8-15 or 11-23 or (20-) 33-45 (-50).

3 Heads usually corymbiform to thyrsiform in arrangement (borne primarily on distal branches, distally clustered); inner phyllaries 4-5.5 (–6) mm long; phyllary apices acute to abruptly short-acuminate or long-acuminate, the distal margins inrolled/involute or not; ray florets in 1 (-2) series, corollas 2-3 mm long, the laminae 0.1-0.3 mm wide (dried), white to light pinkish or slightly blue, coiling back in 1-2 coils or less commonly remaining straight; disc florets (6-) 8-15; [of FL westward across the Gulf Coast] ........................................... \textit{S. expansum}

3 Heads diffusely paniculiform to pyramidal-paniculiform to corymbiform or second to subsecund and paniculiform; inner phyllaries 5-6.5 mm long; phyllary apices long-acuminate, the distal margins usually inrolled/involute; ray florets in 1-3 series, corollas 2-7 mm long, the laminae 0.2-0.8 mm wide (dried), white to blue or purple, coiling back in 2-5 coils; disc florets either 11-23 or (20-) 33-45 (-50).

4 Heads at first at ends of long, bracteate branches, then produced and maturing as axillary and nearly sessile or on very short lateral branches, commonly on one side of the main stem and appearing second to subsecund, in paniculiform arrangements; ray florets in 2-3 series, corollas mostly 2-3.5 (-4) mm long, laminae 0.2-0.4 mm wide (dry), blue to purple, coiling back in 2-3 (-4) coils; disc florets 11-23; [e. GA southwards].......................................................... \textit{S. bahamense}

4 Heads often at ends of long, bracteate branches, axillary heads usually maturing on elongate lateral branches, the whole arrangement often diffusely paniculiform to pyramidal-paniculiform, or heads more distally disposed and the arrangement corymbiform to thyrsiform; ray florets in 1 series, corollas mostly 4-7 mm long, laminae 0.4-0.8 mm wide (dry), blue to white, coiling back in 3-5 coils; disc florets (20-) 33-45 (-50); [sc. United States east to AL and scattered eastward as an introduction] ................. \textit{S. divaricatum}

**Key C – perennial asters with linear, fleshy leaves**

**[of Symphyotrichum subgenera Astrophilum and Chapmanianii]**

1 Leaves basally disposed; disc florets 47-57; ray floret laminae (10-) 14-15 (-20) mm long; [of FL]; [subgenus \textit{Chapmanianii}] .......... \textit{S. chapmanii}

1 Leaves mainly cauline, the basal and lower stem leaves typically withered by flowering season; disc florets (10-) 13-45 (-54); ray floret laminae (4-) 5-8.5 (-9.5) mm long; [collectively widespread]; [subgenus \textit{Astrophilum}]

2 Midstem leaves (1.0-) 1.5-2.7 mm wide; involucres 4.1-5.3 mm high; ray florets 10-16; disc florets (10-) 13-23; achenes 1.5-2.0 (-2.5) mm long; pappus 3.0-4.4 mm long; [collectively widespread]

3 Midstem leaves > 2 cm long, spreading; rays > 9 mm long (to as short as 7 mm in \textit{S. fontinale} of Panhandle FL); [collectively widespread]

4 Mid-stem leaves < 1.5 cm long, \textit{either} ascending-appressed, \textit{or} spreading, and then the apical portion abruptly deflexed; rays 5-9 (-11) mm long; [of the Coastal Plain from e. NC southward].................. \textit{S. patens}

5 Mid-stem leaves > 2 cm long, spreading; rays > 9 mm long (to as short as 7 mm in \textit{S. fontinale} of Panhandle FL); [collectively widespread]

6 Mid-stem leaves cuneate, rounded, or subclasping; [section \textit{Grandiflori}].

**Key D – perennial asters**

**[of Symphyotrichum subgenus Virgulus]**

1 Mid and upper stem leaves > 8 x as long as wide; phyllaries tipped with a small, white spine; rays white (to pale pink); involucre 2.5-4.5 (-5) mm high; disc florets 6-12 (-20) per head; [section \textit{Ericoidi}].......................... \textit{S. ericoides} var. \textit{ericoides}

1 Mid and upper stem leaves 2-7 x as long as wide; phyllaries not spine-tipped; rays purple, lavender, rose, blue (rarely nearly white); involucre > 5 mm high (except sometimes as short as 4 mm high in \textit{S. adnatum} of s. GA and FL west to LA); disc florets (6-) 11-110 per head.

2 Disc florets yellow, cream, or white (with purplish corolla lobes), fading purple or brown; mid and upper stem leaves with bases rounded to cuneate (or slightly clasping in \textit{S. plumosum} of FL Panhandle); phyllaries not stipitate-glandular; [section \textit{Floridus}]

3 Rays 13-15 (-36); cypsela glabrous............................ \textit{S. fontinale} var. \textit{fontinale}

3 Rays 7-12; cypsela densely strigose.

4 Phyllaries long-acuminate, spreading to recurved; phyllaries with woolly, tangled hairs; involure 7-9 mm tall; [of Franklin County, FL Panhandle].......................... \textit{S. ericoides} var. \textit{ericoides}

4 Phyllaries acute, appressed; phyllaries \textit{either} with appressed, straight hairs (moderately to densely sericeous) \textit{or} glabrous to sparsely pilose; involure 5-7 mm high; [collectively widespread]

5 Phyllaries and upper stem leaves moderately to densely sericeous (silky-pubescent); [widespread]........... \textit{S. concolor} var. \textit{concolor}

5 Phyllaries and upper stem leaves glabrous or sparsely pilose; [of the Gulf Coastal Plain]................. \textit{S. concolor} var. \textit{devestimum}

2 Disc florets pink, fading purple; mid and upper stem leaves with bases clasping or auriculate clasping (except cuneate, rounded, or slightly clasping in \textit{S. grandiflorum}, \textit{S. oblongifolium}, and \textit{S. fontinale}); phyllaries stipitate glandular (or sometimes or always lacking stipitate glands in \textit{S. fontinale} and \textit{S. walteri} (of the Coastal Plain from e. NC southward), and \textit{S. patens} var. \textit{patentissimum} (of KY and MS westward).

6 Mid-stem leaves < 1.5 cm long, \textit{either} ascending-appressed, \textit{or} spreading, and then the apical portion abruptly deflexed; rays 5-9 (-11) mm long; [of the Coastal Plain]; [section \textit{Patentes}].

7 Blades of mid-stem leaves ascending-appressed, basally decurrent; [of s. GA south to s. FL, west to s. LA]............. \textit{S. adnatum}

7 Blades of mid-stem leaves spreading, the apical portion then abruptly deflexed, basally clasping; [of e. NC to c. peninsular FL] ........... \textit{S. bahamense}

6 Mid-stem leaves > 1.5 cm long, \textit{either} ascending-appressed, \textit{or} spreading, and then the apical portion abruptly deflexed; rays 5-9 (-11) mm long; [of the Coastal Plain]; [section \textit{Patentes}].
Key E

1. Phyllaries appressed (or in some species the outer slightly spreading); rays usually < 20 [(10-) 12-23 (-34)]; [mainly of sunny, moist to wet pinelands and marshes of c. Panhandle FL south to s. FL] [section Grandiflorum] ........................................... S. fontinalis

2. Middle stem leaves strongly clasping; involucre 3.8-5.5 mm high; disc corollas 15-22 (-23); phyllaries acute, acuminate, to attenuate; green blaze on phyllary lanceolate to elongate diamond-shaped ................................................................. S. andatum

3. Leaf faces glabrous. .......................................................... S. oolentangiense var. oolentangiense

4. Leaves basally disposed, the largest basal and persistent; largest leaves linear, to 20 cm × 2.5 cm, avg. 10× as long as wide; leaf margins often strongly scabrous; [mainly of the Coastal Plain, of SC and GA west to AR and TX] ................................................................. S. laeve var. purpuratum=S. attenuatum

5. Larger leaves > 5× as long as wide, rarely > 2.5 cm wide, the bases slightly clasping; [N]Y and KY south to GA, Panhandle FL (Jackson County), and MS] ................................................................. S. laeve var. concinnum=S. concinnum

5a. S. laeve var. laeve=S. laeve s.s.

5b. S. oolentangiense var. oolentangiense

5c. S. laeve var. laeve=S. laeve s.s.

1. Phyllaries spreading to squarrose; rays usually > 20 [15-50 (-60)].

6. S. novi-belgii var. elodes [Symp-Sym-Pun]

60d. S. novi-belgii var. elodes [Symp-Sym-Pun]
60c. [S. novi-belgii var. novi-belgii] [Symp-Symp-Symp]
[from Warners & Laughlin (1999)]

1 Stems glabrous, occasionally hispidulous in lines; stem leaves with glabrous midvein on the lower surface; rays white to pale lavender; inflorescence dense, leafy; shoots arising singly from elongate rhizome; stems 3-5 mm thick (at 20 cm above soil surface) .............. S. firmum
1 Stems densely pubescent, usually purplish; stem leaves with pubescent midvein on the lower surface; rays lavender to purple; inflorescence widely spreading; shoots often in clumps of 2-6 stems from a persistent stout caudex; stems 5-9 mm thick (at 20 cm above soil surface) .............

Key F

37. S. retroflexum [Symp-Het]
38. S. depauperatum [Symp-Port]
40a. S. pilosum var. pilosum [Symp-Port]
40b. S. pilosum var. pringlei [Symp-Port]
42. S. priceae [Symp-Port]
43. S. dumosum var. dumosum [Symp-Dum]
43. S. dumosum var. gracilipes [Symp-Dum]
43. S. dumosum var. pergracile [Symp-Dum]
43. S. dumosum var. strictior [Symp-Dum]
43. S. dumosum var. subulifolium [Symp-Dum]
44?. [S. kralii] [Symp-Dum]
44. S. simmondsii [Symp-Dum]
45. S. racemosum var. racemosum [Symp-Dum]
45. S. racemosum var. subdumosum [Symp-Dum]
48. [S. lateriflorum var. angustifolium] [Symp-Dum]
48. S. lateriflorum var. horizontale [Symp-Dum]
48. S. lateriflorum var. lateriflorum [Symp-Dum]
48. [S. lateriflorum var. spatelliforme] [Symp-Dum]
49a. [S. kralii] [Symp-Dum]
49. S. simmondsii [Symp-Dum]
50c. [S. lanceolatum var. interior] [Symp-Dum]
50a. S. lanceolatum var. lanceolatum [Symp-Dum]
50b. S. lanceolatum var. latifolium [Symp-Dum]
50d. S. lanceolatum var. latifolium [Symp-Dum]
51. S. praetextum var. praetextum [Symp-Dum]
51. S. praetextum var. angustior [Symp-Dum]
51. [S. praetextum var. subasperum] [Symp-Dum]
52. [S. boreale] [Symp-Dum]
55. S. elliottii [Symp-Symp-Pun]


Symphyotrichum bahamense (Britton) Nesom, Bahama Salt-marsh Aster. Cp (FL, GA): salt, brackish, and fresh marshes, ditches, wet areas; uncommon. October-November. E. GA and e. FL Panhandle south to s. FL; the Bahamas. [= K, V = S. subulatum (Michaux) Nesom var. elongatum (Bossard) S.D. Sundberg – FNA, Q; < Aster subulatus – GW; < A. subulatus Michaux var. cubensis – SE; = A. subulatus Michaux var. elongatus Bossard]

Symphyotrichum boreale (Torrey & A. Gray) Löve & Löve, Rushlike Aster, Northern Bog Aster. Mt (WV): calcareous wetlands; rare. August-October. E. FL (Newfoundland) west to AK, south to n. NJ, ne PA, nw. PA, WV, OH, IN, IL, IA, NE, CO, ID, and WA. Reported for WV (Barbour, Fayette, Nicholas, and Randolph counties), PA, and NJ. [= FNA, K, X = Aster borealis (Torrey & A. Gray) Provancher – C; ? Aster junciformis Rydberg – F, G]


Symphyotrichum chapmanii (Torrey & Gray) Sempie & Brouillet, Chapman’s Aster. Cp (FL): flatwoods and seepage bogs; rare. Endemic to Panhandle FL and AL, with a few widely scattered records in the FL peninsula. [= FNA, WH = Eurybia chapmanii (Torrey & Gray) Nesom – K, X = Aster chapmanii Torrey & Gray – S, SE]

Symphyotrichum concolor (Linnaeus) Nesom var. concolor, Eastern Silvery Aster. Cp (DE, FL, GA, NC, SC, VA), Pa (GA, NC, SC, VA), Mt (GA, NC, SC, VA); sandhills, Piedmont woodlands, forest edges, roadbanks; common (rare in DE, rare in Mountains). September-October. MA and NY south to s. FL, west to LA, inland less commonly to TN and KY. [= FNA; < S. concolor (Linnaeus) Nesom – K, WH, X = Aster concolor Linnaeus – RAB, C, F, G, S, SE, W; < Virgulus concolor (Linnaeus) Reveal & Keener; = Symphyotrichum concolor sp. concolor – Haines (2010)]


**Symphyotrichum depauperatum** (Fernald) Nesom, Serpine Aster. Pd (NC), Mt (WV): glades and barrens over mafic rocks (diabase) [or calcareous rocks in WV?]; rare. Early September-October. MD and se. PA; disjunct southward in nc. NC. Reported for Hardy County, WV (Harmon, Ford-Werntz, & Grafton 2006, Strausbaugh & Core 1978). [= FNA, K, X; = Aster depauperatus Fernald – C, F, G, SE]


**Symphyotrichum dumosum** (Linnaeus) Nesom var. *pergracile* (Wiegand) Nesom. {NC, SC}. Late August-October. Endemic to NC and SC. [= K; < Aster *dumosus* – RAB, GW, SE; < S. dumosum – FNA; = Aster *dumosus* Linnaeus var. *pergracile* Wiegand]

**Symphyotrichum dumosum** (Linnaeus) Nesom var. *strictior* (Torrey & A. Gray) Nesom. Mt (VA), {NC}: woodlands and glades over mafie rock; rare. Late August-October. NH, ON, and WI south to NC and MO. [= K, X; < Aster *dumosus* – RAB, C, G, GW, SE, W; = Aster *dumosus* Linnaeus var. *strictior* Torrey & A. Gray – F; < S. dumosum – FNA]


**Symphyotrichum ericoides** (Linnaeus) Nesom var. *ericoides*, Heath Aster, Square-rose White Aster. Mt (GA, VA): limestone glades; rare. ME, NL (Labrador), ON, ND, CO, AZ, south to VA, MS, TX, Nuevo Léon, and Coahuila. [= FNA; > Symphyotrichum ericoides (Linnaeus) Nesom var. *ericoides* – K, X; = Symphyotrichum ericoides (Linnaeus) Nesom var. *prostratum* (Kuntze) Nesom – K, X; > Aster ericoides Linnaeus var. *ericoides* – G; > Aster *ericoides* Linnaeus var. *prostratum* (Kuntze) Blake – G; = Aster *ericoides* – C, F; = S. ericoides var. *ericoides* – FNA; = Virgulus ericoides (Linnaeus) Reveall & Keener]

**Symphyotrichum expansum** (Poepigg ex Sprengel) Nesom. Cp (FL): pond margins, disturbed wet areas; rare. July-November (-January). FL. Panhandle and peninsula, AL, OK, UT, NV, and CA south through Mexico and Central America to n. South America; West Indies. [= K, V, X; = Aster *sululatum* (Michaux) Nesom var. *parviflorum* (Nees) S.D. Sundberg – FNA, Q; [add synonymy – S]


**Symphyotrichum georgianum** (Alexander) Nesom, Georgia Aster. Pd (GA, NC, SC), Cp (FL, GA): dry, rocky woodlands, woodland borders, roadbanks, powerline rights-of-way, primarily in places that formerly would have burned and likely been post oak or blackjack oak woodlands or savannas, also in thin soils around granitic flatrocks; rare. Early October-mid November; November-December. SC. NC south to c. GA and west to c. AL; apparently disjunct on the Coastal Plain of sw. GA and e. Panhandle FL (Leon County). [= FNA, K, WH, X; = Aster *georgianum* Alexander – S, Z; < Aster *patens* – RAB; = Aster *patens* Aiton var.
**ASTERACEAE**


**Symphyotrichum grandiflorum** (Linnaeus) Nesom, Big-headed Aster. Cp, Pd (NC, SC, VA): dry woodlands, forest edges; roadbanks and powerline rights-of-way; common. Late September-November. E. and c. VA south through e. and c. NC to nc. SC. [= FNA, K, X; = *Aster grandiflorus* Linnaeus – RAB, C, F, G, S, SE, W; = *Vigilus grandiflorus* (Linnaeus) Reveal & Keener]

**Symphyotrichum laeve** (Linnaeus) Löve & Löve var. *concinnum* (Willdenow) Nesom, Narrow-leaved Smooth Aster. Pd (DE, NC, SC, VA), Mt (VA, WV), Cp (FL). {GA}: dry woodlands over mafic or calcareous rocks; rare. September-October. NY and KY south to GA, Panhandle FL (Jackson County), and MS. [= FNA, K, WH, X; = *Aster concinnus* Willdenow – C, G, S, SE; < *A. laevis* – F, WV; = *A. laevis* Linnaeus var. *concinnum* (Willdenow) House – RAB, W; = *laeve* ssp. *concinnum* (Willdenow) Semple & Brouillet]

**Symphyotrichum laeve** (Linnaeus) Löve & Löve var. *laeve*, Smooth Blue Aster. Pd (DE, NC, SC, VA), Mt (NC, VA, WV), Cp (DE, VA). {GA}: mesic hardwood forests; rare. September-October. NS west to MB, south to GA, LA, and OK. [= FNA, K, X; = *Aster attenuatus* Lindley ex Hooker – G, S; > *Aster purpureus* Nees – S; = *Aster laevis* Linnaeus var. *purpureus* (Nees) A. G. Jones; = *Symphyotrichum attenuatum* (Lindley) Semple]


**Symphyotrichum lanceolatum** (Willdenow) Nesom var. *lanceolatum*. Cp (DE), Pd (DE, MT; NC, WV), {VA}: moist soils; rare. July-October. NL (Newfoundland) west to SK, south to PA (Rhoads & Klein 1993), VA (reported in FNA), NC, SC (?) TN, MS, LA, and TX. Reported for Ashe County, NC (Poidexter & Murrell 2008). [= FNA, X; < *Aster simplex* Willdenow – RAB, GW, WV; = *Aster lanceolatus* Willdenow var. *lanceolatus* – C; = *A. simplex* var. *ramosissimus* (Torrey & A. Gray) Cronquist – F, G; < *A. simplex* var. *simplex* – SE; < *A. lanceolatus* – W; = *A. lanceolatus* ssp. *lanceolatum*; = *A. lanceolatus* ssp. *lanceolatum*]

**Symphyotrichum lateriflorum** (Linnaeus) Löve & Löve var. *horizontale* (Desfontaines) Nesom, Goblet Aster. {DE?, GA, NC, VA}: September-October. ME and MN south to FL and AR. [= K, X; < *S. lateriflorum* – FNA; = *Aster lateriflorus* – C, G, GW, SE, W; = *A. lateriflorus* var. *pendulus* (Aitons) E. S. Burgess – F; = *Aster lateriflorus* (Linnaeus) Britton var. *horizontalis* (Desfontaines) Farwell]

**Symphyotrichum lateriflorum** (Linnaeus) Löve & Löve var. *lateriflorum*, Starved Aster. Mt (WV), {DE?, GA, NC, SC, VA}: dry to moist areas; common in WV. September-November. NS, QC, and MB south to FL and TX. [= K; = *Aster lateriflorus* – RAB (also see *A. ontariensis*); < *A. lateriflorus* – C, G, GW, SE, W; = *A. lateriflorus* Britton var. *lateriflorus* – F; < *S. lateriflorum* – FNA; > *S. lateriflorum* var. *lateriflorum* – X; > *S. lateriflorum* var. *hiruticaule* (Lindley ex A.P. de Candolle) Nesom – X; > *A. lateriflorus* var. *hiruticaule* (Lindley ex A.P. de Candolle) Porter]


**Symphyotrichum novae-angliae** (Linnaeus) Nesom, New England Aster, Michaelmas-daisy. Mt (GA, NC, VA, WV), Pd (DE, VA), Cp (DE, VA*): wet meadows, bogs, prairies; common (rare in GA and NC). September-October. NS west to MT, south to GA, w. AL, c. MS, s. AR, OK, and NM. [= FNA, K, Z; = *Aster novae-angliae* Linnaeus – RAB, C, F, GW, S, SE, W, WV; = *Virgulus novae-angliae* (Linnaeus) Reveal & Keener]


**Symphyotrichum oblongifolium** (Nuttall) Nesom, Eastern Aromatic Aster, Shale-barren Aster. Mt (NC, VA, WV), Pd (VA): rock outcrops and dry woodlands over limestone, calcareous shale; common (uncommon in WV, rare in NC). Late September-October. NY, WI, MN, and MT, south to sc. VA, w. NC, nc. AL, n. MS, TX, and NM. [= FNA, K, X; = *Aster oblongifolius* Nuttall var. *augustatus* Shinners – G, SE; > *A. oblongifolius* var. *orientis* Shinners – WV; > *A. oblongifolius* – RAB, C, F, S, W; = *Virgulus oblongifolius* (Nuttall) Reveal & Keener]

**Symphyotrichum ontariensis** (Wiegand) Nesom var. *ontariensis*, Bottomland Aster. Mt (WV), {GA}: bottomlands, samps, bogs; rare. August-October. QC, ON, MN, and SD, south to WV, GA, AL, MS, LA, and TX. See Nesom (1997) and Brouillet
**Symphyotrichum oolentangiense** (Riddell) Nesom var. oolentangiensi. Cp (FL), {GA}: {habitat}; rare. NY, ON, MN, and SD, south to Panhandle FL and TX. Reported for GA (Kartesz 1999) on the basis of Fernald (1950), and also reported for GA in FNA.


**Symphyotrichum praecatum** (Poiret) Nesom var. angustior (Wiegand) Nesom, Willow Aster, Veiny Lined Aster. Mt (VA, {NC}?): fen-like calcareous wetlands; rare (VA Rare). ME south to NC and TN. Abrams Creek, Frederick County, VA. Also reported for GA (Kartesz 1999). [= FNA, K, X; = Aster praecatum – RAB; = Symphyotrichum praecatum var. angustior – C, F, G, SE; = Symphyotrichum pilosum var. angustior – WH]

**Symphyotrichum pratense** (Linnaeus) G.L. Nesom var. pratense. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA, WV), Cp (DE, NC, SC, VA): dry woodlands, roadsides, woodland edges, clearings, roadbanks; common (rare in FL). Late August-early November, October-November. Var. pratense ranges from VT and NY west to PA, s. OH, s. IN, s. MO, and se. KS, south to e. GA, ne. FL, Panhandle FL, s. AL, s. MS, s. LA, and sc. TX. [= FNA, K, X; = Aster pratense var. pratense – C, F, G, SE, WV; = A. pratense var. gracilis Hooker – C, F, G, SE, misapplied as to our area (now more narrowly defined and occurring only west of our area); = A. pratense – S; = A. pratense var. pratense – Z; = Virgulopsis pratense (Aiton) Reveal & Keener var. pratense]

**Symphyotrichum phlogifolius** (Muhlenberg ex Willdenow) Nesom, Appalachian Clasping Aster. Mt (GA, NC, SC, VA, WV), Pd (NC, SC, VA): mesic, nutrient-rich mixed hardwood forests; uncommon (rare in GA). Late August-mid October. NJ and Long Island, NY west to PA, n. OH, and e. IN south to c. VA, c. NC, w. SC, n. GA, and ne. AL, primarily in the Appalachian Mountains and adjacent provinces. [= FNA, K, X; = Aster phlogifolius var. phlogifolius – RAB, C, F, G, SE, W; = Symphyotrichum phlogifolius (Willdenburg ex Willdenow) Reveel & Keener var. phlogifolius (Muhlenberg ex Willdenow) Reveel & Keener]

**Symphyotrichum pilosum** (Willdenow) Nesom var. pringlei (A. Gray) Nesom. Cp (DE, NC), Pd (DE, NC, VA), Mt (WV), {GA, SC}: {habitat}; common (uncommon in NC and VA, rare in WV). September-November. NS west to MN, south to GA and TN. [= FNA, K, X; = Aster pilosus Willdenow var. demotus Blake – RAB, SE; = Aster pilosus var. pringlei A. Gray – C; = A. pilosus Willdenow var. demotus Blake – F, G, WV; = A. pilosus var. pringlei – F, G, WV]


**Symphyotrichum praealtum** (A.P. de Candolle) Nesom. Mt (GA, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): old fields, disturbed areas, woodland borders; common. September-November. NB west to MN, south to Panhandle FL and TX. Reported for Giles County, VA. [= FNA, K, X; = Aster praecatum – RAB; = Symphyotrichum praealtum – C, F, G, SE, WV; = Symphyotrichum praealtum var. praecatum – WH]

**Symphyotrichum racemosum** (Willdenow) Nesom var. racemosum. Mt (GA, NC, SC, VA, WV), {in e. WV and apparently through our area judging from F)} [= FNA, K, X; = Aster racemosum Elliott – C; = A. racemosum Elliott var. racemosum – F; = A. racemosum – S; = A. racemosum var. racemosum – WH; = A. racemosum var. subdulvatus (Wiegand) A.G. Jones, misapplied]

**Symphyotrichum retroflexum** (A.P. de Candolle) Nesom. Mt (GA, NC, SC, VA): forests; common. Late August-October. W. NC and e. TN south to nw. SC and n. GA. [= FNA, K, X; = Aster curtissii Torrey & A. Gray – RAB, S, SE, W; = A. retroflexum Lindley ex A.P. de Candolle – C]
**Symphyotrichum rhiannon** Weakley & Govus, Buck Creek Aster, Rhionn's Aster. Mt (NC): ultramafic outcrop barren; rare. October. Endemic (as far as is known) to the Buck Creek Serpentine Barren, Clay County, NC. Showing some similarities to *S. puniceum* and *S. prenanthoides*, but unique in many characters and not seemingly intermediate. See Kauffman et al. (2004) for additional information. [= FNA]

**Symphyotrichum ×schistosum** (Steele) Nesom [*S. cordifolium × laeve var. laeve*], Millboro Aster. Mt (VA): rare. [= K, X; = *Aster ×schistosus* Steele (pro sp.); = *A. schistosus* Steele]

**Symphyotrichum shortii** (Lindley) Nesom, Midwestern Blue Heart-leaved Aster, Short's Aster. Pd (GA, VA), Mt (GA, NC, WV), Cp (FL): dry, rocky slopes, calcareous hammocks (in FL); uncommon (rare in FL, GA, NC, and VA). Pa, s. ON, and MN, south to w. NC, c. GA, Panhandle FL (Gadsden and Jackson counties), MS, and AR. The lower stem leaves are indeed reminiscent of the leaves of *Asplenum rhizophyllum* (formerly known as *Camptosorus*), explaining one of Small's names for this species. [= FNA, K, X; = *Aster shortii* Lindley – C, F, G, SE, WV; > *A. shortii* – S; > *A. cordifolium* Small – S]

**Symphyotrichum simmondsii** (Small) Nesom. Cp (FL, GA, NC, SC), Pd (SC): ditches, other wet places, uncommon? Se. NC south to s. FL. [= K, X; < S. simmondsii – FNA, WA (also see *S. krakii*); = *Simmondsia* Small; < *A. pinifolius* Small]

> **Symphyotrichum squamatum** (Sprengel) Nesom, South American Salt-marsh Aster. Cp (FL): disturbed areas (on ballast), escaped to coastal marshes and dunes; rare, native of South America. AL (Mobile County), FL (Escambia County), LA, TX. [= K, V, WH, X; = *S. subulatum* (Linnaeus) Nesom var. *squamatum* (Sprengel) S.D. Sundberg – FNA, Q; < *Aster subulatus* Michaux var. *cubensis* – SE; ? *Aster subulatus* Michaux var. *australis* (A. Gray) Shinners]


**Symphyotrichum undulatum** (Linnaeus) Nesom. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): dry forests, woodlands, roadbanks; common. August-November. NS west to s. ON, south to c. peninsular FL and LA. [= FNA, K, WH, X; = *Aster undulatus* Linnaeus – RAB, C, G, SE, W; > *A. undulatus* var. *undulatus* – F, WV; > *A. undulatus* var. *loriformis* E.S. Burgess – F, WV; > *A. undulatus* var. *diversifolius* (Michaux) A. Gray – F; > *A. asperifolius* E.S. Burgess – S; > *A. linguiformis* E.S. Burgess – S; > *A. loriformis* (E.S. Burgess) Nesom – S; > *A. mohrii* E.S. Burgess – S; > *A. claviger* E.S. Burgess – S; > *A. corrigiata* E.S. Burgess – S; > *A. graciliscens* E.S. Burgess – S; > *A. proteus* E.S. Burgess – S; > *A. sylvestris* E.S. Burgess – S; > *A. triangularis* (E.S. Burgess) E.S. Burgess – S; > *A. truellus* E.S. Burgess – S; > *A. undulatus* – S; > *A. undulatus* var. *asperifolius* (Torrey & A. Gray) Wood]

**Symphyotrichum urophyllum** (Lindley in A.P. de Candolle) Nesom, White Arrowleaf Aster. {confused} Mt (VA), Pd (NC, SC), Cp (FL, NC, SC, GA), Cp (GA, VA): Late August-October. ME west to MN and NE, south to e. Panhandle FL, MS, and OK. [= FNA, K, WH, X; = *Aster sagittifolius* Wedemeyer ex Wildenow – RAB, C, G, S, SE, W; = *A. sagittifolius* var. *sagittifolius* – F; = *A. urophyllum* Lindley in A.P. de Candolle]


**Symphyotrichum drummondii** (Lindley) Nesom var. *texanum* (E.S. Burgess) Nesom. East to MS, AL, and KY. [= FNA, K; = *Aster texanus* Burgess – C, G, SE; = *Aster drummondii* Lindley var. *texanum* (E.S. Burgess) A.G. Jones; = *Symphyotrichum texanum* (E.S. Burgess) Semple] {synonymy incomplete}

> **Symphyotrichum kralli** Nesom. Cp (FL): East Gulf Coastal Plain of AL and FL. See Nesom (1997); the name *A. pinifolius* is illegitimate. [= K; = *Aster pinifolius* Alexander in Small – S, name illegitimate; < S. simmondsii (Small) Nesom – FNA, WH; < *Aster dumosus* – SE]

**Symphyotrichum lateriflorum** (Linnaeus) Löve & Löve var. *angustifolium* (Wiegand) Nesom. South to KY and NJ (Kartesz (1999)). [= K, X; < S. lateriflorum – FNA, W; = *Aster lateriflorum* – FNA, Q; = *S. lateriflorum* – FNA] {add to synonymy}


**Symphyotrichum longifolium** (Lamarck) Nesom [Cp (SC): = X; = *A. longifolium* Lamarck]

**Symphyotrichum patens** (Aiton) Nesom var. *gracile* (Hooker) Nesom. Var. *gracile*, as defined more narrowly by Z, ranges east to se. LA, s. MS, and s. AL from a core range in la. c. and c. TX, and OK. [= FNA, K; < *A. patens* Aiton var. *gracilis* Hooker – C, F, G, SE; = *A. patens* var. *gracilis* – Z]

**Symphyotrichum patens** (Aiton) Nesom var. *patens* (Lindley ex de Candolle) Nesom. Var. *patens* is largely Ozarkian, east to w. KY and w. MS. [= FNA, K; = *Aster patens* Aiton var. *patens* (Lindley) Torrey & A. Gray – C, F, G, SE, Z]

**Symphyotrichum praecaelum** (Poirot) Nesom var. *subasperum* (Lindley) Nesom. KY, IN, IL, MO, and OK south to AL and TX. [= K; < S. praecaelum – FNA]

**Symphyotrichum puniceum** (Linnaeus) Löve & Löve var. *scabriceaule* (Shinners) Nesom. Pineland seepage bogs. AL, MS, LA, TX. [= FNA, K; < *Aster puniceus* Linnaeus – C, GW, S, SE, W; = *Aster puniceus* var. *sericeus* (Ventenat) Nesom, Western Silvery Aster. See Jones, Witsell, & Nesom (2008); all reports of this species east of the Mississippi River and south of the Ohio River are based on misidentifications (or a taxonomically broader application of) *S. pratense*. [= FNA, K, X; = *Aster sericeus* VENTENAT – G, S; < *A. sericeus* VENTENAT – C, F, SE; = *Virgulus sericeus* (Ventenat) Reveal & Keener]

**Syndredrella** Gaertner 1791 (Nodeweed)

**ASTERACEAE**

* Synedrella nodiflora* (Linnaeus) Gaertner, Nodeweed. Cp (FL): moist to wet disturbed areas (on ballast); rare (not collected since the late 1800s), native of tropical America. January-December. [= FNA, S, SE, WH]

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**Tagetes** Linnaeus 1753 (Marigold)

A genus of about 40-50 species, of tropical and warm temperate America. References: Strother in FNA (2006c); Cronquist (1980)=SE.

