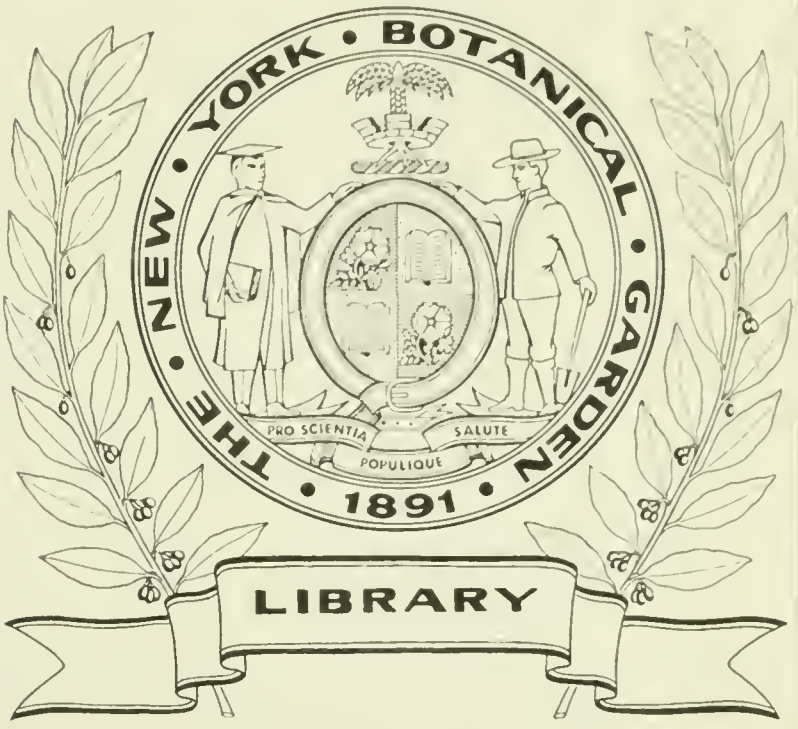


# PHYTOLOGIA

*Designed to expedite botanical publication*

Vol. 18 December, 1968 No. 1

CONTENTS





Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, $1; per volume, $6.75 in advance,
or $7 at close of volume

# THE NOMENCLATURE AND SYNONOMY OF THE AMARANTHACEAE, CHENOPODIACEAE AND NYCTAGINACEAE OF THE FLORA OF TEXAS

Clyde F. Reed*

During the preparation of the manuscripts of the families, Amaranthaceae, Chenopodiaceae and Nyctaginaceae, for the Manual of the Flora of Texas and for the Flora of Texas, the author has had to deal with many taxa and synonyms. In the Manual most of the taxa will appear without synonomy. However, in the Flora of Texas, not only the symonomy will be given, but also the type specimens or their type locality will be given for all acceptable species in the families in the Flora of Texas.

The author has seen the types in the United States National Herbarium, the herbaria of the New York Botanical Gardens, of Harvard University, of the University of Texas, of Southern Methodist University, of A & M College of Texas and of Texas Research Foundation at Renner.

There has been no extensive treatment of these families for western United States, except statewise, since Standley's monograph in the North American Flora (1916-1918). Subsequent studies of western species has shown that many are synonyms of each other. A paper here or there has straightened out a few species or rarely a whole genus. Since my interest at this time only concerns those species found in Texas, only their taxonomy and synonomy will be considered here.

## AMARANTHACEAE

Represented in Texas by 13 genera and 67 species and varieties.

1. CELOSIA L., Sp. Pl., 205. 1753; Standl., N. Amer. Fl., 21(2): 96. 1917. Syn.: Amaranthus Adans., Fam. Pl., 2: 269. 1763, non L. 1753; Sukana Adans., Fam. Pl., 2: 269. 1763; Lestibudesia Thouars, Hist. Veg. Iles Afr., 53. 1806; Lophoxera Raf., Fl. Tell., 3: 42. 1837; Gonufas Raf., Sylva Tell., 124. 1838.

---

* Reed Herbarium, Baltimore, Maryland; Research Botanist and Plant Explorer for United States Department of Agriculture; Collaborator in Department of Botany, Smithsonian Institution.

1a. Celosia argentea L., Sp. Pl., 205. 1753; Standl., N. Amer. Fl., 21(2): 97. 1917. COCKSCOMB.

1b. Celosia argentea forma cristata (L.) Kuntze, Rev. Gen. Pl., 541. 1891. COCKSCOMB. Syn.: Celosia cristata L., Sp. Pl., 205. 1753; C. margaritacea L., Sp. Pl., ed. 2, 297. 1763; C. marilandica Retz., Obs. Bot., 3: 27. 1783; C. pallida Salisb., Prodr., 145. 1796; Amaranthus purpureus Nieuwl., Amer. Midl. Nat., 3: 279.1914.

2. Celosia nitida Vahl, Symb., 3: 44. 1791; Standl., N. Amer. Fl., 21(2): 98. 1917. ALBAHACA. Syn.: Celosia paniculata sensu Krebs, non L. 1753; Small, Fl. SE. U.S., 1st ed., 390. 1913; C. texana Scheele, Linnaea, 22: 148. 1849; Lestibudesia paniculata R.Br., Prodr., 414. 1801; Lophoxera paniculata Raf., Fl. Tell., 3: 42. 1837; Gonufas paniculata Raf., Sylva Tell., 124. 1838.

3. Celosia palmeri S.Wats., Proc. Amer. Acad., 18: 143. 1883; Standl., N. Amer. Fl., 21(2): 97. 1917.

2. AMARANTHUS L., Sp. Pl., 989. 1753; Standl., N. Amer. Fl., 21(2): 101. 1917. PIGWEED, AMARANTH.

1. Amaranthus palmeri S.Wats., Proc. Amer. Acad., 12: 274. 1877; Standl., N. Amer. Fl., 21(2): 106. 1917; Sauer, Madrona, 13: 31-36, fig. 8. 1955. PALMER AMARANTH. Syn.: Amaranthus palmeri var. glomeratus Uline et Bray, Bot. Gaz., 19: 272. 1894.

2. Amaranthus arenicola I.M.Johnston, Journ. Arnold Arb., 29: 193. 1948; Sauer, Madrona, 13: 39-42, fig. 10. 1955. SANDHILLS AMARANTH. Syn.: Sarratia berlandieri Torr., Bot. Mex. Bound. Surv., 179. 1859, non S. berlandieri Moq.; Amblogyne torreyi A.Gray, Proc. Amer. Acad., 5: 167. 1861 (in part, not as to type); Amaranthus torreyi (A.Gray) Benth. in S. Wats., Bot. Calif., 2: 42. 1880 (in part); Uline et Bray, Bot. Gaz., 19: 272. 1894.

3. Amaranthus greggii S.Wats., Proc. Amer. Acad., 12: 274. 1877; Standl., N. Amer. Fl., 21(2): 105. 1917; Sauer, Madrona, 13: 42-44, fig. 11. 1955. GREGG AMARANTH. Syn.: Amaranthus greggii var. muelleri Uline et Bray, Bot. Gaz., 19: 272. 1894; A. myrianthus Standl., Bull. Torr. Bot. Club, 41: 506. 1914; Blake, Journ. Bot., 53: 103. 1915; Standl., N. Amer. Fl., 21(2): 105. 1917.

4. Amaranthus crassipes Schlecht., Linnaea, 6: 757. 1831; Standl., N. Amer. Fl., 21(2): 104. 1917. Syn.: Scleropus crassipes Schlecht.) Moq. in DC. Prodr., 13(2): 271. 1849; Euxolus crassipes (Schlecht.) Hieron., Bol. Acad. Mus. Cordoba, 4: 13. 1881; Scleropus amaranthoides Schrad., Ind. Sem. Hort. Goetting, 1835; Linnaea, 11: Litt.-Ber. 89. 1837; Amaranthus warnockii I.M.Johnston, Journ. Arnold Arb., 25: 153. 1944.

5. Amaranthus scleropoides Uline et Bray, Bot. Gaz., 19: 316. 1894; Standl., N. Amer. Fl., 21(2): 104. 1917. BONEBRACT AMARANTH. Syn.: Amaranthus blitoides var. reverchoni Uline et Bray, Bot. Gaz., 19: 315. 1894; A. blitoides var. scleropoides (Uline et Bray) Thell. in Aschers. u. Graebn., Syn. Mitteleur. Fl., 5(Abt.): 293. 1914; A. blitoides var. reverchoni forma scleropoides (Uline et Bray) Thell. ex Probst., Mitteil. Naturfor. Gesellsch. Solothurn, 8: 59. 1928.

6. Amaranthus berlandieri (Moq.) Uline et Bray, Bot. Gaz., 19: 268. 1894; Standl., N. Amer. Fl., 21(2): 105. 1917. BERLANDIER AMARANTH. Syn.: Sarratia berlandieri Moq. in DC. Prodr., 13(2): 268. 1849.

7. Amaranthus polyponoides L., Pl. Jam. Pug., 2: 27. 1759; Uline et Bray, Bot. Gaz., 19: 269. 1894; Standl., N. Amer. Fl., 21(2): 104. 1917. TROPICAL AMARANTH. Syn.: Roemeria polygonoides (L.) Moench., Meth., 341. 1794; Amblogyna polygonoides (L.) Raf., Fl. Tell., 3: 42. 1836 (1837); Albersia polygonoides Kunth, Fl. Berol., ed. 2, 2: 144. 1838; Sarratia polygonoides Moq. in DC. Prodr., 13(2): 270 (pro syn.). 1849; Amarantus polygonoides Hemsley, Biol. Cent. Amer., 3: 14 (in part). 1882; Amaranthus verticellatus Pavon in Moq. in DC. Prodr., 13(2): 270 (pro syn.). 1849.

8. Amaranthus obcordatus (A.Gray) Standl., N. Amer. Fl., 21(2): 107. 1917. Syn.: Amblogyne urceolata var. obcordata A.Gray, Proc. Amer. Acad., 5: 168. 1861; Amaranthus urceolatus var. obcordatus (A.Gray) Uline et Bray, Bot. Gaz., 19: 269. 1894; A. urceolatus var. jonesii Uline et Bray, Bot. Gaz., 19: 269. 1894.

9. Amaranthus chihuahuensis S. Wats., Proc. Amer. Acad., 21: 436. 1886; Standl., N. Amer. Fl., 21(2): 108. 1917.

10. Amaranthus torreyi (A.Gray) Benth. ex S.Wats., Bot. Calif., 2: 42. 1880; I.M.Johnston, Journ. Arnold Arb., 25: 155. 1944. TORREY AMARANTH. Syn.: Sarratia berlandieri sensu Torr., Bot. Mex. Bound. Surv., 178. 1859; Amblogyne torreyi A.Gray, Proc. Amer. Acad., 5: 167. 1861; Sarratia berlandieri var. emarginata Torr., Bot. Mex. Bound. Surv., 179. 1859; Amaranthus pringlei S.Wats., Proc. Amer. Acad., 22: 476. 1887; Standl., N. Amer. Fl., 21(2): 110. 1917; A. bigelovii Uline et Bray, Bot. Gaz., 19: 271. 1894; Standl., N. Amer. Fl., 21(2): 109. 1917; A. bigelovii var. emarginata (Torr.) Uline et Bray, Bot. Gaz., 19: 271. 1894.

11. Amaranthus fimbriatus (Torr.) Benth. ex S.Wats., Bot. Calif., 2: 42. 1880; Standl., N. Amer. Fl., 21(2): 109. 1917. FRINGED AMARANTH. Syn.: Sarratia berlandieri var. fimbriata Torr., Bot. Mex. Bound. Surv., 179. 1859; Amblogyna fimbriata (Torr.) A.Gray, Proc. Amer. Acad., 5: 167. 1861.

12. Amaranthus spinosus L., Sp. Pl., 991. 1753; Standl., N. Amer. Fl., 21(2): 114. 1917. SPINY AMARANTH, SPINY PIGWEED. Syn.: Amaranthus diacanthus Raf., Fl. Ludov., 31. 1817; A. caracasanus HBK., Nov. Gen. et Sp., 2: 195. 1817; A. spinosus var. rubricaulis Hassk., Flora, 25: Litt. 20. 1842; A. spinosus var. viridicaulis Hassk., Flora, 25: Litt. 20. 1842; A. spinosus var. purpurascens Moq. in DC. Prodr., 13(2): 260. 1849; A. spinosus var. inermis Schum. et Laut., Fl. Deuts. Schutz. Südsee, 305. 1900; A. spinosus var. circumscissus Thell. in Asch. u. Graebn., Syn. Mitteleur. Fl., 5: 269. 1914; A. spinosus var. indehiscens Thell. in Asch. u. Graebn., Syn. Mitteleur. Fl., 5: 269. 1914; A. spinosus var. basiscissus Thell. in Asch. u. Graebn., Syn. Mitteleur. Fl., 5: 269. 1914; Galliaria spinosa (L.) Nieuwl., Amer. Midl. Nat., 3: 278. 1914.

13. Amaranthus hypochondriacus L., Sp. Pl., 991. 1753; Sauer, Ann. Missouri Bot. Gard., 54(2): 110-122. 1967. PRINCE'S-FEATHER, PRINCE-OF-WALES FEATHER. Syn.: Amaranthus flavus L., Syst. Nat., ed. 10, 2: 1269. 1759; A. frumentaceus Buch.-Hamilton ex Roxb., Fl. Ind., 3: 613. 1832; A. anardans Buch.-Hamilton in Wall. ex Moq. in DC. Prodr., 13(2): 256. 1849; A. hybridus L., var. y erythrostachys Moq. in DC. Prodr., 13(2): 259. 1849; A. leucocarpus S.Wats., Proc. Amer. Acad., 10: 347. 1875; A. leucospermus S.Wats., Proc. Amer. Acad., 22: 446. 1887; A. caudatus of Amer. auth., non L., 1753; Standl., N. Amer. Fl., 21(2): 110. 1917.

14. Amaranthus cruentus L., Syst. Nat., ed. 10, 2: 1269. 1759; Standl., N. Amer. Fl., 21(2): 111. 1917; Sauer, Ann. Missouri Bot. Gard., 37: 601. 1950; l.c., 54: 122. 1967. CATERPILLAR, PURPLE AMARANTH. Syn.: Amaranthus paniculatus L., Sp. Pl., ed. 2, 2: 1406. 1763; A. sanguineus L., Sp. Pl., ed. 2, 2: 1407 (pro parte). 1763; A. speciosus Sims, Curtis Bot. Mag., 48: 2227. 1821; A. paniculatus var. cruentus (L.) Seub. in Mart. Fl. Bras., 5(1): 238. 1875; A. hybridum var. paniculatus (L.) Uline et Bray, Mem. Torr. Bot. Club, 5: 145. 1894; A. hybridus subsp. cruentus (L.) Thell., Fl. Adventice de Montpellier, 205. 1912; A. hybridus subsp. cruentus var. paniculatus Thell., Fl. Adventice de Montpellier, 205. 1912.

15. Amaranthus hybridus L., Sp. Pl., 990. 1753; Sauer, Ann. Missouri Bot. Gard., 54: 108-109. 1967. GREEN AMARANTH. Syn.: Amaranthus chlorostachys Willd., Hist. Amaranth., 34, tab. 10, fig. 19. 1790; A. hybridus subsp. hypochondriacus var. chlorostachys (Willd.) Thell., Fl. Adventice de Montpellier, 205. 1912; A. patulus Bertol., Comment. It. Neap., 19, tab. 2. 1837; A. incurvatus Tim ex Gren. et Gadr., Prosp. Fl. France, 8. 1846.

16. Amaranthus powellii S.Wats., Proc. Amer. Acad., 10: 347. 1875; Standl., N. Amer. Fl., 21(2): 112. 1917; Sauer, Ann. Missouri Bot. Gard., 54: 108. 1967. POWELL AMARANTH. Syn.: Amaranthus obovatus S.Wats., Proc. Amer. Acad., 12: 275. 1877; A. chlorostachys

var. pseudoretroflexus Thell., Vierteljahrsschr. Naturf. Ges. Zürich, 83: 728. 1919; A. bouchoni Thell., Monde des Plantes, Ser. III, 45: 4. 1926; A. hybridus subsp. hypochondriacus var. chlorostachys subvar. genuinus forma bouchoni Thell., Monde des Plantes, Ser. III, 45: 4. 1926.

17. Amaranthus wrightii S.Wats., Proc. Amer. Acad., 12: 275. 1877; Standl., N. Amer. Fl., 21(2): 113. 1917. WRIGHT AMARANTH.

18. Amaranthus retroflexus L., Sp. Pl., 991. 1753; Standl., N. Amer. Fl., 21(2): 113. 1917. REDROOT PIGWEED, ROUGH PIGWEED. Syn.: Amaranthus spicatus Lam., Fl. Fr., 2: 192. 1778; A. recurvatus Desf., Cat. Hort. Paris, ed. 3: 390. 1829; A. delilei Richt. et Loret, Bull. Soc. Bot. Fr., 13: 316. 1866; Galliaria scabra Bubani, Fl. Pyren., 1: 187. 1897; G. retroflexa (L.) Nieuwl., Amer. Midl. Nat., 3: 278. 1914.

18a. Amaranthus retroflexus var. salicifolius I.M.Johnston, Journ. Arnold Arb., 25: 157. 1944.

19. Amaranthus blitoides S. Wats., Proc. Amer. Acad., 12: 273. 1877; Standl., N. Amer. Fl., 21(2): 115. 1917. PROSTRATE PIGWEED. Syn.: Amaranthus graecizans of Amer. auth., non L. 1753; Galliaria blitoides (S.Wats.) Nieuwl., Amer. Midl. Nat., 3: 278. 1914.

20. Amaranthus californicus(Moq.) S.Wats., Bot. Calif., 2:.42. 1880; Standl., N. Amer. Fl., 21(2): 115. 1917. Syn.: Mengea californica Moq. in DC. Prodr., 13(2): 278. 1849; Amaranthus carneus Greene, Pittonia, 2: 105. 1890; A. albomarginatus Uline et Bray, Bot. Gaz., 19: 318. 1894; A. microphyllus Shinners, Sida, 1(4): 248-249. 1964.

21. Amaranthus pubescens (Uline et Bray) Rydb., Bull. Torr. Bot. Club, 39: 313. 1912; Standl., N. Amer. Fl., 21(2): 115-116. 1917; Harrington, Manual Fl. Colorado, 217. 1954. Syn.: Amaranthus graecizans var. pubescens Uline et Bray, Bot. Gaz., 19: 317. 1894; A. albus var. pubescens (Uline et Bray) Fernald, Rhodora, 47: 140. 1945; A. viscidulus Thell. in Asch. u. Graebn., Syn. Mitteleur. Fl., 5: 289. 1914, non A. viscidulus Greene, 1898.

22. Amaranthus albus L., Syst. Pl., ed. 10: 1268. 1759. WHITE AMARANTH, TUMBLEWEED. Syn.: Pyxidium graecizans Moench., Meth., 359. 1794, non L. 1753; Amaranthus leucanthus Raf., Fl. Ludov., 32. 1817; A. oleraceus Eaton, Man.,ed. 2: 152. 1818, non A. oleraceus L., 1753; A. blitum var. nanus Moq. in DC. Prodr., 13(2): 263. 1849; A. blitum var. graecizans Moq. in DC. Prodr., 13(2): 263. 1849; A. albus var. parviflorus Moq. in DC. Prodr., 13(2): 264. 1849; Dimeiandra graecizans Raf. ex Moq. in DC. Prodr., 13(2): 264 (pro syn.). 1849; Galliaria albida Bubani, Fl. Pyren., 1: 185. 1897; Amaranthus albus var. puberulus Thell. in Asch. u. Graebn., Syn. Mitteleur. Fl., 5: 287. 1914; A. albus var. rubicundus Thell.

in Asch. u. Graebn., Syn. Mitteleur. Fl., 5: 287. 1914; A. albus var. monosepalus Thell. in Asch. u. Graebn., Syn. Mitteleur. Fl., 5: 287. 1914; Galliaria graecizans Nieuwl., Amer. Midl. Nat., 3: 278. 1914; Amaranthus graecizans of Amer. auth., non L. 1753; Standl., N. Amer. Fl., 21(2): 116. 1917.

23. Amaranthus viridis L., Sp. Pl., ed. 2: 1405. 1763; Standl., N. Amer. Fl., 21(2): 118. 1917. GREEN AMARANTH. Syn.: Pyxidium viride (L.) Moench., Meth., 359. 1794; Glomeraria viridis (L.) Cav., Descr. Pl. 319. 1802; Amaranthus ascendens Loisel., Not. Pl. France, 141. 1810; Euxolus viridis (L.) Moq. in DC. Prodr., 13(2): 273. 1849; E. viridis var. ascendens Moq. in DC. Prodr., 13(2): 274. 1849; Amaranthus emarginatus Salzm. ex Uline et Bray, Bot. Gaz., 19: 319. 1894; A. gracilis Desf. of Amer. auth.; Standl., N. Amer. Fl., 21(2): 117. 1917.

3. ACNIDA L., Sp. Pl., 1027. 1753; Standl., N. Amer. Fl., 21(2): 119. 1917. WATERHEMP.

1. Acnida cuspidata Bert. ex Spreng., Syst. Veg., 3: 903. 1826; Standl., N. Amer. Fl., 21(2): 120. 1917. SOUTHERN WATERHEMP. Syn.: Acnida cannabina var. B cuspidata (Bert. ex Spreng.) Moq. in DC. Prodr., 13(2): 277. 1849; A. australis A.Gray, Mem. Amer. Nat., 10: 489. 1876; A. cannabina var. australis (A.Gray) Uline et Bray, Bot. Gaz., 20: 157. 1895; A. alabamensis Standl., N. Amer. Fl., 21(2): 121-122. 1917; Amaranthus australis (A.Gray) J.D.Sauer, Madrona, 13: 15. 1955.

2. Acnida tamariscina (Nutt.) Wood, Bot. & Fl., 289. 1873; Standl., N. Amer. Fl., 21(2): 123. 1917. NUTTALL WATERHEMP. Syn.: Amaranthus tamariscinus Nutt., Trans. Amer. Phil. Soc., II, 5: 165. 1837; Montelia tamariscina (Nutt.) A.Gray, Man., ed. 2: 370 (pro parte). 1856.

4. ACANTHOCHITON Torr., Sitgreaves, Rep. Exp., 170. 1853; Bot. Mex. Bound. Surv., 179. 1859; Uline et Bray, Bot. Gaz., 21: 356. 1896; Standl., N. Amer. Fl., 21(2): 123. 1917.

1. Acanthochiton wrightii Torr., Sitgreaves Rep. Exp., 170. 1853; Standl., N. Amer. Fl., 21(2): 123. 1917. GREENSTRIPE. Syn.: Amaranthus acanthochiton ("Torr.") J.S.Sauer, Madrona, 13: 44. 1955. (Based on the generic name, Acanthochiton Torr.).

5. ACHYRANTHES L., Sp. Pl., 204. 1753; Bullock, Kew Bull., 1957(1): 73-74. 1957.

1. Achyranthes aspera L., Sp. Pl., 204. 1753. Syn.: Centrostachys aspera (L.) Standl., Journ. Wash. Acad. Sci., 5: 75. 1915; N. Amer. Fl., 21(2): 126. 1917; Achyranthes argentea Lam., Encycl., 1: 545. 1785; A. sicula Roth, Catal. Bot., 1: 39. 1797; Stachyarpagophora aspera Maza, Fl. Haban., 93. 1897.