1 Rays inconspicuous, ca. 1-2 mm long; [plant a well-established weed, primarily in the Coastal Plain].................................................. *T. minuta*

2 Rays showy, mostly > 10 mm long; [plant cultivated, rarely occurring as a waif].

2 Peduncles conspicuously swollen and hollow below the flower; involucr 15-20 mm high; achenes 7-10 mm long ..................... *T. erecta*

2 Peduncles not conspicuously swollen and hollow below the flower; involucre 10-15 mm high; achenes 4-7 mm long ..................... *T. patula*


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**Tanacetum** Linnaeus 1753 (Tansy)


1 Leaves simple, crenate (sometimes with a few basal lobes).................................................................................................................. *T. balsamita*

1 Leaves 1-3-pinnatifid.

2 Rays present, white; leaf blades 4-10 cm long, 1-2-pinnate (with 3-5 pairs of primary lobes) ................................................... *T. parthenium*

2 Rays absent; leaf blades 8-20 cm long, 2-3-pinnate (with 4-20+ pairs of primary lobes)............................................................... *T. vulgare*

* Tanacetum balsamita* Linnaeus, Costmary. Cp (DE): disturbed areas, rare, native of Mediterranean Europe. Introduced south to PA (Rhoads & Klein 1993), MD (Kartesz 1999), and DE (Kartesz 1999). August-September. [= FNA; = Chrysanthemum balsamita (Linnaeus) Baillon – C; = Balsamita major Desfontaines – K]


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**Taraxacum** G.H. Weber ex Wiggers 1780 (Dandelion)

A genus of about 60 species (or as many as 2000 if apomictic microspecies are recognized), herbs, of boreal and temperate regions. There seems little utility in trying to reconcile the numerous European microspecies against our introduced material. References: Brouillet in FNA (2006a); Cronquist (1980)=SE.

1 Cypselas reddish or purplish at maturity; leaves usually deeply cut throughout their length, the lobes narrow...................... *T. erythrospermum*

1 Cypselas brown or tan at maturity; leaves less deeply cut, particularly toward the base ................................................................. *T. officinale*


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**Tetragonothea** Linnaeus 1753 (Squarehead)


*Tetraneuris* E.L. Greene 1898 (Bitterweed)


Thelesperma Lessing 1831

A genus of 10 or more species, of c. and w. North America, Mexico, and South America. References: Strother in FNA (2006c).

* Thelesperma filifolium* (Hooker) A. Gray. MS. Prairies, glades, and roadsides over calcareous substrates. MO, SD, and WY south LA, TX, Nuevo Léon, and NM; disjunct eastward in the Black Belt of MS and on a chalk bluff in Sumter County, wc. AL (Keener (2009). [= FNA; > Th. filifolium var. filifolium – SE]

Thymophylla Lagasca y Segura 1816


Tithonia Desfontaines ex Jussieu 1789 (Sunflowerweed)


* Tithonia rotundifolia* (Miller) S.F. Blake, Clavel de Muerto. Cp (FL): disturbed areas; rare, native of Mexico. November-January. Also reported for Orleans Parish, LA. [= FNA, K, WH]

Tragopogon Linnaeus 1753 (Goat’s-beard)

A genus of about 110 species, herbs, of temperate Eurasia and the Mediterranean region. References: P. Soltis in FNA (2006a); Voss (1996); Cronquist (1980)=SE.

1 Flowers purple; pappus brownish .......................................................................................................................................................... *T. porrifolius*
1 Flowers yellow; pappus dingy white.
2 Peduncle obviously swollen below the flower and fruit; margins of the phyllaries green (or pale); leaf tips straight; rays pale yellow, obviously shorter than the longest phyllaries .................................................................................................................................................. *T. dubius*
2 Peduncle only slightly swollen below the flower and fruit; margins of the phyllaries reddish purple (rarely green); leaf tips more or less curled or curved; rays bright yellow, as long as or longer than the phyllaries .................................................................................................................................................. *T. pratensis*

ASTERACEAE


Tridax Linnaeus 1753

A genus of about 26 species, herbs, mainly of the New World tropics. References: Strother in FNA (2006c); Powell (1965)=Z.


Trilisa Cassis 1820 (Trilisa)


Identification notes: Trilisa can be distinguished from Carphephorus by its smaller heads (involucres 3.5-6 mm high vs. 6-15 mm high) and fewer phyllaries (6-12 vs. 15-40). When vegetative, Trilisa lacks shining resin dots on the leaves, while Carphephorus has numerous resin dots.

1 Stem glabrous; capitulescence corymbose, the lateral branches equally or overtopping the central ones; leaves 1-6 (-11) cm wide.........................T. odoratissima
1 Stem densely spreading-pubescent; capitulescence a cylindrical panicle; leaves (0.5-) 1-3 (-4) cm wide.........................T. paniculata

Trilisa odoratissima, Deer-tongue, Vanilla-leaf. Cp (FL, GA, NC, SC): moist to mesic savannas and flatwoods; uncommon. Late July-October; September-November. Se. NC south to c. peninsular FL and west to e. L.A. T. odoratissima has the largest leaves of our species of Carphephorus and Trilisa; its leaves are normally wider than 3 cm, and have a very wide and prominent midrib, usually purple toward the base of the leaf and white toward the tip. This species contains coumarin and gives off a pleasant vanilla odor when drying; it is gathered from the wild and used as a supplementary flavoring in cigarettes. See DeLaney, Bissett, & Weidenhamer (1999), Ward (2001), and Orzell & Bridges (2002) for discussion of a southern Florida taxon related to T. odoratissima, named (in Carphephorus) as a species, Carphephorus subtropiccanus DeLaney, N. Bissett, & Weidenhamer, and later reduced in rank to a variety, C. odoratissimus var. subtropiccanus (DeLaney, N. Bissett, & Weidenhamer) Wunderlin & B.F. Hansen. It is probably best treated at the varietal level, but the combination is not yet available in Trilisa. [= Carphephorus odoratissimus (J.F. Gmelin) Herbert var. odoratissimus – FNA, WH, X; < Carphephorus odoratissimus – GW, K, SE, Z = Carphephorus odoratissimus – Y; < Trilisa odoratissima (J.F. Gmelin) Cassini – RAB, S; = Trilisa odoratissima var. odoratissima – V]

Trilisa paniculata (J.F. Gmelin) Cassini. Cp (FL, GA, NC, SC): savannas and flatwoods; common. August-October; September-November. Se. NC south to s. FL, and west to the FL Panhandle and s. AL. The leaves of this species are reminiscent of C. odoratissimus, but are narrower, (0.5-) 1-3 (-4) cm wide, vs. 1-6 (-11) cm wide in C. odoratissimus. Sterile C. paniculata can be mistaken for glabrate C. tomentosus, which has shorter and broader leaves. [= RAB, S, V; = Carphephorus paniculatus (J.F. Gmelin) Herbert – FNA, GW, K, SE, WH, Y, Z]

Tripleurospermum Schultz ‘Bipontinus’ 1844 (Mayweed)

A genus of about 40 species, herbs, of the northern hemisphere. References: Brouillet in FNA (2006a); Arriagada & Miller (1997)=Z.

1 Stem ascending or erect; achenes with resin glands > 2× as long as wide; annual............................[T. inodorum]
1 Stem procumbent (rarely ascending); achenes with resin glands 1.0-1.5× as long as wide; perennial or biennial...............................[T. maritimum ssp. maritimum]

* Tripleurospermum inodorum (Linnaeus) Schultz ‘Bipontinus’, Scentless Chamomille. Introduced at scattered locations in North America, such as AL, FL, KY, MD, and PA. [= FNA; = T. perforata (Mérat) M. Lainz – K, Z; = Matricaria maritima Linnaeus var. agrestis (Krafft) Wilmott – F; = Matricaria perforata Mérat]
* Tripleurospermum maritimum (Linnaeus) W.D.J. Koch ssp. maritimum, Scentless Chamomille. Introduced at scattered locations in eastern North America, such as AL, PA, NJ. [= FNA; = Matricaria maritima Linnaeus var. maritima – F; = T. maritima ssp. maritima – K, orthographic variant; ? Chamomilla maritima (Linnaeus) Rydberg – S]

Tussilago Linnaeus 1753 (Coltsfoot)

A monotypic genus, an herb, of Eurasia and n. Africa. References: Barkley in FNA (2006b); Cronquist (1980)=SE.
**Tussilago farfara** Linnaeus, Coltsfoot. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (VA): roadsides, especially gravelly or shaly roadbanks or ditches, streamside gravel bars, disturbed ground; common (uncommon in VA Piedmont and Coastal Plain, rare in DE, rare in NC Piedmont), native of Eurasia. This species has spread rapidly southward from the Northeast, where it was introduced in North America. Fernal (1950) considered its southern limit to be "New Jersey, Pennsylvania, and Ohio". Gleason (1952) extended it to WV. Strausbaugh and Core (1978) reported that the first collection in WV was actually in 1933, "migrating southward year by year, now abundant and often conspicuous along highways, on strip-mined areas and other denuded areas, in every county of the state." First reported in NC in 1971, it is now rather common in most of the mountain counties, and is beginning to appear at scattered sites in the Piedmont. Though preferring a cool and moist climate, *Tussilago* seems likely to continue to increase in abundance and to spread into the Piedmont. [= C, F, FNA, G, K, SE, W, WV]

*Uropappus* Nuttall 1841 (Silver-puffs)


**Verbesina** Linnaeus 1753 (Crownbeard, Wingstem, Frostweed)


1 Stem and lower leaf-surfaces grey strigose-canescent; alien annuals, 2-10 dm tall, with taproots; [section *Ximenesia*]..............
   1 Stem and lower leaf-surfaces glabrous or pubescent, but not grey strigose-canescent; native perennials, 5-40 dm tall, with fibrous or fleshy-fibrous roots.

2 Leaves primarily opposite (the uppermost sometimes alternate).
   3 Internodes winged; [collectively widespread]...
   4 Plants 4-5 (-10) dm tall, perennating from short horizontal rhizomes; ray florets (5-) 8; disc florets 20-60+; [endemic to ne. FL and se. GA]; [section *Pterophyton*]..........................................................V. heterophylla
   5 Plants 10-30 dm tall, perennating from a crown with fleshy roots; ray florets (0-) 1-3 (-5); disc florets 8-15+; [widespread]; [section *Phaethusa*] ..............................................V. occidentalis

3 Internodes not winged; [collectively of sw. GA, s. AL, and FL Panhandle]; [section *Pterophyton*].
   5 Ray florets (5-) 11-13, yellow; heads 3-20.................................................................V. aristata
   6 Heads, 1-15 (-20), in a compact inflorescence; disc 7-16 mm wide at anthesis; ray florets (5-) 7-15, yellow; plants 5-12 dm tall; [section *Pterophyton*].................................................................V. helianthoides

4 Plants 10-30 dm tall, perennating from a crown with fleshy roots; ray florets (0-) 1-3 (-5); disc florets 8-15+; [widespread]; [section *Pterophyton*] .................................................................V. occidentalis

5 Ray florets 0; heads 1 (-3).................................................................................................V. chapmanii

6 Heads, numerous, 10-200 or more, in a dense to open inflorescence; disc 3-15 mm wide at anthesis; ray florets either absent, or 1-5 and white, or 2-10 and yellow; plants 10-40 dm tall.

7 Ray florets 1-5, white; [section *Ochtractinia*].
   8 Lower and middle leaves pinnately lobed or dissected; achenes of ray florets glabrous; [of the outer Coastal Plain from SC southward]...............................................................V. virginica var. laciniata
   9 Lower and middle leaves entire, serrate, or slightly undulate; achenes of ray florets papillose or short-pubescent; [more widespread in our area]..........................................................V. virginica var. virginica

   7 Ray florets present, 2-10, yellow; [section *Actinomeris*].
   8 Ray florets absent; or 2-10 and yellow; [section *Actinomeris*].
   9 Ray florets absent; disc florets yellow .................................................................V. alternifolia

**Verbesina alternifolia** (Linnaeus) Britton ex Kearney, Common Wingstem. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (FL, NC, VA): alluvial forests, marshes, floodplain pastures; common (uncommon in VA Coastal Plain, rare in DE and FL). August-September. NY and s. ON west to IA, south to Panhandle FL and LA. [= RAB, C, FNA, G, K, SE, WH, WV; *Ridana alternifolia* (Linnaeus) Britton – S]

**Verbesina arista** (Elliott) Heller, Coastal Plain Crownbeard. Cp (FL, GA): longleaf pine sandhills, swamp margins, dry woodlands; rare. SW. GA and ne. FL west to FL Panhandle and s. AL. June-August. [= FNA, K, SE, WH; *Pterophyton aristatum* (Elliott) Alexander – S]


ASTERACEAE

**Verbesina helianthoides** Michaux, Ozark Crownbeard. Mt (NC), Cp (GA?): dry woodlands over mafic rocks; rare. May-October. OH west to IA and KS, south to c. TN, nw. GA, n. AL, and nc. TX; disjunct in w. NC and e. GA. [= C, F, FNA, G, K, SE; = Pterophyton helianthoides (Michaux) Alexander – S]

**Verbesina heterophylla** (Chapman) A. Gray. Cp (FL, GA): pine flatwoods; rare. (April-) June. Ne. FL (8 counties) and se. GA (Charlton County). [= FNA, GW, K, SE, WH; = Pterophyton heterophyllum (Chapman) Alexander – S]

**Verbesina occidentalis** (Linnaeus) Walter, Southern Crownbeard. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): forests, woodlands, pastures, and roadsides, especially abundant in alluvial areas or upland over mafic or calcareous rocks; common (uncommon in FL). MD west to OH and MO, south to Panhandle FL and MS. [= RAB, C, F, FNA, G, GW, K, SE, WH, WV; = Phaethusa occidentalis (Linnaeus) Britton – S]

**Verbesina virginica** Linnaeus var. laciniata (Poiret) A. Gray, Southern Frostweed. Cp (FL, GA, NC, SC): moist forests and thickets; rare. September-October. E. SC (or e. NC?) south to s. FL. Olsen (1979) maps this variety as occurring in e. NC; I know of no documentation. The two varieties need additional study; specific status may be warranted. [= RAB, GW, K, SE, Z, WH; < V. virginica – FNA; = Phaethusa laciniata (Poiret) Small – S; = V. laciniata (Poiret) Nuttall]

**Verbesina virginica** Linnaeus var. virginica. Common Frostweed. Mt (CA, NC, SC, VA), Pd (GA, NC, SC), Cp (FL, GA, SC, VA): moist to dryish forests, especially over mafic or calcareous rocks, in Coastal Plain ravines in VA over coquina limestone; uncommon (rare in VA). July-October. Sc. NC (e. VA?) west to e. KS, south to s. FL and c. TX. Populations of V. virginica from e. VA appear to be substantially disjunct from other populations of either variety. [= RAB, C, F, GW, K, SE, Z; < V. virginica – F, FNA, G, WH; = Phaethusa virginica (Linnaeus) Britton – S]

**Verbesina waltoni** Shinners, Walter’s Wingstem. Cp (GA, SC), Pd (NC): floodplains, low moist forests; rare (NC Watch List). Late August-September. Coastal Plain of SC south to GA, west to LA; disjunct in Piedmont of NC and Ouachita Mountains of AR. [= RAB, FNA, GW, K, SE; = Ridan paniculata (Walter) Small – S]

**Vernonia** Schreber 1791 (Ironweed)

A genus of about 20 species, perennial herbs, of e. and c. North America and n. Mexico; a few species in South America. Traditionally very broadly circumscribed to include about 500 species, trees, shrubs, and herbs, of tropical, subtropical, and warm temperate regions, especially America and Africa; this broader circumscription appears increasingly indefensible.

References: Strother in FNA (2006a); Jones (1982)=Z; Urbatsch (1972)=Y; Jones in Cronquist (1980)=SE. Key based on FNA and SE.

**Identification notes:** Hybrids are frequent between co-occurring species. Only V. ×georgiana is keyed separately below (because of its distinctive appearance). Others may be recognized by intermediate morphology and ecological/geographic context.

1 Basal rosette present, its leaves larger than those of the stem; [of xeric habitats of the Coastal Plain and (in NC southward) xeric rocky habitats of the Piedmont].

2 Phyllary tips acute to rounded (sometimes minutely apiculate), the narrowest short acuminate; [from s. MS westward] ...............[V. texana]

3 Phyllary tips subulate to filiform, the broadest long-acuminate; [from s. MS westward] ...............V. acaulis

1 Basal rosette absent; [collectively of a wide variety of habitats].

4 Phyllary tips subulate to filiform, the broadest long-acuminate.

5 Involucres 11-15 mm in diameter; phyllaries (50-) 60-70+; florets 50-100+ ...............................................................V. arkansana

6 Middle cauleine leaves 1.2-7.5 cm wide; plants 4-35 dm tall; [of various habitats, but not typically in Coastal Plain pineyards].

7 Pappus whitish to yellowish, 30 outer bristles intergrading with 30+ inner bristles; leaf blades 2.5-3.5 (-4)× as long as wide ............V. glauca

7 Pappus brown to purple, 20 outer scales contrasting with 30-40+ inner bristles; leaf blades (3.3-) 4-6× as long as wide.................................V. noveboracensis

6 Middle cauleine leaves 0.1-1.8 cm wide; plants 3-11 dm tall; [of Coastal Plain pineyards].

8 Leaves 3-7 cm long, (5-) 10-20+ mm wide, 2.5-6× as long as wide, somewhat auriculate at the base ......................V. pulchella

8 Leaves 5-12 cm long, 2-4 (-8+) mm wide, (8-) 12-50+ as long as wide, attenuate at the base.

9 Tips of the inner phyllaries long-acuminate, 1.4-4.8 mm long ..........................................................V. angustifolia var. scabrima

9 Tips of the inner phyllaries acuminate, 0.1-1.0 mm long ..........................................................V. angustifolia var. angustifolia

4 Phyllary tips acute to rounded (sometimes minutely apiculate), the narrowest short acuminate.

10 Leaves 2-4 (-8+) mm wide, (8-) 12-50+ as long as wide.

11 Heads 16-19-flowered; phyllary tips acuminate ...............................................................V. angustifolia var. angustifolia

11 Heads 8-15-flowered; phyllary tips acute ...............................................................V. angustifolia var. mohrii

10 Leaves 5-70 mm wide, 2-9 (-17+)× as long as wide.

12 Undersurface of leaf glabrous or nearly so, with pits (best seen at >10× magnification) containing awl-shaped hairs or glands.............

........................[V. fasiculata var. fasiculata]

12 Undersurface of leaf scabrously scabrous or pubescent, lacking pits.

13 Stems glabrous ...............................................................V. flaccidifolia

13 Stems hairy.

14 Leaf undersurfaces scabrous with appressed awl-shaped hairs, with few or no resin glands.

15 Heads with 13-30 flowers; leaf blades linear-lanceolate, 10-30 cm long, 1.2-7.5 cm wide, 4-10× as long as wide .................

........................[V. gigantea

15 Heads with 9-20 flowers; leaf blades elliptic to oblanceolate, 6-20 cm long, 1.2-5 cm wide, 3-5× as long as wide...
**ASTERACEAE**

979

14 Leaf undersurfaces with curled, erect hairs, and with conspicuous resin glands.

16 Heads with (15-) 20-25 (-35) florets; involucres 4-6.7 mm high, 4-7 mm across ................. [V. baldwinii var. baldwinii]

16 Heads with 30-55 florets; involucres (6-) 7-10 mm high, 5-9 mm across ......................... [V. missurica]

**Vernonia acculus** (Walter) Gleason. Cp, Pd (GA, NC, SC): sandhills, dry rocky woodlands, bluffs, and barrens; common. Late June-August; August-October. Coastal Plain and lower Piedmont of ne. and nc. NC south to sc. GA. [= RAB, FNA, K, S, SE]

**Vernonia angustifolia** Michaux var. angustifolia. Cp (GA, NC, SC), Mt? (NC): sandhills; common. Late June-early September; September-October. Se. NC south to GA. [= RAB; < V. angustifolia – FNA, S; = V. angustifolia ssp. angustifolia – K, SE]


**Vernonia ×georgiana** Bartlett (pro sp.). Cp (GA, NC, SC): sandhills; uncommon. Late June-early August; August-October. [= RAB, K, SE; = V. georgiana – S]

**Vernonia gigantea** (Walter) Trelease. Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA), Cp (GA, NC): pastures, bottomlands, streamside; common. Late August-October; August-November. W. NY, s. MI and ne. NC south to SC, FL, and TX. [= W; = V. gigantea (Walter) Trelease ssp. gigantea – K, SE, Y; = V. altissima Nuttall – RAB, G, WV; = V. gigantea var. gigantea – C; > V. altissima var. altissima – F; < V. gigantea – FNA, WH; > V. altissima var. tenniotricha Blake – F; < V. altissima – S; > V. gigantea – S]


**Vernonia missurica** Rafinesque, Missouri Ironweed. Cp (FL), [GA]: wet hammocks, prairies, glades; rare. IN, CN, TN (Chester, Wofford, & Kral 1997), GA (FNA), and Panhandle FL, west to IA, KS, OK, and TX. [= C, K, S, SE, WH]


**Vernonia pulchella** Small. Cp (GA, SC): sandhills; uncommon. Se. SC (Beaufort and Jasper counties) south to se. GA. [= FNA, K, S, SE]

Xanthium Linnaeus 1753 (Cocklebur)

A genus of about 3 species, herbs, cosmopolitan (of somewhat uncertain original distribution). References: Strother in FNA (2006c); Cronquist (1980)=SE.

1 Leaves lanceolate, 2-5× as long as wide, cuneate at the base; leaf axil with a 1-3 cm long yellow 3-forked spine ................. [X. spinosum]

1 Leaves ovate or orbicular, 0.8-1.5× as long as wide, cordate at the base; leaf axil lacking spines ........................................ [X. strumarium]

* **Xanthium spinosum** Linnaeus, Spiny Cocklebur. Mt (VA, WV), Pd (DE, NC, SC), Pd (DE, GA, VA): fields, disturbed ground; uncommon (rare in GA, NC, SC, VA, and WV), introduced, but the native distribution unknown. July-November. [= RAB, C, FNA, K, SE, WV; > X. spinosum var. spinosum – F; > X. spinosum var. inermis Bel – F; > X. ambrosioides Hooker & Arnott – F; = Acanthoxanthium spinosum (Linnaeus) Fourrée – S]

Vittadinia A. Richard 1832

**Xanthium strumarium** Linnaeus, Cockslebur. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): disturbed ground, roadsides, pastures, barnyards, beaches; common. July-November. Nearly cosmopolitan, its original distribution unclear, but probably native to the New World. Various taxa have been recognized (see synonymy); it is unclear that any are usefuly distinguished. The most commonly followed recent treatment is that by Cronquist, recognizing two varieties in eastern North America: var. *canadense*, with burs 2-3.5 cm long, the prickles of the bur with spreading hairs and stipitate glands toward the prickles, and var. *glabratum* (A.P. de Candolle) Cronquist, with burs 1.5-2 cm long, the prickles of the bur nearly glabrous or with short glandular or nonglandular puberulence toward the prickles. [= FNA, GW; > *X. strumarium* var. *glabratum* (A.P. de Candolle) Cronquist – RAB, C, G, K, SE, WH; > *X. strumarium* var. *strumarium* – RAB, misapplied; > *X. strumarium* var. *canadense* (P. Miller) Torrey & A. Gray – C, G, K, SE, WH; > *X. chinense* P. Miller – F; > *X. echinatum* Murray – F; > *X. italicum* Morett – F; > *X. oviforme* Wallroth – F; > *X. pensylvanicum* Wallroth – F; WV; > *X. strumarium* – F, WV]

*Youngia* Cassini 1831 (Youngia)

A genus of about 30-40 species, herbs, of Asia. References: Spurr in FNA (2006a); Cronquist (1980)=SE.

* *Youngia japonica* (Linnaeus) A.P. de Candolle, Asiatic Hawk's-beard, Youngia. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC): roadsides, disturbed areas, trail edges; uncommon, native of se. Asia. Spreading rapidly in our area, and now moving into minimally-disturbed natural areas. [= C, FNA, K, SE, WH; = *Crepis japonica* (Linnaeus) Bentham – RAB, F, G, S; > *Y. japonica* ssp. japonica]

**Zinnia** Linnaeus 1759 (Zinnia)


1 Achenes wingless; receptacular bracts (chaff) toothed or erose on the lip ..........................................................Z. peruviana
2 Achenes winged; receptacular bracts (chaff) with a differentiated fimbriate lip ........................................Z. violacea

* *Zinnia violacea* Cassini, Garden Zinnia, Elegant Zinnia. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC): roadsides, disturbed areas; rare (commonly cultivated), native of the New World tropics. May-November. [= FNA, K, SE, WH; = *Z. elegans* Jacquin – S, SE]

405. **ADOXACEAE** Trautvetter 1853 (Moschatel Family) [in DIPSACALES]

A family of about 4 genera and about 165-200 species, shrubs, small trees, and herbs (here interpreted as including *Sambucus* and *Viburnum*). There now appears to be little doubt that *Sambucus* and *Viburnum* are more naturally placed in the Adoxaceae, in contrast to their traditional placement in the Caprifoliaceae (Zhang et al. 2003, Eriksson & Donoghue 1997). References: Ferguson (1966a).

1 Leaves pinnately compound; fruit 3-5-seeded.................................................................................................. *Sambucus*
1 Leaves simple; fruit 1-seeded.................................................................................................................. *Viburnum*

**Sambucus** Linnaeus 1753 (Elderberry)

A genus of about 9 species of shrubs and small trees, north temperate and subtropical. References: Bolli (1994)=Z; Ferguson (1966a)=Y.

1 Inflorescence racemose, normally longer than broad; fruits red when ripe; pith of stems and second-year branches brown; leaves with 5-7 leaflets, these never further divided; foliage and young twigs puberulent; [primarily of the Mountains, extending into the Piedmont in VA]...........
2 Inflorescence cymose, normally broader than long; fruits black or deep purple when ripe; pith of stems and second-year branches white; leaves with 5-11 leaflets, the lower leaflets sometimes further divided; foliage and young twigs glabrous or with trichomes mostly limited to the veins of the leaves; [collectively widespread].

* *Sambucus canadensis* Linnaeus, Common Elderberry. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): streambanks, thickets, moist forests, disturbed areas; common. Late April-July; July-August. NS west to MB, south to s. FL, TX, Mexico; West Indies. The leaflets, particularly of young shoots or stunted sprouts, are often variegated. This is one of the first woody plants to leaf out in the spring. Bolli (1994) treats this taxon as a subspecies of a
broadly defined *S. nigra*. He recognizes 6 subspecies: ssp. *nigra* in Europe, ssp. *palmensis* (Link) R. Bolli in the Canary Islands, ssp. *maderensis* (Lowe) R. Bolli in Madeira Island, ssp. *canadensis* in eastern North America, Mexico, Central America, and the West Indies, ssp. *cerifera* (Rafinesque) R. Bolli of western North America, and ssp. *peruviana* (Humboldt, Bonpland, and Kunth) R. Bolli of South America. I prefer to retain these taxa at the species level, particularly as Bolli states "the geographical races, in the following defined as subspecies, turned out to be the biological units in *Sambucus*." Bolli further discusses 3 races within what is here called *S. canadensis* (his *S. nigra ssp. canadensis*), one from eastern North America, another from montane Mexico and Central America, and a third from subtropical se. North America and the West Indies; he considers these geographic races to represent "morphological and perhaps genetic" differences, and that "at present, all races are probably interconnected." This variation may be worthy of taxonomic recognition at the varietal level, and these "races" have formerly been considered to be species or varieties. Plants of most of our area represent *S. canadensis* var. *canadensis*, while evergreen (or tardily deciduous), bipinnate plants of FL, s. GA, s. AL, s. MS, s. LA, se. TX, and the West Indies represent *S. canadensis* var. *laciniiata* A. Gray. [= RAB, C, GW, W, WV, Y; > *S. canadensis* var. *canadensis* – F; G; > *S. canadensis* var. *submollis* Rehder – F; G; = *S. nigra* Linnaeus ssp. *canadensis* (Linnaeus) R. Bolli – K, WH, Z; > *S. canadensis* – S; > *S. simpsonii* Rehder ex Sargent – S; > *Sambucus canadensis* Linnaeus var. *laciniiata* A. Gray]


*Sambucus racemosa* Linnaeus var. *pubens* (Michaux) Koehne, Red Elderberry. Mt (GA, NC, VA, WV), Pd (VA): spruce-fir and northern hardwood forests, especially typical on boulderfield, talus, and other rocky situations, primarily at high elevations in the Mountains, though sometimes descending in our area (mainly in VA) to low elevations (as low as 75 m); uncommon (rare in VA Piedmont). Late April-early June; late June-August. As interpreted here, *S. racemosa* is an intermediately circumboreal species, represented in ne. North America by var. *pubens*, in n. Europe by var. *racemosa*, and in ne. Asia and nw. North America by several additional varietal taxa. *Sambucus racemosa* var. *pubens* ranges from NL (Newfoundland) west to BC (?), south to PA, IN, IL, and in the mountains to w. NC, e. TN, and ne. GA (Jones & Coile 1988). [= *S. pubens* – RAB, F, G, S, W, WV; = *S. racemosa* ssp. *pubens* (Michaux) House var. *pubens* – C; < *S. pubens* ssp. *pubens* – Y; < *S. racemosa* var. *racemosa* – K, Z]

**Viburnum** Linnaeus 1753 (Viburnum)

(contrived by B.A. Sorrie & A.S. Weakley)

A genus of about 150 species of shrubs and small trees, largely temperate, and primarily in Asia and North America. There remain a number of taxonomic problems, particularly in the *Viburnum dentatum* complex; the treatment and key for that group is highly provisional. Dirr (2007) discusses the genus in detail from a horticultural perspective. References: McAtee (1956)=Z; Ferguson (1966a)=Y; Weckman et al. (2002); Winkworth & Donoghue (2005).

**Identification notes:** Leaves vary in shape in some taxa more than in others; we have allowed for some of this variation in the key, but readers should expect that some specimens will not key cleanly, especially vegetative shoots. Petiole length of leaves varies considerably, even with those possessing "short" petioles. However, by measuring only the petioles of the first leaves below an inflorescence one reduces the chances of misidentifications greatly. Warning: even in some of the "long" petioled taxa, one may occasionally encounter unusually short petioles; therefore it is wise to examine several twigs. Density of pubescence and glandularity of leaves, petioles, and inflorescences varies more in some taxa than in others; we have allowed for some of this variation in the key, but readers should expect that some specimens will not key cleanly, especially vegetative shoots. Stipitate glands are usually very short, especially those on leaf veins; a 10× lens may not be adequate to see them clearly. It is highly provisional. Dirr (2007) discusses the genus in detail from a horticultural perspective. References: McAtee (1956)=Z; Ferguson (1966a)=Y; Weckman et al. (2002); Winkworth & Donoghue (2005).

1 Leaves (at least the larger and better developed) palmately lobed and veined.
2 Petioles lacking glands near its junction with the leaf blade; flowers all alike and fertile; twigs pubescent; fruit blue-black; [section *Lobata*] .......................................................... \*V. acerifolium*
3 Petioles with several glands near its junction with the leaf blade; marginal flowers of the inflorescence stem much larger and the fertile central flowers (or in cultivated forms all the flowers sterile and enlarged); twigs glabrous; fruit red; [section *Opulus*]
4 Petiolars glands mostly taller than wide, stalked, rounded on the top; [native, of n. WV, PA, and NJ northward] .......................................................... \*V. opulus var. *americanum*
5 Petiolars glands mostly wider than tall, sessile, concave on the top; [alien, sometimes planted and escaped] ............ \*V. opulus var. *opulus*
6 Leaves unlobed and pinnately veined.
7 Lateral veins curving and branching repeatedly through most of their length, not noticeably parallel, the lateral veins becoming obscure in the general pattern of anastomasing veins and not obviously leading to marginal teeth; [section *Lentago*]
8 Leaves entire or with a crenate margin, the teeth < 5 cm of margin.
9 Leaves 2-5 cm long, obovate or spatulate, widest towards the tip; [of e. SC southward in then Coastal Plain] ............... \*V. obovatum*
10 Leaves 5-12 cm long, generally elliptic or ovate, widest at or below the middle; [collectively widespread and of various habitats].
11 Leaves dull to slightly shiny above; peduncle (5-) avg. 13 (-25) mm long; leaves undulate-crenulate (or rarely entire); [of Mountains and upper Piedmont] .......................................................... \*V. cassinoides*
12 Leaves shiny above (as if varnished); peduncle (20-) avg. 35 (-50) mm long; leaves entire (rarely somewhat undulate-crenate); [of Coastal Plain, Piedmont, and low elevation boggy sites in the Mountains] ................................................ \*V. nudum*
13 Leaves serrulate, the teeth > 5 cm of margin.
14 Leaves mostly strongly acuminate at the tip; [of w. VA northward] .......................................................... \*V. lentago*
15 Leaves acute, obtuse, or rounded (rarely somewhat acuminate) at the tip; [collectively widespread in our area].
16 Leaves herbaceous in texture, dull above; petioles and veins (lower surface) glabrous or slightly brown-scurfy; [widespread in our area, usually in bottomland or other mesic forests] ................................................ \*V. prunifolium*
9 Leaves somewhat coriaceous in texture, glossy above (as if lacquered); petioles and veins (lower surface) red-scurfy; [of c. VA southward, usually in dry to dry-mesic woodlands and forests] ......................................................... V. rufidulum
4 Lateral veins of the leaves nearly straight and prominently parallel for most of their length, many of themforking near the margin, the ultimate veins leading to a tooth.
10 Winter buds consisting of tightly folded leaves uncovered by bud scales; plants strongly and noticeably stellate pubescent, especially on young parts and on the lower leaf surface; fruits red then turning black.
11 Leaves lanceolate, 3-5× as long as wide, entire; leaf base truncate to rounded; leaf surface strongly rugose; [section Viburnum] ................. V. rhytidophyllum

10 Winter buds covered by bud scales; plants noticeably stellate-pubescent or not; fruits orange, red, or blue-black.
14 Leaves oblong-obovate, wider towards the tip; inflorescence panicle, with an elongate central axis, the lowest branches opposite and with other branches above; fresh leaves malodorous; [section Saccodontotinus] ........................................................................... V. sieboldii
13 Marginal flowers of the inflorescence sterile and much larger than the fertile central flowers (or all the flowers sterile and enlarged) ........................................................................................................... [V. macrocephalum]

16 Fruit blue-black; [native].
18 Petioles short, those immediately below a cyme ≤ 8mm long.
19 Cymes and petioles stipitate-glandular; leaf shape ovate, occasionally rotund; [endemic to two small areas: Ozark and Ouachita Mountains of s. MO, AR, and e. OK] ................................................................. V. bracteatum
15 Leaves with 8-12 lateral veins on each side; marginal flowers of the inflorescence sterile and much larger than the fertile central flowers; winter buds with 2 scales; [section Tomentosa] ............................................................................. V. plicatum
17 Leaves broadly ovate, acute, pubescent on both surfaces .............................................................................. V. dilatatum
16 Fruit orange or red; [aliens, planted and escaping]; [section Vaccinopsis] .............................................................. V. setigerum
18 Petioles longer, those immediately below a cyme ≥ 11mm long.
19 Cymes stipitate-glandular (occasionally glabrous in V. dentatum var. deamii and V. dentatum var. indianense).
20 Leaf bases strongly cuneate; plants usually restricted to limestone substrates.
21 Petioles eglandular; leaf veins eglandular; leaves glabrate beneath or with simple hairs in axils; bark not exfoliating; [endemic to two small areas: n. AL, sc. TN, and nw. GA, and Ozark and Ouachita Mountains of s. MO, AR, and e. OK] ................................................................................................................ V. bracteatum
17 Leaves ovate or ovate-lanceolate, acuminate, glabrous except for long, somewhat appressed hairs along the veins beneath,........... V. dilatatum
22 Stipitate glands present on petioles and leaf veins; stipular leaf bracts often present.
23 Petioles with stellate hairs all over; leaves beneath moderately to densely stellate pubescent .................................................. V. dentatum var. deamii
22 Stipitate glands absent on petioles and leaf veins; stipular leaf bracts absent; [of sandstone substrates in Lookout Mountain region of ne. AL] ........................................................................................................ V. specie 1
23 Petioles with stellate hairs confined to groove; leaves beneath glabrate .................. [V. dentatum var. indianense]
19 Cymes eglandular (occasionally glandular in V. dentatum var. dentatum and V. scabrellum)
24 Petioles glabrous or glabrate; stellate hairs absent on leaves and petioles; hairs on leaf undersides confined to axils and a few veins; leaf shape usually ovate.................................................. V. dentatum var. lucidum
25 Petioles sparsely to densely stellate pubescent; stellate hairs present on leaf underside and petiole, dense and soft to touch (V. carolinianum, V. scabrellum, most V. venosum) or sparse to moderate (V. dentatum var. dentatum, some V. venosum); leaf shape various.
26 Leaf shape ovate to broadly ovate; leaf teeth 5-12 per side; upper leaf surface scabridulous with abundant simple hairs; [of southern Atlantic and Gulf Coastal Plain] ................................................. V. scabrellum
27 Leaf underside densely pubescent and soft to touch (felt-like); stipular leaf bracts often present; fruits pubescent; leaf teeth 13-18 per side; [of southern Appalachian mountains of w. NC, n. GA, and se. TN] ........... V. carolinianum
27 Leaf underside moderately to densely pubescent and somewhat soft to touch (but not felt-like); stipular leaf bracts absent; fruits glabrous; leaf teeth 10-15 per side; [of northern Appalachian Coastal Plain of se. MA, s. RI, and Long Island, NY] ........................................ V. venosum

**Viburnum bracteatum** Rehder, Linnomon Arrowwood. Mt (GA): calcareous forests and woodlands. Late April–early May. Se. TN south to nw. GA and ne. AL; disjunct westwards in the Ozark region of s. MO, nw. AR, and e. OK. [= *V. bracteatum* Rehder – K, S, Y, Z; > *V. ozarkense* W.W. Ashe – K, S, Y, Z]

**Viburnum cassinoides** Ashe, Carolina Arrowwood. Mt (GA, NC, SC?, VA?). Pd (NC): moist to dry forests, rock outcrops, streambanks; uncommon. April; September. Sw. NC and adjacent GA and TN: remainder of distribution unclear at this time. [=? *V. dentatum* Linnaeus var. *decom* (Rehder) Fernand – C, F, G; < *V. dentatum* var. *dentatum* – RAB, K; < *V. dentatum* – GW; < *V. semitomentosum* (Michaux) Rehder – S; > *V. carolinianum* Ashe var. *cismontanum* McAtee – Z; > *V. carolinianum* Ashe var. *carolinianum* – Z]

**Viburnum cassinoides** Linnaeus, Northern Wild Raisin, Withe-rod, Shonny Haw. Mt (GA, NC, SC, VA, WV), Pd (NC, SC), Cps (DE): bogs, moist forests, high elevation forests and outcrops; common (rare in DE). Late May–June; August–October. NL (Newfoundland), ON, and WI south to n. GA and AL. [= RAB, F, G, S, WV, Y; = *V. nudum* Linnaeus var. *cassinoides* (Linnaeus) Torrey & A. Gray – C, K; < *V. nudum* – GW; > *V. cassinoides* var. *cassinoides* – Z; > *V. cassinoides* var. *nitidum* Aiton – Z; > *V. cassinoides* var. *harbisonii* McAtee – Z]

**Viburnum dentatum** Linnaeus var. *dentatum*, Arrowwood. Cps (DE, FL?, NC, SC, VA), Pd (DE, NC, SC, VA), Mt (NC, SC, VA, WV): marshes, streambanks, other moist places; common (rare in WV). Late March–April; July–September. East of the Appalachians, from Se. PA and sw. NJ south to s. SC and ne. GA, with scattered records westward to sw. NC, nw. TN, sw. VA, n. WV, and w. MD. [= C, F, G, K; < *V. dentatum* var. *dentatum* – RAB (also see *V. carolinianum*); < *V. dentatum* – GW, W, WH, WV, Y; < *V. semitomentosum* (Michaux) Rehder – S; > *V. dentatum* – Z]

**Viburnum dentatum** Linnaeus var. *lucidum* Aiton. Mt (GA, NC, SC, VA, WV): marshes, moist forests, streambanks; common. Late March–May; July–September. ME, NY, and OH south to s. SC, c. GA, and ne. AL. [= RAB, C, G; = *V. recognitum* Fernand – F, K, WV; < *V. dentatum* – GW, W; > *V. dentatum* – S, misapplied; > *V. recognitum* var. *lucidum* Aiton – Z; > *V. recognitum* var. *alabamense* McAtee – Z]

**Viburnum dilatatum** Thunberg, Linden Viburnum. Pd (DE, VA), Cps (VA): suburban woodlands; uncommon (rare in VA), native of e. Asia. [= C, K]

**Viburnum lantanoides** Linnaeus, Wayfaring Tree. Mt (WV): widely planted, sometimes escaped or persistent; rare, native of Eurasia. Reported as naturalized as far south as MD (Kartesz 1999) and KY (Weckman et al. 2002). May; September. [= C, F, G, K, Z]


**Viburnum lenta* Linnaeus, Nannyberry, Sheepberry. Mt (VA, WV), Pd (DE): shrubby stream-bottoms, other wetlands and woodland margins; rare. NB and SK south to w. VA, MO, and CO. Reported in the past for NC (see Radford, Ahles, & Bell 1968), from GA (Kartesz 1999), and from AL; these reports all appear to be based on misidentifications. [= RAB, C, F, G, K, S, W, WV, Y, Z]

**Viburnum nudum** Linnaeus, Southern Wild Raisin, Possumhaw. Cps (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA): bogs, blackwater floodplains, seepages; common (rare in Mountains). April–May; August–October. RI, CT, and NY south to e. peninsular FL, west to TX, inland to w. NC, TN, w. KY, and AR. [= RAB, G, S, W, WH, Y, Z; = *V. nudum* var. *nudum* – C, K; > *V. nudum* var. *angustifolium* Torrey & A. Gray – F; < *V. nudum* – GW]

**Viburnum obtusifolium** Walter, Small Leaf Viburnum. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA): marshes, streams, streambanks; common. Late March–May; July–September. ME, NY, and OH south to e. SC, c. GA, and ne. AL. [= RAB, C, G; = *V. recognitum* Fernand – F, K, WV; < *V. dentatum* – GW, W; > *V. dentatum* – S, misapplied; > *V. recognitum* var. *lucidum* Aiton – Z; > *V. recognitum* var. *alabamense* McAtee – Z]

**Viburnum opulus** Linnaeus. Aiton. Mt (VA, WV), Pd (DE, GA, NC, SC, VA, WV), Cps (DE, FL, GA, NC, SC, VA): alluvial forests, other mesic forests; common. March–April; September–October. E. SC south to s. FL, west to s. AL. [= RAB, GW, K, Y, Z; > *V. opulus* var. *opulus* – S; > *V. opulus* var. *roseum* Linnaeus – F, WV, Y; > *V. opulus* var. *glabrescens* Chapman – F, WV]


**Viburnum plicatum** Thunberg, Japanese Snowball, Doublefile Viburnum. Pd (DE, NC), Mt (WV): suburban woodlands; uncommon (rare in NC), native of e. Asia. Also reported as naturalized in various more northern states, including se. and sw. PA (Rhoads & Klein 1993), OH (Cooperrider 1995), MI (Voss 1996), and others. [= C, G, K, Z]


**Viburnum rafinesquianum** J.A. Schulz, Downy Arrow-wood. Mt (GA, NC, SC, VA), Pd (VA, WV): dry-mesic to dry woodlands and forests, especially over mafic rocks (but not at all restricted to such sites); common (uncommon in WV, rare in DE and GA). Mid April–May; June–July. NH, QC and MB south to n. GA, AL, AR, and OK; apparently not yet recorded for SC. [= *V. rafinesquianum* – RAB, K, S, W, WV (orthographic variant); > *V. rafinesquianum* var. *rafinesquianum* – C, F, G, Y; =? *V. affine* Bush ex Schneider var. *hypomalacum* Blake – Z]
Viburnum scabrellum (Torrey & A. Gray) Chapman. Cp (FL, GA, SC): streambanks, marshes, other moist sites; common. A Coastal Plain endemic, ranging from se. GA south to c. peninsular FL, west to e. TX; with scattered collections north to ec. GA (Richmond County), ne. AL (Cherokee County), nw. AL (Lamar County), c. MS, and n. LA. Expected in s AR, but no specimens seen. Specimens of V. dentatum from s. SC show signs of hybridization. Mohr (1901) and some other 19th century authors misapplied the name V. molle to it. <| V. dentatum var. dentatum – RAB; <| V. dentatum var. venosum (Britton) Gleason – G, K; <| V. dentatum – GW, W, WH, Y; <| F. semitomentosum (Michaux) Rehder – S, misapplied; > V. scabrellum (Torrey & Gray) Chapman var. scabrellum – Z; > V. scabrellum var. ashei Bush – Z; = Viburnum dentatum Linnaeus var. scabrellum Torrey & A. Gray]

Viburnum setigerum Hance, Tea Viburnum. Pd (DE, NC): suburban forests, commonly planted horticulturally; uncommon (rare in NC), native of China. Naturalizing at Guilford Courthouse National Military Park (Greensboro, Guilford County, NC) and in Battle Park (Chapel Hill, Orange County, NC), and elsewhere in our area. Also naturalizing in KY (Weckman et al. 2002). [= K]


Viburnum macrocephalum Fortune, Chinese Snowball. Mt (NC): suburban areas near plantings; rare, native of China. Reported as naturalized in the mountains of NC (Pitillo 2003. pers. comm.). [investigate]

Viburnum molle Michaux. Limestone areas. Scattered, discontinuous range (but locally may occur in several contiguous counties) from sw. OH, nc. IN, wc. IL, and sc. IA south to sc. TN, nw. AR; disjunct in sw. IA. [= C, F, G, K, Y, Z]

406a. DIERVILLACEAE (Rafinesque) Pyck 1998 (Bush-honeysuckle Family) [in DIPSACALES]

Various segregate families (or reassignments) of taxa traditionally placed in the Caprifoliaceae have been proposed, including the transfer of Sambucus and Viburnum to the Adoxaceae, placement of Diervilia and Weigela in the Diervillaceae (Backlund & Pyck 1998), placement of Abelia and Linnaea in the Linnaeaceae (Backlund & Pyck 1998, Pyck et al. 2002), and retention of Lonicera, Symphoricarpos, and Triosteum in a much more narrowly circumscribed Caprifoliaceae. Alternatively, all these taxa could be included in the Caprifoliaceae, along with Dipsaceae and Valerianaceae, as a broadly circumscribed Caprifoliaceae. References: Backlund & Pyck (1998); Pyck et al. (2002); Ferguson (1966a).

**Diervilla P. Miller (Bush-honeysuckle)**


1 Petioles 5-8 mm long; leaves ciliate on the margins; twig terete in cross-section; [of the Mountains of VA and n. NC, south to Buncombe and McDowell counties, NC].................................................................................................................................D. lonicera

2 Petioles 0.5 mm long; leaves not ciliate; twig more-or-less square in cross-section; [of the Mountains of SC and s. NC, north to Mitchell and Yancey cos., NC].

2 Branchlets, leaves, pedicels, and calyx densely pubescent; sepal lobes < 2 mm long ............................................................................................................................D. rivularis

2 Branchlets, leaves, pedicels, and calyx glabrous, except for hairs on the twig angles; sepal lobes 2-3 mm long .......................D. sessilifolia

Diervilla lonicera P. Miller, Northern Bush-honeysuckle. Mt (GA?, NC, VA, WV), Pd (DE), {DC, MD, NJ?, TN, WV}: rock outcrops and ridges at high elevations; uncommon (rare in DE). June-July; August-October. NL (Newfoundland) west to SK, south to w. NC, e. TN, IN, and IA. Reported for GA (GANHP). [= RAB, C, G, K, S, W, WV, Y, Z; > D. lonicera var. lonicera – F; > D. lonicera var. hypomaicala Fernald – F]

Diervilla rivularis Gattinger, Hairy Southern Bush-honeysuckle. Mt (GA, NC), {AL, TN}: rock outcrops, ridges, and streambanks at moderate to high elevations; rare (NC Rare). June-August; August-October. W. NC (Yancey County) and e. TN south to nw. GA (Jones & Coile 1988) and ne. AL. [= K, S, Y, Z; = D. sessilifolia Buckley var. rivularis (Gattinger) Atkes – RAB, W]

Diervilla sessilifolia Buckley, Smooth Southern Bush-honeysuckle. Mt (GA, NC, SC), {AL, TN}: rock outcrops, ridges, landslide scars, trail margins, other rocky open places, streambanks, at moderate to high elevations; uncommon. June-August; August-October. Sw. NC and e. TN south to nw. SC, ne. GA, and ne. AL. [= F, K, S, Y, Z; = D. sessilifolia Buckley var. sessilifolia – RAB, W]
406b. CAPRIFOLIACEAE A.L. de Jussieu 1789 (Honeysuckle Family) [in DIPSAECES]

As here circumscribed, a family of about 5 genera and 220 species, shrubs, trees, and less typically herbs and vines, mainly north temperate and boreal. Circumscription of the family is controversial. Various segregate families (or reassignments) of taxa traditionally placed in the Caprifoliaceae have been proposed, including the transfer of *Sambucus* and *Viburnum* to the Adoxaceae, placement of *Dierverilla* and *Weigela* in the Dierverillaceae (Backlund & Pyck 1998), placement of *Abelia* and *Linnaea* in the Linnaeaceae (Backlund & Pyck 1998), and retention of *Lonicera*, *Symphoricarpus*, and *Triosteum* in a much more narrowly circumscribed Caprifoliaceae. Alternatively, all these taxa could be included in the Caprifoliaceae, along with Dipsacaceae and Valerianaceae, as a very broadly circumscribed Caprifoliaceae (APG III 2009). References: Backlund & Pyck (1998); Ferguson (1966a). [also see ADOXACEAE, DIERVILLACEAE, AND LINNAEACEAE]

1 Erect herb. .................................................. Triosteum
1 Shrubs or woody lianas.

2 Corolla usually > 10 mm long, bilaterally symmetrical; ovary 2-3-locular. .......................................................... Lonicera
2 Corolla 3-8 mm long, radially symmetrical or nearly so; ovary 4-locular .......................................................... Symphoricarpus

A genus of about 180 species, shrubs and vines, mainly north temperate. References: Ferguson (1966a)=Z; Rehder (1903)=Y; Green (1966).

1 Flowers in opposite 3-flowered cymules, borne in terminal clusters subtended by connate leaves; corolla red and yellow (or yellowish-orange only); twining vine or shrub with vining tendencies (in *L. flava* the "vininess' sometimes not apparent).
2 Corolla tube (20-) 30-50 mm long; corolla lobes 4-8 mm long, more or less radially symmetrical; [of a wide variety of habitats, primarily in the Piedmont and Coastal Plain].......................................................... L. sempervirens
2 Corolla tube 10-35 mm long; corolla lobes 8-15 mm long, unequally divided into 2 lips (4 lobes on the upper side and one lobe on the lower side); [of ridgetops, rocky slopes, granite domes, and bogs of the Mountains, or of areas to the north or west of the primary area].
3 Leaves pubescent on the upper surface; [of moist forests, south to PA] .......................................................... L. hirsuta
3 Leaves glabrous on the upper surface.

4 Fused leaves immediately below the inflorescence glaucous on the upper surface, rounded or emarginate; [of c. TN and other areas west and north of our primary area] .......................................................... L. reticulata
4 Fused leaves immediately below the inflorescence green on the upper surface, pointed to mucronate.
5 Corolla tube 30-35 mm long; leaves gray beneath; [of soil mats on dome outcrops of s. NC, SC, and GA and westward].... L. flava
5 Corolla tube 15-25 mm long; leaves strongly white-glaucous beneath; [of rocky forests, ridgetops, and bogs of n. NC, VA, and northward] .......................................................... L. dioica

1 Flowers in peduncled pairs in the axils of leaves, not subtended by connate leaves; corolla white to pastel pink or yellow; plant an erect shrub or (*L. japonica*) a trailing or climbing vine.
6 Trailing or climbing vine; corolla 30-50 mm long; fruit black at maturity; leaves of vigorous shoots often pinnately lobed........ L. japonica
6 Upright shrub; corolla 7-25 mm long; fruit red or yellow at maturity; leaves unlobed.

8 Corolla lobes 5, nearly equal; ovaries separate, divergent; [native species of cool moist forests and bogs] ............... L. canadensis
8 Corolla lobes fused into a 4-lobed lip and a 1-lobed lip; ovaries fused; [exotic species].
9 Branches glabrous; corolla glabrous on the exterior .......................................................... L. fragrantissima
9 Branches retrorsely hispid with reddish-brown hairs; corolla pilose on the exterior............................................. L. standishii

7 Branches hollow between the nodes, with tannish pith; [exotic species, many of them seriously invasive and likely to be encountered in natural areas].
10 Peduncles shorter than or equal to the subtending petiole; leaves ovate (broadest near the base) and distinctly long-acuminate.............. L. maackii
10 Peduncles longer than the subtending petiole; leaves elongate (broadest near the middle) and obtuse to acute (rarely short-acuminate).

11 Leaves glabrous; peduncles 15-25 mm long. .......................................................... L. tatarica
11 Leaves pubescent, at least on the lower surface; peduncles 5-15 mm long.

12 Corolla pink (aging to yellow), nearly glabrous on the exterior, barely bulging on one side at the base; leaves thinly pubescent beneath .......................................................... L. ×bella
12 Corolla white (aging to yellow), pubescent on the exterior, distinctly bulging on one side at the base; leaves rather densely grayish-pubescent beneath.
13 Bracts and sepals ciliate, not glandular; ovary lacking glands; leaf blades broadest at or below the middle ........ L. morrowii
13 Bracts and sepals glandular; ovary glandular; leaf blades broadest beyond the middle............................................ L. xylostereum


**Lonicera dioica** Linnaeus. Seeages, bogs, rocky woods, shrubby mountain bogs at high elevations, rocky ridgetop thickets over amphibolite. June-August; August-September. MA and QC west to WI, south to NJ, NC, and IN. Varieties or species have sometimes been maintained based on minor variation of pubescence; it is unlikely that these are taxonomically meaningful. Var. orientalis has the lower leaf surfaces, hypanthium, and style hairy (vs. glabrous or nearly so in var. dioica). [= RAB, K, W, WV; > L. dioica var. dioica – C, F, G, Z; > L. dioica Linnaeus var. orientalis Gleason – C, G; > L. dioica var. glaucescens (Rydberg) Butters – F, Z; > L. dioica – S, Y; > L. glaucescens (Rydberg) Rydberg – S, Y]


**Lonicera fragrantissima** Lindley & Paxton, Sweet-breath-of-spring. Forests, woodlands, old house sites; native of China. February-early April; April-May. [= RAB, K, Y, Z; = Xylosteon fragrantissimum (Lindley & Paxton) Small – S]

**Lonicera hirsuta** Eaton, Hairy Honeysuckle. QC west to MB, south to c. PA (Rhoads & Klein 1993) and MN. [= F, K, Y; > L. hirsuta var. interior Gleason – C] {rejected; keyed; not mapped}


**Lonicera maackii** (Ruprecht) Maximowicz, Amur Honeysuckle. Suburban woodlands, moist forests, fencerows; native of e. Asia (Korea, China, Japan). May-June. This is one of worst “shrub-weeds”, aggressively invasive in various parts of eastern North America, as in the vicinity of DC and in calcareous substrate parts of the interior South. [= C, K, Y, Z]

**Lonicera ×minutiflora** Zabel [of complex hybrid origin, apparently involving *L. morrowii*, *L. tatarica*, and *L. xylosteum*]. Suburban areas, disturbed areas. Known from KY and other states in e. North America (Clark et al. 2005). [= K] {not yet keyed}


**Lonicera reticulata** Rafinesque. {habitats}. NY west to WI, south to TN and AR. In nc. TN (Davidson County) (Chester, Wofford, & Kral 1997; Wofford & Chester 2002). [= K; > L. prolifera (G. Kirchner) Booth ex Rehder var. prolifera – C, G; = L. sullivantii A. Gray – Y; = L. prolifera – F, Z]

**Lonicera sempervirens** Linnaeus, Coral Honeysuckle. Dry forests and woodlands, maritime forests. March-July (and sporadically to November); July-September. CT to OK, south to c. peninsular FL and TX; and more widely distributed as an escape from cultivation. Var. hirsutula has sometimes been maintained, differing from var. *sempervirens* in its ciliate leaf margins, pubescent upper leaf surfaces, sometimes glandular hypanthium and stems (vs. glabrous; it is doubtful that these distinctions are taxonomically meaningful. [= RAB, GW, W, WH, WV, Z; > L. sempervirens Linnaeus var. sempervirens – C, G, K, Y; > L. sempervirens Linnaeus var. hirsutula Rehder – F, C, F, G, K, Y; > L. sempervirens var. sempervirens – F; > L. sempervirens var. minor Aiton – F; = Phanenanthus sempervirens (Linnaeus) Rafinesque – S]

**Lonicera standishii** Jacques, Standish's Honeysuckle. Forests, woodlands, old home sites; native of China. Locally abundant and invasive in c. NC (Uwharrie National Forest, Montgomery County, NC). Also reported from KY (Jones 2005), se. PA (Rhoads & Klein 1993), and MD (Kartesz 1999). [= F, K, Y]

**Lonicera tatarica** Linnaeus, Tartarian Honeysuckle. Disturbed forests; native of Central Asia. [= C, F, G, K, WV; > L. tatarica var. tatarica – Y]
CAPRIFOLIACEAE

* Lonicera xylosteum * Linnaeus, European Fly-honeysuckle. Suburban forests, disturbed forests; native of Europe and Asia. Establishing mainly in ne. United States, south to VA, MD (Kartesz 1999), and KY (Clark et al. 2005). [= C, F, G, K; > L. xylosteum var. xylosteum – Y]

Symphoricarpos Duhamel 1755 (Snowberry, Coralberry)

A genus of about 17 species, shrubs, of North America and e. Asia. References: Jones (1940); Ferguson (1966a)=Z.

Corolla 2-4 mm long; fruits pink to purple .......................................................... S. orbiculatus
Corolla 5-9 mm long; fruits white.

Fruit 6-10 (-12) mm in diameter; young twigs puberulent; leaves usually pubescent beneath; shrub usually < 1 m tall; [native] ..........

Fruit 12-20 mm in diameter; young twigs glabrous; leaves usually glabrous beneath; shrub usually 1-2 m tall; [introduced] ..........

Symphoricarpos albus (Linnaeus) Blake var. albus, Common Snowberry. Limestone woodlands. QC west to s. AK, south to w. VA, WV, MI, MN, and CA; the original native distribution somewhat uncertain due to cultivation and escapes. Var. albus is the more eastern variety. [= C, F, G, K, Z; < S. albus – RAB, S, W, WV]


Symphoricarpos occidentalis Hooker, Western Snowberry, Wolfberry. In PA, MD, KY. {investigate} [= F, K] {not yet keyed}

Symphoricarpos orbiculatus Moench, Coralberry. Moist to dry forests, woodlands, thickets, pastures, and old fields, especially over mafic or calcareous rocks. Late July–September; September–November (and often persisting well into winter). CT west to IN, MN, and CO, south to Panhandle FL, TX, and Mexico; the original native distribution somewhat uncertain due to cultivation and escapes. Seemingly increasing in VA and behaving aggressively in dry woodlands and barrens over greenstone and diabase. [= RAB, C, F, G, K, W, WH, WV, Z; = S. symphoricarpos (Linnaeus) MacM. – S]

Triosteum Linnaeus 1753 (Horse-gentian, Feverwort)

A genus of 6 species, rather woody herbs, of e. Asia (3 species) and e. North America (3 species); the 3 North American species form one clade, the 3 Asian species another (Gould & Donoghue 2000). References: Gould & Donoghue (2000); Ferguson (1966a)=Z.

Longer (nonglandular) hairs of the stem 1.5-3 mm long; corolla greenish-yellow; leaves 1.5-6 cm wide.

Lower leaf surface glabrous or pubescent only along the main veins; leaves averaging 4× as long as wide .................................................. T. angustifolium var. angustifolium

Lower leaf surface densely puberulent; leaves averaging 2× as long as wide .................................................. T. angustifolium var. eamesii

Longer (nonglandular) hairs of the stem 0-1.5 mm long (or with a very few longer hairs); leaves 4-15 cm wide; corolla greenish-yellow to purple.

Most the stem hairs 1-2 mm long, mostly not gland-tipped; leaves predominantly not connate (or if 1-3 pairs connate, then only 1-2 cm wide at the joined base); style equaling or slightly shorter than the corolla (rarely exserted) ...................... T. aurantiacum var. aurantiacum

Most the stem hairs 0-0.5 mm long (sometimes with a few scattered longer hairs), gland-tipped; leaves predominantly connate-perfoliate, the joined base 3-9 cm wide; style exserted beyond the corolla.......................................................... T. perfoliatum

Triosteum angustifolium Linnaeus var. angustifolium, Smooth Lesser Horse-gentian. Cp (DE, Pd (DE), Mt (WV), {Pd (NC, VA)}, Mt (GA, VA), Cp (VA)); distributional and habitat information needed for two varieties} (GA Rare). April-May; July-August. CT west to ON and MO, south to NC, nw. GA (Jones & Coile 1988), AL, and LA. [= C, F, G; < T. angustifolium – RAB, K, S, W, WV, Z]

Triosteum angustifolium Linnaeus var. eamesii Wiegand, Hairy Lesser Horse-gentian. {Pd (NC, VA), Mt (VA), WV?}; distributional and habitat information needed for two varieties. April-May; July-August. CT and NJ south to NC. [= C, F, G; < T. angustifolium – RAB, K, S, W, Z]

Triosteum aurantiacum Bicknell var. aurantiacum. Mt (GA?, NC, SC, CA, WV), Pd (DE, NC, VA); woodlands and forests in circumneutral soils, particularly those over mafic or calcareous rocks; uncommon (rare in DE, GA, and NC). Late May–early June; August–October. QC west to MN, south to GA, KY, and OK; other varieties are more restricted and midwestern or northern in distribution. [= C, F, K; < T. aurantiacum – RAB, S, W, WV, Z; < T. perfoliatum Linnaeus var. aurantiacum (Bicknell) Wiegand – G]
**Triosteum perfoliatum** Linnaeus, Perfoliate Horse-gentian. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, VA): woodlands and forests in circumneutral soils, particularly those over mafic or calcareous rocks; uncommon (rare in DE). Late May-early June; August-October. MA west to MN, south to SC, GA (Jones & Coile 1988), and OK. [= RAB, C, F, K, S, W, WV, Z; = T. perfoliatum var. perfoliatum – G]

406c. **LINNAEACEAE** (Rafinesque) A. Backlund 1998 (Twinflower Family) [in DIPSACALES]

A family of 5 genera and about 35 species, shrubs and suffrutescent herbs. Various segregate families (or reassignments) of taxa traditionally placed in the Caprifoliaceae have been proposed, including the transfer of *Sambucus* and *Viburnum* to the Adoxaceae, placement of *Diervilla* and *Weigela* in the Diervillaceae (Backlund & Pyck 1998), placement of *Abelia*, *Linnaea*, and *Kolkwitzia* in the Linnaeaceae (Backlund & Pyck 1998), and retention of *Lonicera*, *Symphoricarpos*, and *Triosteum* in a much more narrowly circumscribed Caprifoliaceae. Alternatively, all these taxa could be included in the Caprifoliaceae, along with *Dipsacaceae* and *Valerianaceae*, as a very broadly circumscribed Caprifoliaceae. References: Backlund & Pyck (1998).

1 Trailing shrubby herb; [native] .................................................................................................................................................................... Linnaea

1 Upright shrub; [planted and persistent or weakly naturalizing].

2 Sepals oblanceolate, the larger > 1 mm wide; fruit and ovaries free, not hirsute ................................................................. Abelia

2 Sepals lanceolate to linear, < 1 mm wide; fruit and ovaries fused in pairs, densely hirsute ......................................................... Kolkwitzia

**Abelia** R. Brown, Abelia

A genus of about 30 species, shrubs, primarily of s. and e. Asia.

* Abelia ×grandiflora (André) Rehder [chinensis × uniflora], Abelia. Cp (AL, FL, NC): suburban thickets; commonly planted in our area; sometimes persistent or rarely weakly naturalizing, the parent species native of China. Reported for AL (Diamond & Woods 2009). [= K, WH]

**Kolkwitzia** Graebner (Beautybush)

A monotypic genus, a shrub, of c. China.

* Kolkwitzia amabilis. Beautybush. Mt (NC) {KY}: disturbed areas; planted as an ornamental shrub, rarely naturalized from plantings, native of c. China. [= K]

**Linnaea** Linnaeus (Twinflower)

A monotypic genus, a trailing weak shrub, circumboreal.

* Linnaea borealis Linnaeus ssp. americana (Forbes) Hultén ex Clausen, American Twinflower. Mt (MD, TN, WV): northern hardwoods; rare. Greenland, NL (Labrador), and AK south to WV, IN, IL, IA, NM, AZ, and CA; disjunct in e. TN. *L. borealis* is documented by an early specimen (1892) from Sevier County, TN, presumably from the Great Smoky Mountains; the TN population (not seen since) is disjunct from e. WV and w. MD. [= K; = L. borealis var. longiflora Torrey – C, G; = L. borealis var. americana (Forbes) Rehder – F; < L. borealis – W; = L. americana Forbes; = L. borealis ssp. longiflora (Torrey) Hultén]

406d. **DIPSACACEAE** A.L. de Jussieu 1789 (Teasel Family) [in DIPSACALES]

A family of about 11 genera and 300 species, herbs and shrubs, of Eurasia and Africa.