6. IRESINE P.Browne, Hist. Jam., 358. 1756 (conserv.); Standl., N. Amer. Fl., 21(2): 154. 1917. BLOODLEAF. Syn.: Trommsdorffia Mart., Nov. Gen. et Sp., 2: 40. 1826; Rosea Mart., Nov. Gen. et Sp., 2: 58. 1826; Xerandra Raf., Fl. Tell., 3: 43. 1837; Treneis Moq. in DC. Prodr., 13(2): 349. 1849.

1. Iresine palmeri (S.Wats.) Standl., Journ. Wash. Acad. Sci., 5: 395. 1915; N. Amer. Fl., 21(2): 160. 1917. PALMER BLOODLEAF. Syn.: Hebanthe palmeri S.Wats., Proc. Amer. Acad., 18: 144. 1883.

2. Iresine rhizomatosa Standl., Proc. Biol. Soc. Wash., 28: 172. 1915; N. Amer. Fl., 21(2): 165. 1917. ROOTSTOCK BLOODLEAF. Syn.: Iresine celosioides Michx., Fl. Bor. Amer., 2: 244. 1803, non L. 1753; I. paniculata sensu Uline et Bray, Bot. Gaz., 21: 353 (partim). 1896, non L. 1753; I. celosia of Amer. auth., partim.

3. Iresine celosia L., Syst. Pl., ed. 10: 1291. 1759; Standl., N. Amer. Fl., 21(2): 166. 1917. JUDA'S-BUSH. Syn.: Celosia paniculata L., Sp. Pl., 206. 1753; Iresine celosioides L., Sp. Pl., ed. 2: 1456. 1763; I. diffusa Humb. et Bonpl. in Willd., Sp. Pl., 4: 765. 1805; I. elongata Humb. et Bonpl. in Willd., Sp. Pl., 4: 765. 1805; I. parvifolia HBK., Nov. Gen. et Sp., 2: 198. 1818; I. havanensis HBK., Nov. Gen. et Sp., 2: 199. 1818; I. mutisii HBK., Nov. Gen. et Sp., 2: 200. 1818; I. verticillata Spreng., Syst., 1: 821. 1825; I. polymorpha Mart., Nov. Gen. et Sp., 2: 56. 1826; I. polymorpha var. alopecuroidea Mart., Nov. Gen. et Sp., 2: 56. 1826; I. polymorpha var. effusa Mart., Nov. Gen. et Sp., 2: 56. 1826; I. polymorpha var. verticillata Mart., Nov. Gen. et Sp., 2: 56. 1826; Xerandra celosioides (L.) Raf., Fl. Tell., 3: 43. 1837; I. gracilis var. floribunda Mart. et Gal., Bull. Acad. Brux., 10(1): 347. 1843; I. celosioides var. eriophylla Benth., Bot. Voy. Sulph., 156. 1844; I. hookeri Moq. in DC. Prodr., 13(2): 344. 1849; I. acuminata Moq. in DC. Prodr., 13(2): 345. 1849; Celosia parvifolia Vahl in Moq. in DC. Prodr., 13(2): 346 (pro syn.). 1849; I. celosioides var. pubescens Moq. in DC. Prodr., 13(2): 347. 1849; I. eriophylla (Benth.) Moq. in DC. Prodr., 13(2): 347. 1849; I. gossypiantha A Rich. in Sagra, Hist. Cub., 11: 177. 1850; I. eriophora Peyr., Linnaea, 30: 21. 1859; Alternanthera paniculata Bello, Anal. Soc. Esp. Hist. Nat., 12: 106. 1883; I. paniculata (L.) Kuntze, Rev. Gen. Pl., 542. 1891, non I. paniculata Poir. 1813; Achyranthes lanata Sesse et Moc., Fl. Mex., ed. 2, 67. 1894, non A. lanata L., 1753; I. paniculata var. floridana Uline et Bray, Bot. Gaz., 21: 353. 1896.

7. DICRAIRUS Hook. f. in Benth. et Hook., Gen. Pl., 3: 42. 1880; Standl., N. Amer. Fl., 21(2): 153 (Dicraurus). 1917; Airy-Shaw, Kew Bull., 14(3): 344. 1960.

1. Dicrairus leptocladus Hook. f. in Benth. et Hook., Gen. Pl., 3: 43. 1880; Standl., N. Amer. Fl., 21(2): 153-154. 1917; Airy-

Shaw, Kew Bull., 14(3): 344. 1960. Syn.: Iresine alternifolia var. texana Coult., Contr. U.S. Nat. Herb., 1: 48. 1890; I. diffusa Torr., Bot. Mex. Bound. Surv., 180. 1859, non I. diffusa Humb. et Bonpl., 1805; Dicrairus diffusus Baill., Hist. Pl., 9: 214. 1888 (Dicraurus).

8. GUILLEMINEA HBK., Nov. Gen. et Sp., 6: 40, 518. 1823; emend., Mears, Sida, 3(3): 137-152. 1967. Syn.: Guilleminea Necker (Illegit. nom.); Guilleminia Reichb., Consp., 161 (orthogr. var.). 1828; Gossypianthus Hook., Icon. Pl., 3: t. 251. 1840; Brayulinea Small, Fl. SE. U.S., ed. 1, 394. 1903.

1. Guilleminea densa (Willd.) Moq. in DC. Prodr., 13(2): 338. 1849; Mears, Sida, 3(3): 140-144, fig. 2. 1967. Syn.: Illecebrum densum Willd. in Roem. et Schult., Syst., 5: 517. 1819; Guilleminea illecebroides HBK., Nov. Gen. et Sp., 6: 41. 1923; G. illecebrum Spreng., Syst., 4(Cur. Post.): 103. 1825; Illecebrum alsinaefolium Pavon ex Moq. in DC. Prodr., 13(2): 339. 1849; Achyranthes conferta Ruiz in Mart. Fl. Bras., 5(1): 233. 1840; Guilleminea densa B alsinaefolia (Pavon) Moq. in DC. Prodr., 13(2): 339. 1849; Brayulinea densa (Willd.) Small, Fl. SE. U.S., ed. 1, 394. 1903; G. densa var. densa, Mears, Sida, 3(3): 142-143. 1967.

1a. Guilleminea densa var. aggregata Uline et Bray, Bot. Gaz., 20: 343. 1895; Mears, Sida, 3(3): 144. 1967.

2. Guilleminea lanuginosa (Poir.) Hook. f. in Benth. et Hook., Gen. Pl., 3: 37. 1883; Mears, Sida, 3(3): 145-149. 1967. COTTONFLOWER. Syn.: Paronychia lanuginosa Poir., Encycl. Suppl., 4: 303. 1816; Gossypianthus lanuginosus (Poir.) Moq. in DC. Prodr., 13(2): 337. 1849; Standl., N. Amer. Fl., 21(2): 132. 1917; Illecebrum lanuginosum Poir. ex Moq. in DC. Prodr., 13(2): 338. 1849; I. lanatum Hort. Par. ex Moq. in DC. Prodr., 13(2): 337. 1849; Celosia piloselloides Poir. ex Moq. in DC. Prodr., 13(2): 338. 1849; Guilleminea lanuginosa var. lanuginosa, Mears, Sida, 3(3): 145-147. 1967.

2a. Guilleminea lanuginosa var. rigidiflora (Hook.) Mears, Sida, 3(3): 149. 1967. WOOLLY COTTONFLOWER. Syn.: Gossypianthus rigidiflorus Hook., Icon. Pl., 3: t. 251. 1840.

2b. Guilleminea lanuginosa var. sheldonii (Uline et Bray) Mears, Sida, 3(3): 149. 1967. SHELDON COTTONFLOWER. Syn.: Gossypianthus lanuginosus var. sheldoni Uline et Bray, Bot. Gaz., 20: 342. 1895; G. sheldoni (Uline et Bray) Small, Fl. SE. U.S., ed. 1, 394. 1903; Standl., N. Amer. Fl., 21(2): 132. 1917.

2c. Guilleminea lanuginosa var. tenuiflora (Hook.) Mears, Sida, 3(3): 147. 1967. LANCELEAF COTTONFLOWER. Syn.: Gossypianthus tenuiflorus Hook., Icon. Pl., 3: t. 251. 1840; Standl., N. Amer. Fl., 21(2): 132. 1917.

9. ALTERNANTHERA Forsk., Fl. Aegypt.-Arab., 28. 1775; J.F.Gmel., Syst. Nat., 2: 106. 1791; Pedersen, Darwiniana, 14(2-3): 431. 1967. Syn.: Achyranthes sensu Standl., N. Amer. Fl., 21(2): 133. 1917, non L. 1753.

1. Alternanthera pungens HBK., Nov. Gen. et Sp., 2: 206. 1817 (Feb. 1818); Merville, Kew Bull., 13: 172-174. 1958; Pedersen, Darwiniana, 14(2-3): 446. 1967. CHAFF-FLOWER. Syn.: Achyranthes repens L., Sp. Pl., 1: 205. 1753; Alternanthera achyrantha Sweet, Hort. Suburb. Lond., 48. 1818; Alternanthera echinata Smith in Rees Cycl. Suppl. No. 10. 1819; Celosia echinata Humb. et Bonpl. in Roem. et Schult., Syst. Veg., 5: 531. 1819; Alternanthera repens (L.) Link, Enum. Pl. Hort. Berol., 1: 154. 1821, non A. repens Gmel., 1791; Illecebrum pungens (HBK.) Spreng., Syst., 1: 820. 1825; Telanthera pungens (HBK.) Moq. in DC. Prodr., 13(2): 371. 1825; Alternanthera achyranthes var. leiantha Seub. in Mart. Fl. Bras., 5(1): 183, pl. 55. 1875; A. repens (L.) Kuntze, Rev. Gen. Pl., 2: 540. 1891, non A. repens Gmel., 1791; Achyranthes leiantha (Seub. in Mart.) Alain, Contr. Ocas. Mus. Hist. Nat. Col. "De La Salle", No. 9: 1. 1950; Alternanthera pungens forma pauciflora Suesseng., Mitteil. Bot. Staatssaml. München, 2: 68. 1950; A. pungens var. leiantha (Seub. in Mart.) Suesseng., Mitteil. Bot. Staatssaml. München, 4: 103. 1952.

2. Alternanthera caracasana HBK., Nov. Gen. et Sp., 2: 205. 1817 (Feb. 1818); Pedersen, Darwiniana, 14(2-3): 431. 1967. MAT CHAFF-FLOWER. Syn.: Illecebrum peploides Humb. et Bonpl., ex Roem. et Schult., Syst. Veg., 5: 517. 1819; Celosia humifusa Humb. et Bonpl. ex Roem. et Scult., Syst. Veg., 5: 531. 1819; Telanthera caracasana (HBK.) Moq. in DC. Prodr., 13(2): 370. 1849; Alternanthera villiflora Scheele, Linnaea, 22: 149. 1849; A. achyrantha (L.) Sweet, var. parvifolia Moq. in DC. Prodr., 13(2): 358. 1849; A. repens of Amer. auth.; Small, Fl. SE. U.S., ed. 1, 395. 1913; Urban, Symb. Antill., 4: 221. 1905 (partim), non A. repens Gmel. 1791, nec A. repens (L.) Link 1821; A. parvifolia (Moq.) Fawcett et Rendle, Fl. Jam., 3: 139. 1914; Achyranthes repens sensu Standl., N. Amer. Fl., 21(2): 136. 1917 (partim), non A. repens L. 1753; Achyranthes peploides (Humb. et Bonpl.) Britt., N.Y. Acad. Sci. (Sci. Surv. Porto Rico), 5(2): 279. 1924; Alternanthera peploides (Humb. et Bonpl.) Urban, Fedde Repert. Spec. Nov., 15: 168. 1918; Merville, Kew Bull., 13: 175. 1958.

3. Alternanthera polygonoides (L.) R.Br., Prodr., 1: 417. 1810. SMOOTH CHAFF-FLOWER. Syn.: Gomphrena polygonoidea L., Sp. Pl., 225. 1753; Illecebrum polygonoides (L.) L., Sp. Pl., ed. 2, 300. 1762; Achyranthes polygonoides (L.) Lam., Encycl., 1: 547. 1785; Standl., N. Amer. Fl., 31(2): 136. 1917; Bucholzia polygonoides (L.) Mart., Nov. Gen. et Sp., 2: 51. 1826; Alternanthera paronychioides St. Hil., Voy. Bras., 2: 439. 1833; Pedersen, Darwiniana, 14(2-3): 437. 1967; Steiremis repens Raf., Fl. Tell., 3: 41. 1837;

Telanthera polygonoides (L.) Moq. in DC. Prodr., 13(2): 363. 1849; T. polygonoides var. radicans Moq. in DC. Prodr., 13(2): 364. 1849; T. polygonoides var. compacta Moq. in DC. Prodr., 13(2): 364. 1849; Alternanthera ficoidea Griseb., Fl. Brit. W. Indies, 67. 1859, non Gomphrena ficoides L., 1753.

4. Alternanthera bettzickiana (Regel) Nich., Gard. Dict., ed. 1, 59 (bettsichiana). 1884; Aschers. u. Graebn., Syn. Mitteleur. Fl., 5(1): 365. 1914; Standl., Field Mus. Pub. Bot., 3: 254. 1930. Syn.: Telanthera bettzickiana Regel, Gartenflora, 11: 178. 1862; Achyranthes picta Pass., Giardini, 9: 515. 1863; Alternanthera spathulata Lemaire, Ill. Hortic., 12: pl. 445. 1865; Telanthera picta (Pass.) C.Koch, Wockenschr. Gartn., 9: 15. 1866; T. bettzickiana var. typica Seub. in Mart. Fl. Bras., 5(1): 172. 1875; T. bettzickiana var. spathulata (Lemaire) Seub. in Mart. Fl. Bras., 5(1): 172. 1875; Alternanthera kerberi Uline et Bray, Bot. Gaz., 20: 450. 1895; Achyranthes bettzickiana (Regel) Standl., N. Amer. Fl., 21(2): 138. 1917; N.Y. Acad. Sci. (Sci. Surv. Porto Rico), 5(2): 280. 1924; A. ficoides (L.) R.Br. ex Roem. et Schult., var. bettzickiana (Nich.) Bucker in van Steenis, Fl. Mal., 4(2): 93. 1949.

5. Alternanthera philoxeroides (Mart.) Griseb., Abh. Ges. Wiss. Gött., 24: 36. 1879. ALLIGATORWEED. Syn.: Bucholzia philoxeroides Mart., Nova Acta Acad. Leop.-Carol., 13(1): 315. 1826; Telanthera philoxeroides (Mart.) Moq. in DC. Prodr., 13(2): 362. 1849; T. philoxeroides var. obtusifolia Moq. in DC. Prodr., 13(2): 363. 1849; T. philoxeroides var. phyllantha Seub. in Mart. Fl. Bras., 5(1): 169. 1875; T. philoxeroides var. denticulata Seub. in Mart. Fl. Bras., 5(1): 170. 1875; Achyranthes philoxeroides (Mart.) Standl., Journ. Wash. Acad. Sci., 5: 74. 1915; N. Amer. Fl., 21(2): 142. 1917.

10. FROELICHIA Moench., Meth., 50. 1794; Standl., N. Amer. Fl., 21(2): 127. 1917. COTTONWEED, SNAKECOTTON. Syn.: Oplotheca Nutt., Gen., 2: 78. 1818; Hoplotheca Nutt. in Spreng., Syst., 4: Cur. Post. 52. 1827; Ninanga Raf., Fl. Tell., 3: 26. 1837; Everion Raf., Sylva Tell., 124. 1838.

1. Froelichia gracilis (Hook.) Moq. in DC. Prodr., 13(2): 420. 1849; Standl., N. Amer. Fl., 21(2): 127. 1917; Reed, Castanea, 27: 59-61. 1962. SLENDER SNAKECOTTON. Syn.: Oplotheca gracilis Hook., Icon. Pl., 256. 1840; Froelichia floridana sensu Uline et Bray, Bot. Gaz., 20: 338 (partim). 1895.

2. Froelichia braunii Standl., N. Amer. Fl., 21(2): 128. 1917. BRAUN SNAKECOTTON. Syn.: Froelichia floridana Moq. in DC. Prodr., 13(2): 420 (partim). 1849; Oplotheca texana A.Br., Ann. Sci. Nat., III, 12: 355. 1849; Froelichia texana A.Br. ex Standl., Flora SE. United States, 397. 1903, non F. texana Coult. et Fisher, 1892;

Hoplotheca floridana var. texana, Herb. Lips. 1851; Oplotheca minor Hook., Hcrt. Cantab., 1848.

3. Froelichia floridana (Nutt.) Moq. in DC. Prodr., 13(2): 420. 1849; Standl., N. Amer. Fl., 21(2): 128. 1917. FLORIDA SNAKECOTTON. Syn.: Oplotheca floridana Nutt., Gen., 2: 79. 1818; Gomphrena floridana (Nutt.) Spreng., Syst., 1: 824. 1825; Froelichia floridana var. pallescens Moq. in DC. Prodr., 13(2): 421. 1849; F. gracilis var. floridana (Nutt.) Holz., Contr. U.S. Nat. Herb., 1: 197. 1892.

3a. Froelichia floridana var. campestris (Small) Fernald, Rhodora, 43: 336. 1941. PLAINS SNAKECOTTON. Syn.: Froelichia campestris Small, Fl. SE. U.S., ed. 1, 397. 1903; F. floridana Uline et Bray, Bot. Gaz., 20: 338 (partim). 1895.

4. Froelichia arizonica Thornber ex Standl., N. Amer. Fl., 21(2): 128. 1917; I.M.Johnston, Journ. Arnold Arb., 25: 158. 1944. ARIZONA SNAKECOTTON. Syn.: Froelichia campestris Small, Fl. SE. United States, ed. 1, 397 (partim). 1903.

5. Froelichia drummondii Moq. in DC. Prodr., 13(2): 421. 1849; Standl., N. Amer. Fl., 21(2): 129. 1917. DRUMMOND SNAKECOTTON. Syn.: Froelichia gracilis var. drummondii (Moq.) Holz., Contr. U.S. Nat. Herb., 1: 214. 1892; F. floridana var. drummondii (Moq.) Uline et Bray, Bot. Gaz., 20: 339. 1895.

6. Froelichia interrupta (L.) Moq. in DC. Prodr., 13(2): 421. 1849; Standl., N. Amer. Fl., 21(2): 129. 1917. TEXAS SNAKECOTTON. Syn.: Gomphrena interrupta L., Sp. Pl., 224. 1753; Celosia procumbens Jacq., Misc. Austr., 344. 1778; Gomphrena spicata Lam., Encycl., 1: 120. 1783; Froelichia lanata Moench., Meth., 50. 1794; Oplotheca interrupta Nutt., Gen., 2: 79. 1818; O. tomentosa Mart., Nov. Gen. et Sp., 2: 48. 1826; Ninanga interrupta Raf., Fl. Tell., 3: 77. 1837; Everion interrupta Raf., Sylva Tell., 124. 1838; Froelichia floridana Moq. in DC. Prodr., 13(2): 420 (partim). 1849; F. tomentosa Moq. in DC. Prodr., 13(2): 421. 1849; F. alata S.Wats., Proc. Amer. Acad., 21: 437. 1886; F. texana Coult. et Fisher, Bot. Gaz., 17: 350. 1892; F. interrupta var. cordata Uline et Bray, Bot. Gaz., 20: 340. 1895.

11. PHILOXERUS R.Br., Prodr. Fl. Nov. Holl., 416. 1810; Standl., N. Amer. Fl., 21(2): 168. 1917. SALTWEED. Syn.: Caraxeron Vaill. ex Raf., Fl. Tell., 3: 38. 1837; Blutaparon Raf., New Fl., 4: 45. 1838.

1. Philoxerus vermicularis (L.) R.Br., Prodr. Fl. Nov. Holl., 416. 1810; Nutt., Gen., 2: 78. 1818; Standl., N. Amer. Fl., 21(2): 168. 1917. SALTWEED, SILVERHEAD. Syn.: Gomphrena vermicularis L., Sp. Pl., 224. 1753; Illecebrum vermiculatum (L.) L., Sp. Pl., ed.

2: 300. 1762; Gomphrena aggregata Willd., Enum., 294. 1809; Philoxerus vermiculatus Smith in Rees, Cycl., 27: Philoxerus No. 5. 1814; Ph. aggregatus HBK., Nov. Gen. et Sp., 2: 203. 1818; Ph. crassifolius HBK., Nov. Gen. et Sp., 2: 203. 1818; Achyranthes vermicularis Ell., Bot. S.C. and Ga., 1: 310. 1821; Gomphrena crassifolia Spreng., Syst., 1: 824. 1825; Caraxeron vermicularis (L.) Raf., Fl. Tell., 3: 38. 1837; Blutaparon breviflorum Raf., New Fl., 4: 45. 1838; B. repens Raf., New Fl., 4: 46. 1838; Iresine vermicularis (L.) Moq.,in DC. Prodr., 13(2): 340. 1849; I. crassifolia (HBK.) Moq. in DC. Prodr., 13(2): 340. 1849; I. aggregata (HBK.) Moq. in DC. Prodr., 13(2): 340. 1849; Celosia maritima Salzm. ex Moq. in DC. Prodr., 13(2): 341. 1849; Cruzeta crassifolia Maza, Fl. Haban., 94. 1897; Lithophila vermicularis (L.) Uline, Field Mus. Bot., 2: 39. 1900; Small, Flora SE. United States, ed. 1, 398. 1903.

12. TIDESTROMIA Standl., Journ. Wash. Acad. Sci., 6: 70. 1916; N. Amer. Fl., 21(2): 130. 1917. TIDESTROM. Syn.: Cladothrix Nutt. (Moq. in DC. Prodr., 13(2): 359 (pro syn.) 1849) ex S.Wats., Bot. Calif., 2: 43. 1880, non Cladothrix Cohn, 1875 (Schizomycetes).

1. Tidestromia lanuginosa (Nutt.) Standl., Journ. Wash. Acad. Sci., 6: 70. 1916; N. Amer. Fl., 21(2): 130. 1917. WOOLLY TIDESTROM. Syn.: Achyranthes lanuginosa Nutt., Trans. Amer. Phil. Soc., II, 5: 166. 1820; Alternanthera lanuginosa (Nutt.) Moq. in DC. Prodr., 13(3): 359. 1849; Cladothrix lanuginosa Nutt. (Moq. in DC. Prodr., 13(3): 360 (pro syn.). 1849) ex S. Wats., Bot. Calif., 2: 43 (partim). 1880.

1a. Tidestromia lanuginosa var. carnosa (Steyerm.) Cory, Rhodora, 38: 405. 1936. FLESHY TIDESTROM. Syn.: Tidestromia carnosa (Steyerm.) I.M.Johnston, Journ. Arnold Arb., 24: 232. 1943; l.c., 25: 159. 1944; Cladothrix lanuginosa var. carnosa Steyerm., Ann. Missouri Bot. Gard., 19: 389. 1932.

2. Tidestromia gemmata I.M.Johnston, Journ. Arnold Arb., 24: 233. 1943. GEMMATE TIDESTROM.

3. Tidestromia oblongifolia (S.Wats.) Standl., Journ. Wash. Acad. Sci., 6: 70. 1916; N. Amer. Fl., 21(2): 131. 1917. HONEYSWEET TIDESTROM. Syn.: Cladothrix oblongifolia S.Wats., Proc. Amer. Acad., 17: 376. 1882; C. cryptantha S.Wats., Proc. Amer. Acad., 26: 125. 1891; C. lanuginosa S. Wats., Bot. Calif., 2: 43 (partim). 1880, non Achyranthes lanuginosa Nutt., 1820.