1 Stem prickly .................................................................................................................................................................................. Dipsacus

1 Stem not prickly ................................................................................................................................................................................. Knautia

**Dipsacus** Linnaeus (Teasel)
DIPSACACEAE

A genus of about 15 species, herbs, of Eurasia. *Dipsacus* begins flowering about halfway up the head, the flowers then opening sequentially toward both the base and the tip of the inflorescence. References: Ferguson (1965)=Z; Ferguson & Brizicky (1965); Stace (2010).

1. Principal cauline leaves laciniate-pinnatifid, cut at least halfway to the midrib; stems to 3 (-4) m tall ......................... *D. laciniatus*
2. Bracts on the receptacle with straight apical spines, these stiff but flexible; bracts of the involucre curved upward ............ *D. fullonum*
3. Bracts on the receptacle with recurved apical spines, these rigid; bracts of the involucre spreading more or less horizontally....... *D. sativus*

* Dipsacus fullonum *Linnaeus, Wild Teasel, Common Teasel. Mt (GA, NC, VA, WV), Pd (VA), Cp (DE, VA): roadsides, pastures, disturbed areas; common (rare in DE and NC, rare in VA Coastal Plain), native of Europe. July-September; September-October. Recently discovered for GA in Floyd County (T. Govus, pers. comm. 2009). The inflorescences are frequently collected for crafts and dried arrangements. [= K, W, Z; = D. sylvestris (Hudson) Clapham]

* Dipsacus laciniatus *Linnaeus, Cutleaf Teasel. Mt (VA, WV), Pd (VA): disturbed areas; uncommon, native of Europe. July-September; September-October. [= C, F, G, K, WV, Z]

* Dipsacus sativus *Linnaeus, Fuller's Teasel. Mt (VA): disturbed areas; rare, native of Europe. July-September; September-October; September-October. I am here following Ferguson (1965), Ferguson & Brizicky (1965), and Stace (2010) in their determination that *D. sativus* is the correct name to apply to this plant. The occurrence of this species in our area is implied in various sources; I have not seen specimens. The dried inflorescences were used in the past for fulling cloth (raising the nap). [= K, Z; = D. fullonum – C, F, G, misapplied]

**Knautia** *Linnaeus*

A genus of about 60 species, herbs, of Europe, w. Asia, and n. Africa.

* Knautia arvensis *Linnaeus* Coulter, Blue Buttons. Mt (WV): dry areas, pastures, other disturbed areas; rare, native of Europe. June-September. Naturalized south at least to s. PA (Rhoads & Klein 1993), MD (Kartesz 1999), and WV (Harmon, Ford-Werntz, & Grafton 2006). [= C, F, G, K; = Scabiosa arvensis *Linnaeus]*

406e. VALERIANACEAE Batsch 1802 (Valerian Family) [in DIPSACALES]

A family of about 10 genera and 300-350 species, herbs (rarely shrubs), nearly cosmopolitan in distribution. References: Bell (2004); Ferguson (1965).

1. Stem leaves divided into 3-21 segments .................................................................................................................................................... *Valeriana*
2. Stem leaves simple .................................................................................................................................................................................. *Valerianella*

* Valeriana* *Linnaeus 1753* (Valerian)

A genus of about 200 species, herbs and shrubs, of temperate North America and Eurasia, s. Africa, and Andean South America.

1. Corolla tube 12-16 mm long; stem leaves pinnately divided into 3-7 segments; [native, of VA and TN northward]......................... *V. pauciflora*
2. Corolla tube 1.5-4 mm long; stem leaves divided either into 3 segments or into 11-21 segments.
3. Upright perennial herb; stem leaves divided into 11-21 segments; corolla tube 3-4 mm long; [alien, grown as an ornamental and casually escaped]................................................................. *V. officinalis*
4. Scandent vine; stem leaves divided into 3 segments; corolla tube 1.5-2 mm long; [native, of FL]................................................................. *V. scandens*

* Valeriana officinalis *Linnaeus, Garden-heliotrope. Mt (WV): cultivated and rarely escaped; rare, native of Europe. Sometimes cultivated in our area; it may escape or persist. May-August. [= C, F, G, K]

* Valeriana pauciflora *Michaux, Pink Valerian, Long-tube Valerian. Pd (VA, WV): very nutrient-rich alluvium in floodplain forests; uncommon (rare in VA). May; June. MD, se. PA, and sw. PA, west to s. IL, south to n. VA, sc. TN, KY, and MO. [= C, F, G, K, W, WV]


* Valerianella* *P. Miller 1754* (Corn-salad)

A genus of about 50 species, herbs, of temperate North America, Eurasia, and n. Africa. References: Ware (1983)=Z.

Identification notes: *Valerianella* species exhibit an interesting set of fruit polymorphisms; the fruit forms in a single species are often strikingly different, and these forms were traditionally regarded as separate taxa. Ware (1983) demonstrated that they were under simple genetic control,
and that different fruit forms were found in the same population. Thus, some taxa previously considered distinct are best considered mere fruit types. The fruit consists of three locules, one of which is fertile and dorsal to or more-or-less flanked by the two sterile locules. The sterile locules may be elongate, forming (between them) a groove, or they may be expanded laterally well beyond the width of the fertile locule into flattened or bulbous wings. In *V. locusta*, there is additionally a corky mass on the side of the fertile locule opposite the two sterile locules.

1 Fruit greatly thickened by a corky mass on the back of the fertile locule; corolla pale blue (or white) ......................................................... *V. locusta*

1 Fruit lacking a corky mass on the back of the fertile locule; corolla white.

2 Fertile locule much wider than the combined width of the 2 sterile locules; fruit sharply triangular in ×-section .................. *V. chenopodiifolia*

2 Fertile locule slightly wider or narrower than the combined width of the 2 sterile locules; fruit not sharply triangular in ×-section.

3 Corolla 1.5-2 mm long, the corolla lobes 0.4-0.8 mm long.............................................. *V. radiata*

3 Corolla 3-5 mm long, the corolla lobes 1-2 mm long.................................................. *V. umbilicata*

**Valerianella chenopodiifolia** (Pursh) A.P. de Candolle. Mt (VA, WV): moist forests, bottomlands; common (rare in VA). S, ON west to WI, south to MD, PA, WV, sw. VA, IN, and IL. [= K; = *V. chenopodiifolia* – C, F, G, WV, orthographic variant]


* Valerianella umbilicata* (Suffivant) Wood. Pd (NC, VA), Mt (NC, VA, WV), Cp (VA), {SC?}; moist forests, bottomlands, disturbed areas; rare. S, NY west to IL, south to NC and sc. TN (Chester, Wofford, & Kral 1997). Ware (1983) raises the question of whether *V. woodsiiana* is a distinct taxon; further study is needed. [= Z; < *V. umbilicata* – RAB, C, WV; > *V. umbilicata* – F, G; > *V. patelaria* (Suffivant ex A. Gray) Wood – F, S; > *V. intermedia* Dyal – F; > *V. radiata* var. *intermedia* (Dyal) Gleason – G]

* Valerianella dentata* (Linnaeus) Pollich. Reported as naturalized in central TN by Kral (1981) and Chester et al. (1997), in nc. GA (Jones & Coe 1988), and in AL (Kartesz 1999). [= K] {not yet keyed; synonymy incomplete}

* Valerianella woodsiiana* (Torrey & A. Gray) Walpers. Cp (NC, SC, VA), Pd (SC): bottomlands; rare. {distribution} [= K, S, Z] {not yet keyed; add to synonymy}

**410. PITOSPORACEAE** R. Brown 1814 (Pittosporum Family) [in APIALES]


**Pittosporum** Banks ex Solander (Pittosporum)

A genus of about 100-150 species, trees and shrubs, of tropical and warm temperate Old World. References: Judd (1996)=Z.

* Pittosporum tobiira* (Thunberg) Aiton f., Japanese Pittosporum, Australian Laurel. Cp (FL, GA?, NC, SC?): frequently planted on barrier islands, at least persisting and apparently naturalizing; rare, native of Japan and China. Various cultivars are seen, including ones with variegated leaves. This species is one of the more common landscaping plants used on developed barrier islands. The revolute, obovate leaves are characteristic. [= K, WH, Z]

**411. ARALIACEAE** A.L. de Jussieu 1789 (Ginseng Family) [in APIALES]

A family of about 47 genera and 1325 species, trees, shrubs, vines, and rarely herbs, mainly tropical in distribution. *Hydrocotyle* is more closely related to Araliaceae than to Apiaceae, and is transferred here (Chandler & Plunkett 2003). References: Frodin & Govaerts (2003); Graham (1966); Smith (1944).
Aralia Linnaeus 1753 (Aralia)

A genus of about 30-70 species, herbs, shrubs, vines, and trees, primarily of e. North America, e. Asia, and se. Asia. Wen (1998) has suggested that *A. nudicaulis* may need to be removed from the genus *Aralia* in order to maintain both *Aralia* and *Panax* as monophyletic genera. References: Smith (1982)=Z; Moore, Glenn, & Ma (2009)=V; Wen et al. (1998); Wen (1993); Wen (1998); Smith (1944)=Y; Frodin & Govaerts (2003)=X.

1 Plant a shrub, with prickles; fruit black ................................................................. [Eleutherococcus]
1 Plant an herb, lacking prickles; fruit red or yellow ................................................... *Panax*

6 Plant a shrub, with prickles; fruit black ................................................................. [Eleutherococcus]
6 Plant an herb, lacking prickles; fruit red or yellow ................................................... *Panax*

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*Aralia elata* (Miquel) Seemann, Japanese Angelica-tree. Pd (DE): suburban woodlands; uncommon. Naturalizing in ne. North America at least as far south as NJ, DE, se. PA, and DC (likely to be present in MD). See Moore, Glenn, & Ma (2009) for detailed information on this alien species and its naturalization in the northeastern United States. [= K, V]

*Aralia hispida* Ventenat, Bristly Sarsaparilla. Mt (NC?, VA, WV, ): rocky woodlands, cliffs, and clearings, primarily over acidic rocks (such as quartzite, granite, and sandstone); rare. June-August. NL (Labrador) and NL (Newfoundland) west to MB, south to w. VA, w. NC (?), WV, OH, IN, IL, and MN. This species appears to be strongly dependent on disturbance, such as fire, appearing in great numbers following fire where previously rare or apparently absent. F and Y credit this species to w. NC; the documentation is not known to me, and the species was not treated by RAB. Doug Rayner (pers. com. 2002) reports a site record of it in Polk County, NC. [= C, F, G, K, S, W, X, Y, Z]

*Aralia nudicaulis* Linnaeus, Wild Sarsaparilla. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA): upland forests and woodlands, rocky places, most typically in rather dry places, such as ridgetop forests; common (uncommon in Piedmont south of DE, rare in Coastal Plain south of DE, rare in GA). May-July. NL (Labrador) and NL (Newfoundland) west to BC, south to e. VA, e. NC, ne. GA, w. TN, IL, MO, NE, CO, and ID. [= RAB, C, F, G, K, S, W, X, Y, Z]

*Aralia racemosa* Linnaeus, Spikenard, Hungry-root. Mt (GA, NC, SC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA): rich woodlands, trail margins and roadsides; uncommon (rare in Coastal Plain, locally common in Mountains of far sw. VA). June-August. NB and QC west to MN and SD, south to NC, n. GA, AL, MS, MO, and e. KS. The related *A. bicornata* Woolton & Standley (sometimes treated as a subspecies of *A. racemosa*) occurs in AZ, NM, TX, and n. Mexico. [= RAB, C, F, G, S, W, X, Y, Z; *A. racemosa* ssp. racemosa – K]


**Eleutherococcus** Maximowicz 1859 (Fiveleaf Aralia)


* *Eleutherococcus sieboldianus* (Makino) Koidz., Fiveleaf Aralia. Mt (WV): disturbed areas; rare, native to e. Asia. Reported as introduced and apparently naturalized in Randolph County, WV, scattered locations in PA (Rhoads & Klein 1993), OH, and n. KY (Clark et al. 2005). [= Z; *Eleutherococcus pentaphyllus* (Siebold & Zuccarini) Nakai – K, misapplied; = Acanthopanax sieboldianus Makino]

**Hedera** Linnaeus 1753 (Ivy)


**Identification notes:** The leaves of *Hedera* are dimorphic, sometimes confusing observers; ”juvenile” leaves (those of the sterile branches) are about as wide as long and (in *H. helix*) palmately 3-5-lobed, those of the fertile branches (less commonly seen) are obovate or elliptic.

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**ARALIACEAE**

991
1 Trichomes scale-like, 0.1-0.4 mm, those on the leaves, petioles, and young stems with rays fused basally for 1/4 to 1/2 their length; juvenile leaves orbicular, little or not at all lobed, the larger 15-25 cm wide. ........................................................................................................ H. colchica

1 Trichomes stellate, 0.5-1.0 mm, those on the leaves, petioles, and young stems with rays fused basally for < 1/8 their length; juvenile leaves slightly to deeply lobed, the larger 5-15 cm wide.

2 Hairs of young stems, leaves, and petioles whitish, the rays erect (at a right angle to the leaf surface); juvenile leaves usually < 8 cm wide, usually dark green and often also marbled with white, often lobed > 1/2 the way to the base; [often strongly climbing] .... H. helix var. helix

2 Hairs of young stems, leaves, and petioles yellowish-brown to rusty-brown, the rays not erect (parallel to the leaf surface); juvenile leaves often > 8 cm wide, usually medium green (rarely also marbled with white), usually lobed < 1/2 the way to the base; [usually not climbing] .... H. hibernica

Hydrocotyle Linnaeus 1753 (Water-pennywort)

A genus of about 130 species, herbs, cosmopolitan (especially Australia). Molecular analyses have clarified that the affinities of Hydrocotyle lie with the Araliaceae rather than the Apiaceae (Downie et al. 1998; Chandler & Plunkett 2004). References: Mathius & Constance (1945)=MC;

1 Leaves petate, lacking a sinus extending to the attachment of the petiole.

2 Inflorescence umbellate; leaves 1-4 (~7) cm wide. ........................................................................................................ H. umbellata

2 Inflorescence verticillate or umbellate-verticillate (when first developing sometimes appearing merely umbellate); leaves 1-15 cm wide.

3 Inflorescence compound, the main inflorescence axis with nodes which produce verticels or umbels of pedicellate flowers, the inflorescence nodes also producing branches which themselves produce verticels or umbels of flowers; leaves (1-) 4-15 cm wide .......... H. bonariensis

3 Inflorescence verticillate, all the flowers borne sessile or on pedicels on the unbranched inflorescence axis; leaves 1-6 cm wide.

4 Flowers and fruits pedicellate, the pedicels 1-10 mm long. ...................................................................................................... H. prolifera

4 Flowers and fruits sessile or subsessile .................................................................................................................................... H. verticillata

1 Leaves not petate, a sinus extending to the attachment of the petiole.

5 Central leaf lobe notably more distinct than the other lobes (the sinuses on either side extending 1/3 to 3/4 of the way to the petiolar attachment); stems and petioles fleshy. ................................................................. H. ranunculoides

5 Central leaf lobe not more distinct than the other lobes (the sinuses on either side extending 1/10 to 1/4 the way to the petiolar attachment); stems and petioles filiform.

6 Fruiting umbels on peduncles 1-3 mm long; leaves 10-50 mm wide; [native of bogs, spray cliffs, and other wetlands] ...... H. americana

6 Fruiting umbels on peduncles 9-24 mm long; leaves 5-30 mm wide; [alien of lawns and other disturbed habitats].

7 Leaves 5-lobed, 15-30 mm wide ................................................................. H. bowlsiooides

7 Leaves 7-lobed, 5-13 mm wide .................................................................................................................. H. sibthorpioides


* Hydrocotyle bonariensis Lamarck, Dune Water-pennywort. Cp (FL, GA, NC, SC, VA): beaches, dunes, and moist sandy areas; uncommon (rare in VA). April-September. Widespread in South and Central America, north in North America to the Southeastern Coastal Plain, se. VA to s. FL and TX. [= RAB, GW, K, MC, S, WH]


**Kalopanax** Miquel 1863 (Castor Aralia)


**Panax** Linnaeus 1753 (Ginseng)


1 Leaflets (3-) 5, petiolulate, the petiolules (0.7-) 1-2.5 cm long; larger leaflets 6-15 cm long, 3.5-7 cm wide, mostly about 2× as long as wide, the apex acuminate; fruit bright red when ripe ........................................................................................................................................................................P. quinquefolius
2 Leaflets 3 (-5), sessile or subsessile; larger leaflets 4-8 cm long, 0.5-2.5 cm wide, mostly about 3× as long as wide, the apex obtuse to acute; fruit yellow-green when ripe ........................................................................................................................................................................P. trifolius

**Panax quinquefolius** Linnaeus, Ginseng, Sang, American Ginseng. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, VA): cove forests, mesic hardwood forests, generally in nutrient-rich forests though tending to avoid the richest coves; uncommon (rare in DE). May-June; August-October. QC west to MN and SD, south to e. VA, e. NC, nc. SC, GA, c. AL, LA, and OK. *P. quinquefolius* is gathered in quantity throughout its range for the herbal trade; most of the North American harvest is shipped to China, where it is prized for medicinal uses. Dried roots command prices in excess of $1000 per kilogram; in our area, "sang" is a multimillion dollar industry. Formerly abundant and occurring in large populations, *P. quinquefolius* has been reduced in most of its range to small populations of scattered individuals, a classic example of a "predator-prey" relationship. Collection and trade in ginseng is monitored and regulated in most states. In NC, it is illegal for ginseng dealers to buy ginseng from collectors before September; this allows the plants to mature fruits prior to collection. Schlessman (1985) discusses the floral biology of *P. quinquefolius*. [= F, K, W, WV, Y, Z; = P. quinquefolium – RAB, C, G, S, orthographic variant]

**Panax trifolius** Linnaeus, Dwarf Ginseng. Mt (GA, NC, VA), Pd (DE, NC, VA), Cp (DE, VA): cove forests, bottomland forests, other nutrient-rich forests; uncommon (rare south of VA). April-June; August-October. NS and QC west to MN, south to PA, e. VA, c. NC, nc. GA, ec. TN, IN, and IA. [= F, K, W, WV, Y, Z; = P. trifolium – RAB, C, G, S, orthographic variant]

**Tetrapanax** (K. Koch) K. Koch 1859 (Ricepaper-plant)

A monotypic genus, a robust herb or shrub, of China.


**UMBELLIFERAE** A.L. de Jussieu 1789 (Carrot Family) [in APIALES]

A family of about 445 genera and about 3540 species of herbs (rarely shrubs or trees), cosmopolitan, but especially north temperate. *Hydrocotyle* is more closely related to Araliaceae, and has been transferred there (Chandler & Plunkett 2004). References: Mathias & Constance (1945) = MC. [also see ARALIACEAE]

[only a small fragment of the key to genera complete at this time]

1 Fruits (partly to fully mature) with thin-edged wings; flowers yellow, maroon, or white; central flower of each umbellet stamine and pedicelled; fruits all pedicelled in all umbellets............................................................................................................................................................................... *Thaspium*
APIACEAE

Aegopodium Linnaeus 1753 (Goutweed)

A genus of 5-7 species, perennial herbs, of temperate Eurasia. References: Mathias & Constance (1945)=MC.

*Aegopodium podagraria* Linnaeus, Goutweed. Mt (GA, NC, VA, WV), Pd (DE, GA, NC, VA), Cp (DE, SC, VA): disturbed areas; rare, native of Europe. The cultivated forms encountered in our area are usually those with white-margined or variegated leaves. [= C, F, K, MC; > *A. podagraria* var. podagraria – RAB, G; > *A. podagraria* var. variegatum L.H. Bailey – RAB, G]

Aethusa Linnaeus 1753


*Aethusa cynapium* Linnaeus, Fool's-parsley. Cp (DE), Pd (DE), Mt (WV): disturbed areas; uncommon, native of Eurasia. Introduced and naturalized in ne. United States, at least as far south as se. PA (Rhoads & Klein 1993), DE, and Pocahontas County, WV. In Europe, several subspecies are often recognized; it is not known how these entities relate to material naturalized in North America and for now we treat the species broadly. [= C, F, G, K, MC, WV; > *A. cynapium* ssp. agrestis (Wallr.) Dostál – Z; > *A. cynapium* ssp. cynapium – Z; > *A. cynapium* ssp. gigantea (Lejeune) P.D. Sell; > *A. cynapium* ssp. cynapioides (M. Bieb.) Arcangeli – Z]

Ammi Linnaeus 1753 (Bishop's-weed)

A genus of about 4-10 species, annual or biennial herbs, distributed in Mediterranean Europe. References: Mathias & Constance (1945)=MC.

1 Lower leaves with elliptic to narrowly elliptic segments; fruits 1.5-2 mm long; rays 15-60, not rigid and thickened at maturity; bracts not strongly reflexed in fruit ..............................................................................................................................................................

A. majus

1 Lower leaves with filiform segments; fruits 2-2.8 mm long; rays up to 150, rigid and thickened at maturity; bracts strongly reflexed in fruit...

A. visnaga

* Aegopodium podagraria * Linnaeus, Goutweed. Mt (GA, NC, VA, WV), Pd (DE, GA, NC, VA), Cp (DE, SC, VA): disturbed areas; rare, native of Europe. The cultivated forms encountered in our area are usually those with white-margined or variegated leaves. [= C, F, K, MC; > *A. podagraria* var. podagraria – RAB, G; > *A. podagraria* var. variegatum L.H. Bailey – RAB, G]


*Ammoselinum* Torrey & A. Gray 1855 (Sand-parsley)

A genus of 3 species, herbs, of sc. and sw. North America and temperate s. South America. References: Mathias & Constance (1945)=MC.

1 Umbels sessile; fruit glabrous (or slightly roughened) ..............................................................................................................................................................................

A. butleri

1 Umbels pedunculate; fruit roughened with well-developed teeth ..............................................................................................................................................................................

A. popei

*Ami* Linnaeus 1753 (Angelica)

1 Fruits ribbed (with rounded, cordlike ribs), lacking thin-edged wings; flowers yellow; central flower of each umbellet either staminate and pedicelled, or pistillate and sessile; fruits all pedicelled in some umbellets (those with a staminate central flower), or the central fruit sessile in some umbellets (those with a pistillate central flower) ..............................................................................................................................................................................

Zizia

*Ammoselinum popei* Torrey & A. Gray, Pope’s Sand-parsley. Ip (TN): limestone barrens; rare. KS, OK, TX, and NM south to ne. Mexico (Nuevo Léon); disjunct and apparently native in the Nashville Basin of c. TN. [= K, MC]

Anethum Linnaeus 1753 (Dill)

A monotypic genus, an annual herb, apparently native to sw. Asia. References: Mathias & Constance (1945)=MC.

A genus of about 60-110 species, perennial herbs of the northern hemisphere. References: Mathias & Constance (1945)=MC.

1 Larger leaflets 3-6 cm long, 1-2.5 cm wide, obtuse at the apex; umbels either densely pubescent or glabrous; ovary and fruit either pubescent or glabrous; [collectively widespread in our area, in dry to mesic habitats].
2 Umbels pubescent; ovary and fruit hispid; leaf segments coarsely toothed. ................................................................. A. dentata

A genus of about 20 species, herbs, of temperate and subtropical regions, mainly Southern Hemisphere. References: Ronse et al. 1996=Z; Mathias & Constance (1945)=MC.

1 Involucel present; fresh plant not smelling of celery; stem hollow ............................................................................
2 Involucel absent; fresh plant smelling of celery; stem solid ............................................................................................

1 Larger leaflets 8-15 cm long, 4-8 cm wide, acute at the apex; umbels glabrous or sparsely pubescent; ovary and fruit glabrous or sparsely pubescent; [restricted to the Mountains in our area, in mesic habitats]
3 Leaflets acute, the margin hyaline and mostly glabrous; umbels with 20-45 umbellets ...................................................... A. atropurpurea

3 Leaflets acuminate, the margin ciliate; umbels with 13-25 umbellets ............................................................................. A. triquinata

Angelica atropurpurea Linnaeus, Purple Angelica. Pd (DE), Mt (NC*?, WV): riverbanks, streambanks, moist roadsides; rare. May-June; July-August. S. NL (Labrador) west to WI and MN, south to NL (Newfoundland), NS, DE, MD, WV, OH, IN, IL, and ne. IA (and in the mountains to ne. TN and w. NC – the NC occurrences have sometimes been speculated to be naturalized). [= RAB, C, G, K, MC, W; > A. atropurpurea var. atropurpurea – F]


Angelica lucida Linnaeus. Native to n. North America. Reported by Harvill et al. (1992) for Warren County, VA; more information is needed to substantiate this surprising record, presumably from cultivation. [= C, G, K, MC; = Coelopleurum lucidum (Linnaeus) Fernald – F]

Angelica triquinata Michaux, Mountain Angelica, Filmy Angelica. Mt (GA, NC, VA, WV): mesic forests at moderate to high elevations, grassy balds, brookbanks; common (uncommon in WV). August-September; September-October. PA south to sw. NC, se. TN, and n. GA, a Southern and Central Appalachian endemic. The nectar is very attractive, but apparently strongly intoxicating, to yellow jackets and hornets; on the grassy balds of Roan Mountain one can see thousands of umbels of Angelica densely coated by lethargic bees. [= RAB, C, F, G, K, MC, W; ? A. curtisii Backley – S]

Angelica venenosa (Greenway) Fernald, Hairy Angelica. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): dry forests and woodlands, woodland borders, longleaf pine sandhills, hammocks; common (rare in DE and FL). June-August; July-September. MA west to MN, south to Panhandle FL, MS, and AR. Populations of this species in dry sandhill communities in the Fall Line Sandhills have a number of peculiar features: basal leaves often borne appressed against the ground, small leaflets, course and more equilateral toothing of the leaflets. These populations may be worthy of taxonomic recognition; they need further study. [= RAB, C, F, G, K, MC, W; ? A. villosa (Walter) Britton, Sterns, & Poggenburg – S]

Anthriscus Persoon 1814 (Chervil)


1 Fruit ovoid, 2.9-3.2 mm long, hispid with hooked hairs; [section Anthriscus].................................................................. A. caucalis
2 Fruit lanceolate or linear, 6-10 mm long, glabrous.
3 Beak of fruit (1-) 2-4 mm long, well-differentiated from the body; plant an annual; umbel rays pubescent; [section Anthriscus]................
2 Beak of fruit ca. 1 mm long, scarcely differentiated from the body; plant a perennial; umbel rays glabrous (or nearly so); [section Cacosciadium] ............................................................... A. sylvestris


* Anthriscus sylvestris (Linnaeus) Hoffmann ssp. sylvestris, Wild Chervil, Cow-parsley. Mt (NC, TN, VA), Pd (DE): moist disturbed areas; rare, native of Eurasia. May-July. This species has also been reported from the NC-TN state line, on Roan Mountain (Mellichamp, Matthews, & Smithka 1987, 1988); the population is actually entirely in TN. Reported for Watauga, Ashe, and Alleghany counties, NC (Poinexter, pers. comm. 2009). [= Z, < A. sylvestris – C, F, G, K, MC]

Apium Linnaeus 1753 (Celery)

A genus of about 20 species, herbs, of temperate and subtropical regions, mainly Southern Hemisphere. References: Ronse et al. (2010)=Z; Mathias & Constance (1945)=MC.

1 Involucel absent; fresh plant smelling of celery; stem solid............................................................................................. A. graveolens var. dulce
1 Involucel present; fresh plant not smelling of celery; stem hollow.................................................................................... A. graveolens var. dulce

...

**Bifora** Hoffmann 1816 (Bishop)

A genus of 4-6 species, annual herbs, of Mediterranean Europe, w. Asia (Caucasus), and w. North America.

* **Bifora americana** Bentham, Prairie Bishop. Disturbed areas; native of sc. North America. April-June. [= K] [perhaps not naturalized; not keyed or mapped]

* **Bifora radians** Bieberstein. [= K] [probably not naturalized; not keyed or mapped]

* **Bifora testiculata** (Linnaeus) Sprengel. [= K] [probably not naturalized; not keyed or mapped]

**Bowlesia** Ruiz & Pavón 1794 (Bowlesia)

A genus of ca. 15 species, herbs, of South America. References: Mathias & Constance (1945)=MC.

* **Bowlesia incana** Ruiz & Pavón. Cp (FL): open wet hammocks and bottomlands; rare, native of South America. [= GW, K, MC, WH; = *Bowlesia septentrionalis* Coulter & Rose – S]

**Bupleurum** Linnaeus 1753 (Hare’s-ear, Thoroughwax)

A genus of about 190 species, herbs and shrubs, primarily Eurasian. References: Snogerup & Snogerup (2001)=Z; Mathias & Constance (1945)=MC.

1 Upper leaves linear, sessile; [section *Aristata*] ........................................................................................................................................ B. *gerardii*
1 Upper leaves ovate, perfoliate; [section *Bupleurum*] .................................................................................................................... B. *rotundifolium*


* **Bupleurum lancifolium** Hornemann. Reported as a waif for MD by Shetler & Orli (2000) and Reed (1964). [= K] [not keyed; not mapped]


**Carum** Linnaeus 1753 (Caraway)

A genus of about 30 species, temperate. References: Mathias & Constance (1945)=MC.


**Centella** Linnaeus 1764 (Centella, Coinleaf)

A genus of about 40 species, of warm temperate and tropical regions, centered in s. Africa. References: Mathias & Constance (1945)=MC.

**Centella erecta** (Linnaeus f.) Fernald, Centella, Coinleaf. Cp (DE, GA, NC, SC, VA): savannas, pondshores, ditches, and a wide variety of other moist to wet habitats; common (rare in DE). June-August; July-September. S. NJ and DE south to s. FL; west to s. TX; West Indies, Mexico, Central America. *C. erecta* has sometimes been included in the pantropical *C. asiatica*, but the two taxa differ in morphology and chromosome number (*C. erecta* has n = 27, *C. asiatica* has n = 9). [= C, F, G, K, MC; < *C. asiatica* (Linnaeus) Urban – RAB, GW, misapplied; ? *C. repanda* (Persoon) Small – S]

**Chaerophyllum** Linnaeus 1753 (Chervil)

A genus of about 35 species, herbs, of north temperate areas. References: Mathias & Constance (1945)=MC.
A genus of 8 species, herbs, north temperate in distribution. References: Mulligan (1980)=Z; Mathias & Constance (1945)=MC.

1 Flowers usually aborting (if present, the fruits 1.5-2 mm long); axils of upper leaves not bearing bulbils; leaflets with narrowly linear segments, usually <5 mm wide .................................................. C. bulbifera
2 Flowers usually forming mature fruits 2-4 mm long; axils of leaves not bearing bulbils; leaflets lanceolate, usually >6 mm wide.
   1 Dorsal and lateral corky ribs of the fruit much narrower than the oil tubes; fruit abruptly and unevenly constricted at the commissure..........
   2 Dorsal and lateral corky ribs of the fruit equaling to slightly exceeding the width of the oil tubes; fruit restricted or not at the commissure, but not as above.
      3 Leaflets ovate, up to 3.5-5 cm wide .................................................. C. maculata var. maculata
      2 Leaflets lanceolate, 0.6-3 cm wide .................................................. C. maculata var. acuta

Cicuta tainturieri Hooker, Southern Chervil. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA, WV), Mt (GA, NC, SC, VA, WV); roadsides, disturbed areas, fields; common (rare in DE and WV). March-April; April-May. MD west to NE, south to c. peninsular FL, TX, and AZ. Var. tainturieri (with fruits glabrous) and var. dasycarpum (with fruits pubescent) are sometimes distinguished (see synonymy). They have largely overlapping distributions, and seem unlikely to warrant taxonomic status, but need additional study. C. texanum Coulter & Rose is reported as a native in the Nashville Basin of TN (Chester, Wofford, & Kral 1997); it is usually now included in C. tainturieri (var. tainturieri). [= RAB, C, GW, W, WH; > C. tainturieri var. tainturieri – K; > C. texanum var. texanum – C, F, G; > C. tainturieri var. floridanum Coulter & Rose – F; C. texanum Coulter & Rose – F, G, MC; > C. teinturieri – S, orthographic variant; > C. floridana (Coulter & Rose) Bush – S; > C. tainturieri var. dasycarpum Hooker ex S. Watson – K, MC; > C. dasycarpum (Hooker ex S. Watson) Nuttall ex Small – S]

* Chaerophyllum bulbosum Linnaeus, Parsnip Chervil. Waif in DC; native of Europe. [= C, G, K, MC] [not keyed; not mapped]

A genus of about 10 species, herbs, north temperate in distribution. References: Mathias & Constance (1945)=MC.

Cicuta Linnaeus 1753 (Water-hemlock)

Cicuta bolanderi S. Watson. Marshes, bogs, seepages, ditches, swamp forests. Scattered in distribution, from NJ, WI, and MN south to GA, TX, Mexico, and AZ. Further study is needed of the distinctiveness, distribution, and ecology of this species. [=K, MC; < C. maculata var. maculata – C, F, G; = C. maculata Linnaeus var. bolanderi (S. Watson) Mulligan – Z]

Cicuta bulbifera Linnaeus, Bulb-bearing Water-hemlock. Marshes and swamps. July-September. NL (Newfoundland) west to AK, south to MD, n. VA (?), OH, KY, IN, IL, IA, NE, MT, ID, and OR; disjunct (perhaps introduced only) in NC and FL. [= C, F, G, K, MC, Z]

Cicuta maculata Linnaeus var. maculata. Water-hemlock. Marshes, bogs, seepages, ditches, swamp forests. May-August; July-September. NS west to AK, south to FL, CA, and Mexico. Two other varieties are more northerly or western: var. victorinii (Fernald) Boivin of QC and var. angustifolia Hooker of western North America. All parts of the plant, especially the tubers, are dangerously poisonous. [= C. maculata – RAB, GW, MC, S, W; < C. maculata var. maculata – C, F, G (also see var. bolanderi); < C. maculata var. maculata – K, Z (also see C. mexicana); < C. maculata – WH]

Cicuta mexicana Coulter & Rose, Southern Water-hemlock. Marshes, bogs, seepages, ditches, swamp forests, floating vegetation mats. May-August; July-September. Se. VA (GW), south to FL, and west to TX, south into Mexico (more inland records in our area and westward are of uncertain disposition). Though not recognized by Mulligan (1980), this taxon appears to warrant taxonomic recognition. It is a generally coarser plant than C. maculata. [= RAB, GW, MC; = C. maculata var. curtissii (Coulter & Rose) Fernald – F, G; < C. maculata var. maculata – K, Z; = C. curtissii Coulter & Rose – S; < C. maculata – WH]

Conioselinum Hoffmann 1819 (Hemlock-parsley)

A genus of about 10 species, herbs, north temperate in distribution. References: Mathias & Constance (1945)=MC.

Conioselinum chinense (Linnaeus) Britton, Sterns, & Poggenburg, Hemlock-parsley. Nutrient-rich seepage over cliffs and through boulderfields, at high elevations, known from seepage over cliffs and through boulderfields at about 1500 m on the north
slop of Grandfather Mountain (Avery County, NC), and from a north-facing greenstone cliff-top seep at 1150 m on Stony Man, Page County (VA). July-September. The specific epithet is a misnomer; the species is native to n. North America (the specific epithet a misnomer): south to PA, IN, IA, and NB, and disjunct in VA and NC) and ne. Asia (e. Siberia), but not found in China (the epithet a mistake based on confusion between "Genesee," New York, and "Chinensem"). The single NC population was first discovered in 1842 by Asa Gray and John Carey, and not seen again until 1989. The VA population was first reported by Fleming & Ludwig (1996). The report of the species from Roan Mountain was found to be in error; see Anthriscus (Melchamp, Matthews, & Smithka 1987, 1988). [= RAB, C, F, G, K, MC, S, W]

**Conium** Linnaeus 1753 (Poison-hemlock)


* **Conium maculatum** Linnaeus, Poison-hemlock. Ditches, roadsides, streambanks, disturbed areas; native of Eurasia. May-June; June-July. All parts of the plant are highly toxic if ingested, causing respiratory failure in humans and other mammals. [= RAB, C, F, GW, K, MC, S, W, WV]

**Coriandrum** Linnaeus 1753 (Coriander, Cilantro)


**Cryptotaenia** A.P. de Candolle 1829 (Honewort)

A genus of 6 species, herbs, in north temperate areas (and montane Africa). References: Mathias & Constance=MC.

* **Cryptotaenia canadensis** (Linnaeus) A.P. de Candolle, Honewort. Moist and nutrient-rich forests (alluvial, bottomland, slope, and cove forests). May-June; June-August. NB and QC to MB, south to e. GA, sw. GA, Panhandle FL, AL, and TX; also in Japan. [= RAB, C, F, GW, K, MC, WH, WV; = Deringa canadensis (Linnaeus) Kuntze – S]

**Cyclospermum** Lagasca y Segura 1821 (Marsh-parsley)

A genus of 3 species, herbs, of tropical and warm temperate America. Only distantly related to *Apium* and warranting generic sttus (Ronse et al. 2010). References: Ronse et al. (2010)=Z; Mathias & Constance (1945)=MC.


**Cynosciadium** A.P. de Candolle 1829


* **Cynosciadium digitatum** A.P. de Candolle. Wet places, ditches, blackland prairies. IL, sw. TN (Shelby County), and AL west to OK and TX. [= C, F, G, GW, K, MC, S]

**Daucus** Linnaeus 1753 (Wild Carrot, Queen-Anne's-lace)

A genus of about 22 species, herbs, of temperate and tropical areas, primarily Old World. References: Mathias & Constance (1945)=MC.
Daucus carota Linnaeus, Queen-Anne's-Lace, Carrot, Wild Carrot. Pastures, fields, roadsides, waste places; native of Europe. May-September. The cultivated carrot is a form with a fleshy taproot rich in carotene; the familiar field weed has a "carrot" flavor, but the root is woody and tan in color. [= RAB, C, F, G, K, MC, S, W, WH, WV]

Daucus pusillus Michaux, American Queen-Anne's-lace. Pastures, fields, roadsides, waste places. April-May; May-June. This native relative of *D. carota* is smaller and less branched. Widespread in Southeastern United States, north to NC and MO. It should be expected in the lower Piedmont of NC and in the Coastal Plain of se. VA, which it closely approaches. Robert Wright has collected this species as a waif in Henrico County, VA (R. Wright, 2002, pers. comm.). [= RAB, C, F, G, K, MC, S, W, WH]

Erigenia Nuttall 1818 (Harbinger-of-spring, Pepper-and-salt)


Erigenia bulbosa (Michaux) Nuttall, Harbinger-of-spring, Pepper-and-salt, Erigenia. Mesic, nutrient-rich forests, either over calcareous substrate or on very rich alluvial deposits (such as riverbanks). February-May. S. PA, w. NY, s. ON, c. MI, and se. WI south to MD, DC, c. VA, w. VA, nc. NC, w. NC, e. TN, nw. GA, c. AL, n. MS, sw. AR, and se. KS (almost entirely west of the Blue Ridge). Rodgers (1950) states "reported in mtns. of N.C. by Kephart and Hyams;" now documented from both the nc. Piedmont and the w.MD, DC, Mountains. See Buddell & Thieret (1985) for a very interesting and entertaining account of this plant. [= RAB (excluded), C, F, G, K, MC, S, W, WV, Z]

Eryngium Linnaeus 1753 (Eryngo)


1 Leaves thickly coriaceous, palmately lobed, the lobes and teeth tipped with stout spines; [subgenus *Eryngium*] ................................................................. *E. martinum*
1 Leaves thin, fleshy, or subcoriaceous, entire, toothed, palmately lobed, or pinnately incised, the teeth or lobes (if present) unarmed or with weak spines.
2 Inflorescence unbranched, the heads solitary on peduncles from the leaf axils of the prostrate to erect stem; [subgenus *Monocotyloidea*].
3 Leaves pinnately lobed or dissected. ................................................................................................................................. *E. divaricatum*
3 Leaves entire, irregularly toothed (rarely with some irregular lobing).
4 Heads subglobose or hemispherical when fully developed, about as wide as long; bracts subtending the head barely extending beyond the base of the head; main stems leaves linear, narrowly elliptic, narrowly oblanceolate, sometime tricuspid apically                  ................................................................................................................................. *E. baldwinii*
4 Heads cylindrical, longer than wide; bracts subtending the head longer than the radius of the head, thus extending conspicuously beyond the base of the head; main stem leaves elliptic, broader than above .................................................................................................................... *E. prostratum*
2 Inflorescence branched, the heads in a cyme borne terminally on the erect stem.
5 Basal and cauline leaves (all, or at least many of the cauline) definitely deeply lobed into 3 or more divisions, < 10 cm long.
6 Heads blue; basal leaves serrate but not divided; [subgenus *Monocotyloidea*] .......................................................... *E. hookeri*
6 Heads greenish; basal leaves pinnately or pinnately-ternately divided.
7 Plants slender, not fleshy, green; basal and cauline leaves 2-6 cm long, 3-5 (-7) pinnately parted; heads 5-8 mm in diameter; [native species of dry pinelands of the Coastal Plain of e. GA, s. AL, and FL]; [subgenus *Monocotyloidea*] ........................................... *E. aromaticum*
7 Plants stout, fleshy, usually glaucous; basal leaves 10-25 cm long and wide, pinnately or pinnate-ternately divided into > 7 segments, the cauline leaves similar but reduced in size and number of divisions; heads 10-15 mm in diameter; [rare ballast waif of disturbed ground]; [subgenus *Eryngium*] ........................................................................................................................................... *E. campestre*
5 Basal and cauline leaves unlobed (except sometimes the uppermost; note that bracts in the inflorescence are often lobed), 3-100 cm long; [subgenus *Monocotyloidea*]
8 Blades of basal and lower cauline leaves 3-7 (-10) cm long, acute to obtuse apically, cordate to truncate basally, with a length/width ratio of 1.5-3 (-6) ...................................................................................................................................................... *E. integrifolium*
**APIACEAE**

Blades of basal and lower cauline leaves 10-100 cm long, acuminate to acute apically, clasping basally, with a length/width ratio of 5-50.

10 Larger leaves > 1.5 cm wide; marginal bristles of leaves solitary........................................E. yuccifolium var. yuccifolium

10 Larger leaves < 1.5 cm wide; marginal bristles in fascicles of 1-3 (<4), those on the lower portion of the leaf usually in fascicles of 2-3.................................................................E. yuccifolium var. synchaetum

9 Leaves with primary veins pinnate-reticulate, with or without marginal bristles; flowers blue.

11 Styles 3.0-3.5 mm long at maturity, scarcely exceeding the bractlets (which subtend each flower); heads subglobose to hemispherical, 6-12 mm in diameter; middle cusp of the bractlets elongate, distinctly longer than the lateral cusps..............................E. aquaticum var. aquaticum

11 Styles 4.0-6.0 mm long at maturity, exceeding the bractlets; heads globose, 9-15 mm in diameter; middle cusp of the bractlets about equal in length to the lateral cusps .................................................................E. aquaticum var. ravenelli

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**Eryngium aquaticum** Linnaeus var. aquaticum, Marsh Eryngo. Cp (DE, FL, GA, NC, SC, VA): tidal freshwater to brackish marshes; uncommon (rare in DE). July-September. NJ to ne. FL along the Atlantic coast, mostly in brackish marshes. [= RAB, K, MC, Z; < *E. aquaticum* – C, F, G, GW, WH; = *E. virginianum* Lamark – S]


**Eryngium aromaticum** Baldwin, Fragrant Eryngo. Cp (FL, GA): dry pinelands; common (uncommon in GA). E. GA west to s. AL, south to s. FL. [= K, MC, S, WH, Z]

**Eryngium baldwini** Sprengel. Cp (FL, GA): pinelands, temporary pools, ditches, other moist to wet sites; common (uncommon in GA). Se. GA and sw. GA south to s. FL. [= GW, K, S, WH, Z; = E. baldwini – MC, orthographic variant]


* Eryngium divaricatum* Hooker & Arnott. Cp (FL, NC): disturbed areas, introduced on ballast at old port towns (Wilmington, NC; Pensacola, FL); rare, native of South America. July-October. Not seen in recent years and probably not persistent. [= RAB, K, MC, S, WH, Z]

* Eryngium foetidum Linnaeus, Spiritweed. Listed by Kartesz (1999) as introduced in GA and FL, but the only reports are very early and anecdotal, and the species was excluded from the North American flora by Coulter & Rose (1900), with no subsequent documentation that would change that conclusion. Native of Mexico, Central America, South America, and West Indies. [= K, MC] {not keyed}

**Eryngium hookeri** Walpers. Ditches, other wet areas. MS and AR west to OK and TX, perhaps recently adventive in the eastward portions of that distribution, not credited as occurring east of TX in Matthias & Constance (1945). [= K, MC]

**Eryngium integrifolium** Walter, Savanna Eryngo. Cp (FL, GA, NC, SC), Mt (GA, NC, SC), Pd (GA, NC, SC, VA): savannas, pine flatwoods, seepages, other moist, nutrient-poor places; common (rare in Piedmont and Mountains). August-October. Se. VA (Greensville County) (Belden et al. 2004) and e. NC south to ne. FL and Panhandle FL, west to OK and TX, inland in c. TN. [= RAB, K, MC, W, WH, Z; = E. integrifolium – S; > *E. ludovicianum* Morong – S]

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**Eryngium prostratum** Nuttall ex A.P. de Candolle, Spreading Eryngo. Cp (DE*, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC): floodplain forests, bogs, pond margins, moist ditches and lawns, other moist, open habitats; uncommon, definitely native southwards, perhaps only rather recently spread to the northern parts of our area. May-October. Se. VA south to FL, west to OK and TX. [= RAB, C, GW, K, MC, S, W, WH, Z; > *E. prostratum* var. prostratum – F, G; > *E. prostratum* var. disjunctum Fernald – F, G]

**Eryngium yuccifolium** Michaux var. synchaetum A. Gray ex Coulter & Rose, Southern Rattlesnake-master. Cp (FL, GA, NC, SC): wet savannas, especially those over calcareous clay soils; rare (NC Watch List). June-August. A Southeastern Coastal Plain endemic: se. NC to s. FL and west across the Gulf Coastal Plain, the exact range limits obscure. The distinction between the two varieties, seemingly clear in NC and elsewhere in states bordering the Atlantic, seems to become less straightforward further west, as in LA and AR. In NC it has been seen in Pender, Brunswick, Columbus, Bladen, and Robeson counties. [= RAB, K, MC, Z; < *E. yuccifolium* – GW, WH; = *E. synchaetum* (Gray ex Coulter & Rose) Coulter & Rose – S]

**Eryngium yuccifolium** Michaux var. yuccifolium, Northern Rattlesnake-master. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA), Cp (FL2, GA, NC, SC, VA): diabase barrens and glades, olivine barrens, pine savannas, pine flatwoods over loamy or clay soils, other open sites with at least periodic moisture, generally in sites showing some prairie affinities; uncommon (rare in VA). June-August. Widespread in southeastern and midwestern North America, the exact range limits of the typic variety and var. synchaetum somewhat obscure. [= RAB, K, MC, Z; < *E. yuccifolium* – C, F, G, W, WH; < *E. yuccifolium* – GW (also see *E. yuccifolium* var. synchaetum); > *E. aquaticum* – S, misapplied]
**Falcaria** Fabricius 1827 (Sickleweed)

A monotypic genus, an herb, of Eurasia. References: Mathias & Constance (1945)=MC.


**Foeniculum** P. Miller 1763 (Fennel)

A genus of 4-5 species, herbs, of Asia and Mediterranean Europe. References: Mathias & Constance (1945)=MC.

* Foeniculum vulgare P. Miller, Fennel. Cp (DE, FL, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Pd (DE, NC, SC, VA): fields, dredge spoil, old gardens, waste places, vacant lots, roadsides; uncommon (sometimes locally common, rare in DE and WV), native of Mediterranean Europe. June-August, August-September. This is the common garden fennel, cultivated for its seeds, leaves, "bulbs" (finocchio), and ornamental appearance (especially bronze forms), widely used in Mediterranean cuisines. [= RAB, C, F, G, K, MC, W, WH, WV; = Foeniculum foeniculum (Linnaeus) Karsten – S]

**Harperella** Rose 1906 (Harperella)

A genus of 3 species, herbs, temperate, of e. North America. Based on work of Feist & Downie (2008), Harperella should be (re)-separated from Ptilimnium. Some authors, such as C, K, and Kral (1981a) prefer to include H. fluviatilis and H. vivipara in H. nodosa, but recent electrophoretic and morphologic data suggest the existence of three taxa: H. vivipara of w. MD, e. WV, VA, and e. NC, P. fluviatile of n. AL and AR, and P. nodosa of SC and GA. See Maddox & Bartgis (1990) and Kress, Maddox, & Roesel (1994) for additional information. Further electrophoretic and morphologic studies are underway. References: Feist & Downie (2008); Easterly (1957)=Z; Kral (1981a)=Y; Rose (1911)=X; Mathias & Constance (1945)=MC; Kress, Maddox, & Roesel (1994).

1 Leaves 8-30 cm long; plants 4-10.5 dm tall, not proliferating from the nodes (strictly annual); rays 10-25 mm long, 6-15 per inflorescence; pedicels 3.0-6.0 mm long; [of still water of Coastal Plain ponds] ........................................................................................................... H. nodosa
2 Leaves 4-12 (-15) cm long; plants 1-5 (-8 ) dm tall, proliferating from the nodes (thus adventitiously perennial); rays 1-9 mm long, 2-5 (-9) per inflorescence; pedicels 0.5-2.0 (-2.5) mm long; [of shoals, outcrops, and banks of rocky streams or rivers]


**Harperella nodosa** Rose, Pond Harperella. Upland depression ponds, seepage on granite outcrops. June. Known only from a few sites in SC and c. GA. [= S, X; = Ptilimnium nodosum (Rose) Mathias – RAB, GW, MC, Z; < P. nodosum (Rose) Mathias – C, K, Y (also see P. fluviatile)]


**Helosciadium** W.D.J. Koch 1824

A genus of 5 species, herbs, of Eurasia. References: Ronse et al. (2010)=Z; Mathias & Constance (1945)=MC.

* Helosciadium nodiflorum (Linnaeus) W.D.J. Koch, Fool's Watercress. Cp (SC): disturbed areas near old seaports; rare, native of Eurasia. [= Z; = Apium nodiflorum (Linnaeus) Lagasca y Segura – RAB, K, MC; = Ciclospermum nodiflorum (Linnaeus) W.D.J. Koch – S]
Heracleum Linnaeus 1753 (Cow-parsnip, Hogweed)

A genus of about 65 species, herbs, north temperate (and tropical mountains). References: Mathias & Constance (1945)=MC.

* Heracleum mantegazzianum Sommier & Lever. Native to the Caucasus Mountains, has been introduced in ne. North America and is becoming established; it may eventually spread to our area. It is considerably larger and coarser even than *H. maximum* (not a paltry herb itself), reaching 5.5 m in height, the hollow stems to 15 cm in diameter, the lower leaves to 2.5 m long, and the umbels to 5 dm across. More modestly-sized individuals may be distinguished from *H. maximum* by wider oil tubes on the fruit [(0.6-) 0.8-1.0 mm wide vs. 0.3-0.5 (-0.8). [= K] {not keyed}

Heracleum maximum W. Bartram, Masterwort, Cow-parsnip, American Hogweed. Mt (GA, NC, VA, WV), Pd (DE): forests, roadbanks, meadows, forest openings; uncommon (rare in GA). May-July; July-August. NL (Labrador) west to AK, south to DE, PA, OH, IN, IL, MO, KS, NM, AZ, CA, and in the Appalachians south to w. NC, e. TN, and n. GA; also in e. Siberia. The synonymy reflects two questions, one nomenclatural, the other taxonomic. North American plants are very similar to European ones, leading some workers to treat our plants as a subspecies or variety of the European. If recognized as specifically distinct from European *H. sphondylium*, the nomenclatural question is whether to accept Bartram’s (older) name as validly published. [= F, GW, K, WV; = *H. lanatum* Michaux – RAB, C, G, MC, W; = *H. sphondylium* Linnaeus var. *lanatum* (Michaux) Dorn; ? *H. sphondylium* Linnaeus ssp. *montanum* (Schleicher ex Gaudin) Briquet]

Imperatoria Linnaeus 1753 (Masterwort)

A genus of 3 species, of Eurasia. References: Ball in FNA (in prep.); Mathias & Constance (1945)=MC.

* Imperatoria ostruthium* Linnaeus, Masterwort. Mt (TN, WV): disturbed areas; rare, native of Europe. May-July. Naturalized in ne. United States from Europe. Reported from Carter County, TN (Chester, Wofford, & Kral 1997), and also is reported for scattered localities in PA (Rhoads & Klein 1993). [= FNA, MC, WV; = *Peucedanum ostruthium* (Linnaeus) W.D.J. Koch – C, K]

Ligusticum Linnaeus 1753 (Lovage)

A genus of 40-50 species, herbs, circumboreal and north temperate. References: Mathias & Constance (1945)=MC.

Lilaeopsis Greene 1891 (Lilaeopsis)


1 Leaves 7-30 (or more) cm long, often spatulate, up to 11 mm wide toward the apex, with (7-) 10-20 transverse septae; peduncles much shorter than the leaves; pedicels 5-10 mm long ..................................................................................................................................

1 Leaves 1-5 cm long, linear (rarely spatulate), 1-2 (-5) mm wide, with 4-8 (-10) transverse septae; peduncles about as long as or longer than the leaves; pedicels 3-4 mm long ...................................................................................................................................

Lilaeopsis carolinensis Coulter & Rose, Carolina Lilaeopsis. Cp (FL, GA, NC, SC, VA): freshwater marshes and pondshores, ditches, interdune ponds, shores of brackish to freshwater estuarine sounds and rivers; uncommon (rare in GA, NC, SC, and VA). May-June. Se. VA south to FL and west to e. TX (Hatch & Slack 2008); it is also found in South America (Argentina, Brazil, and Paraguay). [= RAB, F, GW, K, S, WH, Z; = *L. attenuata* (Hooker & Arnott) Fernald – C, G, MC]

Lilaeopsis chinensis (Linnaeus) Kuntze, Marsh Lilaeopsis. Cp (DE, FL, GA, NC, SC, VA): brackish and freshwater tidal marshes, especially in mud-flats in the intertidal zone; common. May-June. NS south to FL and west to TX (Brown & Marcus 1998). The epithet "chinensis" is a misnomer; the species is native to e. North America and has nothing to do with China. [= RAB, F, G, GW, K, MC, WH, Z; = *L. lineata* (Michaux) Greene – S]

Oenanthe Linnaeus 1753 (Water-dropwort)

A genus of ca. 40 species, herbs, of north temperate areas.

* Oenanthe javanica* A.P. de Candolle, Water Celery, Water Parsley, Java Dropwort, Seri. Pd (VA), Mt (GA): edge of swamp forests, ditches; rare (but seemingly with the ability to spread rapidly), native of Asia. July-August. [] {add to synonymy}
**Osmorhiza** Rafinesque 1819 (Sweet Cicely, Wild Chervil)

A genus of about 10 species, herbs, of temperate North America, temperate South America, montane tropical Central and South America, and Asia (Wen et al. 2002). References: Lowry & Jones (1979)=Z; Mathias & Constance (1945)=MC; Wen et al. (2002).

1 Styles plus stylopodium 0.5-1.5 mm long; flowers 4-7 (-10) per umbellet (including withering staminate flowers); flowers 3-4 mm across; umbellets 3-5 (-6) per umbel, on rays 2-8 (-10) cm long, the umbel therefore relatively uncrowded; roots (and foliage) not strongly anise-scented ......................................................... **O. claytonii**

1 Styles plus stylopodium 2.0-3.5 mm long; flowers (6-) 9-18 per umbellet (including withering staminate flowers); flowers 5-6 mm across; umbellets 4-6 (-8) per umbel, on rays 1.5-5.0 (-7.5) cm long, the umbel therefore rather crowded; roots (and foliage) strongly anise-scented ....................................................... **O. longistylis**


**Oxypropis** Rafinesque 1825 (Dropwort, Hog-fennel, Cowbane)

A genus of about 7 species, herbs, of temperate North America. Based on work of Feist & Downie (2008), *Oxypropis* is likely to be split into two genera. References: Feist & Downie (2008); Mathias & Constance (1945)=MC; Kral (1981); Tucker et al. (1983).

1 Leaves with 1-13 leaflets, the leaflets flat; [*Oxypropis s.s.*].

2 Leaflets (5-) 7-11 (-13), pinnately disposed, usually toothed (rarely entire), net-veined......................................................... **O. rigidior**

3 Mature fruits with peripheral ribs progressively thinning away from the seed cavity, the fruit with a fusiform cross-section, distinctly thinner toward the ends of the ribs than at the center, 0.2 mm thick at the edge; plants with stout rhizomes or a caudex, not long stoloniferous; lower nodes generally retaining their leaves until flowering; umbellets/umbel 10-20................................................................. **O. canbyi**

4 Flowers white; segments of phyllodia cylindrical ................................................................. **O. filiformis**

5 Flowers maroon; segments of phyllodia distinctly bulging .................................................. **O. greenmanii**

**Oxypropis canbyi** (Coulter & Rose) Fernald, Canby's Cowbane. Cp (DE, GA, NC, SC): clay-based Carolina bays and other depressional wetlands; rare. July-August; August-September. Sw. GA through SC to se. NC (mostly in the middle and inner Coastal Plain); and from e. MD to (formerly) DE. See Tucker et al. (1983) for detailed information on this rare species and a comparison of it to the more widespread *O. filiformis*. [= C, F, G, K, MC; **Tiedemannia**]

**Oxypropis filiformis** (Walter) Britton, Water Dropwort. Cp (FL, GA, NC, SC): wet savannas, sandhill seepages; common (uncommon north of FL). July-August; August-September. Se. NC south to s. FL, west to s. TX; West Indies. [= RAB, GW, K, MC, S; = O. filiformis ssp. filiformis – WH; **Tiedemannia**]


**Oxypropis ternata** (Nuttall) A. Heller, Savanna Cowbane. Cp (FL, GA, NC, SC, VA): wet pine savannas, sandhill seepages; rare. September-October; October-November. Scattered from se. VA south to Panhandle FL; alleged occurrences in e. TX are based on misidentifications of narrow-leafleted forms of *O. rigidior* (Sorrie et al. 2003). Edmondson’s (2005) change of the name to *O. denticulata* is incorrect; the type of *O. denticulata* is unquestionably *O. rigidior* (Feist 2009). [= O. ternata (Nuttall) A. Heller – RAB, C, F, G, GW, K, MC, S, WH; = O. denticulata (Baldwin) J.R. Edmondson, missapplied]
**Pastinaca** Linnaeus 1753 (Parsnip)

A genus of about 14 species, herbs, of temperate Eurasia. References: Mathias & Constance (1945)=MC.


**Perideridia** Reichenbach 1837


**Petroselinum** J. Hill 1756 (Parsley)

A genus of about 2 species, herbs, of Mediterranean Europe. References: Mathias & Constance (1945)=MC.


**Pimpinella** Linnaeus 1753

A genus of about 150 species, herbs, of Europe and Africa. References: Mathias & Constance (1945)=MC.

* *Pimpinella saxifraga* Linnaeus *ssp. saxifraga*, Burnet-saxifrage. Cp (DE), Pd (DE), Mt (VA, WV): fields and roadsides, disturbed areas; common (rare in VA), native of Eurasia. [= K, MC; < *P. saxifraga* – C, F, G]

**Polytaenia** A.P. de Candolle 1830

A genus of 2 species, herbs, of North America. References: Mathias & Constance (1945)=MC.

* *Polytaenia nuttallii* A.P. de Candolle, Prairie-parsley. Prairies, glades. MI west to NE, south to TX and NM, occurring as a disjunct eastward in prairie-like or glade situations in MS and c. TN (Chester, Wofford, & Kral 1998). [= C, F, G, K, MC; = *Pleiotena nuttallii* (A.P. de Candolle) Coulter & Rose – S]

**Pseudotaenidia** Mackenzie 1903 (Mountain Pimpernel)

A monotypic genus, an herb, endemic to the central Appalachians. Although this species has been traditionally separated into a monotypic genus, *Pseudotaenidia*; Cronquist (1982) has suggested that *Pseudotaenidia* be submerged in *Taenidia*. Cronquist's argument that the two monotypes are most closely related to one another is very possibly correct and has been generally followed since, but awaits further assessment with molecular methods. References: Cronquist (1982)=Z; Mathias & Constance (1945)=MC; Weakley & Nesom (2004)=Q; Kress, Maddox, & Roesel (1994).


**Ptilimnium** Rafinesque 1819 (Bishopweed, Harperella)


1 Leaves reduced to hollow, linear, nodose-septate quills, consisting of the petiole and leaflet-less rachis, undivided................. [see Harperella]
1 Leaves dissected into filiform or linear segments.
**Sanicula Linnaeus 1753** (Sanicle, Snakeroot)

A genus of about 40 species, herbs, nearly cosmopolitan. References: Pryer & Phillippe (1989)=Z; Mathias & Constance (1945)=MC. Key based in part on Z.

**Identification note:** *Sanicula* species cannot be reliably determined from sterile plants. Fruits or flowers are required for identification of *Sanicula* species. An important character is the length of the styles in relation to the calyx and/or to the bristles on the fruit. In the longer-styled species, the styles are slender and curved outward, sometimes enmeshed in the bristles, but distinctively longer than them or than the calyx. In the shorter-styled species, the styles are straight to slightly curved, shorter than or about as long as the bristles, and more or less included in the calyx. In most species the calyx is inconspicuous, but consists of 5 deltoid to narrowly triangular (or even subulate) calyx lobes, 0.4-2.0 mm long, at the summit of the schizocarp (the fruit).

1 Styles 1.5× or more as long as the calyx; umbels dimorphic – some contain perfect and staminate flowers, while others contain stamineate flowers only (except sometimes *S. canadensis* var. *grandis*, which may have polygamous umbels only).

2 Styles about 1.5× as long as the calyx; conspicuously exerted from between the calyx lobes and recurved; umbellets usually polygamous; some polygamous and others stamineate only; polygamous umbels with 12-120 flowers (3-4 perfect and the remainder staminate); fruits sessile to subsessile; bracteoles of umbellets broad, white; bases of fruit bristles prominently bulbous, with a minutely warty-reticulate surface pattern ........................................... *S. marilandica*

3 Styles 0.7-2.0 mm long, narrowly triangular to subulate, rigid in texture, the apices acute-acuminate; petals white or greenish-white, equal to or slightly longer than the calyx.

4 Calyx lobes 0.4-0.7 mm long, deltoid, flexible or weak in texture, the apices acute to obtuse; petals yellowish green, much longer than the calyx ............................................................... *S. odorata*

5 Styles 0.3-0.5 mm long; umbellets usually 3-5 per umbel; flowers usually 3-5 per umbellet; umbelles dimorphic, one polygamous and others stamineate only; polygamous umbels with 12-120 flowers (3-4 perfect and the remainder staminate); fruits sessile to subsessile; bracteoles of umbellets broad, white; bases of fruit bristles prominently bulbous, with a minutely warty-reticulate surface pattern ........................................... *S. trifoliata*

6 Styles 0.1-0.2 mm long; umbellets usually 1-3 per umbellet; flowers usually 1-3 per umbellet; umbelles dimorphic, one polygamous and others stamineate only; polygamous umbels with 1-120 flowers (3-4 perfect and the remainder staminate); fruits sessile to subsessile; bracteoles of umbellets broad, white; bases of fruit bristles prominently bulbous, with a minutely warty-reticulate surface pattern ........................................... *S. trifoliata*

7 Styles shorter than or (rarely as long as) the calyx; umbels usually monomonoecious (all containing both perfect and staminate flowers), with staminate flowers 1-7 per umbellet.

8 Sepals on mature fruit connivent, forming a beak-like structure equaling or usually exceeding the adjacent fruit bristles, the tips of the sepals subulate and incurved; pedicels of stamineate flowers 3-8 mm long; [collectively widespread in our area.]