4. Tidestromia suffruticosa (Torr.) Standl., Journ. Wash. Acad. Sci., 6: 70. 1916; N. Amer. Fl., 21(2): 131. 1917. SHRUBBY TIDESTROM. Syn.: Alternanthera suffruticosa Torr., Bot. Mex. Bound. Surv., 181. 1859; Cladothrix suffruticosa (Torr.) S.Wats., Bot. Calif., 2: 43. 1880.

13. GOMPHRENA L., Sp. Pl., 224. 1753; Standl., N. Amer. Fl., 21(2): 147. 1917. GLOBE-AMARANTH. Syn.: Coluppa Adans., Fam. Pl., 2: 268. 1763; Bragantia Vand., Fasc. Pl. Nov., 6. 1771; Wadapus Raf., Fl. Tell., 3: 77. 1837; Xerosiphon Turcz., Bull. Soc. Nat. Mosc., 16: 55. 1843; Xeraea (L.) Kuntze, Rev. Gen. Pl., 545. 1891; Amarantoides (Tourn.) Maza, Fl. Haban., 94. 1897.

1. Gomphrena caespitosa Torr., Bot. Mex. Bound. Surv., 181. 1859; Uline et Bray, Bot. Gaz., 20: 161. 1895; Standl., N. Amer. Fl., 21(2): 152. 1917. TWO-LEAF GLOBE-AMARANTH. Syn.: Xeraea caespitosa (Torr.) Kuntze, Rev. Gen. Pl., 545. 1891.

2. Gomphrena nealleyi Coult. et Fisher, Bot. Gaz., 17: 349. 1892; Uline et Bray, Bot. Gaz., 20: 158. 1895; Standl., N. Amer. Fl., 21(2): 148. 1917. NEALLEY GLOBE-AMARANTH, GULF COAST GLOBE-AMARANTH.

3. Gomphrena dispersa Standl., Contr. U.S. Nat. Herb., 18: 91. 1916; N. Amer. Fl., 21(2): 149. 1917. COASTAL GLOBE-AMARANTH. Syn.: Gomphrena decumbens Moq. in DC. Prodr., 13(2): 410 (partim). 1849, non G. decumbens Jacq., 1804; G. decumbens var. genuina Stuchlik, Repert. Nov. Sp., 11: 156 (partim). 1912, non G. decumbens Jacq., 1804; G. decumbens var. grandifolia Stuchlik, Repert. Nov. Sp., 11: 157 (partim). 1912.

4. Gomphrena decumbens Jacq., Hort. Schoenbr., 4: 41. 1804; Uline et Bray, Bot. Gaz., 20: 159. 1895. PROSTRATE GLOBE-AMARANTH. Syn.: Gomphrena prostrata Desf., Hort. Par. App., 219. 1804, non Mart.; Xeraea decumbens (Jacq.) Kuntze, Rev. Gen. Pl., 545. 1891; Gomphrena decumbens var. albiflora Chod. et Hassl., Bull. Herb. Boiss., II, 3: 389. 1903; G. perennis var. simplex Stuchlik, Repert. Nov. Sp., 11: 153. 1912; G. decumbens var. genuina Stuchlik, Repert. Nov. Sp., 11: 156 (partim). 1912; G. decumbens var. grandifolia Stuchlik, Repert. Nov. Sp., 11: 157 (partim). 1912; G. decumbens var. roseiflora Stuchlik, Repert. Nov. Sp., 11: 157 (partim). 1912.

5. Gomphrena nitida Rothrock, Bot. Wheeler's Surv., 6: 233. 1878; Uline et Bray, Bot. Gaz., 20: 159. 1895; Standl., N. Amer. Fl., 21(2): 150. 1917. PEARLY GLOBE-AMARANTH.

6. Gomphrena globosa L., Sp. Pl., 224. 1753; Standl., N. Amer. Fl., 21(2): 151. 1917. COMMON GLOBE-AMARANTH. Syn.: Gomphrena globosa var. carnea Moq. in DC. Prodr., 13(2): 409. 1849; Xeraea globosa (L.) Kuntze, Rev. Gen. Pl., 545. 1891; Amarantoides globosus (L.) Maza, Fl. Haban., 94. 1897; A. globosus var. albiflorus Maza, Fl. Haban., 95. 1897; Gomphrena globosa var. aureiflora Stuchlik, Repert. Nov. Sp., 12: 340. 1913.

7. Gomphrena haageana Klotzsch, Allg. Gart., 21. 1853; Standl., N. Amer. Fl., 21(2): 151. 1917. Syn.: Gomphrena coccinea Decaisne,

Rev. Hort., IV, 3: 161. 1854; G. tuberifera Torr., Bot. Mex. Bound. Surv., 181. 1849; Xeraea tuberifera (Torr.) Kuntze, Rev. Gen. Pl., 545. 1891.

## CHENOPODIACEAE

Represented in Texas by 16 genera and 80 species and varieties.

1. BETA L., Sp. Pl., 222. 1753. BEET.

1. Beta vulgaris L., Sp. Pl., 222. 1753. BEET. Syn.: Beta vulgaris var. cicla L., Sp. Pl., 222. 1753; Beta hortensis Mill., Gard. Dict., ed. 8, Beta No. 2. 1768; Beta cicla (L.) Pers., Syn. Pl., 1: 295. 1805.

2. MONOLEPIS Schrad., Ind. Sem. Hort. Goetting, 1830: 4. 1830; Linnaea, 6: Litt.-Ber. 73. 1831; Standl., N. Amer. Fl., 21(1): 6-7. 1916.

1. Monolepis nuttalliana (Schultes) Greene, Fl. Franc., 168. 1891; Standl., N. Amer. Fl., 21(1): 6. 1916. NUTTALL MONOLEPIS. Syn.: Blitum chenopodioides Nutt., Gen., 1: 4. 1818, non Lam., 1783; B. nuttallianum Schultes in Roem. et Schult., Syst. Veg. Mant., 1: 65. 1822; Chenopodium trifidum Trev., Ind. Sem. Vratisl., 1829; Moq., Chenop. Enum., 45 (pro syn.). 1840; Monolepis trifida (Trev.) Schrad., Ind. Sem. Hort. Goetting, 1830: 4. 1830; Linnaea, 6: Litt.-Ber., 73. 1831; Blitum nuttallianum var. minus Moq., Chenop. Enum., 45. 1840; Monolepis chenopodioides Moq. in DC. Prodr., 13(2): 86. 1849; M. chenopodioides var. trifida Moq. in DC. Prodr., 13(2): 86. 1849; Chenopodium arcticum Moq. in DC. Prodr., 13(2): 86 (pro syn.). 1849; Monolepis asiatica Moq. in DC. Prodr., 13(2): 86. 1849.

3. CYCLOLOMA Moq., Chenop. Mon. Enum., 17. 1840; Standl., N. Amer. Fl., 21(1): 7-8. 1916. Syn.: Cyclolepis Moq., Ann. Sci. Nat., II, 1: 203. 1834, non Cyclolepis Gillies, 1832; Petermannia Reichenb., Nom. Ind., 153. 1841; Amorea Delile, Cat. Hort. Monsp., 1844; Moq. in DC. Prodr., 13(2): 60 (pro syn.). 1849; Amoreuxia Moq. in DC. Prodr., 13(2): 60 (pro syn.). 1849, non Amoreuxia Moc. et Sesse, 1825.

1. Cycloloma atriplicifolium (Spreng.) Coult., Mem. Torr. Bot. Club, 5: 143. 1894; Standl., N. Amer. Fl., 21(1): 8. 1916. TUMBLE RING-WING, WINGED PIGWEED. Syn.: Salsola atriplicifolia Spreng., Bot. Gart. Hal. Nachtr., 1: 75. 1801; Kochia atriplicifolia (Spreng.) Roth, Neue Beitr., 1: 177. 1802; Salsola platyphylla Michx., Fl. Bor. Amer., 1: 174. 1803; S. radiata Desf., Ann. Mus. Paris, 2: 28. 1803; Kochia dentata Willd., Hort. Berol., pl. 28. 1803; Salsola atriplicis Schultes, Obs. Bot., 52. 1809; Chenopodium radia-

tum Schrad., Neues Journ. Bot., 3(3): 85. 1809; Salsola chenopodioides Dum.-Cours, Bot. Cult., ed. 2, 2: 463 (pro syn.). 1811; Kochia platyphylla (Michx.) Schultes in Roem. et Schult., Syst. Veg., 6: 274. 1820; Cyclolepis platyphylla (Michx.) Jacq., Ann. Sci. Nat., II, 1: 204. 1834; Cycloloma platyphyllum (Michx.) Moq., Chenop. Enum., 18. 1840; C. platyphyllum var. latifolium Moq., Chenop. Enum., 19. 1840; Amorea platyphylla Delile, Cat. Hort. Monsp., 1844; Moq. in DC. Prodr., 13(2): 60 (pro syn.). 1849; Amoreuxia platyphylla Moq. in DC. Prodr., 13(2): 60 (pro syn.). 1849; Cycloloma platyphyllum var. angustifolium Moq. in DC. Prodr., 13(2): 60. 1849; Chenopodium atriplicifolium A.Ludw. in Asch. u. Graebn., Syn. Mitteleur. Fl., 5: 18. 1913.

4. CHENOPODIUM L., Sp. Fl., 218. 1753; Standl., N. Amer. Fl., 21(1): 9-13. 1916; Aellen, Fedde Repert., 26: 119-160. 1929; Wahl, Bartonia, 27: 1-46. 1952-53 (1954). GOOSEFOOT, PIGWEED. Syn.: Anserina Dumort, Fl. Belg., 21. 1827; Teloxys Moq., Ann. Sci. Nat., II, 1: 289. 1834; Agathophytum Moq., Ann. Sci. Nat., II, 1: 291. 1834; Oligandra Less., Linnaea, 9: 199. 1834, non Oligandra Less., 1832; Orthosporum T.Nees, Gen. Fl. Germ. Dicot., 1: pl. 57. 1835; Ambrina Spach, Hist. Veg., 5: 295. 1836; Botrydium Spach, Hist. Veg., 5: 298. 1836; Lipandra Moq., Chenop. Enum., 19. 1840; Gandriloa Steud., Nom. Bot., ed. 2, 1: 662. 1840; Oliganthera Endl., Gen., 1377. 1841; Oxybasis Kar. et Kir., Bull. Soc. Nat. Mosc., 1841: 738. 1841; Orthospermum Opiz, Seznam, 70. 1852; Vulvaria Bubani, Fl. Pyren., 1: 174. 1897; Botrys Nieuwl., Amer. Midl. Nat., 3: 274. 1914.

1. Chenopodium pumilio R.Br., Prodr. Fl. Nov. Holl., 1: 307. 1810; Aellen, Verh. Naturf. Ges. Basel, 44(1): 308-318. 1933; Gleason, Illus. Flora N.E. U.S. & Adj. Canada, 2: 88. 1952; Wahl, Bartonia, No. 27: 7. 1952-53 (1954). RIDGED GOOSEFOOT. Syn.: Chenopodium carinatum of recent auth., non R.Br., 1810.

2. Chenopodium botrys L., Sp. Pl., 219. 1753; Standl., N. Amer. Fl., 21(1): 26. 1916. JERUSALEM-OAK. Syn.: Atriplex botrys (L.) Crantz, Inst., 1: 207. 1766; Botrydium aromaticum Spach, Hist. Veg., 5: 299. 1836; Ambrina botrys (L.) Moq., Chenop. Enum., 37. 1840; Chenopodium botryoides Raf. ex Moq. in DC. Prodr., 13(2): 75 (pro syn.). 1849; Ch. botryoides (var.) gracile Raf. ex Moq. in DC. Prodr., 13(2): 75. 1849; Ch. botrys (var.) gracile Moq. in DC. Prodr., 13(2): 75. 1849; Roubieva botrys (L.) Fuss, Fl. Transsylv., 552. 1866; Ch. botrydium St.-Lag., Ann. Soc. Bot. Lyon, 7: 122. 1880; Vulvaria botrys (L.) Bubani, Fl. Pyren., 1: 177. 1897; Botrys aromatica (Spach) Nieuwl., Amer. Midl. Nat., 3: 275. 1914; Botrydium botrys (L.) Small, Man. SE. U.S., 466. 1933.

3. Chenopodium incisum Poir. in Lam. Encycl. Suppl., 1: 392. 1811; Standl., N. Amer. Fl., 21(1): 25. 1916. RAGLEAF GOOSEFOOT. Syn.: Chenopodium graveolens Willd., Enum. Pl. Hort. Berol., 1: 290.

1809; Aellen, Verh. Naturf. Ges. Basel, 41: 105. 1930; Wahl, Bartonia, No. 27: 7. 1952-53 (1954); non Ch. graveolens Lag. et Rodr., 1802 (See Brenan, Kew Bull., 1950(1): 129-132. 1950); Ch. effusum Mart. et Gal., Bull. Acad. Brux., 10(1): 346. 1843; Ch. foetidum Moq. in DC. Prodr., 13(2): 76 (partim). 1849, non Ch. foetidum Schrad., 1808; Teloxys cornuta Torr., Pacif. R.R.Rept., 4: 129. 1857; Ch. cornutum (Torr.) Benth. et Hook. ex S.Wats., Bot. Calif., 2: 482. 1880; Ambrina incisa (Poir.) Moq., Chenop. Enum., 36. 1840; Ch. incisum var. neomexicanum Aellen, Fedde Repert., 26: 40. 1929; Ch. incisum var. neomexicanum forma rubellum Aellen, Fedde Repert., 26: 40. 1929; Ch. graveolens var. neomexicanum (Aellen) Aellen, Verh. Naturf. Ges. Basel, 41: 108. 1930.

4. Chenopodium ambrosioides L., Sp. Pl., 219. 1753; Standl., N. Amer. Fl., 21(1): 27. 1916; Aellen et Just, Amer. Midl. Nat., 30(1): 50-51. 1943. MEXICAN-TEA, WORMSEED. Syn.: Chenopodium anthelminticum L., Sp. Pl., 220. 1753; Atriplex ambrosioides (L.) Crantz, Inst., 1: 207. 1766; A. anthelminthica (L.) Crantz, Inst., 1: 207. 1766; Ch. suffruticosum Willd., Enum., 290. 1809; Ch. sancta-maria Vell., Fl. Flum., 126. 1825; Ch. chilense Schrad., Ind. Sem. Hort. Gotting, 1832: 2. 1832; Linnaea, 8: Litt.-Ber. 25. 1833, non Pers. 1805; Orthosporum ambrosioides Kostel., Allg. Med.-Pharm. Fl., 1433. 1835; O. suffruticosum Kostel., Allg. Med.-Pharm. Fl., 1433. 1835; Ambrina ambrosioides (L.) Spach, Hist. Veg., 5: 297. 1836; Ambrina anthelmintica (L.) Spach, Hist. Veg., 5: 298. 1836; Ambrina retusa Moq., Chenop. Enum., 38. 1840; Ambrina spathulata Moq., Chenop. Enum., 39. 1840; Ambrina obovata Moq., Chenop. Enum., 40. 1840; Roubieva anthelmintica Hook. et Arn., Bot. Beech. Voy., 387. 1840; Ch. spathulatum Sieber (Moq., Chenop. Enum., 39 (pro syn.) 1840) ex Moq. in DC. Prodr., 13(2): 73. 1849; Ch. retusum Juss. ex Moq. in DC. Prodr., 13(2): 73. 1849; Ch. obovatum Moq. in DC. Prodr., 13(2): 73. 1849; Ch. ambrosioides (var.) anthelminthicum A.Gray, Man., ed. 2, 364. 1856; Aellen, Fedde Repert., 26: 34. 1929; Blitum ambrosioides G.Beck in Reichenb., Icon. Fl. Germ., 24: 118. 1908; Botrys anthelmintica Nieuwl., Amer. Midl. Nat., 3: 275. 1914; Ch. vagans Standl., N. Amer. Fl., 21(1): 26. 1916; Ch. ambrosioides var. vagans (Standl.) J.T.Howell, Leafl. Western Bot., 5: 105. 1948.

5. Chenopodium chenopodioides (L.) Aellen, Ostenia, 98. 1933; Aellen et Just, Amer. Midl. Nat., 30(1): 58. 1943; Wahl, Bartonia, No. 27: 11. 1952-53 (1954). Syn.: Blitum chenopodioides L., Mant. Pl., 2: 170. 1771; Ch. crassifolium Hornem., Hort. Hafn., 254. 1813; Aellen, Magyar Bot. Lapok., 25: 55. 1926 (1927); Ch. rubrum sensu N. Amer. auth., non L.; Ch. humile sensu N. Amer. auth., non Hook.

6. Chenopodium glaucum L., Sp. Pl., 220. 1753; Standl., N. Amer. Fl., 21(1): 28. 1916. Syn.: Atriplex glaucum (L.) Crantz, Inst., 1: 207. 1766; Ch. ambiguum R.Br., Prodr., 407. 1810; Blitum glau-

cum (L.) Koch, Syn. Fl. Germ., 608. 1837; Orthospermum glaucum (L.) Opiz, Seznam, 71. 1852; Agathophytum glaucum (L.) Fuss, Fl. Transsylv., 553. 1866; Botrys glauca (L.) Nieuwl., Amer. Midl. Nat., 3: 275. 1914.

7. Chenopodium desiccatum A. Nels., Bot. Gaz., 34: 362. 1902; Standl., N. Amer. Fl., 21(1): 15. 1916. THICKLEAF GOOSEFOOT. Syn.: Chenopodium leptophyllum (var.) oblongifolium S.Wats., Proc. Amer. Acad., 9: 95. 1874; Ch. oblongifolium (S.Wats.) Rydb., Bull. Torr. Bot. Club, 33: 137. 1906; Ch.leptophyllum subsp. desiccatum (A.Nels.) Aellen, Fedde Repert., 26: 136. 1929; Ch. pratericola var. oblongifolium (S.Wats.) Wahl, Bartonia, No. 27: 19. 1954.

7a. Chenopodium desiccatum var. leptophylloides (Murr) Wahl, Field & Lab., 23: 22. 1955. Syn.: Chenopodium leptophyllum S. Wats., Proc. Amer. Acad., 9: 94 (partim). 1874, non Ch. leptophyllum Nutt., 1874; Ch. leptophyllum var. oblongifolium of auth., non S. Wats., 1874; Ch. petiolare var. leptophylloides Murr, Bull. Herb. Boiss., II, 4: 994. 1904; Ch. pratericola Rydb., Bull. Torr. Bot. Club, 39: 310. 1912; Standl., N. Amer. Fl., 21(1): 14-15. 1916; Aellen et Just, Amer. Midl. Nat., 30(1): 64. 1943; Wahl, Bartonia, No. 27: 18. 1952-53 (1954); Botrys pratericola (Rydb.) Lunell, Amer. Midl. Nat., 4: 306. 1916; Ch. leptophyllum var. leptophylloides (Murr) Thell. et Aellen, Fedde Repert., 26: 134. 1929; Ch. pratericola var. leptophylloides (Murr) Aellen, Ostenia, 100. 1933; Ch. leptophyllum (var.) pratericola (Rydb.) F.C.Gates, Trans. Kansas Acad. Sci., 42: 137. 1940; Ch. pratericola subsp. eu-pratericola Aellen in Aellen et Just, Amer. Midl. Nat., 30(1): 64. 1943; Ch. pratericola subsp. eu-pratericola var. leptophylloides (Murr) Aellen in Aellen et Just, Amer. Midl. Nat., 30(1): 64. 1943.

8. Chenopodium cycloides A.Nels., Bot. Gaz., 34: 363. 1902; Standl., N. Amer. Fl., 21(1): 16. 1916.

9. Chenopodium pallescens Standl., N. Amer. Fl., 21(1): 15. 1916; Wahl, Bartonia, No. 27: 23. 1952-53 (1954). LIGHT GOOSEFOOT.

10. Chenopodium leptophyllum Nutt. ex S. Wats., Proc. Amer. Acad., 9: 94. 1874, non Moq.; Standl., N. Amer. Fl., 21(1): 14. 1916; Wahl, Bartonia, No. 27: 23. 1952-53 (1954). NARROWLEAF GOOSEFOOT. Syn.: Botrys leptophyllum Nieuwl., Amer. Midl. Nat., 3: 275. 1914, non Moq., Ch. inamoenum Standl., N. Amer. Fl., 21(1): 15. 1916 (as to descr. and plants considered, not as to type).

11. Chenopodium hians Standl., N. Amer. Fl., 21(1): 16. 1916.

12. Chenopodium vulvaria L., Sp. Pl., 220. 1753; Standl., N. Amer. Fl., 21(1): 20. 1916. Syn.: Atriplex vulvaria (L.) Crantz, Inst., 1: 207. 1766; Ch. foetidum Lam., Fl. Franc., 3: 244. 1778; Ch.

olidum Curt., Fl. Lond., 5: pl. 20. 1788; Ch. album var. vulvaria Kuntze, Taschen-Fl. Leipz., 218. 1867; Vulvaria vulgaris Bubani, Fl. Pyren., 1: 175. 1897.

13. Chenopodium fremontii S.Wats., Bot. King's Expl., 287. 1871; Standl., N. Amer. Fl., 21(1): 18. 1916; Wahl, Bartonia, No. 27: 24-25. 1952-53 (1954). FREMONT GOOSEFOOT. Syn.: Botrys fremontii (S.Wats.) Lunell, Amer. Midl. Nat., 4: 305. 1916; Ch. fremontii var. fremontii Fosberg, Amer. Midl. Nat., 26: 691. 1941.

13a. Chenopodium fremontii forma farinosum Aellen, Fedde Repert., 26: 142. 1929.

13b. Chenopodium fremontii var. pringlei (Standl.) Aellen, Fedde Repert., 26: 142. 1929. Syn.: Chenopodium pringlei Standl., N. Amer. Fl., 21(1): 18. 1916.

14. Chenopodium atrovirens Rydb., Mem. N.Y. Bot. Gard., 1: 131. 1900; Standl., N. Amer. Fl., 21(1): 17. 1916. Syn.: Chenopodium wolfii Rydb., Bull. Torr. Bot. Club, 30: 248. 1903, non Ch. wolffii Simonkai, 1879; Ch. aridum A.Nels., Bull. Torr. Bot. Club, 31: 240. 1904.

15. Chenopodium incanum (S.Wats.) Heller, Plant World, 1: 23. 1897; Standl., N. Amer. Fl., 21(1): 18. 1916; Wahl, Bartonia, No. 27: 25. 1952-53 (1954). MEALY GOOSEFOOT. Syn.: Chenopodium fremontii var. incanum S.Wats., Proc. Amer. Acad., 9: 94. 1874; Ch. nevadense Standl., N. Amer. Fl., 21(1): 16. 1916; Aellen, Fedde Repert., 26: 158. 1929; Fosberg, Amer. Midl. Nat., 26: 691. 1941; Ch. deltaphyllum Osterhout, Bull. Torr. Bot. Club, 57: 559. 1931.

16. Chenopodium carnosulum Moq. in DC. Prodr., 13(2): 64. 1849; Aellen et Just, Amer. Midl. Nat., 30(1): 65. 1943. Syn.: Chenopodium patagonicum Phil., Anal. Univ. Santiago, 91: 421. 1895; Ch. fuegianum Speg., Anal. Mus. Nac. Buenos Aires, 5: 72. 1896-97; Ch. scabricaule Speg., Anal. Mus. Nac. Buenos Aires, II (4), 7: 138. 1902.