9 Sepals on mature fruit spreading, loose, inconspicuous and immersed in the adjacent fruit bristles, the tips of the sepals acute or narrowly acute, straight; pedicels of stamineate flowers 1-2 (-3) mm long; ........................................... *S. trifoliata*

10 Larger leaves mostly 8-15 cm across; leaf teeth weak, hylane; [collectively widespread in our area.

**Sanicula Linnaeus 1753** (Sanicle, Snakeroot)
**Sanicula canadensis** Linnaeus var. canadensis, Canada Sanicle, Black Snakeroot. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): dry-mesic to mesic forests; common. April-May; June-July. VT and s. ON west to MN and SD, south to Panhandle FL and e. TX. [= F, G, Z; < S. canadensis – RAB, C, MC, W, WH, WV; < S. canadensis var. canadensis – K; = S. canadensis – S]

**Sanicula canadensis** Linnaeus var. floridana (Bicknell) H. Wolff, Florida Sanicle, Florida Snakeroot. Cp (FL, GA, NC, SC, VA): dry-mesic to mesic, sandy forests, often associated with *Fagus grandifolia* (and southward *Magnolia grandiflora*); common (uncommon north of GA). April-May; June-July. Se. VA south to c. peninsular FL, west to s. MS, in the Coastal Plain. Additional differences between var. *floridana* and var. *canadensis* should be investigated. They may not be worthy of taxonomic differentiation. [= F, G; < S. canadensis – RAB, C, MC, WH, WV; < S. canadensis var. canadensis – K; = S. floridana Bicknell – S]

**Sanicula canadensis** Linnaeus var. grandis Fernald, Large Sanicle. Mt (NC?, VA?, WV): {herbarium work, and information on habitats, rarity, phenology}. VT and n. NY west to s. ON, WI, se. MN, and n. IA, south to PA, n. WV, n. KY, c. IL, and allegedly south in the Mountains to VA and/or NC. [= F, K, Z; < S. canadensis – RAB, C, MC, W, WV]

**Sanicula marilandica** Linnaeus, Maryland Sanicle. Mt (GA, NC, SC, VA, WV), Cp (FL, GA, NC, SC, VA), Pd (DE, NC, SC, VA): mesic to dry-mesic nutrient-rich forests; common (uncommon in Coastal Plain, uncommon in WV, rare in DE). May-June; July-August. QC and NL (Newfoundland) west to BC, south to Panhandle FL, se. LA, NM, and WA. The Coastal Plain populations (designated as var. *petiolulata* by Fernald) are disjunct from the main range of distribution, occur in rather different (more acidic) habitats, and warrant additional study. The primary morphological difference indicated by F is that var. *petiolulata* has "the leaflets of 1 or 2 lower cauline leaves on petiolules 1.5-5 cm long" (vs. sessile or short-petiolulate). [= RAB, C, K, MC, W, WH, WV, Z; > S. marilandica var. marilandica – F, G; > S. marilandica var. petiolulata Fernald – F, G; = S. marylandica – S, orthographic variant]


**Sanicula trifoliata** Bicknell, Beaked Sanicle, Large-fruited Sanicle. Mt (GA, NC, SC, VA, WV), Pd (DE, VA): cove forests, other mesic, nutrient-rich forests; common (rare in Piedmont, rare in GA). May; June-July. QC and VT west to s. WI and se. MN, south to n. VA, w. NC, n. GA, c. TN, c. IL, and ne. IA. [= RAB, C, F, G, K, MC, S, W, WV, Z]

**Scandix Linnaeus 1753 (Venus'-comb)**

A genus of about 15-20 species, herbs, temperate, of Eurasia. References: Mathias & Constance (1945)=MC.


**Sium Linnaeus 1753 (Water-parsnip)**

A genus of about 14 species, herbs, of the northern hemisphere. References: Mathias & Constance (1945)=MC.

* **Sium suave** Walter, Water-parsnip. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (NC, SC, VA, WV): freshwater marshes, brackish marshes, swamp forests; uncommon (rare in Piedmont south of DE, rare in Mountains). June-August; August-October. NL (Newfoundland) west to AK and Siberia, south to Panhandle FL, n. peninsular FL, and CA. The plant can be very coarse, up to 3 m in height and the stem to 5 cm in diameter. The taxonomic status of *Sium floridana* Small, known from se. VA south to GA, needs additional investigation; it is probably just a depauperate shade form. [= RAB, C, K, W, WH, WV; > S. suave – F, G, GW, MC; > S. floridana Small – F, G, GW, MC, S; > S. cicutaefolium Schrank – S]

**Smyrnium Linnaeus 1753**

A genus of 7 species, herbs, of Europe.

* **Smyrnium perfoliatum** Linnaeus. Mt (AL): moist forests; rare, introduced. Found in a mesic forest in Cherokee County, AL, apparently introduced via seed in nursery material (Keener 2007).

**Spermolepis Rafinesque 1825 (Spermolepis)**

A genus of 5 species, herbs, of North America, Argentina, and Hawaii. References: Mathias & Constance (1945)=MC.
## APIACEAE

1. Ovary and fruit with hooked bristles. .......................................................... *S. echinata*
2. Ovary and fruit smooth or tubercled. .......................................................... *S. divaricata*

### Spermolepis divaricata (Walter) Rafinesque ex Seringe, Southern Spermolepis, Roughfruit Spermolepis. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): sandy roadsides, disturbed areas; common. April-May; May-June. VA south to s. FL, west to TX, and north in the interior to KS and MO. Apparently native in our area, though weedy in behavior, and perhaps introduced only in VA. [= RAB, C, G, GW, K, MC, S, WH]


### Spermolepis inermis (Nuttall ex A.P. de Candolle) Mathias & Constance, Western Spermolepis. Mt (GA), Cp (NC*): calcareous prairies in the Mountains (GA), disturbed areas in the Coastal Plain (NC); rare (GA Rare), northeastward in our area native of sc. United States. April; May. [= RAB, C, F, G, K, MC, S, WH]

#### Taenidia (Torrey & A. Gray) Drude 1898 (Yellow Pimpernel)

A monotypic genus (unless *Pseudotaenidia* is included), an herb, temperate, of e. North America. References: Mathias & Constance (1945) = MC. [also see *Pseudotaenidia*]

#### Taenidia integrerrima (Linnaeus) Drude, Yellow Pimpernel. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (VA): in rocky, dry to dry-mesic forests and woodlands over mafic or calcareous rock, such as diabase, amphibolite, calcareous siltstone, calcareous shale, or limestone; common (uncommon in NC and SC, rare in DE). April-May; May-June. QC, ON, MN, and SD south to c. GA, AL, MS, LA, and TX. [= RAB, C, F, G, K, MC, S, WH]

#### Thaspium Nuttall 1818 (Meadow-parsnip)

A genus of 3-4 species, herbs, temperate, of e. North America. References: Mathias & Constance (1945) = MC; Cooperrider (1985) = Z; Coulter & Rose (1900) = Y.

**Identification notes:** Because *Thaspium* and *Zizia* are often confused when not in fruit, a combined key emphasizing vegetative characters has been provided; it may also be helpful to use the key to genera, and if a clear answer is obtained, then use the *Thaspium-Zizia* combined key, skipping taxa of the "wrong" genus

1. Leaves 3-4-ternate, the very numerous ultimate segments 1-3 mm wide; petals white (fading to yellowish tan in older herbarium material)....

### Thaspium trifoliatum

2. Basal leaves 2-ternate or more divided.

3. Leaflets finely to coarsely serrate or incised, many of the teeth at least 2 mm long as measured on the shorter side; umbel rays 8-10, < 3.5 cm long even in petal; petals pale to creamy yellow. .......................... *Thaspium barbinode*

4. Teeth of the leaflets fine, averaging (4-) 5-10 per cm of margin, acuminate (the 2 sides making an angle of about 45 degrees); umbel rays (6-) 10-18, in fruit 2-5 (-4) cm long; basal leaves many-foliolate, the leaflets mostly acuminate; fruit ca. 2× as long as wide. ...

5. Teeth of the leaflets coarse, averaging (1-) 2-3 (-4) per cm of margin, acute to obtuse (the 2 sides making an angle of about 90 degrees); umbel rays 4-10 (-12), the longest to 11 cm long in fruit (some on a plant at least 5 cm long); basal leaves 3-5 (-7)-foliolate, the leaflets mostly rounded to obtuse at the apex; fruit 1-1.5× as long as wide. .......................... *Zizia aurea*

6. Basal leaves simple or 3-foliolate.

7. Teeth of the leaflets coarse, averaging 2-3 (-4) per cm of margin, the long side of most of the teeth 2-10 mm long; basal leaves mostly 3-foliolate (or more divided); middle and upper stem leaves equally or more divided than the basal leaves (the most divided leaves usually those of the mid-stem) ....... *Zizia trifoliata*

8. Teeth relatively acute, without a well-developed callous tip and a thickened, transluscent border (use 10×); lower portion of stem puberulent, the upper nodes also usually puberulent (use 10×); leaf margins often ciliate; umbel rays 7-15; flowers golden yellow...

9. Teeth relatively obtuse, with a well-developed callous tip and a thickened, transluscent border (use 10×); lower portion of stem glabrous, the upper nodes sometimes minutely roughened; leaf margins glabrous and hyaline; umbel rays 4-10 (-11); flowers maroon or golden yellow. .......................... *Zizia trifoliata var. aureum*

10. Flowers golden yellow. .................................................................................. *Thaspium trifoliatum var. aureum*

11. Flowers dark maroon.................................................................................. *Thaspium trifoliatum var. trifoliatum*
**Thaspium barbinode** (Michaux) Nuttall. Mt (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Cp (GA, NC, SC, VA): moist forests; common (rare in DE). April-May; July-August. NY and ON west to IA, south to c. GA, c. AL, and ne. MO. The hispid, purple-tinged leaf sheath is a good additional character for this species. [= RAB, S, W; = Th. barbinode var. barbinode – F, Y; < Th. barbinode – C, G, K, MC, WV, Z (also see Th. chapmanii)]

**Thaspium pinnatifidum** (Buckley) A. Gray. Mt (GA, NC): forests and woodlands over calcareous rock, such as limestone, dolostone, or calcareous siltstone); rare. May-June; June-July. KY south to w. NC, e. TN (Chester, Wofford, & Kral 1997), and n. AL. The report from VA is of unknown documentation. The distribution and rarity of this plant is complicated because of dolostone, or calcareous siltstone); rare. May-June; June-July. KY south to w. NC, e. TN (Chester, Wofford, & Kral 1997), and n. AL. The report from VA is of unknown documentation. The distribution and rarity of this plant is complicated because of confusion with Th. chapmanii. [= RAB, C, F, G, K, MC, S, W, Y, Z]

**Thaspium trifoliatum** (Linnaeus) A. Gray var. aureum (Linnaeus) Britton. Mt (NC, SC, VA), Pd (NC, SC, VA), Cp (NC, SC, VA); [GA]: moist forests; uncommon (rare in Coastal Plain). April-May; July-August. NY west to MN, south to SC, AL, AR, and se. KS. Various workers have differed on the characters used to separate two varieties in T. trifoliatum. RAB and C separate the two strictly on petal color; F, however, allows var. aureum to sometimes have purple petals, seeming to regard the critical differences to be var. aureum's generally more robust size and larger fruits (4.5 mm long vs. 3-4 mm long). It is presently not clear how two varieties should be separated, or, indeed, if varieties are warranted. Though the ranges overlap, var. aureum is generally more northern and western, var. trifoliatum more southern and eastern. [= K, S, Y; = T. trifoliatum var. flavum Blake – RAB, C, F, MC, W, WV, Z; < T. trifoliatum – G]

**Thaspium trifoliatum** (Linnaeus) A. Gray var. trifoliatum. Mt (NC, SC, VA), Pd (NC, SC, VA), Cp (FL, NC, SC, VA), {GA}: moist forests; common (rare in Coastal Plain). April-May; July-August. NJ, PA, and MO, south to Panhandle FL and LA. [= RAB, C, F, K, MC, S, W, WV, Y, Z; < T. trifoliatum – G]

**Thaspium chapmanii** (Coulter & Rose) Small. Mt (GA, WV), Pd (GA), Cp (FL, GA): calcareous bluffs; rare. Sw. PA, s. ON, s. MI, sw. WI, and s. MN south to Panhandle FL and e. TX. [= T. barbinode var. angustifolium Coulter & Rose – F; < Th. barbinode (Michaux) Nuttall – C, G, K, MC, WV, WH, WV, Z; > Th. barbinode var. angustifolium – Y; > Th. barbinode var. chapmanii Coulter & Rose – Y] {not yet keyed}

**Torilis Adanson 1763** (Hedge-parsley, Bur-parsley)

A genus of about 15 species, herbs, temperate, of the Old World. References: Mathias & Constance (1945)=MC.

1 Rays reduced or absent, < 5 mm long, the inflorescence therefore compact, appearing like a head; inflorescences opposite the leaves, on peduncles 0-1 (-2) cm long; mericarps dimorphic, one with spines, the other tuberculate .................................................................................................................. T. arvensis
1 Rays and pedicels well-developed, > 5 mm long, the inflorescence therefore open, distinctly and obviously an umbel; inflorescences opposite the leaves and terminal, on peduncles (1-) 3-16 cm long; mericarps monomorphic, both with spines.

2 Involutal bracts >2, generally 1 per ray; fruits 2-2.5 mm long (not including the spines); spines curved, not hooked at the tip ............................................................................................................................ T. arvensis
2 Involucral bracts >2, generally 1 per ray; fruits 2-2.5 mm long (not including the spines); spines straight or nearly so, with a minute hook at the tip ............................................................................................................................ T. aureum


* **Torilis japonica** (Houttuyn) A.P. de Candolle. Mt (VA, WV), Pd (VA), Cp (VA): disturbed areas; uncommon (rare in VA), native of Eurasia, naturalized south to se. PA and VA. [= C, F, G, K, MC, WV; = T. anthriscus (Linnaeus) Gmelin]


**Trepocarpus Nuttall ex A.P. de Candolle 1829**

A monotypic genus, an herb, temperate, of se. United States. References: Mathias & Constance (1945)=MC.

**Trepocarpus aethusae** Nuttall ex A.P. de Candolle. Cp (FL), Pd (SC), ?? (GA): rich moist forests, sometimes weedy in disturbed soils; rare. May-June. C. SC south to Panhandle FL and AL, west to e. TX, north in the interior to w. TN, w. KY, AR, and se. OK. Nelson (1993) states that despite "something of a reputation as a rarity," Trepocarpus is "a reasonably successful weed." [= RAB, C, GW, K, MC, WH]

**Zizia** W.D.J. Koch 1825 (Golden-Alexanders)

A genus of about 4 species, herbs, temperate, of North America. References: Mathias & Constance (1945)=MC; Cooperrider (1985)=Z.

[see combined key to Thaspium and Zizia under Thaspium]

**Zizia aptera** (A. Gray) Fernald, Heartleaf Golden-Alexanders. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests, openings, and woodland edges; common (rare in Coastal Plain, rare in DE). April-May;


### AUXILIARY KEYS

**Key to Maianthemum (RUSCACEAE), Polygonatum (RUSCACEAE), Prosartes (LILIACEAE), Streptopus (LILIACEAE), and Uvularia (COLCHICACEAE), emphasizing vegetative features**

1 Leaves perfoliate.
2 Leaves puberulent beneath (or rarely glabrate); leaves below the fork (0-1 (-2); tepals glabrous within; ............... _Uvularia grandiflora_
2 Leaves glabrous and often glaucous beneath; leaves below the fork 2-4; tepals conspicuously granular-papillose within.........................

1 Leaves sessile (though sometimes slightly to strongly clasping).
3 Stem simple.
4 Stem brown, wiry, puberulent; distalmost 2 leaves on each branch approximate to one another (sometimes subopposite) and with noticeably oblique bases; flowers and fruits terminal on the branches.
5 Leaf glabrous on the surface above (except for sparsely pubescent on the midrib and main veins), densely pubescent on the midrib below, sparsely pubescent on the surface below; leaf pubescence weak, often twisted or curled apically (as seen at 10-20× magnification), the leaf therefore very soft to the touch; fruit glabrous, ellipsoid, weakly triangular in cross-section, the surface smooth and shiny, red when ripe; tepals greenish, unspotted; leaves relatively small and many............................................. _Prosartes lanuginosa_
5 Leaf sparsely pubescent on the surface above and below; leaf pubescence stiff, generally straight and perpendicular to the surface (as seen at 10-20× magnification), the leaf therefore slightly rough to the touch; fruit pubescent, strongly 3-lobed (or 1- or 2-lobed by abortion), the surface textured and dull, whitish-tan when ripe; tepals whitish, spotted with purple; leaves relatively few and large............................................................. _Prosartes maculata_
4 Stem green, not wiry, glabrous; distalmost 2 leaves on each branch no closer together than other leaves, with symmetrical bases; flowers (and fruits) either terminal on the branches or solitary and axillary to most leaves.
6 _Streptopus_
7 Leaf margins and nodes not coarsely ciliate; leaves strongly cordate-clasping; fruit ellipsoid.........................................................
7 Leaf margins and nodes coarsely ciliate; leaves sessile to somewhat cordate-clasping (especially the lower leaves of robust individuals); fruit globose ....................................................... _Streptopus lanceolatus var. lanceolatus_

6 _Uvularia_
3 Stem simple.
Maianthemum
*Polygonatum*
_Uvularia_

1 Leaves pubescent on the veins beneath; flowers 7-13 mm long ........................................... _Polygonatum pubescens_
1 Leaves glabrous; flowers 12-21 mm long.
2 Stem slender, 1.5-5 mm in diameter; plants to 9 dm tall; lower axillary peduncles terete or nearly so, with (1-) 2-3 (-5) flowers; lowest peduncle in the axil of the (3rd-) 4th-5th (-8th) leaf; larger leaves 9-25 cm long, 3.5-13 cm wide; lower leaves clasping to 300° ....

2 Stem robust, 5-13 mm thick below the leaves; plants to 20 dm tall; lower axillary peduncles strongly flattened, with (2-) 3-6 (-15) flowers; lowest peduncle in the axil of the (3rd-4th, 5th-8th) leaf; larger leaves 9-25 cm long, 3.5-13 cm wide; lower leaves clasping to 300° ........

1 Leaves sessile, the margins scarious and minutely papillose-denticulate; [section Oakesiella].
3 Undivided portion of the style 0.5-1× as long as the style branches; upper stem and lower leaf surfaces puberulent to glabrous, light green; rhizome very short, with clustered, thickened roots.
4 Leaves cuneate at base, thin in texture, faintly reticulate on the undersurface, glabrous (rarely puberulent becoming glabrate); stems usually glabrous; [of the Coastal Plain and Piedmont]......................................................... _U. puberula var. nitida_
4 Leaves broadly rounded to somewhat clasping at base, firm in texture, obviously reticulate on the undersurface, puberulent (sometimes becoming glabrate); stems usually minutely puberulent in lines; [of the Mountains and Piedmont].............. _Uvularia puberula var. puberula_
3 Undivided portion of the style 3-5× as long as the style branches; upper stem and lower leaf surfaces glabrous, usually also glaucous; rhizome elongate, with scattered, fibrous roots.
5 Pedicel bearing a sessile, leaf-like bract 5-17 mm below the flower; capsule sessile at base, conspicuously beaked at apex

5 Pedicel bractless; capsule on a stalk 2-4 (-6) mm long, not beaked........................................... _Uvularia sessilifolia_

**APIACEAE**

1 Leaves sessile (though sometimes slightly to strongly clasping).
3 Stem simple.
2 Stem robust, 5-13 mm thick below the leaves; plants to 20 dm tall; lower axillary peduncles strongly flattened, with (2-) 3-6 (-15) flowers; lowest peduncle in the axil of the (3rd-) 4th-5th (-8th) leaf; larger leaves 9-25 cm long, 3.5-13 cm wide; lower leaves clasping to 300° ........

2 Stem slender, 1.5-5 mm in diameter; plants to 9 dm tall; lower axillary peduncles terete or nearly so, with (1-) 2-3 (-5) flowers; lowest peduncle in the axil of the (3rd-) 4th-5th (-8th) leaf; larger leaves 9-25 cm long, 3.5-13 cm wide; lower leaves clasping to 300° ....

1 Leaves pubescent on the veins beneath; flowers 7-13 mm long ........................................... _Polygonatum pubescens_
1 Leaves glabrous; flowers 12-21 mm long.
2 Stem slender, 1.5-5 mm in diameter; plants to 9 dm tall; lower axillary peduncles terete or nearly so, with (1-) 2-3 (-5) flowers; lowest peduncle in the axil of the (1st-) 3rd-5th (-9th) axil; larger leaves 5-15 cm long, 1.2-6 cm wide; lower leaves clasping to 90° (-180°) ................................................................. _Polygonatum biflorum var. biflorum_
2 Stem robust, 5-13 mm thick below the leaves; plants to 20 dm tall; lower axillary peduncles strongly flattened, with (2-) 3-6 (-15) flowers; lowest peduncle in the axil of the (3rd-4th, 5th-8th) leaf; larger leaves 9-25 cm long, 3.5-13 cm wide; lower leaves clasping to 300° ........

1 Leaves sessile, the margins scarious and minutely papillose-denticulate; [section Oakesiella].
3 Undivided portion of the style 0.5-1× as long as the style branches; upper stem and lower leaf surfaces puberulent to glabrous, light green; rhizome very short, with clustered, thickened roots.
4 Leaves cuneate at base, thin in texture, faintly reticulate on the undersurface, glabrous (rarely puberulent becoming glabrate); stems usually glabrous; [of the Coastal Plain and Piedmont]......................................................... _U. puberula var. nitida_
4 Leaves broadly rounded to somewhat clasping at base, firm in texture, obviously reticulate on the undersurface, puberulent (sometimes becoming glabrate); stems usually minutely puberulent in lines; [of the Mountains and Piedmont].............. _Uvularia puberula var. puberula_
3 Undivided portion of the style 3-5× as long as the style branches; upper stem and lower leaf surfaces glabrous, usually also glaucous; rhizome elongate, with scattered, fibrous roots.
5 Pedicel bearing a sessile, leaf-like bract 5-17 mm below the flower; capsule sessile at base, conspicuously beaked at apex

5 Pedicel bractless; capsule on a stalk 2-4 (-6) mm long, not beaked........................................... _Uvularia sessilifolia_
APIACEAE

1 Flowers in a terminal panicle ........................................................................................................... Maianthemum racemosum ssp. racemosum
1 Flowers in a simple raceme.
2 Perianth segments 4 (flowers 2-merous); leaves 1(-) 2 (-3) .......................................................... Maianthemum canadense
2 Perianth segments 6 (flowers 3-merous); leaves 6 or more .......................................................... Maianthemum stellatum

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INDEX of FAMILIES and GENERA

<table>
<thead>
<tr>
<th>Family</th>
<th>Genera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abahia</td>
<td>..................................... 106</td>
</tr>
<tr>
<td>Abeia</td>
<td>..................................... 988</td>
</tr>
<tr>
<td>Abelmoschus</td>
<td>..................................... 600</td>
</tr>
<tr>
<td>Abies</td>
<td>..................................... 61</td>
</tr>
<tr>
<td>Abrus</td>
<td>..................................... 413</td>
</tr>
<tr>
<td>Abutilon</td>
<td>..................................... 600</td>
</tr>
<tr>
<td>Acacia</td>
<td>..................................... 413, 457</td>
</tr>
<tr>
<td>Acaciella</td>
<td>..................................... 413</td>
</tr>
<tr>
<td>Acalyptra</td>
<td>..................................... 538</td>
</tr>
<tr>
<td>ACANTHACEAE</td>
<td>..................................... 848</td>
</tr>
<tr>
<td>Acanthopanax</td>
<td>..................................... 991</td>
</tr>
<tr>
<td>Acanthospermum</td>
<td>..................................... 871</td>
</tr>
<tr>
<td>Acer</td>
<td>..................................... 591</td>
</tr>
<tr>
<td>Acerates</td>
<td>..................................... 760, 761</td>
</tr>
<tr>
<td>Acetaella</td>
<td>..................................... 649</td>
</tr>
<tr>
<td>Acholefarus</td>
<td>..................................... 871</td>
</tr>
<tr>
<td>Agyranthus</td>
<td>..................................... 666, 667</td>
</tr>
<tr>
<td>Acciarphua</td>
<td>..................................... 868</td>
</tr>
<tr>
<td>Actinos</td>
<td>..................................... 823</td>
</tr>
<tr>
<td>Acnella</td>
<td>..................................... 872</td>
</tr>
<tr>
<td>Acnispone</td>
<td>..................................... 413</td>
</tr>
<tr>
<td>Acnida</td>
<td>..................................... 668, 669</td>
</tr>
<tr>
<td>Acornastylis</td>
<td>..................................... 480</td>
</tr>
<tr>
<td>Aconitum</td>
<td>..................................... 376</td>
</tr>
<tr>
<td>ACORACEAE</td>
<td>..................................... 86</td>
</tr>
<tr>
<td>Acors</td>
<td>..................................... 86</td>
</tr>
<tr>
<td>Acosta</td>
<td>..................................... 887</td>
</tr>
<tr>
<td>Acurolton</td>
<td>..................................... 872</td>
</tr>
<tr>
<td>Acrostichum</td>
<td>..................................... 38</td>
</tr>
<tr>
<td>Actaea</td>
<td>..................................... 378</td>
</tr>
<tr>
<td>Actinida</td>
<td>..................................... 711</td>
</tr>
<tr>
<td>ACTINIDIACEAE</td>
<td>..................................... 710</td>
</tr>
<tr>
<td>Actinospermum</td>
<td>..................................... 880</td>
</tr>
<tr>
<td>Acanthus</td>
<td>..................................... 428</td>
</tr>
<tr>
<td>Adenolinum</td>
<td>..................................... 561</td>
</tr>
<tr>
<td>Adenoplea</td>
<td>..................................... 807</td>
</tr>
<tr>
<td>Adiantum</td>
<td>..................................... 42</td>
</tr>
<tr>
<td>Adicera</td>
<td>..................................... 506</td>
</tr>
<tr>
<td>Adduma</td>
<td>..................................... 362</td>
</tr>
<tr>
<td>Adonis</td>
<td>..................................... 376</td>
</tr>
<tr>
<td>ADOXACEAE</td>
<td>..................................... 980</td>
</tr>
<tr>
<td>Aeglops</td>
<td>..................................... 270</td>
</tr>
<tr>
<td>Aegopodium</td>
<td>..................................... 994</td>
</tr>
<tr>
<td>Aeschynome</td>
<td>..................................... 413</td>
</tr>
<tr>
<td>Aesculhus</td>
<td>..................................... 595</td>
</tr>
<tr>
<td>Aethusua</td>
<td>..................................... 994</td>
</tr>
<tr>
<td>Afzelia</td>
<td>..................................... 840</td>
</tr>
<tr>
<td>Agalinis</td>
<td>..................................... 838</td>
</tr>
<tr>
<td>Aglomia</td>
<td>..................................... 544, 545</td>
</tr>
<tr>
<td>Agarista</td>
<td>..................................... 726</td>
</tr>
<tr>
<td>Agastache</td>
<td>..................................... 822</td>
</tr>
<tr>
<td>AGAVACEAE</td>
<td>..................................... 163</td>
</tr>
<tr>
<td>Agave</td>
<td>..................................... 163</td>
</tr>
<tr>
<td>Ageratina</td>
<td>..................................... 872</td>
</tr>
<tr>
<td>Ageratum</td>
<td>..................................... 873</td>
</tr>
<tr>
<td>Agrimonia</td>
<td>..................................... 466</td>
</tr>
<tr>
<td>Agropyron</td>
<td>..................................... 270, 317, 357</td>
</tr>
<tr>
<td>Agropyrum</td>
<td>..................................... 336</td>
</tr>
<tr>
<td>Agrostemma</td>
<td>..................................... 652</td>
</tr>
<tr>
<td>Agrostis</td>
<td>..................................... 270, 279, 326, 346</td>
</tr>
</tbody>
</table>
INDEX