17. Chenopodium neomexicanum Standl., N. Amer Fl., 21(1): 19. 1916; Wahl, Bartonia, No. 27: 28. 1952-53 (1954). Syn.: Chenopodium lenticulare Aellen, Fedde Repert., 26: 152. 1929.

18. Chenopodium standleyanum Aellen, Fedde Repert., 26: 153. 1929; Wahl, Bartonia, No. 27: 28. 1952-53 (1954). STANDLEY GOOSEFOOT. Syn.: Chenopodium boscianum Moq. of auth., not as to type; Ch. gigantospermum var. standleyanum (Aellen) Aellen in Aellen et Just, Amer. Midl. Nat., 30(1): 75. 1943.

19. Chenopodium gigantospermum Aellen, Fedde Repert., 26: 144. 1929; Aellen et Just, Amer. Midl. Nat., 30(1): 75. 1943; Wahl, Bartonia, No. 27: 30. 1952-53 (1954); Holmgren et Reveal, U.S. Forest Ser-

vice, Research Paper Int.-32, p. 29. 1966. BIGSEED GOOSEFOOT. Syn.: Chenopodium hybridum of Amer. auth., non L. 1753; Ch. gigantospermum var. standleyanum Aellen, Fedde Repert., 26: 147. 1929; Ch. hybridum var. gigantospermum (Aellen) Rouleau, Nat. Canad., 71: 268. 1944; Ch. gigantospermum forma griffithsii Aellen, Fedde Repert., 26: 174. 1929

20. Chenopodium murale L., Sp. Pl., 219. 1753; Standl., N. Amer. Fl., 21(1): 12. 1916; I.M.Johnston, Journ. Arnold Arb., 25: 145. 1944. NETTLELEAF GOOSEFOOT, SOWBANE. Syn.: Atriplex muralis (L.) Crantz, Inst., 1: 206. 1766; Ch. guineense Jacq., Coll., 2: 346. 1788; Ch. carthagenense Zuccagni in Roem., Coll., 133. 1806; Ch. murale (var.) albescens Moq., Chenop. Enum., 32. 1840; Ch. murale var. carthagenense (Zucc.) Moq. in DC. Prodr., 13(2): 69. 1849; Vulvaria trachiosperma Bubani, Fl. Pyren., 1: 177. 1897; Ch. murale (var.) spissidentatum Murr, Magyar Bot. Lapok, 2: 11. 1903.

21. Chenopodium albescens Small, Flora SE. United States, ed. 1, 385, 1330. 1903; Standl., N. Amer. Fl., 21(1): 17. 1916. PALE GOOSEFOOT. Syn.: Chenopodium berlandieri subsp. zschackei var. glaucoviride Aellen, Fedde Repert., 26: 58. 1929.

22. Chenopodium opulifolium Schrad. in Koch et Ziz., Cat. Pl. Palat., 6. 1814; Wahl, Bartonia, No. 27: 33. 1952-53 (1954). Syn.: Chenopodium album var. opulifolium G.Meyer, Chlor. Hanov., 465. 1836; Vulvaria opulifolia Bubani, Fl. Pyren., 1: 176. 1897; Ch. viride sensu Standl., N. Amer. Fl., 21(1): 21. 1916 (partim), non Ch. viride L., 1753; Ch. flabellifolium Standl., N. Amer. Fl., 21(1): 19. 1916.

23. Chenopodium album L., Sp. Pl., 219. 1753; Standl., N. Amer. Fl., 21(1): 23. 1916; Wahl, Bartonia, No. 27: 33. 1952-53 (1954); Aellen, Fedde Repert., 26: 126. 1929. PIGWEED, LAMB'S-QUARTERS. Syn.: Chenopodium viride L., Sp. Pl., 219 (partim). 1753; Atriplex alba (L.) Crantz, Inst., 1: 206. 1766; Ch. canadense Lam., Fl. Franc., 3: 248. 1778; Ch. lanceolatum Muhl. ex Willd., Enum., 291. 1809; Ch. album var. integerrimum S.F.Gray, Nat. Arr. Brit. Pl., 2: 285. 1821; Ch. album (var.) spicatum Koch, Syn. Fl. Germ., 606. 1837; Ch. album var. lanceolatum (Muhl.) Coss. et Germ., Fl. Paris, 451. 1845; Vulvaria albescens Bubani, Fl. Pyren., 1: 176. 1897; Ch. album (var.) collinsii Murr, Bull. Herb. Boiss., II, 4: 990. 1904; Botrys alba (L.) Nieuwl., Amer. Midl. Nat., 3: 277. 1914; B. alba (var.) pauper Lunell, Amer. Midl. Nat., 4: 305. 1916; Ch. album var. polymorphum Aellen, Amer. Midl. Nat., 30: 68. 1943; Ch. album var. polymorphum forma lanceolatum (Muhl.) Aellen, Amer. Midl. Nat., 30: 69. 1943.

24. Chenopodium missouriense Aellen, Bot. Notis. Lund, 1928: 206, figs. 1928; Aellen, Fedde Repert., 26: 155. 1929; Aellen et Just, Amer. Midl. Nat., 30(1): 68. 1943; Wahl, Bartonia, No. 27: 36. 1952-53

(1954); MISSOURI GOOSEFOOT. Syn.: Chenopodium missouriense var. bushianum Aellen, Fedde Repert., 26: 156. 1929; Aellen et Just, Amer. Midl. Nat., 30: 68. 1943; Ch. paganum sensu Standl., N. Amer. Fl., 21(1): 23 (partim). 1916, non Reichenb.

25. Chenopodium giganteum Don, Prodr. Pl. Nepal, 75. 1825; Wahl, Bartonia, No. 27: 50. 1952-53 (1954). Syn.: Chenopodium album var. amaranticolor Coste et Reynier in Reynier, Bull. Herb. Boiss., II, 5: 979. 1905; Ch. amaranticolor Coste et Reynier, Bull. Soc. Bot. Fr., 54: 178. 1907; Standl., N. Amer. Fl., 21(1): 21. 1916.

26. Chenopodium berlandieri Moq., Chenop. Enum., 23. 1840; Standl., N. Amer. Fl., 21(1): 24-25. 1916; Aellen, Fedde Repert., 26: 50-63. 1929; Aellen et Just, Amer. Midl. Nat., 30(1): 71. 1943; Wahl, Bartonia, No. 27: 40. 1952-53 (1954). PITSEED GOOSEFOOT. Syn.: Chenopodium album var. berlandieri (Moq.) Mackenzie et Bush, Fl. Jackson Co., 80. 1902; Ch. texanum Murr, Magyar Bot. Lapok, 2: 8. 1903; Ch. berlandieri var. texanum (Murr) Zobel, Verz. Anhalt Phanerog., 3: 71. 1907; Ch. berlandieri var. typicum Ludwig in Aschers. u. Graebn., Syn. Mitteleur Fl., 5: 81-82. 1913; Aellen, Fedde Repert., 26: 52. 1929; Aellen et Just, Amer. Midl. Nat., 30(1): 72. 1943; Botrys berlandieri (Moq.) Nieuwl., Amer. Midl. Nat., 3: 276. 1914; Ch. berlandieri subsp. eu-berlandieri Aellen, Fedde Repert., 26: 62. 1929; Aellen et Just, Amer. Midl. Nat., 30(1): 71-73. 1943; Ch. palmeri Standl., N. Amer. Fl., 21(1): 19. 1916; Wahl, Bartonia, No. 27: 28. 1952-53 (1954); Ch. arizonicum Standl., N. Amer. Fl., 21(1): 19-20. 1916; Ch. berlandieri subsp. yucatanum Aellen, Fedde Repert., 26: 51, 59. 1929.

26a. Chenopodium berlandieri var. zschackei (Murr) Murr, Festschrift Aschers. 70 Geburtst., p. 227. 1904; Aellen, Fedde Repert., 26: 50-51. 1929; Wahl, Bartonia, No. 27: 42, f. 9. 1952-53 (1954). Syn.: Chenopodium zschackei Murr, Deut. Bot. Monatschr., 19: 39. 1901; Ch. berlandieri subsp. zschackei (Murr) Zobel, Verz. Anhalt Phanerog., 3: 70. 1909; Aellen, Fedde Repert., 26: 51. 1929; Ch. platyphyllum Issler, Allg. Bot. Zeits., 8: 183. 1902; Ch. berlandieri subsp. platyphyllum (Issler) Ludwig ex Aschers. u. Graebn., Syn. Mitteleur. Fl., 5: 83. 1913; Schinz u. Keller, Fl. Schweiz, II: 94. 1914; Ch. opulifolium (var.) platyphyllum (Issler) G. Beck in Reichenb., Icon. Fl. Germ., 24: 102. 1907; Ch. berlandieri subsp. farinosum Ludwig ex Aschers. u. Graebn., Syn. Mitteleur. Fl., 5: 82. 1913; Ch. berlandieri subsp. foetens Ludwig ex Aschers. u. Graebn., Syn. Mitteleur. Fl., 5: 83. 1913; Ch. dacoticum Standl., N. Amer. Fl., 21(1): 22. 1916; Ch. berlandieri var. foetens (Ludwig) Aellen, Fedde Repert., 26: 57. 1929; Ch. berlandieri var. farinosum (Ludwig) Aellen, Fedde Repert., 26: 56. 1929; Ch. berlandieri var. californicum Aellen, Fedde Repert., 26: 57. 1929; Ch. berlandieri subsp. esauae Aellen, Fedde Repert., 26: 51, 59. 1929; Ch. berlandieri subsp. ludwigianum Aellen, Fedde Repert., 26: 50, 59. 1929.

26b. Chenopodium berlandieri var. boscianum (Moq.) Wahl, Bartonia, No. 27: 42. 1952-53 (1954). Syn.: Chenopodium boscianum Moq., Chenop. Enum., 21 (partim). 1840; Standl., N. Amer. Fl., 17-18. 1916; Fernald, Gray's Man., 8th ed., 594. 1950; Ch. berlandieri subsp. boscianum (Moq.) Aellen, Fedde Repert., 26: 51, 61. 1929; Ch. polyspermum (var.) spicatum A.Gray, Man., ed. 2, 363. 1856, non Ch. polyspermum (var.) spicatum Moq., 1840; Botrys bosciana (Moq.) Nieuwl., Amer. Midl. Nat., 3: 275. 1914.

26c. Chenopodium berlandieri var. sinuatum (Murr) Wahl, Bartonia, No. 27: 42. 1952-53 (1954). Syn.: Chenopodium petiolare var. sinuatum Murr, Bull. Herb. Boiss., II, 4: 994. 1904; Ch. berlandieri subsp. pseudo-petiolare Aellen, Fedde Repert., 26: 51-60. 1929; Aellen et Just, Amer. Midl. Nat., 30(1): 72-73. 1943; Ch. berlandieri subsp. pseudo-petiolare forma sinuatum (Murr) Aellen, Fedde Repert., 26: 61. 1929; Ch. petiolare of N. Amer. auth., non Ch. petiolare HBK., 1817.

5. SPINACIA L., Sp. Pl., 1027. 1753. SPINACH.

1. Spinacia oleracea L., Sp. Pl., 1027. 1753; Standl., N. Amer. Fl., 21(1): 33. 1916. SPINACH. Syn.: Spinacia glabra Mill., Gard. Dict., ed. 8: Spinacia No. 8. 1768; Spinacia oleracea var. inermis Peterm., Pflanzenschlüss, 377. 1846; S. inermis Moench., Meth., 318. 1794; S. spinosa Moench., Meth., 318. 1794.

6. ATRIPLEX L., Sp. Pl., 1052. 1753; Standl., N. Amer. Fl., 21(1): 33. 1916; Hall et Clements, Carnegie Inst. Publ. No. 326. 1923; Brown, Amer. Midl. Nat., 55: 201. 1956. SALTBUSH. Syn.: Obione Gaertn., Fruct., 2: 198. 1791; Halimus Wallr., Sched. Crit., 117. 1822; Pterochiton Torr. et Frem. in Frem. Rept. Expl. Exped. Rocky Mts. and Oregon-California, 318. 1845; Schizotheca C.Meyer ex Lindl., Veg. Kingd., 513 (hyponym). 1846, non Schizotheca Ehrenb., 1832; Phyllotheca Nutt. ex Moq. in DC. Prodr., 13(2): 98 (pro syn.). 1849; Lophocarya Nutt. ex Moq. in DC. Prodr., 13(2): 106 (pro syn.). 1849; Pterocarya Nutt. ex Moq. in DC. Prodr., 13(2): 106 (pro syn.). 1849, non Pterocarya Kunth, 1824; Phyllocarpa Nutt. ex Moq. in DC. Prodr., 13(2): 108 (pro syn.). 1849, non Phyllocarpus Riedel, 1842; Theleophyton Moq. in DC. Prodr., 13(2): 115. 1849; Armola Kirschl. ex Montand., Syn. Fl. Jura Sept., 261. 1856; Teutliopsis Celak, Oesterr. Bot. Zeits., 22: 168. 1872; Senniella Aellen, Engl.,Bot. Jahrb., 68: 416.1938.

1. Atriplex patula L., var. hastata (L.) A.Gray, Man., ed 5, 409. 1867; Fernald, Gray's Man., ed 8, 597. 1950. HALBERD-LEAVED SALTBUSH. Syn.: Atriplex hastata L., Sp. Pl., 1053. 1753; Standl., N. Amer. Fl., 21(1): 42. 1916; A. halimus Pursh, Fl. Amer. Sept., 199. 1814, non A. halimus L., 1753; A. laciniata Pursh, Fl. Amer. Sept., 199. 1814, non A. laciniata L., 1753; A. halimoides Raf., Amer. Monthly Mag., 2: 176. 1818; A. mucronata Raf., Amer. Monthly Mag., 2: 176. 1818; A. dioica Raf.,

Amer. Monthly Mag., 2: 176. 1818; Chenopodium subspicatum Nutt., Gen., 1: 199. 1818; A. laciniata var. americana Torr., Fl. U.S., 1: 293. 1824; A. purshiana Moq., Chenop. Enum., 55. 1840; A. tetrandra Torr. ex Moq. in DC. Prodr., 13(2): 93 (pro syn.). 1849; A. gracilis Moq. in DC. Prodr., 13(2): 95 (pro syn.).1849; Chenopodium hastatum (L.) Dumort, Bull. Soc. Bot. Belg., 4: 339. 1865; Teutliopsis hastata (L.) Celak, Oesterr. Bot. Zeits., 22: 168. 1872; A. patula var. subspicata S.Wats., Proc. Amer. Acad., 9: 107. 1874; A. lapathifolia Rydb., Mem. N.Y. Bot. Gard., 1: 133. 1900; A. carnosa A.Nels., Bot. Gaz., 34: 261. 1902; A. subspicata (S.Wats.) Rydb., Bull. Torr. Bot. Club, 33: 137. 1906; A. patula subsp. hastata (L.) Hall et Clements, Carnegie Inst. Publ. No. 326: 249, pl. 37. 1923.

2. Atriplex rosea L., Sp. Pl., ed. 2, 1493. 1763; Standl., N. Amer. Fl., 21(1): 43. 1916. ROSEATE SALTBUSH. Syn.: Atriplex alba Scop., Delic. Insub., 2: 16. 1787, non A. alba Crantz, 1766; Teutliopsis rosea (L.) Celak, Oesterr. Bot. Zeits., 22: 169. 1872; A. spatiosa A.Nels., Bot. Gaz., 34: 360. 1902.

3. Atriplex elegans (Moq.) D.Dietr., Syn. Pl., 5: 537. 1852; Standl., N. Amer. Fl., 21(1): 58. 1916. WHITESCALE SALTBUSH. Syn.: Obione elegans Moq. in DC. Prodr., 13(2): 113. 1849; O. radiata Torr., Bot. Mex. Bound. Surv., 183. 1859; O. elegans var. radiata Torr., Bot. Mex. Bound. Surv., 183 (partim). 1859; A. argentea Coult., non Nutt.

4. Atriplex holocarpa F. v. Muell., Rep. Babb. Exp., 19. 1858; Benth., Fl. Austral., 5: 179. 1870; Bidwell et Wooton, U.S.D.A., Dept. Bull. No. 1345: 10. 1925. POP SALTBUSH. Syn.: Senniella spongiosa var. holocarpa (F.v.Muell.) Aellen, Engl. Bot. Jahrb., 68: 417. 1938; Atriplex spongiosa var. holocarpa (F.v.Muell.) Black, Flora S. Australia, Ed. 2, Part II: 300. 1948.

5. Atriplex saccaria S.Wats., Proc. Amer. Acad., 9: 112. 1874; Standl., N. Amer. Fl., 21(1): 45. 1916; Harrington, Man. Fl. Colorado, 207. 1954. Syn.: Atriplex cornuta M.E.Jones, Proc. Calif. Acad., II, 5: 718. 1895; A. truncata var. cornuta M.E. Jones, Contr. West.Bot., 11: 20. 1903; A. expansa var. cornuta M.E.Jones, Contr. West.Bot., 11: 21. 1903.

6. Atriplex klebergorum M.C.Johnston, Southwest Nat., 6: 49. 1961. KLEBERG SALTBUSH.

7. Atriplex argentea Nutt., Gen., 1: 198. 1818; Standl., N. Amer. Fl., 21(1): 46. 1916. SILVERSCALE SALTBUSH, SILVER ORACHE. Syn.: Obione argentea (Nutt.) Moq., Chenop. Enum., 76. 1840; A. nodosa Greene, Pittonia, 1: 40. 1887; A. caput-medusae, Eastw., Proc. Calif. Acad., II. 6: 316. 1896; Standl., N. Amer. Fl., 21(1): 48. 1916; A. volutans A.Nels., Bull. Torr. Bot. Club, 25:

203. 1898; A. spatiosa A.Nels., Bot. Gaz., 34: 360 (partim). 1902; A. argentea var. caput-medusae (Eastw.) Fosberg, Amer. Midl. Nat., 26: 693. 1941; A. argentea var. hillmani Jones, Contr. West. Bot., 11: 21. 1903; A. hillmani (Jones) Standl., N. Amer. Fl., 21(1): 48. 1916; A. argentea subsp. typica var. caput-medusae (Eastw.) Fosberg, Amer. Midl. Nat., 26: 693. 1941; A. argentea subsp. typica Hall et Clements, Carnegie Inst. Publ. No. 326: 284. 1923.

7a. Atriplex argentea subsp. expansa (S.Wats.) Hall et Clements, Carnegie Inst. Publ. No. 326: 284. 1923; Harrington, Man. Pl. Colorado, 207-208. 1954. SPREADING SALTBUSH, FOGWEED. Syn.: Obione argentea Torr., Bot. Mex. Bound. Surv., 182. 1859; A. expansa S.Wats., Proc. Amer. Acad., 9: 116. 1874; Standl., N. Amer. Fl., 21(1): 47. 1916; A. expansa var. mohavensis M.E.Jones, Contr. West. Bot., 11: 20. 1903; A. mohavensis (M.E.Jones) Standl., N. Amer. Fl., 21(1): 47. 1916; A. rydbergii Standl., N. Amer. Fl., 21(1): 47-48. 1916.

8. Atriplex semibaccata R.Br., Prodr. Fl. Nov. Holl., 1: 406. 1810; Standl., N. Amer. Fl., 21(1): 52. 1916. AUSTRALIAN SALTBUSH. Syn.: Atriplex denticulata Moq. in DC. Prodr., 13(2): 97. 1849; A. flagellaris Wooton et Standl., Contr. U.S. Nat. Herb., 16: 119. 1913.

9. Atriplex wrightii S.Wats., Proc. Amer. Acad., 9: 113. 1874; Standl., N. Amer. Fl., 21(1): 53. 1916. WRIGHT SALTBUSH. Syn.: Obione elegans var. radiata Torr., Bot. Mex. Bound. Surv., 183 (partim). 1859, non O. radiata Torr.; A. radiata Coult., Contr. U.S. Nat. Herb., 2: 368. 1894.

10. Atriplex pentandra (Jacq.) Standl., N. Amer. Fl., 21(1): 54. 1916. SEASHORE SALTBUSH. Syn.: Axyris pentandra Jacq., Sel. Stirp. Am., 244. 1763; Atriplex cristata Humb. et Bonpl. ex Willd., Sp. Pl., 4: 959. 1805; Obione cristata (HBK.) Moq., Chenop. Enum., 73. 1840; Atriplex arenaria of auth. for most western specimens.

11. Atriplex arenaria Nutt., Gen., 1: 198. 1818; Standl., N. Amer. Fl., 21(1): 55. 1916. COASTAL SALTBUSH. Syn.: Obione arenaria (Nutt.) Moq., Chenop. Enum., 71. 1840; Atriplex cristata var. arenaria (Nutt.) Kunze, Rev. Gen. Pl., 546. 1891.

12. Atriplex texana S.Wats., Proc. Amer. Acad., 9: 113. 1874; Standl., N. Amer. Fl., 21(1): 55. 1916. TEXAS SALTBUSH. Syn.: Atriplex tuberculata Coult., Contr. U. S. Nat. Herb., 2: 368. 1894; Small, Flora SE. United States, ed. 2, 387. 1913; Obione elegans var. tuberculosa Torr., Bot. Mex. Bound. Surv., 183. 1859.

13. Atriplex wardii Standl., N. Amer. Fl., 21(1): 56. 1916. WARD SALTBUSH.

14. Atriplex canescens (Pursh) Nutt., Gen., 1: 197. 1818; Standl., N. Amer. Fl., 21(1): 71. 1916; Brown, Amer. Midl. Nat., 55: 208-210. 1956. FOURWING SALTBUSH, CHAMISA, CHAMIZA. Syn.: Calligonum canescens Pursh, Fl. Amer. Sept., 340. 1814; Obione canescens (Pursh) Moq., Chenop. Enum., 74. 1840; Atriplex berlandieri Moq., Chenop., Enum., 65. 1840; Obione tetraptera Benth., Bot. Voy. Sulph., 48. 1844; Pterochiton occidentale Torr. et Frem. in Frem. Rept. Oregon and California, 318. 1845; Pt. canescens Nutt., Journ. Acad. Phila., II, 1: 184. 1847; Lophocarya spinosa Nutt. ex Moq. in DC. Prodr., 13(2): 112 (pro syn.). 1849; Obione occidentalis Moq. in DC. Prodr., 13(2): 114. 1849; O. berlandieri Moq. in DC. Prodr., 13(2): 114. 1849; Atriplex occidentalis (Torr.) D.Dietr., Syn. Pl., 5: 537. 1852; Obione occidentalis var. angustifolia Torr., Bot. Mex. Bound. Surv., 184. 1859; Atriplex canescens var. angustifolia S.Wats., Proc. Amer. Acad., 9: 121. 1874; A. angustior Cockerell, Proc. Davenp. Acad., 9: 7. 1902; A. tetraptera (Benth.) Rydb., Bull. Torr. Bot. Club, 39: 311. 1912; A. linearis S.Wats., Proc. Amer. Acad., 24: 72. 1889; A. canescens var. macilenta Jepson, Fl. Calif., 442. 1914; A. canescens subsp. typica Hall et Clements, Carnegie Inst. Publ. No. 326: 343, pl. 58. 1923; A. canescens var. linearis (S.Wats.) Munz, Man. S. Calif., 141. 1935.

15. Atriplex matamorensis A.Nels., Proc. Biol. Soc. Wash., 17: 99. 1904; Standl., N. Amer. Fl., 21(1): 59-60. 1916. MATAMOROS SALTBUSH. Syn.: Atriplex oppositifolia S.Wats., Proc. Amer. Acad., 9: 118. 1874, non Vill., 1779; Small, Flora SE. United States, ed. 2, 387. 1913.

16. Atriplex acanthocarpa (Torr.) S.Wats., Proc. Amer. Acad., 9: 117. 1874; Standl., N. Amer. Fl., 21(1): 65. 1916. ARMED SALTBUSH. Syn.: Obione acanthocarpa Torr., Bot. Mex. Bound. Surv., 183. 1859; Atriplex cuneata A.Nels., Bot. Gaz., 34: 357 (partim). 1902.

17. Atriplex obovata Moq., Chenop. Enum., 61. 1840; Standl., N. Amer. Fl., 21(1): 66. 1916. SILVER SALTBUSH. Syn.: Atriplex acanthocarpa Torr., Bot. Mex. Bound. Surv., 183 (partim). 1859; A. greggii S.Wats., Proc. Amer. Acad., 9: 118. 1874; A. cuneata A. Nels., Bot. Gaz., 34: 357 (partim). 1902; A. sabulosa M.E.Jones, Contr. West. Bot., 11: 21. 1903; A. jonesii Standl., N. Amer. Fl., 21(1): 65. 1916; A. obovata var. tuberata Macbr., Contr. Gray Herb., 53: 11. 1918.

18. Atriplex confertifolia (Torr. et Frem.) S.Wats., Proc. Amer. Acad., 9: 119. 1874; Standl., N. Amer. Fl., 21(1): 70. 1916; Brown, Amer. Midl. Nat., 55: 203. 1956. SPINY or SHADSCALE SALTBUSH, SHEEPBUSH. Syn.: Obione confertifolia Torr. et Frem. in Frem. Rept. Oregon and California, 318. 1845; O. rigida Torr. et Frem. in Frem. Rept. Oregon and California, 156 (nom. nud.). 1845; O. spinosa Moq. in DC. Prodr., 13(2): 108. 1849; Atriplex

spinosa D.Dietr., Syn. Pl., 5: 536. 1852; A. collina Wooton et Standl., Contr. U.S. Nat. Herb., 16: 119. 1913; Standl., N. Amer. Fl., 21(1): 70. 1916; A subconferta Rydb., Fl. Rocky Mts., 248. 1917.

7. SUCKLEYA A.Gray, Proc. Amer. Acad., 11: 103. 1876; Standl., N. Amer. Fl., 21(1): 74. 1916. SUCKLEYA.

1. Suckleya suckleyana (Torr.) Rydb., Mem. N.Y. Bot. Gard., 1: 133. 1900; Standl., N. Amer. Fl., 21(1): 74. 1916. POISON SUCKLEYA. Syn.: Obione suckleyana Torr. ex A.Gray, Pacific R.R. Rept., 12(2): 47. 1860; Atriplex suckleyana S.Wats., Proc. Amer. Acad., 9: 111. 1874; Suckleya petiolaris A.Gray, Proc. Amer. Acad., 11: 1876.

8. EUROTIA Adans., Fam. Pl., 2: 260. 1763; Standl., N. Amer. Fl., 21(1): 75. 1916. WINTERFAT. Syn.: Krascheninnikovia Gueldenst., Novi Comm. Acad. Petrop., 16: 548. 1772; Gueldenstaedtia Neck., Elem., 2: 204. 1790; Diotis Schreb., Gen., 2: 633. 1791; Ceratospermum Pers., Syn. Pl., 2: 551. 1807; Kranikofa Raf., Princ. Somiol., 30. 1814.

1. Eurotia lanata (Pursh) Moq., Chenop. Enum., 81. 1840; Standl., N. Amer. Fl., 21(1): 76. 1916. COMMON WINTERFAT, WHITE SAGE. Syn.: Diotis lanata Pursh, Fl. Amer. Sept., 602. 1814; D. revoluta Nutt. ex Moq. in DC. Prodr., 13(2): 121 (pro syn.). 1849; Eurotia ceratoides var. lanata Kuntze, Rev. Gen. Pl., 549. 1891.

1a. Eurotia lanata var. subspinosa (Rydb.) Kearney et Peeble, Journ. Wash. Acad., 29: 475. 1939. BUSH WINTERFAT. Syn.: Eurotia subspinosa Rydb., Bull. Torr. Bot. Club, 39: 312. 1912; Standl., N. Amer. Fl., 21(1): 75. 1916.

9. KOCHIA Roth in Schrad. Journ. Bot., 1800(1): 307. 1801; Standl., N. Amer. Fl., 21(1): 77. 1916. SUMMER-CYPRESS. Syn.: Sclerochlamys F.Muell., Trans. Phil. Inst. Vict., 2: 76. 1858.

1. Kochia scoparia (L.) Roth, Neues Journ. Bot. Schrad., 3(3): 85. 1809; Standl., N. Amer. Fl., 21(1): 77. 1916. BELVEDERE, SUMMER-CYPRESS. Syn.: Chenopodium scoparia L., Sp. Pl., 221. 1753; Atriplex scoparia (L.) Crantz, Inst., 1: 208. 1766; Salsola scoparia (L.) Marsch.-Bieb., Mem. Soc. Nat. Moscou, 1: 144. 1811; Kochia virgata Kostel., Ind. Sem. Hort. Prag., 77. 1844; Bushiola scoparia (L.) Nieuwl., Amer. Midl. Nat., 4: 95. 1915; Kochia alata Bates, Amer. Bot., 24: 52. 1918.

1a. Kochia scoparia var. culta (Voss) Farwell, Papers Mich. Acad. Sci., (1940), 26: 10. 1941. MEXICAN FIREBUSH, SUMMER-CYPRESS. Syn.: Bassia scoparia var. culta Voss, Deutsch. Gartenrat., 1904; Beil. Pflanzenk. Gärtner-Neuz., 18. 1905; Kochia trichophila Voss,

Deutsch. Gartenrat., 1904; Beil. Pflanzenk. Gärtner-Neuz., 18. 1905; Stapf in Sim, Verz. Haage u. Schmidt, 1906; K. trichophylla Hort. in Burpee Farm Annual, 1906; K. trichophylla Voss, Beil. Pflanzenk. Gartner-Neuz., 18. 1905; K. scoparia var. trichophylla Möllers, Deutsch. Gärtner-Zeit., 1906; Ugolini, Bol. Soc. Bot. Ital., 191. 1909; K. scoparia forma trichophila Schinz et Thell., Verz. Säm. Bot. Gart. Zürich, 10. 1909; K. scoparia var. trichophila Bailey, Hortus, 343. 1930; K. trichophila Hort. ex Tribune Hortic., 2: 445. 1907; K. childsii Hort. (Trade name).

2. Kochia americana S. Wats., Proc. Amer. Acad., 9: 93. 1874; Standl., N. Amer. Fl., 21(1): 78. 1916. PERENNIAL SUMMER-CYPRESS.

10. BASSIA All., Misc. Taur., 3: 177. 1766; l.c., 5: 93. 1776; Harrington, Man. Fl. Colorado, 210. 1954. Syn.: Echinopsilon Moq., Ann. Sci. Nat., II, 2: 127. 1834; Standl., N. Amer. Fl., 21(1): 78. 1916; Abrams, Ill. Fl. Pacific States, 2: 20. 1944.

1. Bassia hyssopifolia (Pallas) Kuntze, Rev. Gen. Pl., 1: 547. 1891; Davis, Flora Idaho, 262. 1952; Harrington, Man. Fl. Colorado, 210. 1954. SMOTHERWEED, FIVEHOOK BASSIA. Syn.: Salsola hyssopifolia Pallas, Reise, 1: 491. 1771; Suaeda hyssopifolia Pallas, Ill. Pl., 44, t. 36. 1803; Echinopsilon hyssopifolium (Pallas) Moq. in DC. Prodr., 13(2): 135. 1849; Kochia hyssopifolia (Pallas) Boiss., Fl. Orient., 4: 926. 1879.

11. CORISPERMUM L., Sp. Pl., 4. 1753; Standl., N. Amer. Fl., 21(1): 79. 1916. TICKSEED, BUGSEED.

1. Corispermum hyssopifolium L., Sp. Pl., 4. 1753; Standl., N. Amer. Fl., 21(1): 79. 1916. HYSSOPLEAF TICKSEED or BUGSEED. Syn.: Corispermum hyssopifolium var. americanum Nutt., Gen., 1: 4. 1818; C. americanum (Nutt.) Nutt., Trans. Amer. Phil. Soc., II, 5: 165. 1837; C. marginale Rydb., Bull. Torr. Bot. Club, 30: 247. 1903; C. emarginatum Rydb., Bull. Torr. Bot. Club, 31: 404. 1904; C. imbricatum A.Nels. ex Coult. et A.Nels., Man., 164. 1909; C. simplicissimum Lunell, Amer. Midl. Nat., 1: 207. 1910.

2. Corispermum nitidum Kit. ex Schult., Oesterr. Fl., ed. 2, 1: 7. 1814; Standl., N. Amer. Fl., 21(1): 79. 1916. SHINING TICKSEED or BUGSEED. Syn.: Corispermum tenue Link, Jahrb. Gewächsk., 1(3): 29. 1820; C. microspermum Host, Fl. Austr., 1: 319. 1827; C. hyssopifolium var. microcarpum S.Wats., Proc. Amer. Acad., 9: 123. 1874.

12. ALLENROLFEA Kuntze, Rev. Gen. Pl., 1: 545. 1891; Standl., N. Amer. Fl., 21(1): 80. 1916. PICKLEWEED. Syn.: Spirostachys S.Wats., Proc. Amer. Acad., 9: 125. 1874, non Spirostachys Sonder, 1850.

1. Allenrolfea occidentalis (S.Wats.) Kuntze, Rev. Gen. Pl., 1: 546. 1891; Standl., N. Amer. Fl., 21(1): 81. 1916. PICKLEWEED. Syn.: Arthrocnemum fruticosum Torr. in Stansb., Expl. Utah, 394. 1853, non A. fruticosum Moq., 1840; Arthrocnemum macrostachyum Torr., Bot. Mex. Bound. Surv., 184. 1859, non A. macrostachyum Moris, 1854; Halostachys occidentalis S.Wats., Bot. King's Expl., 293. 1871; Spirostachys occidentalis S.Wats., Proc. Amer. Acad., 9: 125. 1874; Salicornia occidentalis Greene, Fl. Fran., 173. 1891.

13. SALICORNIA L., Sp. Pl., 3. 1753; Standl., N. Amer. Fl., 21(1): 82. 1916. GLASSWORT. Syn.: Sarcathria Raf., Fl. Tell., 3: 47. 1837.

1. Salicornia bigelovii Torr., Bot. Mex. Bound. Surv., 184. 1859; Standl., N. Amer. Fl., 21(1): 83. 1916. BIGELOW GLASSWORT. Syn.: Salicornia mucronata Bigel., Fl. Boston, ed 2, 2. 1824, non S. mucronata Lag., 1817; S. virginica Moq. in DC. Prodr., 13(2): 145 (partim). 1849, non S. virginica L., 1753; S. mucronata var. suffrutescens S.Wats., Proc. Amer. Acad., 9: 124. 1874.

2. Salicornia virginica L., Sp. Pl., 4. 1753. VIRGINIA GLASSWORT, PERENNIAL SALTWORT, WOODY GLASSWORT. Syn.: Salicornia perennis sensu Standl., N. Amer. Fl., 21(1): 82-83 (partim). 1916, non S. perennis Mill., 1786; S. ambigua Michx., Fl. Bor. Amer., 1: 2. 1803; Sarcathria ambigua Raf., Fl. Tell., 3: 47. 1837; Arthrocnemum ambiguum Moq., Chenop. Enum., 112. 1840.

3. Salicornia utahensis Tidestrom, Proc. Biol. Soc. Wash., 26: 13. 1913; Standl., N. Amer. Fl., 21(1): 83. 1916. UTAH SAMPHIRE.

14. SARCOBATUS Nees in Max. Reise N. Amer., 1: 510. 1839; Standl., N. Amer. Fl., 21(1): 85. 1916. GREASEWOOD. Syn.: Fremontia Torr. in Frem. Rept., 91. 1843.

1. Sarcobatus vermiculatus (Hook.) Torr. in Emory's Notes Mil. Reconnois., 149. 1848; Standl., N. Amer. Fl., 21(1): 85. 1916. GREASEWOOD. Syn.: Batis vermiculata Hook., Fl. Bor. Amer., 2: 128. 1838; Fremontia vermicularis Torr. in Frem. Rept., 91. 1843; Sarcobatus maximilliani Nees in Max. Reise N. Amer., 1: 510. 1839.

15. SUAEDA Forsk. (Fl. Aegypt.-Arab., 69. 1775) ex Scopoli, Intr., 333. 1777 (Conserved). SEABLITE, SEEPWOOD. Syn.: Lerchea Rueling, Ordin. Pl., 45 (hyponym). 1774; Kuntze, Rev. Gen. Pl., 1: 549. 1891, non Lerchea L., 1771; Schoberia C.Meyer in Ledeb., Fl. Atl., 1: 395. 1829, non Schoberia Scop., 1777; Dondia Adans., Fam. Pl., 2: 261. 1763; Standl., N. Amer. Fl., 21(1): 86. 1916; Sevada Moq. in DC. Prodr., 21(1): 86. 1916; Chenopodina Moq. in DC. Prodr., 13(2): 159. 1849; Calvelia Moq. in DC. Prodr., 13(2): 167. 1849; Belowia Moq. in DC. Prodr., 13(2): 168. 1849.

1. Suaeda depressa (Pursh) S.Wats., Bot. King's Expl., 294. 1871; Abrams, Ill. Fl. Pac. States, 2: 95. 1944; Hitchcock et al, Vasc. Pl. Pac. Northwest, 2: 214. 1964. PURSH SEEPWEED. Syn.: Salsola depressa Pursh, Fl. Amer. Sept., 197. 1814; Dondia depressa (Pursh) Britton in Britt. & Brown, Ill. Fl. NE. U.S., 1: 585. 1896; Standl., N. Amer. Fl., 21(1): 87. 1916; Chenopodium calceoliforme Hook., Fl. Bor. Amer., 2: 126. 1838; Suaeda calceoliformis Moq., Chenop. Enum., 128. 1840; Schoberia calceoliformis Moq. in DC. Prodr., 13(2): 166. 1849; Schoberia americana C.Meyer ex Moq. in DC. Prodr., 13(2): 164 (pro syn.). 1849; Chenopodium americanum Spreng., Syst. Veg., 1: 922. 1825; Chenopodina depressa Moq. in DC. Prodr., 13(2): 164. 1849; Suaeda plattensis Nutt. ex Moq. in DC. Prodr., 13(2): 164 (pro syn.). 1849; Larchea calceoliformis (Hook.) Kuntze, Rev. Gen. Pl., 1: 549. 1891; Dondia calceoliformis (Hook.) Rydb., Bull. Torr. Bot. Club, 39: 313.1912.

1a. Suaeda depressa var. erecta S.Wats., Proc. Amer. Acad., 9: 90. 1874; Abrams, Ill. Fl. Pac. States, 2: 95. 1944. Syn.: Suaeda minutiflora S.Wats., Proc. Amer. Acad., 18: 194. 1883; Dondia minutiflora (S.Wats.) Heller, Cat. N. Amer. Pl., 3. 1898; Standl., N. Amer. Fl., 21(1): 87. 1916; D. depressa var. erecta (S.Wats.) Heller, Cat. N. Amer. Pl., 3. 1898; D. erecta (S.Wats.) A.Nels., Bot. Gaz., 34: 364. 1902; Suaeda erecta (S.Wats.) A.Nels., in Coult. et A. Nels., Man. Bot. Rocky Mts., 169. 1909.

2. Suaeda linearis (Ell.) Moq., Chenop. Enum., 130. 1840. ANNUAL SEEPWEED, SEABLITE. Syn.: Chenopodium maritimum Pursh, Fl. Amer. Sept., 198. 1814, non Ch. maritimum L., 1753; Salsola linearis Ell., Bot. S.C. & Ga., 1: 332. 1821; Suaeda maritima Torr., Fl. N.Y., 2: 141. 1843, non S. maritima Dumort, 1827; Chenopodina maritima var. erecta Moq. in DC. Prodr., 13(2): 161 (partim). 1849; Chenopodina linearis Moq. in DC. Prodr., 13(2): 164. 1849; Chenopodina maritima A.Gray, Man., ed. 2, 366. 1856, non Ch. maritima Moq., 1849; Suaeda linearis var. ramosa S.Wats., Proc. Amer. Acad., 9: 87 (partim). 1874; Dondia americana Britton in Britt. & Brown, Ill. Fl. NE. U.S., 1: 584 (as to description and illustration). 1896; D. linearis (Ell.) Heller, Cat. N. Amer. Pl., 3. 1898; D. carinata Millsp., Field Columb. Mus. Publ. Bot., 2: 297. 1909; Suaeda tharpii Johnston, in herb. ined.

3. Suaeda mexicana (Standl.) Standl., Bull. Torr. Bot. Club, 44: 428. 1917. MEXICAN SEEPWEED. Syn.: Dondia mexicana Standl., N. Amer. Fl., 21(1): 89. 1916.

4. Suaeda duripes I.M.Johnston, Journ. Arnold Arb., 24: 231. 1943.

5. Suaeda torreyana S.Wats., Proc. Amer. Acad., 9: 88. 1874. TORREY SEEPWEED. Syn.: Chenopodina linearis Torr. in Stansbury, Expl. Utah, 394. 1853, non Ch. linearis Moq., 1849; Suaeda fruticosa S.Wats., Bot. King's Expl., 294. 1871, non S. fruticosa Forsk., 1775; Dondia torreyana (S.Wats.) Standl., N. Amer. Fl., 21(1): 90. 1916.

6. Suaeda nigrescens var. glabra I.M.Johnston, Journ. Arnold Arb., 24: 229. 1943. SMOOTH SEEPWEED.

7. Suaeda conferta (Small) I.M.Johnston, Journ. Arnold Arb., 24: 230. 1943. Syn.: Dondia conferta Small, Bull. N.Y. Bot. Gard., 1: 280. 1899; Lerchea conferta (Small) K.Schumann in Just Bot. Jahrb., 27(1): 482. 1901; Suaeda fruticosa var. multiflora Torr., Pac. R.R. Rept., 4: 130. 1857; Dondia multiflora (Torr.) Heller, Cat. N. Amer. Pl., 3. 1898; D. fruticosa sensu Standl., N. Amer. Fl., 21(1): 90(partim). 1916.

8. Suaeda tampicensis (Standl.) Standl., Publ. Field Mus. Nat. Hist. Chicago, Bot. Ser., 8: 10. 1930. Syn.: Dondia tampicensis Standl., N. Amer. Fl., 21(1): 91. 1916.

9. Suaeda suffrutescens S.Wats., Proc. Amer. Acad., 9: 88. 1874. DESERT or SHRUBBY SEEPWEED. Syn.: Dondia suffrutescens (S.Wats.) Heller, Cat. N. Amer. Pl., 3. 1898; Standl., N. Amer. Fl., 21(1): 92. 1916.

16. SALSOLA L., Sp. Pl., 222. 1753; Standl., N. Amer. Fl., 21(1): 92. 1916. RUSSIAN THISTLE. Syn.: Kali Tourn. ex Adans., Fam. Pl., 2: 261. 1763; Isgarum Raf., Fl. Tell., 3: 46. 1837; Sarcomorphis Bojer ex Moq. in DC. Prodr., 13(2): 179 (pro syn.). 1849; Soda Fourr., Ann. Soc. Linn. Lyon, II. 17: 145. 1869.

1. Salsola kali L., Sp. Pl., 222. 1753. RUSSIAN THISTLE, TUMBLEWEED. Syn.: Salsola caroliniana Walt., Fl. Car., 111. 1788; S. rosacea Schkuhr, Handb., 1: 175. 1791, non S. rosacea L., 1753; S. kali var. caroliniana (Walt.) Nutt., Gen., 1: 199. 1818; S. kali var. hirsuta Hornem., Oec. Pl., ed. 3, 1: 293. 1821; S. kali var. glabra Deth., Consp. Pl. Megalop., 25. 1828; S. kali var. tenuifolia G.F.W.Meyer ex Tausch, Flora, 11: 326. 1828; Davis, Fl. Idaho, 268. 1952; S. kali var. crassifolia Reichenb., Fl. Germ. Exc., 583. 1832; S. tragus Reichenb., Fl. Germ. Exc., 583. 1832, non S. tragus L., 1756; S. kali var. rubella Moq., Chenop. Enum., 136. 1840; S. kali var. angustifolia Fenzl in Ledeb., Fl. Ross., 3: 798. 1849; S. kali var. pseudotragus G.Beck in Reichenb., Icon. Fl. Germ., 24: 172. 1909; S. pestifer A.Nels., in Coult. et A.Nels., Man., 169. 1909.

## NYCTAGINACEAE

Represented in Texas by 13 genera and 68 species and varieties.

1. PISONIA L., Sp. Pl., 1026. 1753; Standl., N. Amer. Fl., 21(3): 168. 1918. DEVIL'S-CLAW. Syn.: Pallavia Vell., Fl. Flum., 151. 1827.

1. Pisonia aculeata L., Sp. Pl., 1026. 1753; Standl., N. Amer. Fl., 21(3): 188. 1918. DEVIL'S-CLAW, COCKSPUR, PULL-and-HOLD-BACK, OLD HOOK. Syn.: Pisonia villosa Poir. in Lam. Encycl., 5: 347. 1804; P. sieberi Schlecht., Linnaea, 22: 876. 1822; P. loranthoides HBK., Nov. Gen. et Sp., 7: 197. 1825; Pallavia aculeata (L.) Vell., Fl. Flum., 151. 1825; Pisonia monotaxadenia Wright ex Sauv., Anal. Acad. Ci. Habana, 7: 199. 1870; P. tomentosa Vahl ex Heimerl., Bot. Jahrb., 21: 631 (pro syn.). 1896; P. grandifolia Standl., Contr. U.S. Nat. Herb., 13: 391. 1911, non P. grandifolia Warb., 1891.

2. BOUGAINVILLEA Commers. ex Juss., Gen., 91. 1789; Standl., N. Amer. Fl., 21(3): 194. 1918. BOUGAINVILLEA. Syn.: Josepha Vell., Fl. Flum., 154. 1825.

1. Bougainvillea glabra Choisy in DC. Prodr., 13(2): 437. 1849; Standl., N. Amer. Fl., 21(3): 194. 1918. BOUGAINVILLEA. Syn.: Bougainvillea spectabilis var. glabra (Choisy) Hook., Bot. Mag., pl. 4810. 1854.

3. NYCTAGINEA Choisy in DC. Prodr., 13(2): 429. 1849; Standl., N. Amer. Fl., 21(3): 201. 1918. MUCKFLOWER.

1. Nyctaginea capitata Choisy in DC. Prodr., 13(2): 429. 1849; Standl., N. Amer. Fl., 21(3): 201. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 165. 1944. SCARLET MUCKFLOWER, DEVIL'S BOUQUET. Syn.: Boerhaavia aggregata Pavon ex Choisy in DC. Prodr., 13(2): 429 (pro syn.). 1849; Nyctaginea ovata Choisy, Mem. Soc. Phys. Geneve, 12: 167. 1849; Boerhaavia capitata (Choisy) Heimerl, Jahresb. Staats-Oberrealsch. Fünfhaus Wien, 23: repr. 28. 1897; Nyctaginea cockerellae A.Nels., Proc. Biol. Soc. Wash., 16: 29, 52. 1903; Standl., Contr. U.S. Nat. Herb., 12(8): 330. 1909.