ARECACEAE .............................................. 167
Arenea ........................................... 652, 656, 657, 665
Arethusa ............................................. 129
Argemone ............................................ 365
Argentaceae ......................................... 594
Argentina .............................................. 482
Argyrochosma ....................................... 39
Arissaem .............................................. 90
Aristida ................................................. 279
Aristolochia .......................................... 75, 76, 78, 79
ARISTOLOCHIACEAE .................................... 75
Arivela ................................................... 614
Armeniaca ............................................. 485, 486
Armoricana ........................................... 618, 634
Arihca ..................................................... 877
Arnoglossum .......................................... 877
Aronia ..................................................... 468
Arrhenatherum ........................................ 282
Arseneococcus ........................................ 727
Artemisia ............................................... 278
Arthroxylon ............................................ 283
Arthroxenenum ....................................... 675
Arum ......................................................... 91
Aruncus ................................................... 468
Arundinaria ............................................ 283, 344
Arundo ..................................................... 284
Asarum ................................................... 75, 77, 78
Asclepias ............................................... 757
Asclepiodella .......................................... 760
Asclepiodora ........................................... 761
Ascyrum ................................................. 567, 568, 570
Asemiaca ............................................... 462
Asimina ................................................... 81
ASPARAGACEAE ......................................... 159
Asparagus ................................................ 160
Asperugo .................................................. 773
Asperula .................................................. 741, 742
ASPLENIACEAE .......................................... 45
Asplenium .............................................. 45
Aspleniosorus .......................................... 46, 48
Aspis ....................................................... 272
Aster. ................................................. 874, 879, 899, 908, 909, 925, 936, 951, 962, 969, 970
ASTERACEAE ........................................ 869
Astilbe ...................................................... 395
Astragalus ............................................... 417
Astranthium .......................................... 879
Astrolepis ............................................... 40
Atamasco .............................................. 158
Atamasco .............................................. 157
ATHYRIACEAE .......................................... 53
Athryrium .............................................. 48, 53, 54
Atragene ............................................... 383
Atriplex ................................................... 669
Aucuba ..................................................... 737
Aureolaria ............................................. 841
Avena ...................................................... 284
Avenella .................................................. 284
Avenula .................................................... 284
Avicennia .............................................. 849
Axonopus ............................................... 284
Azalea ...................................................... 721, 722, 723
Azolla ...................................................... 36
Baccarhis .............................................. 879
Bacopa ..................................................... 795, 801
Bacothryon ............................................. 267
Balduina ............................................... 880
BALSAMINACEAE ...................................... 691
Balsamita ............................................. 974
Bambusa ............................................... 285
Baptisia ............................................... 418
Barbaraea .............................................. 618
Bartonia ............................................... 747
Bassella ............................................... 681
BASELACEAE ........................................... 681
Bassia .................................................... 670
BATAECES ............................................... 613
Basion ..................................................... 613
Batodendron .......................................... 732
Barrachium .......................................... 388
Bartschia .............................................. 767
Befaria .................................................. 719
Begovia .................................................. 532
BEGONIACEAE ........................................... 532
Befaria .................................................... 718
Belamcanda .......................................... 147
Bells ....................................................... 880
Benthamidia .......................................... 686
Benzoin ................................................... 84
BERBERIDACEAE ....................................... 368
Berberis .................................................. 369
Berchemia ............................................. 496
Berlandiera .......................................... 880
Berteroa ................................................. 618
Beta ......................................................... 670
Betula ..................................................... 525
BETULACEAE .......................................... 524
BIBLIOGRAPHY ....................................... 1010
Bicucullia ............................................ 364
Bidens .................................................... 881
Bifora ..................................................... 996
Bigelowia .............................................. 882
Bignonia ............................................... 854
BIGNONIACEAE ......................................... 853
Bilderdykia ............................................ 641, 642
Biltia ...................................................... 722
Biota ...................................................... 69
Biovalaria ............................................. 848
Biventricia ............................................ 761
Bivonea ................................................... 540
BLECHNACEAE ........................................... 52
Blechnum .............................................. 52
Blephariglottis ....................................... 137, 138, 139
Bleiophila .............................................. 822
Bletilla .................................................... 129
Boebera ............................................... 889
Boechera .............................................. 618
Boehmeria ............................................. 504
Boerhaavia ............................................ 678
Boerhavia ............................................. 678
Bolboschoenus ....................................... 193
Bolonia ................................................... 883
Bonamia ............................................... 780
Bonaveria ............................................. 450
BORAGINACEAE ....................................... 765
Borago ..................................................... 767
Borreria ............................................... 746
Borrichia .............................................. 884
Bothriochloa ......................................... 285
Botrychium .......................................... 29, 30
Botrypus .............................................. 29, 30
Bouchetia ............................................. 781
Bouteloua .............................................. 286
Bowlies ............................................... 996
Boykinia ............................................... 396
Brachiaia .............................................. 359
Brachyelytrum ....................................... 286
Brachypodium ....................................... 287
Bradburia ............................................. 890
Bradburya ............................................. 423
Bramia ................................................... 796
Brasenica ............................................. 71
Brassica .............................................. 620, 625, 634, 635
BRASSICACEAE .......................................... 616
Braya ..................................................... 620
Breens ................................................... 701
Brevera .................................................. 780
Brickellia .............................................. 884
Brintonia .............................................. 884
Bria ......................................................... 287
Brodiaea .............................................. 165
BROMELIACEAE ......................................... 178
Bromopsis ............................................. 288, 289
Bromus ................................................... 287
Broussetia ............................................. 502
Bruneria ............................................... 89
Brunnichia ............................................ 640
Bryodesma ............................................ 25
Bryophyllum ......................................... 400
Buchloe ............................................... 286
Buchnera .............................................. 842
Buckleya .............................................. 637
Buddlea ............................................... 807
Bugaussoides ......................................... 767
Bulbostylis ............................................ 194
Bumelia ............................................... 696, 697
Bunias ................................................... 620
Bupleurum ............................................ 996
Burmannia ............................................ 106
BURMANNIACEAE ....................................... 106
Bursa ..................................................... 622
Butia ...................................................... 167
BUXACEAE ............................................ 390
Buxella .................................................. 736
Buxus ..................................................... 390
Cabomba .............................................. 71
CABOMBACEAE ......................................... 71
Cacalia ............................................... 878, 950, 951
CACTACEAE ............................................. 683
Cakile .................................................... 621
Calamagrostis ........................................ 290
Calamitha ............................................. 824
Calamovilfa .......................................... 291
Calapina ............................................... 621
Calibrachoa .......................................... 781
Calla ....................................................... 89
Calandra .............................................. 422
Callicarpa ............................................. 811
Callirhoe .............................................. 601
<table>
<thead>
<tr>
<th>Index</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Callirhoe</td>
<td>601</td>
</tr>
<tr>
<td>Callisia</td>
<td>169, 171</td>
</tr>
<tr>
<td>Callistemon</td>
<td>585</td>
</tr>
<tr>
<td>Callitriche</td>
<td>796</td>
</tr>
<tr>
<td>Calluna</td>
<td>725</td>
</tr>
<tr>
<td>Calonyction</td>
<td>778</td>
</tr>
<tr>
<td>Calopogon</td>
<td>129</td>
</tr>
<tr>
<td>Calotis</td>
<td>884</td>
</tr>
<tr>
<td>Caltha</td>
<td>379</td>
</tr>
<tr>
<td>CALYCANTHACEAE</td>
<td>82</td>
</tr>
<tr>
<td>Callithrum</td>
<td>82</td>
</tr>
<tr>
<td>CALYRACEAE</td>
<td>868</td>
</tr>
<tr>
<td>Calycocarpus</td>
<td>367</td>
</tr>
<tr>
<td>Calypodium</td>
<td>885</td>
</tr>
<tr>
<td>Calystegia</td>
<td>774</td>
</tr>
<tr>
<td>Camassia</td>
<td>163</td>
</tr>
<tr>
<td>Camelina</td>
<td>622</td>
</tr>
<tr>
<td>Camellia</td>
<td>702</td>
</tr>
<tr>
<td>Campanula</td>
<td>614</td>
</tr>
<tr>
<td>CAMPAULACEAE</td>
<td>861</td>
</tr>
<tr>
<td>Campanulastrum</td>
<td>866</td>
</tr>
<tr>
<td>Campe</td>
<td>618</td>
</tr>
<tr>
<td>Camphorata</td>
<td>63</td>
</tr>
<tr>
<td>Campsis</td>
<td>853</td>
</tr>
<tr>
<td>Campsorsus</td>
<td>47</td>
</tr>
<tr>
<td>Campalosus</td>
<td>297</td>
</tr>
<tr>
<td>Canavalia</td>
<td>422</td>
</tr>
<tr>
<td>Canna</td>
<td>422</td>
</tr>
<tr>
<td>CANNABACEAE</td>
<td>500</td>
</tr>
<tr>
<td>Cannabis</td>
<td>501</td>
</tr>
<tr>
<td>CANNACEAE</td>
<td>175</td>
</tr>
<tr>
<td>Capnoides</td>
<td>363</td>
</tr>
<tr>
<td>CAPRIFOLIACEAE</td>
<td>985</td>
</tr>
<tr>
<td>Capriola</td>
<td>297</td>
</tr>
<tr>
<td>Capsella</td>
<td>622</td>
</tr>
<tr>
<td>Capsicum</td>
<td>781</td>
</tr>
<tr>
<td>Carara</td>
<td>630</td>
</tr>
<tr>
<td>Cardamine</td>
<td>622</td>
</tr>
<tr>
<td>Cardaria</td>
<td>630</td>
</tr>
<tr>
<td>Cardiospermum</td>
<td>596</td>
</tr>
<tr>
<td>Caruus</td>
<td>885</td>
</tr>
<tr>
<td>Carpus</td>
<td>527</td>
</tr>
<tr>
<td>Carpobrotus</td>
<td>676</td>
</tr>
<tr>
<td>Curthamus</td>
<td>886</td>
</tr>
<tr>
<td>Carum</td>
<td>996</td>
</tr>
<tr>
<td>Carya</td>
<td>520</td>
</tr>
<tr>
<td>CARPOPHYLLACEAE</td>
<td>651</td>
</tr>
<tr>
<td>Cassandra</td>
<td>728</td>
</tr>
<tr>
<td>Cassia</td>
<td>423, 450, 451</td>
</tr>
<tr>
<td>Castor</td>
<td>73</td>
</tr>
<tr>
<td>Castanea</td>
<td>507</td>
</tr>
<tr>
<td>Castilleja</td>
<td>843</td>
</tr>
<tr>
<td>Casaurina</td>
<td>524</td>
</tr>
<tr>
<td>CASUARINACEAE</td>
<td>523</td>
</tr>
<tr>
<td>Catalpa</td>
<td>853</td>
</tr>
<tr>
<td>Catapodium</td>
<td>298</td>
</tr>
<tr>
<td>Catharanthus</td>
<td>761</td>
</tr>
<tr>
<td>Cathartolinum</td>
<td>561, 562</td>
</tr>
<tr>
<td>Caulophyllum</td>
<td>366</td>
</tr>
<tr>
<td>Cayaponia</td>
<td>531</td>
</tr>
<tr>
<td>Cayratia</td>
<td>407</td>
</tr>
<tr>
<td>Ceanothus</td>
<td>496</td>
</tr>
<tr>
<td>Cedrus</td>
<td>62</td>
</tr>
<tr>
<td>CELASTRACEAE</td>
<td>533</td>
</tr>
<tr>
<td>Celastrus</td>
<td>534</td>
</tr>
<tr>
<td>Celosia</td>
<td>671</td>
</tr>
<tr>
<td>Celsis</td>
<td>501</td>
</tr>
<tr>
<td>Cenchrus</td>
<td>292</td>
</tr>
<tr>
<td>Centauria</td>
<td>866, 942</td>
</tr>
<tr>
<td>Centaurea</td>
<td>747</td>
</tr>
<tr>
<td>Centella</td>
<td>996</td>
</tr>
<tr>
<td>Centrosema</td>
<td>422</td>
</tr>
<tr>
<td>Centrostachys</td>
<td>666</td>
</tr>
<tr>
<td>Centunculus</td>
<td>699</td>
</tr>
<tr>
<td>Cerapathus</td>
<td>737</td>
</tr>
<tr>
<td>CEPHALOTAXACEAE</td>
<td>69</td>
</tr>
<tr>
<td>Cephalotaxus</td>
<td>69</td>
</tr>
<tr>
<td>Cerasus</td>
<td>653</td>
</tr>
<tr>
<td>Cerasus</td>
<td>485, 486</td>
</tr>
<tr>
<td>Ceratola</td>
<td>725</td>
</tr>
<tr>
<td>CERATOPHYLLACEAE</td>
<td>362</td>
</tr>
<tr>
<td>Ceratophyllium</td>
<td>362</td>
</tr>
<tr>
<td>Ceratopteris</td>
<td>39</td>
</tr>
<tr>
<td>Ceris</td>
<td>423</td>
</tr>
<tr>
<td>Cerothamnus</td>
<td>519</td>
</tr>
<tr>
<td>Cestrum</td>
<td>782</td>
</tr>
<tr>
<td>Chaenomeles</td>
<td>469</td>
</tr>
<tr>
<td>Chenoarhinum</td>
<td>797</td>
</tr>
<tr>
<td>Chaeophyllium</td>
<td>996</td>
</tr>
<tr>
<td>Chaetochloa</td>
<td>340, 350, 351</td>
</tr>
<tr>
<td>Chaetopappa</td>
<td>887</td>
</tr>
<tr>
<td>Chaiturus</td>
<td>823</td>
</tr>
<tr>
<td>Chamaecrista</td>
<td>423</td>
</tr>
<tr>
<td>Chamaecyparis</td>
<td>68</td>
</tr>
<tr>
<td>Chamaedaphne</td>
<td>728</td>
</tr>
<tr>
<td>Chamaerium</td>
<td>114</td>
</tr>
<tr>
<td>Chamaemelum</td>
<td>887, 892</td>
</tr>
<tr>
<td>Chamaerion</td>
<td>581</td>
</tr>
<tr>
<td>Chamaepericlymenum</td>
<td>686</td>
</tr>
<tr>
<td>Chamaeysce</td>
<td>543</td>
</tr>
<tr>
<td>Chamerion</td>
<td>581</td>
</tr>
<tr>
<td>Chamomilla</td>
<td>935, 976</td>
</tr>
<tr>
<td>Chapstick</td>
<td>424</td>
</tr>
<tr>
<td>Chasia</td>
<td>887</td>
</tr>
<tr>
<td>Chasmanthium</td>
<td>292</td>
</tr>
<tr>
<td>Chelanthus</td>
<td>39, 41</td>
</tr>
<tr>
<td>Cheirinia</td>
<td>627</td>
</tr>
<tr>
<td>Chelidonium</td>
<td>366</td>
</tr>
<tr>
<td>Chelone</td>
<td>797</td>
</tr>
<tr>
<td>CHENOPODIACEAE</td>
<td>665</td>
</tr>
<tr>
<td>Chenopodium</td>
<td>671, 673</td>
</tr>
<tr>
<td>Chelyson</td>
<td>403</td>
</tr>
<tr>
<td>Chevrelia</td>
<td>888</td>
</tr>
<tr>
<td>Chimaphila</td>
<td>717</td>
</tr>
<tr>
<td>Chiococca</td>
<td>738</td>
</tr>
<tr>
<td>Chiogenas</td>
<td>729</td>
</tr>
<tr>
<td>Chionanthus</td>
<td>790</td>
</tr>
<tr>
<td>Chionodoxa</td>
<td>166</td>
</tr>
<tr>
<td>Chloris</td>
<td>293, 318, 321</td>
</tr>
<tr>
<td>Chondrilla</td>
<td>888</td>
</tr>
<tr>
<td>Chondrophylla</td>
<td>883</td>
</tr>
<tr>
<td>Choripora</td>
<td>625</td>
</tr>
<tr>
<td>Christella</td>
<td>50</td>
</tr>
<tr>
<td>Chromolaena</td>
<td>888</td>
</tr>
<tr>
<td>Chrosopera</td>
<td>115</td>
</tr>
<tr>
<td>Chrysanthemum</td>
<td>888, 914, 929, 974</td>
</tr>
<tr>
<td>CHRYSOBALANACEAE</td>
<td>550</td>
</tr>
<tr>
<td>Chrysobalanus</td>
<td>550</td>
</tr>
<tr>
<td>Chrysogonum</td>
<td>888</td>
</tr>
<tr>
<td>Chrysoma</td>
<td>889</td>
</tr>
<tr>
<td>Chrysopogon</td>
<td>294</td>
</tr>
<tr>
<td>Chrysopsis</td>
<td>889, 922, 941, 942</td>
</tr>
<tr>
<td>Chrysosplenium</td>
<td>396</td>
</tr>
<tr>
<td>Cicere</td>
<td>424</td>
</tr>
<tr>
<td>Cichorium</td>
<td>890</td>
</tr>
<tr>
<td>Ciclosporum</td>
<td>1001</td>
</tr>
<tr>
<td>Cicuta</td>
<td>997</td>
</tr>
<tr>
<td>Cimicifuga</td>
<td>379</td>
</tr>
<tr>
<td>Cina</td>
<td>294, 327</td>
</tr>
<tr>
<td>Cinnamomum</td>
<td>83</td>
</tr>
<tr>
<td>Circaeae</td>
<td>580</td>
</tr>
<tr>
<td>Cirsius</td>
<td>890</td>
</tr>
<tr>
<td>Cissus</td>
<td>408</td>
</tr>
<tr>
<td>CISTACEAE</td>
<td>609</td>
</tr>
<tr>
<td>Citrus</td>
<td>530</td>
</tr>
<tr>
<td>Citrus</td>
<td>597</td>
</tr>
<tr>
<td>Cladanthus</td>
<td>892</td>
</tr>
<tr>
<td>Cladium</td>
<td>232</td>
</tr>
<tr>
<td>Cladrastis</td>
<td>425</td>
</tr>
<tr>
<td>Clesgenella</td>
<td>403</td>
</tr>
<tr>
<td>Claytonia</td>
<td>679</td>
</tr>
<tr>
<td>Cleites</td>
<td>130</td>
</tr>
<tr>
<td>Cleistopsis</td>
<td>130</td>
</tr>
<tr>
<td>Clematis</td>
<td>381</td>
</tr>
<tr>
<td>CLEOMACEAE</td>
<td>614</td>
</tr>
<tr>
<td>Cleome</td>
<td>614, 615</td>
</tr>
<tr>
<td>Cleoserrata</td>
<td>615</td>
</tr>
<tr>
<td>Clorodendraum</td>
<td>812</td>
</tr>
<tr>
<td>Clethra</td>
<td>711</td>
</tr>
<tr>
<td>CLETHRACEAE</td>
<td>711</td>
</tr>
<tr>
<td>Clevera</td>
<td>695</td>
</tr>
<tr>
<td>Cliftonia</td>
<td>711</td>
</tr>
<tr>
<td>Clitoria</td>
<td>823, 824</td>
</tr>
<tr>
<td>Clintonia</td>
<td>123</td>
</tr>
<tr>
<td>Cnucus</td>
<td>887</td>
</tr>
<tr>
<td>CNidoscolus</td>
<td>539</td>
</tr>
<tr>
<td>Coccinia</td>
<td>530</td>
</tr>
<tr>
<td>Coccus</td>
<td>367</td>
</tr>
<tr>
<td>Cocos</td>
<td>168</td>
</tr>
<tr>
<td>Coelagostrongyllum</td>
<td>130</td>
</tr>
<tr>
<td>Coelorhachis</td>
<td>294</td>
</tr>
<tr>
<td>Coincya</td>
<td>625</td>
</tr>
<tr>
<td>Coix</td>
<td>295</td>
</tr>
<tr>
<td>COLCHICACEAE</td>
<td>118</td>
</tr>
<tr>
<td>Colchicum</td>
<td>118</td>
</tr>
<tr>
<td>Coleaetania</td>
<td>295</td>
</tr>
<tr>
<td>Colgeoton</td>
<td>104</td>
</tr>
<tr>
<td>Coleasanthus</td>
<td>884</td>
</tr>
<tr>
<td>Collinisia</td>
<td>798</td>
</tr>
<tr>
<td>Collinsonia</td>
<td>821</td>
</tr>
<tr>
<td>Colocasia</td>
<td>90</td>
</tr>
<tr>
<td>Comandra</td>
<td>637</td>
</tr>
<tr>
<td>Commelina</td>
<td>170</td>
</tr>
</tbody>
</table>
INDEX

COMMELINACEAE.............. 169
COMPOSITAE................. 869

Comptonia.................. 518
Conioselinum.............. 997
Conium..................... 998

Conocephalum.................

Conopholis............... 845
Conradina................. 824
Conringia................. 625

Consolida................... 376
Convallaria................. 160

CONVOLVULACEAE........... 774

Convulavus.............. 775

Coryza...................... 892
Copis......................... 373

Corallorhiza............... 131

Corallorhiza............... 131, 132

Corchorus.................. 602
Coryza......................... 373

Coriandrum.................. 998

Cortaderia.................. 296
Corydalis.................. 363

Corylus......................... 527

Cosmos....................... 896
Cota......................... 896

Cotinus...................... 588

Cotoneaster................ 487

Cotula...................... 897
Cracca..................... 453

Crassula.................... 401
CRASSULACEAE.............. 400

Crataegus................... 469, 487

Crepis......................... 897, 980

Crinum......................... 155

Critesion.................... 325

Crocanthemum............... 609

Crocosmia.................... 145

Crocosmia.....................

Crocosmia.................... 145

Crookea....................... 569

Croomia...................... 1087

Crotakanthus.............. 741

Crotanthera............... 741

Cucurbita................... 530, 531

Cucurbitaceae............. 528

Cudrania..................... 503

Cullen........................ 426

Cunila........................ 825

Cunninghamia.............. 67

Cuphea........................ 573

CUPRESSACEAE.............. 67

Cupularia.................... 898

Curcuma....................... 176

Cuscata........................ 775

CUSCUTACEAE.............. 774

Cuthbertia.................... 171

Cyanococcus................ 732, 733, 734

Cyclachaena................ 898

Cycladon..................... 763

Cycloloma.................... 673

Cyclosporin........................ 998

Cydonia......................... 476

Cymbalaria................... 798

Cymodoceae.................. 105

CYMODOCEACEAE........... 104

Cymophyllus.................. 220

Cynanchum................... 762, 764

Cynocodon....................