4. ALLIONIA L., Syst. Nat., ed. 10, 883, 890, 1361. 1759 (Conserved); non Standl., N. Amer. Fl., 21(3): 217. 1918. UMBRELLAWORT. Syn.: Wedelia Loefl. (Iter Hisp. 180 (hyponym). 1759), Reise, 240. 1766, non Wedelia Jacq., 1760; Wedeliella Cockerell, Torreya, 9: 167. 1909; Standl., N. Amer. Fl., 21(3): 199. 1918.

1. Allionia incarnata L., Syst. Nat., ed. 10, 890. 1759; I.M.Johnston, Journ. Arnold Arb., 25: 164. 1944. TRAILING FOUR-O'CLOCK or ALLIONIA, UMBRELLAWORT. Syn.: Allionia malacoides Benth., Bot. Voy. Sulph., 44. 1844; Wedelia incarnata (L.) Kuntze, Rev. Gen. Pl., 533. 1891; W. incarnata var. anodonta Standl., Contr. U.S. Nat. Herb., 12: 333. 1909; W. incarnata var. villosa Standl., Contr. U. S. Nat. Herb., 12: 333. 1909; W. incarnata var. nudata Standl., Contr. U. S. Nat. Herb., 12: 334. 1909; Wedeliella incarnata (L.) Cockerell, Torreya, 9: 167. 1909; W. incarnata var. anodonta (Standl.) Cockerell, Torreya, 9: 167. 1909; W. incarnata var. villosa (Standl.) Cockerell, Torreya, 9: 167. 1909; W.

incarnata var. nudata (Standl.) Cockerell, Torreya, 9: 167. 1909; Allionia incarnata var. multiserrata Heimerl, Symb. Ant., 7: 212. 1912.

2. Allionia choisyi Standl., Field Mus. Nat. Hist., Bot. Ser., 8: 310. 1931; I.M.Johnston, Journ. Arnold Arb., 25: 165. 1944. SMOOTH UMBRELLAWORT. Syn.: Allionia incarnata var. glabra Choisy in DC. Prodr., 13(2): 435. 1849; Wedelia glabra (Choisy) Standl., Contr. U.S. Nat. Herb., 12: 332. 1909; Wediella glabra (Standl.) Cockerell, Torreya, 9: 167. 1909; Standl., N. Amer. Fl., 21(3): 200. 1918; Allionia glabra (Choisy) Standl., in herb., non A. glabra (S.Wats.) Kuntze, 1891.

5. MIRABILIS L., Sp. Pl., 177. 1753. FOUR-O'CLOCK. Syn.: Vitmania Turra ex Cav., Icon., 3: 53. 1794, non Vitmannia Vahl, 1794; Oxybaphus L'Her. ex Willd., Sp. Pl., 1: 185. 1797; Calyxhymenia Gomez, Ortega, Dec., 5. 1797; Calymenia Pers., Syn. Pl., 1: 36. 1805; Quamoclidion Choisy in DC. Prodr., 13(2): 429. 1849; Standl., Contr. U.S. Nat. Herb., 12: 357. 1909; Allioniella Rydb., Bull. Torr. Bot. Club, 29: 687. 1902; Standl., Contr. U.S. Nat. Herb., 12: 356. 1909; Allionia sensu Standl., N. Amer. Fl., 21(3): 217. 1918.

1. Mirabilis oxybaphoides (A.Gray) A.Gray in Torr., Bot. Mex. Bound. Surv., 173. 1859; I.M.Johnston, Journ. Arnold Arb., 25: 181. 1944. SPREADING FOUR-O'CLOCK. Syn.: Quamoclidion oxybaphoides A.Gray, Amer. Journ. Sci., II. 15: 320. 1853; Oxybaphus wrightii Hemsl., Biol. Centr. Amer., 3: 3. 1882; Allionia oxybaphoides (A.Gray) Kuntze, Rev. Gen. Pl., 2: 533. 1891; Mirabilis oxybaphoides var. glabrata Heimerl, Ann. Cons. Jard. Bot. Geneve, 5: 180. 1901; Allioniella oxybaphoides (A.Gray) Rydb., Bull. Torr. Bot. Club, 29: 687. 1902; Contr. U.S. Nat. Herb., 12: 357. 1909; N. Amer. Fl., 21(3): 230. 1918; Allioniella oxybaphoides var. glabrata (Heimerl) Stanld., Contr. U.S. Nat. Herb., 12: 357. 1909.

2. Mirabilis multiflora (Torr.) A.Gray in Torr., Bot. Mex. Bound. Surv., 173. 1859; I.M.Johnston, Journ. Arnold Arb., 25: 181. 1944. COLORADO FOUR-O'CLOCK. Syn.: Oxybaphus multiflora Torr., Ann. Lyc. N.Y., 2: 237. 1827; Allionia multiflora (Torr.) Eaton, Man., ed. 6, 11. 1833; Nyctaginea torreyana Choisy in DC. Prodr., 13(2): 430. 1849; Quamoclidion multiflorum Torr. ex A.Gray, Amer. Journ. Sci., II. 15: 321. 1853; Standl., N. Amer. Fl., 21(3): 232. 1918; Q. multiflorum subsp. glandulosum Standl., Contr. U.S. Nat. Herb., 12: 359. 1909; Q. multiflorum subsp. obtusum Standl., Contr. U.S. Nat. Herb., 12: 359. 1909; Mirabilis multiflora var. glandulosa (Standl.) F.Macbr., Contr. Gray Herb., 49: 49. 1917; M. multiflora var. obtusa (Standl.) F.Macbr., Contr. Gray Herb., 49: 49. 1917.

3. Mirabilis lindheimeri (Standl.) Shinners, Field & Laboratory, 19(4): 175. 1951. LINDHEIMER'S FOUR-O'CLOCK. Syn.: Mirabilis jalapa subsp. lindheimeri Standl., Contr. U.S. Nat. Herb., 12:

368. 1909; M. jalapa var. lindheimeri (Standl.) Cory, Rhodora, 38: 405. 1936.

4. Mirabilis jalapa L., Sp. Pl., 177. 1753; Standl., N. Amer. Fl., 21(3): 238-239. 1916. COMMON FOUR-O'CLOCK. Syn.: Mirabilis odorata L., Cent. Pl., 1: 7. 1755; M. dichotoma L., Sp. Pl., ed. 2, 252. 1762; Jalapa dichotoma (L.) Crantz, Inst., 2: 266. 1766; J. congesta Moench., Meth., 508. 1794; Nyctago versicolor Salisb., Prodr., 57. 1796; J. undulata Moench., Meth. Suppl., 196. 1802; Nyctago jalapae DC., Fl. Fr., 3: 426. 1805; Nyctago mirabilis (L.) Jaume St.-Hil., Expos. Fam., 1: 212. 1805; Mirabilis pedunculata Stokes, Bot. Mat. Med., 1: 311. 1812; M. divaricata Lowe, Trans. Cambridge Phil. Soc., 17. 1831; M. procera Bertol., Novi Comm. Bonon., 3: 15. 1839; M. planiflora Trautv., Bull. Acad. Sci. St.-Petersb., 6: 216. 1840; Trimista levigata Raf., Aut. Bot., 12. 1840; Mirabilis ambigua Trautv., Linnaea, 15: Litt.-Ber., 97. 1841; M. jalapa var. procera (Bertol.) Choisy in DC. Prodr., 13(2): 428. 1849; M. jalapa var. ambigua (Trautv.) Choisy in DC. Prodr., 13(2): 428. 1849; M. jalapa var. planiflora (Trautv.) Choisy in DC. Prodr., 13(2): 428. 1849; M. jalapa var. odorata (L.) Heimerl, Bot. Jahrb., 21: 616. 1896; M. jalapa var. volcanica Standl., Contr. U.S. Nat. Herb., 12: 367. 1909; M. jalapa var. gracilis Standl., Contr. U.S. Nat. Herb., 12: 367. 1909; M. jalapa var. ciliata Standl., Contr. U.S. Nat. Herb., 12: 368. 1909; Admirabilis peruana Nieuwl., Amer. Midl. Nat., 3: 280. 1914.

5. Mirabilis longiflora L., Svensk Vet.-Akad. Handl., 1755: 176. 1755; Standl., N. Amer. Fl., 21(3): 239. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 180. 1944. SWEET FOUR-O'CLOCK. Syn.: Jalapa longiflora (L.) Moench., Meth., 508. 1794; Nyctago longiflora (L.) Salisb., Prodr., 57. 1796; Mirabilis suaveolens HBK., Nov. Gen. et Sp., 2: 213. 1817; M. wrightiana A.Gray ex Britton et Kearney, Trans. N.Y. Acad., 14: 28. 1894; M. longiflora var. wrightiana (A.Gray) Kearney et Peebles, Journ. Wash. Acad. Sci., 29: 475. 1939.

6. Mirabilis glabrifolia (Gomez Ortega) I.M.Johnston, Journ. Arnold Arb., 25: 179. 1944. FLATTOP FOUR-O'CLOCK. Syn.: Calyxhymenia glabrifolia Gomez Ortega, Nov. Pl. Dec., 1: 5, t. 1. 1797; Mirabilis corymbosa Cav., Icon., 4: 55, pl. 379. 1798; Calymenis corymbosa (Cav.) Pers., Syn. Pl., 1: 37. 1805; Oxybaphus glabrifolius Vahl, Enum. Pl., 2: 40. 1806; Allionia corymbosa (Cav.) Kuntze, Rev. Gen. Pl., 2: 533. 1891; A. corymbosa var. texensis Coult., Contr. U.S. Nat. Herb., 2: 351. 1894; A. texensis (Coult.) Small, Flora SE. U.S., ed. 1, 406. 1903; Allionia cardiophylla Standl., Contr. U.S. Nat. Herb., 13: 415. 1911; Oxybaphus cardiophyllus (Standl.) Weatherby, Proc. Amer. Acad., 49: 492. 1913; Oxybaphus corymbosus (Cav.) Standl., Field Mus. Publ. Bot., 8: 10. 1930.

7. Mirabilis rotata (Standl.) I.M.Johnston, Journ. Arnold Arb., 25: 179. 1944. ROTATE FOUR-O'CLOCK. Syn.: Allionia rotata Standl., Contr. U.S. Nat. Herb., 12: 347. 1909; Oxybaphus rotatus (Standl.) Weatherby, Proc. Amer. Acad., 49: 492. 1913.

8. Mirabilis glabra (S.Wats.) Standl., Field Mus. Publ., Bot. Ser., 8: 304. 1931; I.M.Johnston, Journ. Arnold Arb., 25: 177. 1944. SMOOTH FOUR-O'CLOCK. Syn.: Oxybaphus glaber S.Wats., Amer. Nat., 7: 301. 1873; Allionia glabra (S.Wats.) Kuntze, Rev. Gen. Pl., 2: 533. 1891; Oxybaphus glaber var. recedens Weatherby, Proc. Amer. Acad., 45: 425. 1910; Allionia glabra var. recedens (Weatherby) Standl., Contr. U.S. Nat. Herb., 13: 406. 1911.

9. Mirabilis exaltata (Standl.) Standl., Field Mus. Publ. Bot. Ser., 8: 305. 1931; Shinners, Field & Laboratory,19(4): 178-179. 1951. Syn.: Allionia exaltata Standl., Contr. U.S. Nat. Herb., 12: 355. 1909; N. Amer. Fl., 21(3): 220. 1918; Oxybaphus exaltatus (Standl.) Weatherby, Proc. Amer. Acad., 49: 492. 1913.

10. Mirabilis carletonii (Standl.) Standl., Field Mus. Publ. Bot. Ser., 8: 305. 1931; Shinners, Field & Laboratory, 19: 178. 1951. CARLETON FOUR-O'CLOCK. Syn.: Allionia carletoni Standl., Contr. U.S. Nat. Herb., 12: 355. 1909; Oxybaphus hirsutus Holz., Contr. U.S. Nat. Herb., 1: 213. 1892, non O. hirsutus Sweet, 1825; O. nyctagineus var. pilosus Holz., Contr. U.S. Nat. Herb., 1: 213. 1892, non O. nyctagineus var. pilosus A.Gray, 1859; O. carletoni (Standl.) Weatherby, Proc. Amer. Acad., 49: 492. 1913.

11. Mirabilis coccinea (Torr.) Benth. et Hook., Gen. Pl., 3: 3. 1880. SCARLET FOUR-O'CLOCK. Syn.: Oxybaphus coccineus Torr., Bot. Mex. Bound. Surv., 169. 1859; O. linearifolius S.Wats., Proc. Amer. Acad., 17: 375. 1882; Allionia linearifolia (S.Wats.) Kuntze, Rev. Gen. Pl., 2: 533. 1891; Mirabilis coccinea var. scabridata Heimerl, Ann. Cons. Jard. Bot. Geneve, 5: 186. 1901; A. linearis var. coccinea (Torr.) M.E.Jones, Contr. West. Bot., 10: 51. 1902; A. coccinea (Torr.) Standl., Contr. U.S. Nat. Herb., 12: 339. 1909; N. Amer. Fl., 21(3): 221. 1918; A. gracillima Standl., Contr. U.S. Nat. Herb., 12: 340. 1909; A. gracillima var. filifolia Standl., Contr. U.S. Nat. Herb., 12: 340. 1909; A. gracillima var. scabridata (Heimerl) Standl., Contr. U.S. Nat. Herb., 12: 340. 1909; A. linearifolia var. filifolia (Standl.) Standl., Contr. U.S. Nat. Herb., 16: 120. 1913.

12. Mirabilis gausapoides (Standl.) Standl., Field Mus. Publ. Bot. Ser., 8: 305. 1913. Syn.: Mirabilis linearis var. subhispida Heimerl, Ann. Cons. Jard. Bot. Geneve, 5: 186. 1901; Allionia linearis var. subhispida (Heimerl) Standl., Contr. U.S. Nat. Herb., 12: 342. 1909; A. subhispida (Heimerl) Standl., Contr. U.S. Nat. Herb., 16: 120. 1913; Allionia gausapoides Standl., Contr. U.S. Nat. Herb., 13: 406. 1911; N. Amer. Fl., 21(3): 222. 1918; Oxybaphus linearis var. subhispida (Heimerl) Dayton, Rhodora, 61: 85. 1959.

13. Mirabilis linearis (Pursh) Heimerl, Ann. Cons. Jard. Bot. Geneve, 5: 186. 1909. LINEARLEAF FOUR-O'CLOCK. Syn.: Allionia linearis Pursh, Fl. Amer. Sept., 728. 1814; Standl., N. Amer. Fl., 21(3): 222. 1918; Calymenia angustifolia Nutt., Gen., 1: 26. 1818; C. decumbens Nutt. of Manuals, non Gen., 1: 26. 1818; Oxybaphus angustifolius (Nutt.) Sweet, Hort. Brit., 1: 334. 1826; O. angustifolius var. linearis (Pursh) Choisy in DC. Prodr., 13(2): 433. 1849; M. angustifolia (Nutt.) MacM., Metasp. Minn. Valley, 216. 1892; O. bodini Holz., Contr. U.S. Nat. Herb., 1: 287. 1893; l.c., 5: 354. 1894; Standl., Contr. U.S. Nat. Herb., 12: 344. 1909; A. bodini (Holz.) Morong, Mem. Torr. Bot. Club, 5: 354. 1894; A. bushii Britton, Bull. Torr. Bot. Club, 22: 223. 1895; M. nyctaginea var. angustifolia (Nutt.) Heimerl, Beitr. Syst. Nyct., 22. 1897; A. montanensis Osterhout, Muhlenbergia, 1: 39. 1906; O. linearis (Pursh) B.L.Robinson, Rhodora, 10: 31. 1908; A. petrophila Standl., Contr. U.S. Nat. Herb., 12: 340. 1909; A. vaseyi Standl., Contr. U.S. Nat. Herb., 12: 343. 1909; A. pinetorum Standl., Contr. U.S. Nat. Herb., 12: 344. 1909; A. linearis var. bodini (Holz.) A.Nels. in Coult. et A.Nels., Man., 174. 1909.

14. Mirabilis diffusa (Heller) Reed, comb. nov. Basionym: Allionia diffusa Heller, Minn. Bot. Studies, 2: 33. 1898; Standl., Contr. U.S. Nat. Herb., 12: 343. 1909; Rydb., Fl. Prairies and Plains Centr. N.A., 310. 1932. Syn.: A. glandulifera A.Nels., Bot. Gaz., 34: 364. 1902; Oxybaphus angustifolius var. viscidus Eastw., Proc. Calif. Acad., II. 6: 313. 1896; A. viscida (Eastw.) Cockerell, Proc. Acad. Sci. Phila., 1904: 108. 1904.

15. Mirabilis aggregata (Gomez Ortega) Cav., Icon., 5: 22. 1799. Syn.: Calyxhymenia aggregata Gomez Ortega, Nov. Rar. Pl., 8: 81, t. 11. 1798; Allionia aggregata (Gomez Ortega) Spreng., Syst., 1: 384. 1825; Standl., Contr. U.S. Nat. Herb., 12: 344. 1909; N. Amer. Fl., 21(3): 225 (partim). 1918; Calymenia aggregata (Gomez Ortega) Pers., Syn. Pl., 1: 37. 1805; A. albida Coult., Contr. U.S. Nat. Herb., 2: 352 (partim). 1894, non A. albida Walt., 1788; A. hirsuta var. aggregata (Gomez Ortega) A.Nels. in Coult. et A.Nels., Man., 173 (partim). 1909.

16. Mirabilis decumbens (Nutt.) Daniels, Univ. Missouri Stud. Sci., 1: 276. 1907. Syn.: Mirabilis aggregata Cav., Icon., 5: 22, pl. 437. 1799, non Vahl 1798; Calymenia decumbens Nutt., Gen., 1: 26. 1818; Allionia decumbens (Nutt.) Spreng., Syst., 1: 384. 1825; Standl., Contr. U.S. Nat. Herb., 12: 344. 1909; Oxybaphus decumbens (Nutt.) Sweet, Hort. Brit., 1: 334. 1826; O. angustifolius var. decumbens (Nutt.) Choisy in DC. Prodr., 13(2): 433. 1849; A. pilosa var. decumbens (Nutt.) A.Nels. in Coult. et A.Nels., Man., 173 (partim). 1909.

17. Mirabilis ciliata (Standl.) Standl., Field Mus. Publ. Bot. Ser., 8: 306. 1913; Shinners, Field and Laboratory, 19(4): 173. 1951.

FRINGED FOUR-O'CLOCK. Syn.: Allionia ciliata Standl., Contr. U.S. Nat. Herb., 12: 345. 1909; N. Amer. Fl., 21(3): 229. 1918; Oxybaphus aggregatus A.Gray in Torr., Bot. Mex. Bound. Surv., 168. 1858, non Vahl 1806; Allionia deltoidea Standl., Contr. U.S. Nat. Herb., 13: 405. 1911; N. Amer. Fl., 21(3): 229 (pro syn.). 1918; Oxybaphus ciliatifolius Weatherby, Proc. Amer. Acad., 49: 492, (nom. nud.). 1913; Mirabilis ciliatifolia (Weatherby) Standl., Field Mus. Publ. Bot. Ser., 11: 154. 1936; M. ciliata (Philippi) Meigen, Engl. Bot. Jahrb., 17: 231. 1893 (nom. nud.); Oxybaphus ciliatus Philippi ex Meigen, Engl. Bot. Jahrb., 17: 231.1892 (1893) (nom. nud.).

18. Mirabilis hirsuta (Pursh) MacMillan, Metasp. Minn. Valley, 217. 1892; Shinners, Field and Laboratory, 19(4): 178. 1951. HAIRY FOUR-O'CLOCK. Syn.: Allionia hirsuta Pursh, Fl. Amer. Sept., 728. 1814; Calymenia hirsuta (Pursh) Nutt., Gen., 1: 26. 1818; C. pilosa Nutt., Gen., 1: 26. 1818; Oxybaphus pilosus (Nutt.) Sweet, Hort. Brit., 1: 334. 1826; O. hirsutus (Pursh) Sweet, Hort. Brit., 1: 334. 1826; O. hirsutus var. integrifolius Choisy in DC. Prodr., 13(2): 433. 1849; O. nyctagineus var. pilosus (Nutt.) A.Gray in Torr., Bot. Mex. Bound. Surv., 174 (partim). 1859; M. nyctaginea var. hirsuta (Pursh) Heimerl, Beitr. Syst. Nyct., 22. 1897; M. nyctaginea var. pilosa (Nutt.) Heimerl, Beitr. Syst. Nyct., 23 (partim). 1897; A. pilosa (Nutt.) Rydb., Bull. Torr. Bot. Club, 29: 690. 1902; A. aggregata sensu Rydb., Bull. Torr. Bot. Club, 29: 692. 1902, non A. aggregata Spreng., 1825; A. hirsuta var. rotundifolia Lunell, Bull. Leeds Herb., 2: 6. 1908; A. hirsuta var. coloradensis Standl., Contr. U.S. Nat. Herb., 12: 353. 1909; A. chersophila Standl., Contr. U.S. Nat. Herb., 12: 354. 1909; A. hirsuta var. aggregata A.Nels. in Coult. et A.Nels., Man., 173 (partim). 1909; A. pilosa var. decumbens A.Nels. in Coult. et A.Nels., Man., 173 (partim). 1909, non Calymenia decumbens Nutt., 1818.

19. Mirabilis eutricha Shinners, Field and Laboratory, 19(4): 176-177. 1951.

20. Mirabilis gigantea (Standl.) Shinners, Field and Laboratory, 19(4): 177-178. 1951. GIANT FOUR-O'CLOCK. Syn.: Allionia gigantea Standl., Contr. U.S. Nat. Herb., 12: 348. 1909; Oxybaphus giganteus (Standl.) Weatherby, Proc. Amer. Acad., 49: 492. 1913.

21. Mirabilis pauciflora (Buckl.) Standl., Field Mus. Publ. Bot.Ser., 8: 305. 1931. FEWFLOWERED FOUR-O'CLOCK. Syn.: Oxybaphus pauciflorus Buckl., Proc. Acad. Phila., 14: 7. Jan. 1862; Allionia pauciflora (Buckl.) Standl., N. Amer. Fl., 21(3): 224. 1918.

22. Mirabilis pseudaggregata Heimerl, Ann. Cons. Jard. Geneve, 5: 182. 1901. Syn.: Oxybaphus aggregatus Vahl, Enum., 2: 41 (partim). 1806; Mirabilis pseudaggregata forma subhirsuta Heimerl, Ann. Cons.

Jard. Geneve, 5: 184. 1901; M. pseudaggregata forma eglandulosa Heimerl, Ann. Cons. Jard. Geneve, 5: 184. 1901; Allionia pseudaggregata (Heimerl) Standl., Contr. U.S. Nat. Herb., 12: 356. 1909; A. pseudaggregata var. subhirsuta (Heimerl) Standl., Contr. U.S. Nat. Herb., 12: 356. 1909; Oxybaphus pseudaggregatus (Heimerl) Weatherby, Proc. Amer. Acad., 45: 425. 1910; A. trichodonta Standl., Contr. U.S. Nat. Herb., 12: 354. 1909; A. albida Coult., Contr. U.S. Nat. Herb., 2: 352 (partim). 1894, non A. albida Walt., 1788.