Cynoglossum.................. 766

Cynosciadium................ 998

Cynosurus..................... 297

Cynoxylon..................... 686

Cynthia........................ 927

CYPERACEAE................. 192

Cyperus....................... 232, 248, 249

Cypripedium.................. 132

Cyrilla......................... 712

CYRILLACEAE................. 711

Cytotrichum.................. 55

CYSTOPTERIDACEAE........... 43

Cystopteris.................. 43

Cytisus......................... 426

Dactylis....................... 297

Dactylolophium............. 297

Dactylorhiza............... 131

Dalea.......................... 427

Dalibarda....................... 491

Danac.......................... 161

Danthonia..................... 297

Dasiphora..................... 476

Dasistoma.................... 841

Dasystemon................. 749, 750

Dasystemon................... 842

Datura......................... 782

Daubentonia.................. 451

Daucus......................... 998

Decachneza.................... 735, 736

Decnemnium.................... 771

Decodon....................... 574

Decumaria.................... 688

Dendroculum.................. 645

Delphimium................... 377

Dendranthema................ 888

Dendrimum..................... 724

Dendrolycopodium........... 20

Dendropogon................... 179

Dentstaediad.................. 37

DENNSTAEDIACEAE........... 36

Dentaria....................... 623, 624, 625

Deparia......................... 54

Deringa......................... 998

Deschampsia.................. 284, 298

Descurainia.................. 625

Desmanthus.................... 428

Desmazeria.................... 298

Desmodium..................... 428, 434

Desmosphaerum............... 937

Dethia......................... 688

Diamorpha..................... 401

Dianthera...................... 851

Dianthus......................... 654

Dipterocarpus................ 849

DIAPENSIACEAE.............. 704

Diaproporhethemia.......... 179

Diaporina....................... 299

Diarrhea......................... 298

Dicerandra.................... 364

Dieranthera................... 888

Dichanthelium................ 299

Dichostachys.................. 432

Dichroptera.................. 849, 853

Dieranthera................... 888

Dicksonia....................... 777

Dichroplina................... 254, 256

Dichromastix.................. 432

Dicksonia....................... 299

Dioecia........................ 436

Dioda........................ 738

Diodia........................ 738

Dionaea......................... 650

DIONAECIACEAE.............. 650

 Dioscorea....................... 107

Dioscoreaceae............... 107

Diphasiastrum................ 20

Diplobrachia................... 370

Diplochne........................ 327

DIPLAZIOPSIDACEAE........... 48

Diplazia......................... 48

Diplazia......................... 48

Diplazia......................... 48

Diplazia......................... 48

Diplazia......................... 48

Diplopterygium................ 25

Diplotes......................... 626

DIPSACEAE..................... 398

Dipsids......................... 988

Dittrichia...................... 898

Dodecatheon.................... 699

Doellingeria.................. 898, 936

Dolichos......................... 436

Dondia......................... 676

Doronicum...................... 877

Draba........................ 626
<table>
<thead>
<tr>
<th>Index Word</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eremochloa</td>
<td>320</td>
</tr>
<tr>
<td>Eranthis</td>
<td>477</td>
</tr>
<tr>
<td>Eragrostis</td>
<td>320</td>
</tr>
<tr>
<td>Dryopteris</td>
<td>44, 49, 50, 55</td>
</tr>
<tr>
<td>Drymarea</td>
<td>655</td>
</tr>
<tr>
<td>Drymocallis</td>
<td>54</td>
</tr>
<tr>
<td>DROSERAECES</td>
<td>650</td>
</tr>
<tr>
<td>DRYOPTERIDACEAE</td>
<td>54</td>
</tr>
<tr>
<td>Echinacea</td>
<td>899</td>
</tr>
<tr>
<td>Echinocystis</td>
<td>314</td>
</tr>
<tr>
<td>Echinochloa</td>
<td>528</td>
</tr>
<tr>
<td>Echinochloa</td>
<td>529</td>
</tr>
<tr>
<td>Echinodorus</td>
<td>93</td>
</tr>
<tr>
<td>Enteropogon</td>
<td>638</td>
</tr>
<tr>
<td>Echiochloa</td>
<td>767</td>
</tr>
<tr>
<td>Echium</td>
<td>900</td>
</tr>
<tr>
<td>Edgeworthia</td>
<td>608</td>
</tr>
<tr>
<td>Edsania</td>
<td>763</td>
</tr>
<tr>
<td>Egeria</td>
<td>98</td>
</tr>
<tr>
<td>Eichhornia</td>
<td>173</td>
</tr>
<tr>
<td>ELAEGNACEAE</td>
<td>495</td>
</tr>
<tr>
<td>Elaeagnus</td>
<td>495</td>
</tr>
<tr>
<td>ELATINACEAE</td>
<td>549</td>
</tr>
<tr>
<td>Elate</td>
<td>549</td>
</tr>
<tr>
<td>Eleocharis</td>
<td>240</td>
</tr>
<tr>
<td>Elephantopus</td>
<td>900</td>
</tr>
<tr>
<td>Eleusine</td>
<td>315</td>
</tr>
<tr>
<td>Eleutherococcus</td>
<td>991</td>
</tr>
<tr>
<td>Elionurus</td>
<td>315</td>
</tr>
<tr>
<td>Elliottia</td>
<td>723</td>
</tr>
<tr>
<td>Ellisia</td>
<td>770</td>
</tr>
<tr>
<td>Elodea</td>
<td>98</td>
</tr>
<tr>
<td>Elsholtzia</td>
<td>822</td>
</tr>
<tr>
<td>Elymus</td>
<td>315</td>
</tr>
<tr>
<td>Elyonurus</td>
<td>315</td>
</tr>
<tr>
<td>Elytraria</td>
<td>850</td>
</tr>
<tr>
<td>Elytriga</td>
<td>317, 336, 357</td>
</tr>
<tr>
<td>Elmestella</td>
<td>451</td>
</tr>
<tr>
<td>Emex</td>
<td>640</td>
</tr>
<tr>
<td>Emilia</td>
<td>901</td>
</tr>
<tr>
<td>Endoeca</td>
<td>76</td>
</tr>
<tr>
<td>Endormia</td>
<td>880</td>
</tr>
<tr>
<td>Endymion</td>
<td>166</td>
</tr>
<tr>
<td>Enemion</td>
<td>374</td>
</tr>
<tr>
<td>Enteropogon</td>
<td>318</td>
</tr>
<tr>
<td>Epibaterrum</td>
<td>368</td>
</tr>
<tr>
<td>Epilobium</td>
<td>581</td>
</tr>
<tr>
<td>Epipactis</td>
<td>133</td>
</tr>
<tr>
<td>EQUISETACEAE</td>
<td>27</td>
</tr>
<tr>
<td>Equisetum</td>
<td>27</td>
</tr>
<tr>
<td>Eragrostis</td>
<td>318, 332</td>
</tr>
<tr>
<td>Erantis</td>
<td>378</td>
</tr>
<tr>
<td>Erecchites</td>
<td>901</td>
</tr>
<tr>
<td>Eremochloa</td>
<td>320</td>
</tr>
<tr>
<td>Erinanthus</td>
<td>346, 347, 348</td>
</tr>
<tr>
<td>Erica</td>
<td>725</td>
</tr>
<tr>
<td>ERICACEAE</td>
<td>712</td>
</tr>
<tr>
<td>Erigenia</td>
<td>999</td>
</tr>
<tr>
<td>Erigeron</td>
<td>892, 893, 901</td>
</tr>
<tr>
<td>Eriobotrya</td>
<td>477</td>
</tr>
<tr>
<td>ERIOCALCEAE</td>
<td>183</td>
</tr>
<tr>
<td>Eriocaulon</td>
<td>183</td>
</tr>
<tr>
<td>Eriochloa</td>
<td>320</td>
</tr>
<tr>
<td>Eriogonum</td>
<td>640</td>
</tr>
<tr>
<td>Eriophorum</td>
<td>245</td>
</tr>
<tr>
<td>Erodium</td>
<td>571</td>
</tr>
<tr>
<td>Erophila</td>
<td>627</td>
</tr>
<tr>
<td>Eruca</td>
<td>627</td>
</tr>
<tr>
<td>Erucastrum</td>
<td>627</td>
</tr>
<tr>
<td>Erygium</td>
<td>999</td>
</tr>
<tr>
<td>Erysimum</td>
<td>627, 635</td>
</tr>
<tr>
<td>Erythrina</td>
<td>432</td>
</tr>
<tr>
<td>Erythroxys</td>
<td>139</td>
</tr>
<tr>
<td>Erythronium</td>
<td>23</td>
</tr>
<tr>
<td>Eschscholzia</td>
<td>367</td>
</tr>
<tr>
<td>Eubotrys</td>
<td>729</td>
</tr>
<tr>
<td>Euchlaena</td>
<td>360</td>
</tr>
<tr>
<td>Eudalia</td>
<td>329</td>
</tr>
<tr>
<td>Euphoria</td>
<td>541</td>
</tr>
<tr>
<td>EUPHORIACEAE</td>
<td>538</td>
</tr>
<tr>
<td>Eurybia</td>
<td>907</td>
</tr>
<tr>
<td>Eustachys</td>
<td>321</td>
</tr>
<tr>
<td>Eustoma</td>
<td>748</td>
</tr>
<tr>
<td>Euthemia</td>
<td>909</td>
</tr>
<tr>
<td>Eutochium</td>
<td>910</td>
</tr>
<tr>
<td>Evax</td>
<td>898</td>
</tr>
<tr>
<td>Evolvalus</td>
<td>777</td>
</tr>
<tr>
<td>Exochorda</td>
<td>477</td>
</tr>
<tr>
<td>FABACEAE</td>
<td>411</td>
</tr>
<tr>
<td>Facelis</td>
<td>911</td>
</tr>
<tr>
<td>FAGACEAE</td>
<td>507</td>
</tr>
<tr>
<td>Fagopyrum</td>
<td>640</td>
</tr>
<tr>
<td>Fagus</td>
<td>508</td>
</tr>
<tr>
<td>Falcaria</td>
<td>1001</td>
</tr>
<tr>
<td>Fallopia</td>
<td>641, 647</td>
</tr>
<tr>
<td>Fatoua</td>
<td>503</td>
</tr>
<tr>
<td>Festuca</td>
<td>321, 348, 360</td>
</tr>
<tr>
<td>Ficaria</td>
<td>384</td>
</tr>
<tr>
<td>Ficus</td>
<td>503</td>
</tr>
<tr>
<td>Filaginopsis</td>
<td>898</td>
</tr>
<tr>
<td>Filago</td>
<td>898, 911</td>
</tr>
<tr>
<td>Filipendula</td>
<td>477</td>
</tr>
<tr>
<td>Finnystis</td>
<td>132</td>
</tr>
<tr>
<td>Flaveria</td>
<td>911</td>
</tr>
<tr>
<td>Fleischmannia</td>
<td>912</td>
</tr>
<tr>
<td>Floerkea</td>
<td>613</td>
</tr>
<tr>
<td>Foeniculum</td>
<td>1001</td>
</tr>
<tr>
<td>Forestiera</td>
<td>790</td>
</tr>
<tr>
<td>Forsythia</td>
<td>790</td>
</tr>
<tr>
<td>Fothergilla</td>
<td>391</td>
</tr>
<tr>
<td>Fragaria</td>
<td>477</td>
</tr>
<tr>
<td>Frangula</td>
<td>497</td>
</tr>
<tr>
<td>Franklinia</td>
<td>703</td>
</tr>
<tr>
<td>Frasera</td>
<td>748</td>
</tr>
<tr>
<td>Fraxinus</td>
<td>791</td>
</tr>
<tr>
<td>Freesia</td>
<td>145</td>
</tr>
<tr>
<td>Froelichia</td>
<td>673</td>
</tr>
<tr>
<td>Fuirena</td>
<td>247</td>
</tr>
<tr>
<td>Fumaria</td>
<td>364</td>
</tr>
<tr>
<td>FUMARIACEAE</td>
<td>362</td>
</tr>
<tr>
<td>Funastrum</td>
<td>764</td>
</tr>
<tr>
<td>Guillardia</td>
<td>912</td>
</tr>
<tr>
<td>Galactia</td>
<td>432, 436</td>
</tr>
<tr>
<td>Galanthus</td>
<td>155</td>
</tr>
<tr>
<td>Galanthus</td>
<td>543, 544, 545</td>
</tr>
<tr>
<td>Galax</td>
<td>705</td>
</tr>
<tr>
<td>Gale</td>
<td>520</td>
</tr>
<tr>
<td>Galearts</td>
<td>133</td>
</tr>
<tr>
<td>Galenia</td>
<td>676</td>
</tr>
<tr>
<td>G Leoemadon</td>
<td>821</td>
</tr>
<tr>
<td>Galespiss</td>
<td>817</td>
</tr>
<tr>
<td>Galeorchis</td>
<td>133.</td>
</tr>
<tr>
<td>Galinsoga</td>
<td>912</td>
</tr>
<tr>
<td>Galium</td>
<td>738</td>
</tr>
<tr>
<td>Galypola</td>
<td>463</td>
</tr>
<tr>
<td>Gamochocerta</td>
<td>913</td>
</tr>
<tr>
<td>GARRYACEAE</td>
<td>737</td>
</tr>
<tr>
<td>Gastridium</td>
<td>322</td>
</tr>
<tr>
<td>Gastrynychia</td>
<td>659</td>
</tr>
<tr>
<td>Gaultheria</td>
<td>729</td>
</tr>
<tr>
<td>Gaur</td>
<td>584, 585</td>
</tr>
<tr>
<td>Gaylussacia</td>
<td>735</td>
</tr>
<tr>
<td>GELSEMIACEAE</td>
<td>754</td>
</tr>
<tr>
<td>Gelsemium</td>
<td>754</td>
</tr>
<tr>
<td>Genista</td>
<td>433</td>
</tr>
<tr>
<td>Gentiannella</td>
<td>750, 751</td>
</tr>
<tr>
<td>GENTIANACEAE</td>
<td>746</td>
</tr>
<tr>
<td>Geranium</td>
<td>571</td>
</tr>
<tr>
<td>Gerardia</td>
<td>839, 840, 841, 852</td>
</tr>
<tr>
<td>Geum</td>
<td>478, 479</td>
</tr>
<tr>
<td>Gibasis</td>
<td>171</td>
</tr>
<tr>
<td>Giberia</td>
<td>659</td>
</tr>
<tr>
<td>Gifola</td>
<td>911</td>
</tr>
<tr>
<td>Gilia</td>
<td>692</td>
</tr>
<tr>
<td>Gillenia</td>
<td>480</td>
</tr>
<tr>
<td>Ginkgo</td>
<td>61</td>
</tr>
<tr>
<td>GINKGOACEAE</td>
<td>61</td>
</tr>
<tr>
<td>Gladiolus</td>
<td>146</td>
</tr>
<tr>
<td>Glandularia</td>
<td>855</td>
</tr>
<tr>
<td>Glauclium</td>
<td>366</td>
</tr>
<tr>
<td>Glaux</td>
<td>701</td>
</tr>
<tr>
<td>Glebionis</td>
<td>914</td>
</tr>
<tr>
<td>Glechoma</td>
<td>826</td>
</tr>
<tr>
<td>Gleocedra</td>
<td>826</td>
</tr>
<tr>
<td>Gleditsia</td>
<td>433</td>
</tr>
<tr>
<td>GLEICHENIACEAE</td>
<td>34</td>
</tr>
<tr>
<td>Globifera</td>
<td>810</td>
</tr>
<tr>
<td>INDEX</td>
<td>1065</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>JUGLANDACEAE              ........................................ 520</td>
<td></td>
</tr>
<tr>
<td>Juglans                    ........................................ 523</td>
<td></td>
</tr>
<tr>
<td>JUNCACEAE                 ........................................ 185</td>
<td></td>
</tr>
<tr>
<td>JUNCAGINACEAE             ........................................ 100</td>
<td></td>
</tr>
<tr>
<td>Juncoideae                ........................................ 192</td>
<td></td>
</tr>
<tr>
<td>Juncus                    ........................................ 185</td>
<td></td>
</tr>
<tr>
<td>Juniperus                 ........................................ 68</td>
<td></td>
</tr>
<tr>
<td>Jussiaeae                 ........................................ 578</td>
<td></td>
</tr>
<tr>
<td>Justicia                  ........................................ 850</td>
<td></td>
</tr>
<tr>
<td>Kalianchoe                ........................................ 401</td>
<td></td>
</tr>
<tr>
<td>Kallstroemia              ........................................ 410</td>
<td></td>
</tr>
<tr>
<td>Kalmlia                   ........................................ 723</td>
<td></td>
</tr>
<tr>
<td>Kalmiella                 ........................................ 724</td>
<td></td>
</tr>
<tr>
<td>Kalopanax                 ........................................ 993</td>
<td></td>
</tr>
<tr>
<td>Kerria                    ........................................ 480</td>
<td></td>
</tr>
<tr>
<td>Kickxia                   ........................................ 799</td>
<td></td>
</tr>
<tr>
<td>Knautia                   ........................................ 989</td>
<td></td>
</tr>
<tr>
<td>Kniefia                  .......................................... 584, 585</td>
<td></td>
</tr>
<tr>
<td>Kochia                    ........................................ 670</td>
<td></td>
</tr>
<tr>
<td>Koeleria                  .......................................... 325, 347</td>
<td></td>
</tr>
<tr>
<td>Koelzia                  ............................................. 833, 834</td>
<td></td>
</tr>
<tr>
<td>Koelreuteria              .......................................... 596</td>
<td></td>
</tr>
<tr>
<td>Kolkwitza                 .......................................... 988</td>
<td></td>
</tr>
<tr>
<td>Kostelecky                 ....................................... 604</td>
<td></td>
</tr>
<tr>
<td>Krameria                  ....................................... 410</td>
<td></td>
</tr>
<tr>
<td>KRAMIERACAE               ....................................... 410</td>
<td></td>
</tr>
<tr>
<td>Kraunhia                  ......................................... 460</td>
<td></td>
</tr>
<tr>
<td>Krigia                    .......................................... 926</td>
<td></td>
</tr>
<tr>
<td>Kuhnia                    ........................................ 884</td>
<td></td>
</tr>
<tr>
<td>Kuhnistera                .......................................... 428</td>
<td></td>
</tr>
<tr>
<td>Kummerowia                ......................................... 435</td>
<td></td>
</tr>
<tr>
<td>Kyllinga                  .......................................... 248</td>
<td></td>
</tr>
<tr>
<td>Lablab                    .......................................... 436</td>
<td></td>
</tr>
<tr>
<td>Lachnagrostis             ........................................ 326</td>
<td></td>
</tr>
<tr>
<td>Lachnanthes               .......................................... 175</td>
<td></td>
</tr>
<tr>
<td>Lachnocaulon              .......................................... 184</td>
<td></td>
</tr>
<tr>
<td>Lactinaria                ........................................... 931, 932</td>
<td></td>
</tr>
<tr>
<td>Lackeya                  .......................................... 436</td>
<td></td>
</tr>
<tr>
<td>Lactuca                   .......................................... 926, 927</td>
<td></td>
</tr>
<tr>
<td>Lagascea                  .......................................... 928</td>
<td></td>
</tr>
<tr>
<td>Lagenaneris               .......................................... 530</td>
<td></td>
</tr>
<tr>
<td>Lagerstroemia             .......................................... 574</td>
<td></td>
</tr>
<tr>
<td>Lagurus                   .......................................... 326</td>
<td></td>
</tr>
<tr>
<td>LAMIACEAE                ........................................... 810</td>
<td></td>
</tr>
<tr>
<td>Lamiastylum               .......................................... 821</td>
<td></td>
</tr>
<tr>
<td>Lamium                    .......................................... 820, 821</td>
<td></td>
</tr>
<tr>
<td>LAMPROCAPNOS              ........................................ 364</td>
<td></td>
</tr>
<tr>
<td>Landoltia                 .......................................... 88</td>
<td></td>
</tr>
<tr>
<td>Lantana                   ........................................... 855</td>
<td></td>
</tr>
<tr>
<td>Lapithrea                 .......................................... 752, 753</td>
<td></td>
</tr>
<tr>
<td>Laportea                 .......................................... 505</td>
<td></td>
</tr>
<tr>
<td>Lappula                  ............................................. 766</td>
<td></td>
</tr>
<tr>
<td>Lappana                   .......................................... 928</td>
<td></td>
</tr>
<tr>
<td>LARDIZABALACEAE            ...................................... 367</td>
<td></td>
</tr>
<tr>
<td>Larix                    .......................................... 62</td>
<td></td>
</tr>
<tr>
<td>Lasioccoccus               ........................................ 736</td>
<td></td>
</tr>
<tr>
<td>Lathyrus                  .......................................... 436</td>
<td></td>
</tr>
<tr>
<td>LAURACEAE                 .......................................... 83</td>
<td></td>
</tr>
<tr>
<td>Laureoceras               .......................................... 485</td>
<td></td>
</tr>
<tr>
<td>Lavenaxia                .......................................... 585</td>
<td></td>
</tr>
<tr>
<td>Leavenworthia             ........................................ 628</td>
<td></td>
</tr>
<tr>
<td>Lechea                    .......................................... 611</td>
<td></td>
</tr>
<tr>
<td>Lecticula                 .......................................... 848</td>
<td></td>
</tr>
<tr>
<td>Leersia                   ........................................... 326</td>
<td></td>
</tr>
<tr>
<td>LEGUMINOSAE               ......................................... 411</td>
<td></td>
</tr>
<tr>
<td>Leiaden                     .......................................... 895</td>
<td></td>
</tr>
<tr>
<td>Leiofyllium               .......................................... 724</td>
<td></td>
</tr>
<tr>
<td>Leitneria                 .......................................... 599</td>
<td></td>
</tr>
<tr>
<td>LEITNERIACEAE             ......................................... 598</td>
<td></td>
</tr>
<tr>
<td>Lemna                    ............................................. 87</td>
<td></td>
</tr>
<tr>
<td>Lens                     ............................................. 437</td>
<td></td>
</tr>
<tr>
<td>LENTIBULARIACEAE          ......................................... 845</td>
<td></td>
</tr>
<tr>
<td>Leonotis                  .......................................... 827</td>
<td></td>
</tr>
<tr>
<td>Leontodon                 .......................................... 929, 974</td>
<td></td>
</tr>
<tr>
<td>Leonurus                 .......................................... 820, 823</td>
<td></td>
</tr>
<tr>
<td>Lepadina                 .......................................... 544</td>
<td></td>
</tr>
<tr>
<td>Lepidium                 ............................................ 629</td>
<td></td>
</tr>
<tr>
<td>Lepidostrobus             .......................................... 935</td>
<td></td>
</tr>
<tr>
<td>Lepidium                 ............................................ 842</td>
<td></td>
</tr>
<tr>
<td>Lepiton                  .......................................... 892, 893</td>
<td></td>
</tr>
<tr>
<td>Lepotchoa                .......................................... 326</td>
<td></td>
</tr>
<tr>
<td>Leptogloitidis            .......................................... 443</td>
<td></td>
</tr>
<tr>
<td>Leptotomis               .......................................... 813</td>
<td></td>
</tr>
<tr>
<td>Leptopus                 .......................................... 548</td>
<td></td>
</tr>
<tr>
<td>Lepturus                 .......................................... 324, 336</td>
<td></td>
</tr>
<tr>
<td>LEPEDOPTETALACEAE         ......................................... 532</td>
<td></td>
</tr>
<tr>
<td>Lepidopteron              .......................................... 532</td>
<td></td>
</tr>
<tr>
<td>Lepespedea                ........................................... 436, 437</td>
<td></td>
</tr>
<tr>
<td>Lesquerella               .......................................... 632, 633</td>
<td></td>
</tr>
<tr>
<td>Leucaena                 .......................................... 440</td>
<td></td>
</tr>
<tr>
<td>Leucanthemum             .......................................... 929</td>
<td></td>
</tr>
<tr>
<td>Leucojum                 .......................................... 155</td>
<td></td>
</tr>
<tr>
<td>Leucospora               .......................................... 800</td>
<td></td>
</tr>
<tr>
<td>Leucothoe                 .......................................... 726, 728, 729</td>
<td></td>
</tr>
<tr>
<td>Liatris                  .......................................... 929</td>
<td></td>
</tr>
<tr>
<td>Licania                  .......................................... 550</td>
<td></td>
</tr>
<tr>
<td>Ligularia                .......................................... 933</td>
<td></td>
</tr>
<tr>
<td>Ligusticum               .......................................... 1002</td>
<td></td>
</tr>
<tr>
<td>Liguistrum               .......................................... 792</td>
<td></td>
</tr>
<tr>
<td>Lilaceopsis              .......................................... 1002</td>
<td></td>
</tr>
<tr>
<td>LILIACEAE                .......................................... 122</td>
<td></td>
</tr>
<tr>
<td>Lilium                   .......................................... 124</td>
<td></td>
</tr>
<tr>
<td>LINNANTHACEAE            .......................................... 613</td>
<td></td>
</tr>
<tr>
<td>Linnobium                .......................................... 98</td>
<td></td>
</tr>
<tr>
<td>Linnodea                .......................................... 327</td>
<td></td>
</tr>
<tr>
<td>Linnophila               .......................................... 800</td>
<td></td>
</tr>
<tr>
<td>Limodorum                .......................................... 129, 130</td>
<td></td>
</tr>
<tr>
<td>Limonium                .......................................... 639</td>
<td></td>
</tr>
<tr>
<td>Limosella               .......................................... 800</td>
<td></td>
</tr>
<tr>
<td>LINACEAE                .......................................... 560</td>
<td></td>
</tr>
<tr>
<td>Linaria                 ............................................ 798, 800, 801</td>
<td></td>
</tr>
<tr>
<td>Lindera                 .......................................... 83</td>
<td></td>
</tr>
<tr>
<td>Linderris               .......................................... 809</td>
<td></td>
</tr>
<tr>
<td>LINDEIRIACEAE            .......................................... 808</td>
<td></td>
</tr>
<tr>
<td>Linnaea                 .......................................... 988</td>
<td></td>
</tr>
<tr>
<td>LINNAEACEAE            .......................................... 988</td>
<td></td>
</tr>
<tr>
<td>Linum                  ............................................. 560</td>
<td></td>
</tr>
<tr>
<td>Liparis                  .......................................... 135</td>
<td></td>
</tr>
<tr>
<td>Lipocarpus               .......................................... 249</td>
<td></td>
</tr>
<tr>
<td>Lippia                  .......................................... 855</td>
<td></td>
</tr>
<tr>
<td>Liquidambar              .......................................... 390</td>
<td></td>
</tr>
<tr>
<td>Liriodendron             .......................................... 79</td>
<td></td>
</tr>
<tr>
<td>Liriopoe                .......................................... 161</td>
<td></td>
</tr>
<tr>
<td>Listera                 .......................................... 135</td>
<td></td>
</tr>
<tr>
<td>Lithococca               .......................................... 773</td>
<td></td>
</tr>
<tr>
<td>Lithospermum             .......................................... 767</td>
<td></td>
</tr>
<tr>
<td>Litsea                   .......................................... 84</td>
<td></td>
</tr>
<tr>
<td>Livistona                .......................................... 168</td>
<td></td>
</tr>
<tr>
<td>LOASACEAE               .......................................... 690</td>
<td></td>
</tr>
<tr>
<td>Lobelia                  .......................................... 861</td>
<td></td>
</tr>
<tr>
<td>Loboluriae              .......................................... 630</td>
<td></td>
</tr>
<tr>
<td>LOGANIACEAE             .......................................... 753</td>
<td></td>
</tr>
<tr>
<td>Lolium                  .......................................... 327, 348</td>
<td></td>
</tr>
<tr>
<td>Loniceria               .......................................... 985</td>
<td></td>
</tr>
<tr>
<td>Lophiola                .......................................... 106</td>
<td></td>
</tr>
<tr>
<td>Lophochloa               .......................................... 347</td>
<td></td>
</tr>
<tr>
<td>Lophophorocarpus         .......................................... 95, 97</td>
<td></td>
</tr>
<tr>
<td>Lorinseria              .......................................... 53</td>
<td></td>
</tr>
<tr>
<td>Lotus                   .......................................... 413, 440</td>
<td></td>
</tr>
<tr>
<td>Ludwigia               .......................................... 576</td>
<td></td>
</tr>
<tr>
<td>Ludwigiantha             .......................................... 578</td>
<td></td>
</tr>
<tr>
<td>Luffa                   .......................................... 529</td>
<td></td>
</tr>
<tr>
<td>Lunaria                 .......................................... 630</td>
<td></td>
</tr>
<tr>
<td>Lupinus                 .......................................... 440</td>
<td></td>
</tr>
<tr>
<td>Luzola                 .......................................... 328</td>
<td></td>
</tr>
<tr>
<td>Lycophyllum             .......................................... 193</td>
<td></td>
</tr>
<tr>
<td>Lychnis                 .......................................... 662</td>
<td></td>
</tr>
<tr>
<td>Lycium                  .......................................... 783</td>
<td></td>
</tr>
<tr>
<td>Lycopersicon             .......................................... 788</td>
<td></td>
</tr>
<tr>
<td>LYCOPODIACEAE            ......................................... 17</td>
<td></td>
</tr>
<tr>
<td>Lycopodiella            .......................................... 18, 20</td>
<td></td>
</tr>
<tr>
<td>Lycopodioides            .......................................... 25, 26</td>
<td></td>
</tr>
<tr>
<td>Lycopodium              .......................................... 18, 19, 20, 21</td>
<td></td>
</tr>
<tr>
<td>Lycopsis               .......................................... 767</td>
<td></td>
</tr>
<tr>
<td>Lycopus                 .......................................... 827</td>
<td></td>
</tr>
<tr>
<td>Lycoris                 .......................................... 155</td>
<td></td>
</tr>
<tr>
<td>Lygodesium              .......................................... 933</td>
<td></td>
</tr>
<tr>
<td>LYGODIACEAE              ......................................... 34</td>
<td></td>
</tr>
<tr>
<td>Lygodium                .......................................... 34</td>
<td></td>
</tr>
<tr>
<td>Lyonia                  .......................................... 726, 764</td>
<td></td>
</tr>
<tr>
<td>Lysimachia              .......................................... 700</td>
<td></td>
</tr>
<tr>
<td>LYTTHACEAE              .......................................... 572</td>
<td></td>
</tr>
<tr>
<td>Lythrum                 .......................................... 574</td>
<td></td>
</tr>
<tr>
<td>Lythrum                 .......................................... 574</td>
<td></td>
</tr>
<tr>
<td>Maackia                 .......................................... 441</td>
<td></td>
</tr>
<tr>
<td>Macbridea               .......................................... 816</td>
<td></td>
</tr>
<tr>
<td>Macfadyena              .......................................... 854</td>
<td></td>
</tr>
<tr>
<td>Macleaya                .......................................... 366</td>
<td></td>
</tr>
<tr>
<td>Maclura                 .......................................... 503</td>
<td></td>
</tr>
<tr>
<td>Macranthera             .......................................... 840</td>
<td></td>
</tr>
<tr>
<td>Macroptilium             .......................................... 441</td>
<td></td>
</tr>
<tr>
<td>Macrothelypteris        .......................................... 49</td>
<td></td>
</tr>
<tr>
<td>Macunalliamia           .......................................... 796</td>
<td></td>
</tr>
<tr>
<td>Madia                   .......................................... 933</td>
<td></td>
</tr>
<tr>
<td>Magnolia                .......................................... 79</td>
<td></td>
</tr>
<tr>
<td>MAGNOLIACEAE            ......................................... 79</td>
<td></td>
</tr>
<tr>
<td>Mahonia                 .......................................... 369, 370</td>
<td></td>
</tr>
<tr>
<td>MAOIAENHUM             .......................................... 161</td>
<td></td>
</tr>
<tr>
<td>Malachondron             .......................................... 704</td>
<td></td>
</tr>
<tr>
<td>Malaxis                 .......................................... 136</td>
<td></td>
</tr>
<tr>
<td>Malus                   .......................................... 480</td>
<td></td>
</tr>
<tr>
<td>Malva                   .......................................... 604</td>
<td></td>
</tr>
<tr>
<td>MALVACEAE              .......................................... 599</td>
<td></td>
</tr>
<tr>
<td>Malvastrum              .......................................... 604</td>
<td></td>
</tr>
<tr>
<td>Malvaviscus             .......................................... 605</td>
<td></td>
</tr>
<tr>
<td>Manfreda                .......................................... 163</td>
<td></td>
</tr>
<tr>
<td>Manihot                .......................................... 546</td>
<td></td>
</tr>
<tr>
<td>Mansuris                .......................................... 294, 295, 347</td>
<td></td>
</tr>
<tr>
<td>Mappia                  .......................................... 825</td>
<td></td>
</tr>
<tr>
<td>MARANTACEAE             .......................................... 176</td>
<td></td>
</tr>
</tbody>
</table>
INDEX

Marganaria .................. 59
Marina ..................... 954
Marilaiunidum ............ 770
Mariscus .................. 232
Marrubium ................ 820
Marshallia ................ 933
Marsee ..................... 35
MARSILEACEAE ........... 35
Martius .......... 425
Martyngia ............ 857
MARTYNGIAE .......... 857
Maruta ..................... 876
Matelea ................... 762, 763
Maticria ............. 935, 976
Matteuccia ................ 52
Matthiola .................. 631
Mayca ..................... 185
MAYACEAE ................. 185
Mazus ..................... 856
Medertonia ............ 880
Medeola ................. 126
Medicace ................. 441
Meehania ................. 828
Megalodonta .......... 882, 884
Megalacha ............... 328
Meloboma ............. 430, 432, 434
Melaleuca ............... 585
Melampodium .......... 871, 935
Melampyrum ............ 844
Melandrium ............. 662
Melanthera .......... 935
MELANANCEAE ...... 115
Mellantheim .......... 117, 118
MELASTOMACEAE ...... 586
Melia ...................... 599
MELIACEAE .......... 599
Melica ..................... 328
Melilotos ................ 442
Melinis .................. 329
Melissa .................. 828
Melochia ................. 605
Melothria ............... 530
MENISPERMACEAE ...... 367
Menispernum ........... 368
Mentha .................. 828
Mentzelia ................ 599
MENYANTHEACEAE ..... 867
Menyanthes ............ 867
Menzesia ................ 719
Mercurialis ............ 546
Merremia ................. 779
Mertensia ............... 768
Mesadenia ............... 878
Micheliellia .......... 821, 822
Micrampelis ........... 529
Micranthemum ........ 809, 810
Micranthes ................ 398
Microsera ............... 398
Micropiper ............. 75
Micropolyodium ..... 58
Microtseugium .......... 329
Microthlaspi ........... 631
Mikania .................. 935
Milium .................... 329
Mimoso .................. 428, 443
Mimulus .................. 836
Minuartia ................ 656
Minuopsis ............... 656
Mirabilis ................ 678
Miscanthidium ....... 347, 348
Miscanthus .............. 329
Mispates ................. 801
Mitchella ................. 744
Mitella ................... 399
Mitracarpus ............. 744
Mitreola ................ 753
Mnesithia ............... 294, 295, 324
Modiola .................... 605
Moeeringia .............. 657
Moenchia ................. 657
Molavica ................ 826
MOLLUGINACEA .......... 679
Mollugo ................ 679
Momisla .................. 501
Momordica ............... 528
Monanthochloe ......... 314
Monarda ................... 829
Monerma .................. 324
Monetropa .............. 717, 718
Monotropis ................ 718
Montia ...................... 680
MONTIACEAE ........... 679
MORACEAE ............. 502
Morella ..................... 518
Moricandia ............... 632
Morus ....................... 504
Mosla ....................... 822
Mucuna ..................... 443
Muhlenbergia .......... 329
Mulgeidium .............. 928
Murannia ................. 172
Murrcauda ................ 91
Muscardina .............. 410
Muscai ....................... 166
Myosotis .................. 768
Myasotony ................. 657
Myosurus .................. 385
Myrica ........... 518, 519, 520
MYRACEAE ............... 518
Myriophyllum ........... 404
Mysine ...................... 699
MYRTACEAE ........... 585
Nabalus ..................... 944
Najas ......................... 98
Najas ......................... 98
Nama ....................... 770, 789
Nandina ................. 368
Napea ....................... 606
Narcissus ............... 156
NARTHECIACEAE ..... 105
Narthecium .............. 106
Nassella ................... 332
Nasturtium ............... 631
Naumburgia .............. 702
Navarretia ............... 692
Nazia ......................... 357
Neeragrostis ............ 332
Negundo .................. 593
Neillia ..................... 481
Netulo ...................... 389
NELUMBONACEAE ..... 389
Nemastylis .......... 145, 148
Nemexia ................ 120, 121
Nemopanthes ........... 860
Nemophila ................. 770
Neobeckia ................. 634
Neoleome ............ 615, 616
Neocondon ................. 867
Neoleop .................. 630
Neopiers ................. 727
Neottia .................... 135
Nepeta ..................... 831
NEPHROELPIDACEAE .... 57
Nepholpitis ................. 57
Netania ...................... 443
Nerium ..................... 763
Nestrion ................. 637
Neebeckia ............. 147, 148
Nevisia ..................... 481
Nicandra ................... 783
Nicotiana ................. 783
Nierembergia ........... 784
Nigella ..................... 378
Nintoo ..................... 986
Nolina ...................... 162
Norta ....................... 635
Nothoalena ............. 39, 41
Notholcus ................. 325
Nothoscutum .......... 154
Nuphar .................... 71
Nutallanthus ........... 801
NYCTAGINACEAE ...... 678
Nycteria .................... 770
Nymphaea .............. 72, 73
NYMPHACAE ............ 71
Nymphoids ............ 868
Nyssa ....................... 687
NYSSACEAE ............ 687
Oakesiella ................ 119
Obalaria ................... 751
Oceanorra ................. 117
Ocimum ..................... 831
Oclemena ................ 936
Odontonychia .......... 658, 659
Odontostephana ....... 763
Oenanthe .................. 1002
Oenothera ............... 582
OLACACEAE .......... 636
Oldenlandia ........... 744, 745
OLEACEAE ............... 789
Oligoneuron .......... 961, 962
ONAGRACEAE .......... 576
Onoclea .................... 52
ONOCLEACEAE .......... 52
Onopordum ............... 936
Onosmodium ............ 769
Oerculina ................. 780
OPHIOPHLODACEAE .... 28
Ophiglossum ........... 28
| Page Dimensions: 612.0x792.0 |

### Index

<table>
<thead>
<tr>
<th>Page</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>133</td>
<td>Parkinonía</td>
</tr>
<tr>
<td>332</td>
<td>Parnassia</td>
</tr>
<tr>
<td>136</td>
<td>Parnassiales</td>
</tr>
<tr>
<td>936</td>
<td>Paronychia</td>
</tr>
<tr>
<td>482</td>
<td>Parsonia</td>
</tr>
<tr>
<td>683</td>
<td>Parthenium</td>
</tr>
<tr>
<td>444</td>
<td>Parthenocissus</td>
</tr>
<tr>
<td>127</td>
<td>Paspalyrium</td>
</tr>
<tr>
<td>350</td>
<td>Paspalum</td>
</tr>
<tr>
<td>336</td>
<td>Paspalum</td>
</tr>
<tr>
<td>530</td>
<td>Passiflora</td>
</tr>
<tr>
<td>1004</td>
<td>Pausinctoria</td>
</tr>
<tr>
<td>837</td>
<td>Paulownia</td>
</tr>
<tr>
<td>135</td>
<td>Pavonia</td>
</tr>
<tr>
<td>355</td>
<td>Piauxistima</td>
</tr>
<tr>
<td>632</td>
<td>Piosonia</td>
</tr>
<tr>
<td>58</td>
<td>Pecluma</td>
</tr>
<tr>
<td>450</td>
<td>Pectis</td>
</tr>
<tr>
<td>810</td>
<td>PEDALIAE:</td>
</tr>
<tr>
<td>844</td>
<td>Pedicularis</td>
</tr>
<tr>
<td>445</td>
<td>Pediolum</td>
</tr>
<tr>
<td>450</td>
<td>Petranisia</td>
</tr>
<tr>
<td>39, 41</td>
<td>Petalla</td>
</tr>
<tr>
<td>89</td>
<td>Pelandra</td>
</tr>
<tr>
<td>340</td>
<td>Pennisetum</td>
</tr>
<tr>
<td>801</td>
<td>Pentstemon</td>
</tr>
<tr>
<td>695</td>
<td>PENTAPHYLACÉAE</td>
</tr>
<tr>
<td>47</td>
<td>Penthaphylloides</td>
</tr>
<tr>
<td>404</td>
<td>PENTOTHORACEAE</td>
</tr>
<tr>
<td>404</td>
<td>Penthorum</td>
</tr>
<tr>
<td>745</td>
<td>Pentodon</td>
</tr>
<tr>
<td>75</td>
<td>Peréromia</td>
</tr>
<tr>
<td>574</td>
<td>Peplis</td>
</tr>
<tr>
<td>531</td>
<td>Peps</td>
</tr>
<tr>
<td>134</td>
<td>Peramium</td>
</tr>
<tr>
<td>1004</td>
<td>Perideridia</td>
</tr>
<tr>
<td>822</td>
<td>Perilla</td>
</tr>
<tr>
<td>940</td>
<td>Perileura</td>
</tr>
<tr>
<td>764</td>
<td>Periplaca</td>
</tr>
<tr>
<td>787</td>
<td>Perzoma</td>
</tr>
<tr>
<td>84</td>
<td>Persea</td>
</tr>
<tr>
<td>642</td>
<td>Persicaria</td>
</tr>
<tr>
<td>427</td>
<td>Petalostemon</td>
</tr>
<tr>
<td>940</td>
<td>Petasites</td>
</tr>
<tr>
<td>677</td>
<td>PETEVERIAEAE</td>
</tr>
<tr>
<td>659</td>
<td>Petrohagia</td>
</tr>
<tr>
<td>403</td>
<td>Petroseum</td>
</tr>
<tr>
<td>1004</td>
<td>Petroselinum</td>
</tr>
<tr>
<td>781, 784</td>
<td>Petunia</td>
</tr>
<tr>
<td>1002</td>
<td>Peucedanum</td>
</tr>
<tr>
<td>418</td>
<td>Phaca</td>
</tr>
<tr>
<td>771</td>
<td>Phaceliæ</td>
</tr>
<tr>
<td>978</td>
<td>Phaethusa</td>
</tr>
<tr>
<td>341</td>
<td>Phalaris</td>
</tr>
<tr>
<td>341</td>
<td>Phanopyrum</td>
</tr>
<tr>
<td>779</td>
<td>Pharthitis</td>
</tr>
<tr>
<td>441, 446</td>
<td>Phaseolus</td>
</tr>
<tr>
<td>49</td>
<td>Phegopteris</td>
</tr>
<tr>
<td>597</td>
<td>Pheliodendron</td>
</tr>
<tr>
<td>680</td>
<td>Phemeranthus</td>
</tr>
<tr>
<td>986</td>
<td>Phelium</td>
</tr>
<tr>
<td>690</td>
<td>Phelium</td>
</tr>
<tr>
<td>98</td>
<td>Philotria</td>
</tr>
<tr>
<td>59</td>
<td>Phlebodium</td>
</tr>
<tr>
<td>341</td>
<td>Phleum</td>
</tr>
<tr>
<td>692</td>
<td>Phlox</td>
</tr>
<tr>
<td>940</td>
<td>Phoeanthus</td>
</tr>
<tr>
<td>336</td>
<td>Pholidotus</td>
</tr>
<tr>
<td>637</td>
<td>Phoradendron</td>
</tr>
<tr>
<td>468, 481, 483</td>
<td>Photinia</td>
</tr>
<tr>
<td>342</td>
<td>Phragmites</td>
</tr>
<tr>
<td>837</td>
<td>Phryma</td>
</tr>
<tr>
<td>836</td>
<td>PHYRMAEAE</td>
</tr>
<tr>
<td>855</td>
<td>Phyla</td>
</tr>
<tr>
<td>548</td>
<td>PHYLANTHACEAE</td>
</tr>
<tr>
<td>548</td>
<td>Phyllanthopsis</td>
</tr>
<tr>
<td>548</td>
<td>Phyllanthus</td>
</tr>
<tr>
<td>47</td>
<td>Phyllitis</td>
</tr>
<tr>
<td>342</td>
<td>Physostachys</td>
</tr>
<tr>
<td>781, 784</td>
<td>Physalis</td>
</tr>
<tr>
<td>83</td>
<td>Physalodes</td>
</tr>
<tr>
<td>632</td>
<td>Physaria</td>
</tr>
<tr>
<td>482</td>
<td>Physocarpus</td>
</tr>
<tr>
<td>816</td>
<td>Physostegia</td>
</tr>
<tr>
<td>139</td>
<td>Physorhiza</td>
</tr>
<tr>
<td>677</td>
<td>Phytolacca</td>
</tr>
<tr>
<td>677</td>
<td>PHYTOLECAEAE</td>
</tr>
<tr>
<td>174</td>
<td>Pears</td>
</tr>
<tr>
<td>63</td>
<td>Picea</td>
</tr>
<tr>
<td>924</td>
<td>Pinus</td>
</tr>
<tr>
<td>940</td>
<td>Picea</td>
</tr>
<tr>
<td>726</td>
<td>Pieris</td>
</tr>
<tr>
<td>506</td>
<td>Pilea</td>
</tr>
<tr>
<td>831</td>
<td>Piloblephar</td>
</tr>
<tr>
<td>923, 924</td>
<td>Pilosella</td>
</tr>
<tr>
<td>462, 463</td>
<td>Pilostaxis</td>
</tr>
<tr>
<td>35</td>
<td>Pilularia</td>
</tr>
<tr>
<td>1004</td>
<td>Pimpinella</td>
</tr>
<tr>
<td>61</td>
<td>PINACEÆ</td>
</tr>
<tr>
<td>745</td>
<td>Pinckneya</td>
</tr>
<tr>
<td>91</td>
<td>Pinellia</td>
</tr>
<tr>
<td>845</td>
<td>Pinguiulus</td>
</tr>
<tr>
<td>63</td>
<td>Pinus</td>
</tr>
<tr>
<td>75</td>
<td>PIPERACEÆ</td>
</tr>
<tr>
<td>343</td>
<td>Piptatherum</td>
</tr>
<tr>
<td>343</td>
<td>Piptochaetum</td>
</tr>
<tr>
<td>551</td>
<td>Piriqucta</td>
</tr>
<tr>
<td>589</td>
<td>Pistacia</td>
</tr>
<tr>
<td>90</td>
<td>Pistia</td>
</tr>
<tr>
<td>446</td>
<td>Pism</td>
</tr>
<tr>
<td>447</td>
<td>Pitcheria</td>
</tr>
<tr>
<td>990</td>
<td>PITTOSPORACEÆ</td>
</tr>
<tr>
<td>990</td>
<td>Pittosporum</td>
</tr>
<tr>
<td>941</td>
<td>Pityopsis</td>
</tr>
<tr>
<td>82</td>
<td>Pityothamnus</td>
</tr>
<tr>
<td>770</td>
<td>Plagiothryrs</td>
</tr>
<tr>
<td>499</td>
<td>Planera</td>
</tr>
<tr>
<td>633</td>
<td>Planodes</td>
</tr>
<tr>
<td>794</td>
<td>PLANTAGINACEÆ</td>
</tr>
<tr>
<td>803</td>
<td>Plantago</td>
</tr>
<tr>
<td>389</td>
<td>PLANTANACEÆ</td>
</tr>
<tr>
<td>136</td>
<td>Platanthera</td>
</tr>
<tr>
<td>389</td>
<td>Platanus</td>
</tr>
<tr>
<td>Index</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>Stylyps</td>
<td>480</td>
</tr>
<tr>
<td>Styphnolobium</td>
<td>452</td>
</tr>
<tr>
<td>STRYCARACEAE</td>
<td>706</td>
</tr>
<tr>
<td>Styx</td>
<td>707</td>
</tr>
<tr>
<td>Suaeda</td>
<td>676</td>
</tr>
<tr>
<td>Sullivantia</td>
<td>400</td>
</tr>
<tr>
<td>Suida</td>
<td>686, 687</td>
</tr>
<tr>
<td>Sveria</td>
<td>748</td>
</tr>
<tr>
<td>Svida</td>
<td>686, 687</td>
</tr>
<tr>
<td>Symphoricarpos</td>
<td>987</td>
</tr>
<tr>
<td>Symphyotrichum</td>
<td>874, 966</td>
</tr>
<tr>
<td>Symphytum</td>
<td>770</td>
</tr>
<tr>
<td>SYMPLOACEAE</td>
<td>704</td>
</tr>
<tr>
<td>Symlocarpus</td>
<td>87</td>
</tr>
<tr>
<td>Symlocos</td>
<td>704</td>
</tr>
<tr>
<td>Synandra</td>
<td>816</td>
</tr>
<tr>
<td>Synedesmon</td>
<td>376</td>
</tr>
<tr>
<td>Synechrella</td>
<td>973</td>
</tr>
<tr>
<td>Syngonanthus</td>
<td>185</td>
</tr>
<tr>
<td>Syosa</td>
<td>951</td>
</tr>
<tr>
<td>Syntherisma</td>
<td>313, 314</td>
</tr>
<tr>
<td>Syringa</td>
<td>794</td>
</tr>
<tr>
<td>Syringodium</td>
<td>105</td>
</tr>
<tr>
<td>Taenia</td>
<td>1004, 1007</td>
</tr>
<tr>
<td>Tagetes</td>
<td>974</td>
</tr>
<tr>
<td>TALINACEAE</td>
<td>681</td>
</tr>
<tr>
<td>Talinum</td>
<td>680, 681</td>
</tr>
<tr>
<td>Tamala</td>
<td>84</td>
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