23. Mirabilis albida (Walt.) Heimerl, Ann. Cons. Jard. Bot. Geneve, 5: 182. 1901. WHITE FOUR-O'CLOCK, UMBRELLAWORT. Syn.: Allionia albida Walt., Fl. Car., 84. 1788; Standl., N. Amer. Fl., 21(3): 224. 1918; Calymenia albida (Walt.) Nutt., Gen., 1: 26. 1818; Oxybaphus albidus (Walt.) Sweet, Hort. Brit., 2: 429. 1827; Calymenia granulata Raf., Aut. Bot., 14. 1840; Oxybaphus angustifolius Choisy in DC. Prodr., 13(2): 433(partim). 1849, non O. angustifolius Sweet, 1827; Mirabilis nyctaginea var. albida Heimerl, Beitr. Syst. Nyct., 22. 1897; Allionia bracteata Rydb., Bull. Torr. Bot. Club, 29: 690. 1902; A. decumbens Rydb., Bull. Torr. Bot. Club, 29: 692. 1902, non A. decumbens Spreng., 1825; A. lanceolata Standl., Contr. U.S. Nat. Herb., 12: 355 (partim). 1909, non A. lanceolata Rydb., 1902; A. divaricata Rydb., Bull. Torr. Bot. Club, 29: 691. 1902; Mirabilis albida var. lata Shinners, Field and Laboratory, 19(4): 176. 1951; (M. bracteata var. elata Shinners, herb. nom.); M. albida var. uniflora Heimerl, Ann. Cons. Jard. Bot. Geneve, 5: 182. 1901; A. albida subsp. uniflora (Heimerl) Standl., Contr. U.S. Nat. Herb., 12: 255. 1909.

24. Mirabilis collina Shinners, Field and Laboratory, 19(4): 180. 1951.

25. Mirabilis nyctaginea (Michx.) MacMillan, Metasp. Minn. Valley, 217. 1892; Shinners, Field and Laboratory, 19(4): 179. 1951. WILD or PRAIRIE FOUR-O'CLOCK. Syn.: Allionia nyctaginea Michx., Fl. Bor. Amer., 1: 100. 1803; A. ovata Pursh. Fl. Amer. Sept., 1: 97. 1814, non Oxybaphus ovatus Vahl, 1806; Calymenia nyctaginea (Michx.) Nutt., Gen., 1: 26. 1818; Oxybaphus nyctaginea (Michx.) Sweet, Hort. Brit., 1: 334. 1826; Calyxhymenia paniculata Desf., Cat. Hort. Par., 390. 1829; A. cucullata Fisch., Mey. et Ave-Lall., Ind. Sem. Hort. Petrop., 9: 55. 1843 (1844); O. glabrifolius var. minor Choisy in DC. Prodr., 13(2): 431. 1849; O. cervantesii var. grandifolius Choisy in DC. Prodr., 13(2): 433. 1849; O. floribundus Choisy in DC. Prodr., 13(2): 433. 1849; O. cucullatus (Fisch., Mey. et Ave-Lall.) Choisy in DC. Prodr., 13(2): 434. 1849; O. nyctaginea var. latifolius A.Gray in Torr., Bot. Mex. Bound. Surv., 174. 1859; A. floribunda (Choisy) Kuntze, Rev. Gen. Pl., 2: 533. 1891; Standl., Contr. U.S. Nat. Herb., 12: 350. 1909; A. nyctaginea var. ovata (Pursh) Morong, Mem. Torr. Bot. Club, 5: 146. 1894; A. foliosa Standl., Contr. U.S. Nat. Herb., 13: 409. 1911.

26. Mirabilis dumetorum Shinners, Field and Laboratory, 19(4): 179. 1951.

27. Mirabilis coahuilensis (Standl.) Standl., Field Mus. Publ. Bot. Ser., 8: 305. 1931; I.M.Johnston, Journ. Arnold Arb., 25: 177. 1944. Syn.: Allionia coahuilensis Standl., Contr. U.S. Nat. Herb., 12: 347. 1909; N. Amer. Fl., 21(3): 225. 1918; Oxybaphus coahuilensis (Standl.) Weatherby, Proc. Amer. Acad., 45: 425. 1910.

28. Mirabilis grayana (Standl.) Standl., Field Mus. Publ. Bot. Ser., 8: 306. 1931. GRAY'S FOUR-O'CLOCK. Syn.: Oxybaphus nyctagineus var. latifolius A.Gray in Torr., Bot. Mex. Bound. Surv., 174 (partim). 1859; Allionia nyctaginea var. latifolia (A.Gray) Coult., Contr. U.S. Nat. Herb., 2: 352 (partim). 1894; A. latifolia (A.Gray) Standl., Contr. U.S. Nat. Herb., 12: 350 (excl. syn.). 1909; A. grayana Standl., N. Amer. Fl., 21(3): 227. 1918.

29. Mirabilis oblongifolia (A.Gray) Heimerl, Ann. Cons. Jard. Geneve, 5: 181. 1901; I.M.Johnston, Journ. Arnold Arb., 25: 178. 1944. Syn.: Oxybaphus nyctagineus (var.) oblongifolius A.Gray in Torr., Bot. Mex. Bound. Surv., 174. 1859; Allionia oblongifolia (A.Gray) Small, Flora SE. U.S., ed. 1, 407. 1903; Standl., Contr. U.S. Nat. Herb., 12: 350. 1909; A. greggii Standl., Contr. U.S. Nat. Herb., 12: 348. 1909; Mirabilis comata (Small) Standl., Field Mus. Bot. Ser., 8: 306. 1931; O. nyctagineus var. cervantesii A. Gray in Torr., Bot. Mex. Bound. Surv., 174. 1859, non Calyxhymenia cervantesii Desf., 1829; O. nyctagineus var. oblongifolius A.Gray in Torr., Bot. Mex. Bound. Surv., 174 (partim). 1859; O. viscosus Hemsl., Biol. Centr. Amer. Bot., 3: 3 (partim). 1882, non O. viscosus L'Her., 1849; O. cervantesii (A.Gray) S.Wats., Proc. Amer. Acad., 18: 142. 1883; A. nyctaginea var. cervantesii (A.Gray) Coult., Contr. U.S. Nat. Herb., 2: 352. 1894, non A. cervantesii Steud., 1840; M. nyctaginea var. setigera Heimerl, Beitr. Syst. Nyct., 22. 1897; M. nyctaginea var. oblongifolia (A.Gray) Heimerl, Beitr. Syst. Nyct., 23 (partim). 1897; M. nyctaginea var. cervantesii (A.Gray) Heimerl, Beitr. Syst. Nyct., 23. 1897; M. nyctaginea var. alpicola Heimerl, Beitr. Syst. Nyct., 23. 1897; Allionia comata Small, Flora SE. U.S., ed. 1, 407. 1903; A. melanotricha Standl., Contr. U.S. Nat. Herb., 12: 351. 1909; A. pratensis Standl., Contr. U.S. Nat. Herb., 12: 351. 1909; O. melanotrichus (Standl.) Weatherby, Proc. Amer. Acad., 45: 425. 1910; O. comatus (Small) Weatherby, Proc. Amer. Acad., 49: 492. 1913; O. pratensis (Standl.) Weatherby, Proc. Amer. Acad., 49: 492. 1913.

6. AMMOCODON Standl., Journ. Wash. Acad. Sci., 6: 631. 1916; N. Amer. Fl., 21(3): 197. 1918. GOOSEFOOT MOONPOD.

1. Ammocodon chenopodioides (A.Gray) Standl., Journ. Wash. Acad. Sci., 6: 631. 1916; N. Amer. Fl., 21(3): 197. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 162. 1944. GOOSEFOOT MOONPOD. Syn.: Selinocarpus chenopodioides A.Gray, Amer. Journ. Sci., II. 15: 262. 1853.

7. SELINOCARPUS A.Gray, Amer. Journ. Sci., II. 15: 262. 1853; Standl., Contr. U.S. Nat. Herb., 12(8): 387. 1909; N. Amer. Fl., 21(3): 197. 1918. MOONPOD.

1. Selinocarpus angustifolius Torr., Bot. Mex. Bound. Surv., 170. 1858; Standl., N. Amer. Fl., 21(3): 198. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 162. 1944. NARROWLEAF MOONPOD.

2. Selinocarpus parvifolius (Torr.) Standl., Contr. U.S. Nat. Herb., 12(8): 388. 1909; N. Amer. Fl., 21(3): 198. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 163. 1944. LITTLELEAF MOONPOD. Syn.: S. diffusus var. parvifolius Torr., Bot. Mex. Bound. Surv., 168. 1858

3. Selinocarpus diffusus A.Gray, Amer. Journ. Sci., II. 15: 262. 1853; Standl., N. Amer. Fl., 21(3): 198. 1918; Abrams, Ill. Fl. Pac. States, 2: 102. 1944. SPREADING MOONPOD. Syn.: S. diffusus subsp. nevadensis Standl., Contr. U.S. Nat. Herb., 21: 388. 1909.

4. Selinocarpus lanceolatus Wooton, Bull. Torr. Bot. Club, 25: 304. 1898; Standl., N. Amer. Fl., 21(3): 198. 1918. GYP MOONPOD.

8. ACLEISANTHES A.Gray, Amer. Journ. Sci., II. 15: 259. 1853; Standl., Contr. U.S. Nat. Herb., 12: 369. 1909; N. Amer. Fl., 21(3): 201. 1918. TRUMPETS. Syn.: Pentacrophys A.Gray, Amer. Journ. Sci., II. 15: 259. 1853.

1. Acleisanthes wrightii (A.Gray) Benth. et Hook. ex Hemsl., Biol. Centr. Amer. Bot., 3: 6. 1882; Standl., Contr. U.S. Nat. Herb., 12: 370. 1909; N. Amer. Fl., 21(3): 202. 1918. WRIGHT TRUMPETS. Syn.: Pentacrophys wrightii A.Gray in Sillim. Journ. Bot., II. 15: 261. 1853.

2. Acleisanthes acutifolia Standl., Contr. U.S. Nat. Herb., 12: 370. 1909; N. Amer. Fl., 21(3): 202. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 167. 1944. Syn.: Pentacrophys wrightii sensu Torr., Bot. Mex. Bound. Surv., 170 (partim). 1859, non P. wrightii A.Gray, 1853; Acleisanthes wrightii forma torreyana Heimerl, herb. nom.

3. Acleisanthes anisophylla A.Gray, Amer. Journ. Sci., II. 15: 261. 1853; Standl., N. Amer. Fl., 21(3): 203. 1918. OBLIQUELEAF TRUMPETS.

4. Acleisanthes crassifolia A.Gray, Amer. Journ. Sci., II. 15: 260. 1853; Small, Flora SE. U.S., ed. 2, 409. 1913; Standl., N. Amer. Fl., 21(3): 203. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 167. 1944.

5. Acleisanthes longiflora A.Gray, Amer. Journ. Sci., II. 15: 261. 1853; Standl., N. Amer. Fl., 21(3): 203. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 166. 1944. ANGEL TRUMPETS, YERBA-de-la-RABIA. Syn.: A. longiflora subsp. hirtella Standl., Contr. U.S. Nat. Herb., 12: 371. 1909; A. longiflora var. hirtella Standl. ex Heimerl, Notizbl. Bot. Gart. Berlin, 11: 459. 1932.

6. Acleisanthes obtusa (Choisy) Standl., Contr. U.S. Nat. Herb., 12: 371. 1909; N. Amer. Fl., 21(3): 203. 1918. BERLANDIER TRUMPETS. Syn.: Nyctaginea obtusa Choisy in DC. Prodr., 13(2): 429. 1849; Acleisanthes berlandieri A.Gray, Amer. Journ. Sci., II. 15: 260. 1853; A. greggii Standl., Contr. U.S. Nat. Herb., 12: 371. 1909.

9. CYPHOMERIS Standl., Contr. U.S. Nat. Herb., 13: 428. 1911; N. Amer. Fl., 21(3): 214. 1918. CYPHOMERIS. Syn.: Lindenia Mart. et Gal., Bull. Acad. Brux., 10(1): 357. 1843, non Lindenia Benth., 1842; Tinantia Mart. et Gal., Bull. Acad. Brux., 11(1): 240. 1844, non Tinantia Scheidw., 1839; Senkenbergia Schauer, Linnaea, 19: 717. 1847; Standl., Contr. U.S. Nat. Herb., 12: 372. 1909, non Senckenbergia Gaertn., Mey et Schreb., 1800.

1. Cyphomeris gypsophiloides (Mart. et Gal.) Standl., Contr. U.S. Nat. Herb., 13: 428. 1911; N. Amer. Fl., 21(3): 214. 1918; I.M. Johnston, Journ. Arnold Arb., 25: 173. 1944. RED CYPHOMERIS. Syn.: Lindenia gypsophiloides Mart. et Gal., Bull. Acad. Brux., 10(1): 358. 1843; Tinantia gypsophiloides Mart. et Gal., Bull. Acad. Brux., 11(1): 240. 1844; Senkenbergia annulata Schauer, Linnaea, 19: 711. 1847; Boerhaavia gibbosa Pavon ex Choisy in DC. Prodr., 13(2): 457. 1849; Senkenbergia gypsophiloides (Mart. et Gal.) Benth. et Hook., Gen. Pl., 3: 5. 1880; Standl., Contr. U.S. Nat. Herb., 12(8): 372. 1909; B. gypsophiloides (Mart. et Gal.) Coult., Contr. U.S. Nat. Herb., 2: 354. 1894.

2. Cyphomeris crassifolia (Standl.) Standl., Contr. U.S. Nat. Herb., 13: 428. 1911; N. Amer. Fl., 21(3): 414. 1918. SINUATE-LOBED CYPHOMERIS. Syn.: Senkenbergia crassifolia Standl., Contr. U.S. Nat. Herb., 12(8): 373. 1909.

10. COMMICARPUS Standl., Contr. U.S. Nat. Herb., 12: 373. 1909; N. Amer. Fl., 21(3): 215. 1918. WARTCLUB.

1. Commicarpus scandens (L.) Standl., Contr. U.S. Nat. Herb., 12: 373. 1909; N. Amer. Fl., 21(3): 215. 1909; I.M.Johnston, Journ. Arnold Arb., 25: 173. 1944. CLIMBING WARTCLUB, PEGA-POLLO. Syn.:

Boerhaavia scandens L., Sp. Pl., 3. 1753; B. grahami A.Gray, Amer. Journ. Sci., II. 15: 323. 1853; B. scandens forma B grahami (A.Gray) Heimerl, herb. nom.

11. ANULOCAULIS Standl., Contr. U.S. Nat. Herb., 21(8): 374. 1909; N. Amer. Fl., 21(3): 216. 1918. RINGSTEM.

1. Anulocaulis eriosolenus (A.Gray) Standl., Contr. U.S. Nat. Herb., 12(8): 375. 1909; N. Amer. Fl., 21(3): 316. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 174. 1944. BIG BEND RINGSTEM. Syn.: Boerhaavia eriosolena A.Gray, Amer. Journ. Sci., II. 15: 322. 1853.

2. Anulocaulis gypsogenus Waterfall, Rhodora, 47: 329-332. 1945. GYP RINGSTEM. Syn.: A. leiosolenus sensu Standl., Contr. U.S. Nat. Herb., 12(8): 375 (partim). 1909.

3. Anulocaulis leiosolenus (Torr.) Standl., Contr. U.S. Nat. Herb., 12(8): 375 (partim). 1909; N. Amer. Fl., 21(3): 216. 1918; I.M. Johnston, Journ. Arnold Arb., 25: 174. 1944; Waterfall, Rhodora, 47: 330. 1945. RINGSTEM. Syn.: Boerhaavia leiosolenus Torr., Bot. Mex. Bound. Surv., 172. 1859; Acleisanthes nummularia M.E. Jones, Contr. West Bot., 10: 43. 1902; Boerhaavia nummularia M.E. Jones, Ind. Kew. Suppl., 4: 27. 1913; Anulocaulis leiosolenus var. typicus Waterfall, Rhodora, 47: 330. 1945.

3a. Anulocaulis leiosolenus var. lasianthus I.M.Johnston, Journ. Arnold Arb., 25: 174-175. 1944; Waterfall, Rhodora, 47: 330. 1945.

4. Anulocaulis reflexus I.M.Johnston, Journ. Arnold Arb., 25: 175. 1944. REFLEXED RINGSTEM.

12. BOERHAAVIA L., Sp. Pl., 3. 1753; Standl., Contr. U.S. Nat. Herb., 12(8): 375. 1909; N. Amer. Fl., 21(3): 204. 1918. SPIDERLING. Syn.: Dantia (Lippi) Choisy in DC. Prodr., 13(2): 449 (pro syn.). 1849.

1. Boerhaavia coccinea Miller, Gard. Dict., ed. 8: Boerhaavia No. 4. 1768; Standl., N. Amer. Fl., 21(3): 205. 1918. SCARLET SPIDERLING. Syn.: Boerhaavia caribea Jacq., Obs. Bot., 4: 5. 1771; B. diffusa Sw., Obs. Bot., 10. 1791, non B. diffusa L., 1753; B. paniculata Rich., Act. Soc. Hist. Nat. Paris, 1: 105. 1792; B. polymorpha Rich., Act. Soc. Hist. Nat. Paris, 1: 185. 1792; Heimerl, Ann. Cons. Jard. Bot. Geneve, 5: 188. 1901; B. hirsuta Willd., Phytogr., 1: 1. 1794; B. adscendens Willd., Sp. Pl., 1: 19. 1797; B. viscosa Lag. et Rodr., Anal. Cienc. Nat. Hist., 4: 256. 1801; B. decumbens Vahl, Enum. Pl., 1: 284. 1804; B. laxa Pers., Syn. Pl., 1: 36. 1805; B. squamata Raf., Aut. Bot., 40. 1840; B. glandulosa Andress., Sv. Vet. Akad. Handl., 1853: 171. 1854; B. sonorae Rose, Contr. U.S. Nat. Herb., 1: 110. 1891; B. diffusa var. paniculata (Rich.) Kuntze, Rev. Gen. Pl., 2: 533.

1891; B. diffusa var. hirsuta (Willd.) Kuntze, Rev. Gen. Pl., 2: 533. 1891; B. diffusa var. viscosa (Lag. et Rodr.) Heimerl, Beitr. Syst. Nyct., 27. 1897; B. viscosa var. oligodena Heimerl, Ann. Cons. Jard. Bot. Geneve, 5: 189. 1901; Standl., Contr. U.S. Nat. Herb., 12: 383. 1909; B. ramulosa M.E.Jones, Contr. West. Bot., 10: 40. 1902; B. viscosa var. apiculata Standl., Contr. U.S. Nat. Herb., 13: 423. 1909; B. ixodes Standl., Contr. U.S. Nat. Herb., 13: 423. 1909; B. coccinea var. parcehirsuta Heimerl, Symb. Antill., 7: 212. 1912.

2. Boerhaavia gracillima Heimerl, Engl. Bot. Jahrb., 11: 86. 1889 (1890); Standl., Contr. U.S. Nat. Herb., 12(8): 386. 1909; N. Amer. Fl., 21(3): 207. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 169. 1944. SLIMSTEM SPIDERLING. Syn.: Boerhaavia anisophylla var. paniculata Coult., Contr. U.S. Nat. Herb., 2: 356. 1894; B. erecta Benth., Pl. Hartw., 9. 1839, non B. erecta L., 1753; B. paniculata Benth., Pl. Hartw., 343. 1848, non B. paniculata Rich., 1792; B. organensis Standl., Contr. U.S. Nat. Herb., 12: 385. 1909; B. gracillima subsp. decalvata Heimerl in Standl., Contr. U.S. Nat. Herb., 12(8): 386. 1909.

3. Boerhaavia anisophylla Torr., Bot. Mex. Bound. Surv., 171. 1858; P. Standl., Contr. U.S. Nat. Herb., 12: 386. 1909; N. Amer. Fl., 21(3): 207. 1918. Syn.: Boerhaavia palmeri S. Wats., Proc. Amer. Acad., 18: 142. 1883; B. anisophylla forma polytricha Heimerl, Fedde Repert., 12: 220. 1913.

4. Boerhaavia linearifolia A.Gray, Amer. Journ. Sci., II. 15: 322. 1853; Standl., Contr. U.S. Nat. Herb., 12: 386. 1909; N. Amer. Fl., 21(3): 208. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 168. 1944. NARROWLEAF SPIDERLING. Syn.: Boerhaavia linearifolia var. glabrata A.Gray, Amer. Journ. Sci., II. 15: 322. 1853; B. tenuifolia (A.Gray) Heimerl, herb. nom.; B. linearifolia var. glandulosa Standl., Contr. U.S. Nat. Herb., 12: 387. 1909, non B. glandulosa Andress., 1854; B. lindheimeri Standl., N. Amer. Fl., 21(3): 208. 1918.

5. Boerhaavia purpurascens A.Gray, Amer. Journ. Sci., II. 15: 321. 1853; Standl., N. Amer. Fl., 21(3): 208. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 172. 1944. PURPLE SPIDERLING.

6. Boerhaavia erecta L., Sp. Pl., 3. 1753; Standl., Contr. U.S. Nat. Herb., 12(8): 380. 1909; N. Amer. Fl., 21(3): 210. 1918; I.M. Johnston, Journ. Arnold Arb., 25: 171. 1944. ERECT SPIDERLING. Syn.: Boerhaavia elongata Salisb., Prodr., 56. 1796; B. virgata HBK., Nov. Gen. et Sp., 2: 215. 1817; B. discolor HBK., Nov. Gen. et Sp., 2: 215. 1817; B. atomaria Raf., Aut. Bot., 40. 1840; Valeriana latifolia Mart. et Gal., Bull. Acad. Brux., 11(1): 124. 1844; B. thornberi M.E.Jones, Contr. West. Bot., 12: 72. 1908; B. erecta var. thornberi (M.E.Jones) Standl., Contr. U.S. Nat. Herb., 12: 381. 1909.

7. Boerhaavia intermedia M.E.Jones, Contr. West. Bot., 10: 41, t. 16. 1902; Standl., N. Amer. Fl., 21(3): 211. 1918; I.M.Johnston, Journ. Arnold Arb., 25: 171. 1944. Syn.: Boernaavia universitatis Standl., Contr. U.S. Nat. Herb., 12: 380. 1909; B. erecta var. intermedia (M.E.Jones) Kearney et Peebles, Journ. Wash. Acad. Sci., 29: 475. 1939.

8. Boerhaavia wrightii A.Gray, Amer. Journ. Sci., II. 15: 322. 1853; Standl., N. Amer. Fl., 21(3): 211. 1918; Abrams, Ill. Fl. Pac. States, 2: 104. 1944; I.M.Johnston, Journ. Arnold Arb., 25: 172. 1944. WRIGHT SPIDERLING. Syn.: Boerhaavia bracteosa S.Wats., Proc. Amer. Acad., 20: 370. 1885.

9. Boerhaavia spicata Choisy in DC. Prodr., 13(2): 456. 1849; I.M. Johnston, Journ. Arnold Arb., 25: 172. 1944. SPICATE SPIDERLING. Senkenbergia coulteri Hook. f. in Benth. et Hook., Gen. Pl., 3:6. 1880; Boerhaavia spicata var. torreyana S.Wats., Proc. Amer. Acad., 24: 70. 1889; B. torreyana (S.Wats.) Standl., Contr. U.S. Nat. Herb., 12: 385. 1909; N. Amer. Fl., 21(3): 213. 1918; B. coulteri (Hook. f.) S.Wats., Proc. Amer. Acad., 24: 70. 1889; B. spicata var. palmeri S.Wats., Proc. Amer. Acad., 24: 70. 1889, non B. palmeri S.Wats., 1883; B. rosei Standl., Contr. U.S. Nat. Herb., 13: 424. 1911; B. watsoni Standl., Contr. U.S. Nat. Herb., 12: 1909.

13. ABRONIA Juss., Gen., 448. 1789; Lam., Tab. Encycl., 1: 469. 1791; Standl., Contr. U.S. Nat. Herb., 12: 306. 1909; N. Amer. Fl., 21(3): 242. 1918. SANDVERBENA. Syn.: Tricratus L'Her. ex Willd., Sp. Pl., 1: 807. 1799; Abronia sect. Tripterocalyx Torr. in Frem. Rept., 92. 1843; Cycloptera Nutt. ex A.Gray, Amer. Journ. Sci., II. 15: 319 (pro syn.). 1853, non Cycloptera Endl., 1841; Apaloptera Nutt. ex A.Gray, Amer. Journ. Sci., II. 15: 319 (pro syn.). 1853; Tripterocalyx (Torr.) Hook., Journ. Bot. & Kew Misc., 5: 261. 1853; Standl., N. Amer. Fl., 21(3): 240. 1918; Tripteridium Torr. ex Benth. et Burm., Ill. Fl., ed. 2, 2: 33 (pro syn.). 1913.

1. Abronia micrantha Torr. in Frem. Rept., 92. 1843. SMALL WINGED SANDVERVERBENA. Syn.: Tripterocalyx micranthus (Torr.) Hook., Journ. Bot. & Kew Misc., 5: 261. 1853 (as macranthus, orthogr. err.); Standl., N. Amer. Fl., 21(3): 241. 1918; Cycloptera annua Nutt. ex A.Gray, Amer. Journ. Sci., II. 15: 319 (pro syn.). 1853; Apaloptera annua Nutt. ex A.Gray, Amer. Journ. Sci., II. 15: 319 (pro syn.). 1853; Tripteridium micranthum Torr. ex Britt. & Brown, Ill. Fl. NE. U.S., ed. 2, 2: 33 (pro syn.). 1913; Abronia micrantha var. pedunculata M.E.Jones, Proc. Calif. Acad., II. 5: 716. 1895; A. pedunculata (M.E.Jones) Rydb., Bull. Torr. Bot. Club, 29: 686. 1902; Tripterocalyx pedunculatus (M.E.Jones) Standl., Contr. U.S. Nat. Herb., 12: 328. 1909, N. Amer. Fl., 21(3): 241. 1918; Abronia cycloptera A.Gray, Amer. Journ. Sci., II. 15: 319 (illegit. syn.). 1853; I.M.Johnston, Journ. Arnold Arb., 25: 181.

1944; Tripterocalyx cycloptera (A.Gray) Standl., Contr. U.S. Nat. Herb., 12: 329. 1909.

2. Abronia carnea Greene, Pittonia, 3: 343. 1898; I.M.Johnston, Journ. Arnold Arb., 25: 181-182. 1944. WINGED SANDVERBENA. Syn.: Tripterocalyx wootonii Standl., Contr. U.S. Nat. Herb., 12: 329. 1909; Abronia cycloptera sensu Standl., N. Amer. Fl., 21(3): 242 (pro syn.). 1918, non A. cycloptera A.Gray, 1853; Tripterocalyx cycloptera sensu Standl., N. Amer. Fl., 21(3): 242. 1918.

3. Abronia angustifolia Greene, Pittonia, 3: 344. 1898; Standl., N. Amer. Fl., 21(3): 253. 1918. NARROWLEAF SANDVERBENA. Syn.: Abronia mellifera Torr., Bot. Mex. Bound. Surv., 170. 1859, non A. mellifera Dougl., 1829; A. turbinata Torr. ex S. Wats., Bot. King's Expl., 285 (partim). 1871; A. turbinata var. stenophylla Heimerl, Ann. Cons. Jard. Geneve, 5: 190. 1901; A. arizonica Standl., Contr. U.S. Nat. Herb., 12: 319. 1909; A. lobatifolia Standl., Contr. U. S. Nat. Herb., 12: 319. 1909; A. torreyi Standl., Contr. U.S. Nat. Herb., 12: 319. 1909.

4. Abronia ameliae Lundell, Wrightia, 1: 54-55. 1945. AMELIA SANDVERBENA.

5. Abronia fragrans Nutt. ex Hook., Journ. Bot. & Kew Misc., 5: 261. 1853; Standl., N. Amer. Fl., 21(3): 250. 1918. SNOWBALL or SWEET SANDVERBENA, LASATER'S PRIDE. Syn.: Abronia speciosa Buckl., Proc. Acad. Phila., 1862: 7. 1862; A. nudata Rydb., Bull. Torr. Bot. Club, 29: 683. 1902; A. robusta Standl., Contr. U.S. Nat. Herb., 12: 324, t. XLII. 1909; A. texana Standl., Contr. U.S. Nat. Herb., 12: 323, t. XLI, f. 2. 1909; A. fendleri Standl., Contr. U.S. Nat. Herb., 12: 324. 1909.

5. Abronia carletonii Coult. et Fisher, Bot. Gaz., 17: 349. 1892; Standl., N. Amer. Fl., 21(3): 253. 1918. CARLETON SANDVERBENA. Syn.: Abronia turbinata var. carletoni (Coult. et Fisher) M.E. Jones, Contr. West. Bot., 10: 44. 1902; A. neallevi Standl., Contr. U.S. Nat. Herb., 12: 323, t. XLI, f. 1. 1909.

# ADDITIONAL NOTES ON THE ERIOCAULACEAE. XVII

Harold N. Moldenke

ERIOCAULON DECANGULARE L.

Additional synonymy: Eriocaulon longifolium Raf., Autikon Bot., pr. 1, 188. 1840 [not E. longifolium Nees, 1841].

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 1, 31, 33, 35, 285, & 287. 1903; E. D. Merr., Ind. Rafin. 82. 1949; Moldenke, Phytologia 17: 490, 493, & 498--505, fig. 3. 1968.

Merrill (1949) reduces Rafinesque's E. longifolium to synonymy under E. decangulare L., probably mostly on the basis of the long and obtuse leaves. This species is, indeed, the only species of pipewort known from New Jersey whose leaves may attain the length of a foot (actually, to 35 cm.). Rafinesque's description of the flower-heads and the color of the involucral bractlets of his plant is disturbing, but he very probably had an immature plant before him. Cretainly he already knew E. compressum Lam., to which some parts of his description better apply, and described it as E. filiformis Raf. and whose leaves he would certainly never have referred to as "obtuse", even in an immature plant. I am, therefore, temporarily, at least, willing to go along with Merrill's disposition of the binomial.

It should be noted here that Rafinesque's binomial invalidates the E. longifolium Nees ex Kunth, Enum. Pl. 3: 567--568 (1841). I therefore hereby propose the substitute name, Eriocaulon willdenovianum Moldenke, nom. nov., for the plant of Nees von Esenbeck.

Additional citations: ALABAMA: County undetermined: Buckley s. n. [July 1840] (Br); Herb. Univ. Wisc. s.n. (Ws). MISSISSIPPI: Forest Co.: S. B. Jones 1872 (Mi); Keefe s.n. [11 May 1941] (Ws). George Co.: Demaree 33430 (Cb, Ss), 34861 (Ss). Hancock Co.: A. R. Moldenke 252 (Fg). Harrison Co.: Demaree 29700 (N), 29766 (N), 30610 (N), 32043 (Ca--987056, Mi), 32447a (Ok, St), 33408 (Cb, Ss); Diener 1209 (Ur); J. F. Joor s.n. [Long Beach, 8/8/91] (S); A. R. Moldenke 256 (Fg); Trécul 894 (B). Jackson Co.: Demaree 28077 (N, Ug), 31221 (Ca--987028), 32202 (Mi, St), 32306 (Ok, St), 33275 (Cb, Ss), 33597 (Z); Diener 276 (Ur), 664 (Ur); A. R. Moldenke 260 (Fg); A. B. Seymour 9199 [Seymour & Earle 16] (Hi--77046, S, Ws), s.n. [Seymour & Earle 16] (Lb--16525); Skehan s.n. [Ocean Springs, 7/2/95] (Dt); S. M. Tracy 6417 (Hi--77042). Pearl River Co.: Kral 17331 (N); A. R. Moldenke 251 (Fg). Stone Co.: Demaree 32584 (Le). LOUISIANA: Allen Par.: Kral 20970 (N). Concordia Par.: Arséne 11786 (B). Saint Tammany Par.: Arséne 11030 (B), 11786 (N); DeWolf

771 (Ms--11029); A. R. Moldenke 245 (Fg). Tangipahoa Par.: Correll & Correll 9316 (N). Vernon Par.: Kral 17223 (N), 20651 (N); R. McVaugh 8456 (Mi). Parish undetermined: C. W. Short s.n. [Louisiana] (Ws). TEXAS: Angelina Co.: Correll & Wasshausen 27521 (Ld). Austin Co.: Tharp s.n. [near Sealy, 6/28/42] (Rf). Freestone Co.: Lundell & Lundell 12954 (Ld). Hardin Co.: Correll & Wasshausen 27567 (Ld), 27572 (Ld); Lundell & Lundell 11482 (Ld), 11527 (Ld), 11902 (Ld); Tharp, Gimbrede, & Yang 51-1449 (Ms--11031); Tharp, Turner, & Johnston 54922 (St). Harrison Co.: Demaree 29766 (St). Henderson Co.: Correll & Wasshausen 27497 (Ld); O. Sanders s.n. [May 11, 1957] (Rf). Jasper Co.: D. S. Correll 26761 (Ld); Correll & Correll 12516 (Rf); Correll & Johnston 19642 (Rf); C. L. Lundell 11793 (Ld). Leon Co.: F. A. Barkley 13556 (N). Milam Co.: Tharp 44344c (N), 44344 (N), 44344b (N, N). Robertson Co.: Novosad 80 (St); Painter & Barkley 13540 (N, N); Rowell 8050 (N), 8136 (N). Rusk Co.: Vinzent s.n. (B). San Augustine Co.: Gould & Leinweber 6532 (Ca--978707). Smith Co.: J. Reverchon s.n. [May 16, 1902] (E), s.n. [Swan, 6-9-1902] (E). Tyler Co.: Cory 49945 (Ca--754800, N); Tharp 44345 (Ok, S); Tharp, Turner, & Johnston 54954 (St); Webster & Wilbur 3199 (W--2067946). County undetermined: Wiedemann s.n. [Texas] (B). MEXICO: Michoacán: Arséne s.n. [Laguna, 6.8.1912] (B). LOCALITY OF COLLECTION UNDETERMINED: Boltwood s.n. (Ws); Buckley s.n. [So. States] (E); Collector undesignated s.n. [Amer. bor.] (S); Herb. Jacquin 3 [North America] (S); Palisot de Beauvois s.n. [America septentr.] (B); Stüvel s.n. [North America, 1819] (B); Mrs. Taylor s.n. [June, 1903] (Rf); Watson & Kelvington s.n. [U. S. A.] (S).

ERIOCAULON DECANGULARE var. LATIFOLIUM Chapm.

Synonymy: Eriocaulon decangular var. latifolium "Chapm. ex Moldenke" apud Kral, Sida 2: 305, in nota sphalm. 1966.

Bibliography: Moldenke, N. Am. Fl. 19: 21. 1937; Moldenke, Phytologia 1: 316. 1939; Moldenke, Known Geogr. Distrib. Erioc. 2, 3, & 34. 1946; Moldenke, Phytologia 3: 322. 1950; Moldenke, Résumé 12, 14, & 480. 1959; Kral, Sida 2: 305. 1966; Shinners, Sida 2: 441. 1966; Moldenke, Phytologia 17: 500. 1968.

ERIOCAULON DECANGULARE var. MINOR Moldenke

Bibliography: Moldenke, Phytologia 15: 462 (1968) and 17: 501 & 502. 1968; Moldenke, Biol. Abstr. 49: 3245. 1968; Moldenke, Résumé Suppl. 16: 2. 1968.

Collectors have found this plant in bogs, moist places in bogs, and forming tufts in sandy peat of bogs in longleaf pine savannas, flowering and fruiting in May and August. Material has been misidentified and distributed in herbaria as E. decangulare L., E. septangulare With., and E. texense Körn.

Citations: LOUISIANA: Beauregard Par.: Kral 17208 (N). TEXAS: Robertson Co.: F. A. Barkley 13543 (N--type, N--isotype); Rowell 8071 (Ms--11040).

ERIOCAULON DECEMFLORUM Maxim.

Synonymy: Eriocaulon decemflorum var. genuinum Nakai in Matsum., Icon. Pl. Koisik. 2: 47. 1914. Eriocaulon decemflorum var. genuinum f. typicum Nakai in Matsum., Icon. Pl. Koisik. 2: 47. 1914. Eriocaulon decemflorum var. decemflorum (Maxim.) Koyama ex Moldenke, Résumé 287, in syn. 1959. Eriocaulon decemfolium Maxim. ex Moldenke, Résumé Suppl. 3: 32, in syn. 1962. Eriocaulon denciflorum Maxim. ex Moldenke, Résumé Suppl. 3: 32, in syn. 1962. Eriocaulon decemlobflorum Maxim. ex Moldenke, Résumé Suppl. 3: 32, in syn. 1962.

Bibliography: Maxim., Bull. Acad. Sci. St. Pétersb. [Dec. Pl. Asiat.] 8: 7. 1893; Mak., Bot. Mag. Tokyo 8: 506. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158 & 501. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 37, & 285. 1903; Matsum., Ind. Pl. Jap. 2 (1): 175. 1905; Matsum., Icon. Pl. Koisik. 2: 47. 1914; Mori, Enum. Pl. Corea 80. 1922; Mak. & Nemoto, Fl. Jap., ed. 1, 1304 (1925) and ed. 2, 1510. 1931; Masamune, Mem. Fac. Sci. Agr. Taihoku Univ. 11, Bot. 4: 537 & 538. 1934; Steinb., Fl. U. R. S. S. 3: 496, pl. 27, fig. 1. 1935; Nemoto, Suppl. Fl. Jap. 1038. 1936; Honda, Nom. Pl. Jap. 462. 1939; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 4--9. 1940; Nakai & Honda, Nov. Fl. Jap. 6: 14. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158 & 501. 1941; Moldenke, Known Geogr. Distrib. Erioc. 24, 25, & 34. 1946; Moldenke, Phytologia 3: 322--323. 1950; Koyama, Journ. Jap. Bot. 31: 9. 1956; Moldenke, Résumé 167, 171, 173, 287, & 480. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158 & 501. 1959; Moldenke, Résumé Suppl. 3: 18, 21, 31, & 32. 1962; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 177--178, fig. 120 (1), pl. 48, fig. 303. 1964.

Illustrations: Steinb., Fl. U. R. S. S. 3: pl. 27, fig. 1. 1935; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 177, fig. 120 (1) & pl. 48, fig. 303. 1964.

Satake (1940) describes this plant as follows: "Herba annua, acaulis, usque 5--15 cm alta, vel raro valde debilis. Radices fibroso-albae, spongiosae, transverse septatae. Folia linearia, apice attenuata, glabra, 3--5 fenestrato-nervia, pedunculis breviora. Pedunculi exiles, 4-costati. Vaginae teretes sublaxae, 3 cm longae, apice oblique fissae. Capitula turbinata, 3--4 mm longa et lata, albida, 10-flora vel pauciflora. Bracteae involucrantes ovato-lanceolatae, quam flores longiores. Bracteae florum oblanceolato-lineares, apice acutae, 1-nerves, hyalinae, apicem margine et dorso pilis clavatis vel subelongatis pilosae. Flos ♂: 2 mm longus; sepala 2, basi connata, lobis lanceolatis, apice acutiusculis pilis albis clavatis 2-cellulatis puberulis; petala 2, in tubum apice 2-lobatum connata, lobis ovatis apice pilis albis

clavatis 2-cellulatis puberulis, intus apicem glandula nigra unica instructis; stamina 4, raro 2—3, antheris nigris rotundatis; in centro pistilli rudimentum nigro-glandulosum dispositum. Flos ♀: 1.5 mm longus, breve stipitatus; sepala 2, libera, linearilanceolata, apice acuta, glabra vel apicem margine sparse pilosa; petala 2, libera, lineari-spathulata, apice obtusa, albo-spongiosa cellulis oblongis composita, apicem intus et margine pilis elongatis 2—3-cellulatis barbata, intus apicem glandula nigra unica coronata; capsula 2-cocca; stylus brevis crassus, capsula conspique brevior; stigmata 2, stylo conspique longiora; semina elliptica, 0.7—0.9 mm longa, supra hamato-papillosa."

He reminds us, also, that "This variety was divided into two forms, typicum Nakai and coreanum Nakai, by Prof. T. Nakai in Matsumura, Icon. Pl. Koisikaw, II, 47 (1914). The former has perfect flowers, while the latter has abortive flowers. It was originally named Eriocaulon coreanum by Lecomte, based on the specimen collected by U. Faurie in the Saisyuto Island of Tyosen."

It is worth noting here that E. decemflorum Komarov (1940), E. decemflorum var. nipponicum (Maxim.) Nakai, E. decemflorum var. nipponicum f. typicum Nakai, and E. decemflorum var. nipponicum f. yoshinoi Nakai are all now regarded as E. nipponicum Maxim., E. decemflorum var. genuinum f. coreanum (H. Lecomte) Nakai and E. decemflorum var. coreanum Nakai are now regarded as E. decemflorum f. coreanum (H. Lecomte) Nakai, and E. decemflorum var. nipponicum f. glaberrimum Satake is E. nipponicum var. glaberrimum Satake. Koyama (1964), however, regards E. nipponicum Maxim. as conspecific with and a synonym of E. decemflorum Maxim.

Recent collectors have found this plant growing in dryish soil in open grasslands, sandy soil of pond margins by the coast, wet open grasslands, wet sedge meadows, and wet fields at streamsides, at 1100—1450 meters altitude, flowering in August and October. Koyama 13104 bears a notation that the plant was "scattered in wet meadows with Parnassia; a robust specimen merging to nipponicum". On Ohwi & Koyama s.n. [18 October 1954] the collectors note "flowers perfectly dimerous". The vernacular name, "ko-inunohige", is recorded for the species.

Satake (1940) cites the following collections: JAPAN: Honshu: Hasimoto s.n. [Oct. 1928]; Hayata s.n. [Aug. 1924]; Hisauti 853; Itô s.n.; Iwabuti 5426 & 5471; Kawakami s.n. [Oct. 1894]; Koidzumi 34099, 34100, 34101, & 63805; Satow 451. Kiushu: Doi 92 & 238; Koidzumi s.n. [Sept. 1921]; Masamune s.n. [Aug. 1926]; Muramatsu 296; Takahasi 11; Tasiro s.n. [Aug. 1916]; Yamamoto s.n. [Aug. 1925]. KOREA: Tyô 43. KOREAN COASTAL ISLANDS: Saisyû-tô: Nakasima 144.

Additional citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Furuse s.n. [Naka-tashiro, 18 Aug. 1954] (S), s.n. [Imooto-numa, 16 Sept. 1954] (S), s.n. [Utsukushi-no-mori, 31 August 1955] (Ca—

59913, S, S, S, S, S), s.n. [Mt. Mitsu-tooge, 7 Sept. 1955] (S); Koyama 13104 (Ss); Koyama & Itoo 13108 (Z); Ohwi & Koyama s.n. [18 October 1954] (Ss).

ERIOCAULON DECEMFLORUM f. COREANUM (H. Lecomte) Nakai

Synonymy: Eriocaulon coreanum H. Lecomte, Not. Syst. 1: 191--192. 1910. Eriocaulon decemflorum var. genuinum f. coreanum (H. Lecomte) Nakai in Matsum., Icon. Pl. Koisik. 2: 47. 1914. Eriocaulon decemflorum f. coreanum Nakai ex Masamune, Mem. Sci. Fac. Agr. Taihoku Univ. 11, Bot. 4: 537 & 538. 1934. Eriocaulon decemflorum var. coreanum Nakai ex Moldenke, Résumé 287, in syn. 1959.

Bibliography: H. Lecomte, Not. Syst. 1: 191--192. 1910; Prain, Ind. Kew. Suppl. 4, pr. 1, 82. 1913; Nakai in Matsum., Icon. Pl. Koisik. 2: 47. 1914; Masamune, Mem. Sci. Fac. Agr. Taihoku Univ. 11, Bot. 4: 537 & 538. 1934; Prain, Ind. Kew. Suppl. 4, pr. 2, 82. 1938; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 5. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 61. 1946; Moldenke, Résumé 171, 173, 287, & 480. 1959; Moldenke, Résumé Suppl. 1: 12 (1959) and 3: 18 & 21. 1962.

This taxon is said by Satake (1940) to be based on a specimen collected by Père Urbain Jean Faurie on Saisyû-tô Island in the Korean Coastal Islands. Actually, however, the type of the taxon was collected by Père Emile Joseph Taquet (no. 1738) "dans les herbes humides, 1700 m. alt." on Quelpart Island. Recent collectors have found the plant growing at 1700--1800 meters altitude, flowering in October. A vernacular name recorded for it is "tanna-imunohige".

Citations: KOREAN COASTAL ISLANDS: Quelpart: Taquet 1738 (B--isotype, Z--isotype). WESTERN PACIFIC ISLANDS: RYUKYO ISLAND ARCHIPELAGO: SATSUNAN ISLANDS: Yakushima: Hatusima 148444a (Kg).

ERIOCAULON DECIPIENS N. E. Br.

Bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 245. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 75 & 285. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Moldenke, Known Geogr. Distrib. Erioc. 47. 1946; Moldenke, Phytologia 3: 323. 1950; Moldenke, Résumé 149, 287, & 480. 1959.

Recent collectors have found this plant growing in swamps at 2400 meters altitude.

Additional citations: RHODESIA: Nordlindh & Weimarck 4983 (S).

ERIOCAULON DEHNIAE H. Hess

Bibliography: H. Hess, Bericht. Schweitz. Bot. Gesell. 67: 84-87. 1957; Moldenke, Résumé Suppl. 1: 10 & 25. 1959; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

This species is said to be endemic to Rhodesia (the former Southern Rhodesia).

ERIOCAULON DEIGHTONII Meikle

Bibliography: Meikle, Kew Bull. 22: 143. 1968.

This species is said by Meikle (1968) to be related to E. transvaalicum N. E. Br., but differing in having subulate leaves, many scapes, the heads pale-brownish, the sepals of the pistillate florets conspicuously unequal, and the larger of these conspicuously alate-keeled. The type was collected by H. D. Jordan (no. 946) near Mando, Mambolo, Sierra Leone, on October 15, 1953, and is deposited in the herbarium of the Royal Botanic Gardens at Kew. He cites, in addition, the following collections, presumably all deposited at Kew: GUINEA: Chillou 726; Pitot s.n. [Pita, 16 Oct. 1950]. SIERRA LEONE: Adames 88 & 245; Deighton 2795 & 4402, in part; Jordan 92, 113, 164, 533, 574, 622, & 816.

ERIOCAULON DEMBIANENSE A. Chiov.

Bibliography: A. Chiov., Ann. Bot. Roma 9: 148. 1911; Prain, Ind. Kew. Suppl. 5, pr. 1, 97 (1921) and pr. 2, 97. 1960; Moldenke, Résumé Suppl. 10: 4. 1964.

Mooney, on the label of the specimen cited below, comments that the plant is "possibly not distinct from. E. branningtonii N. E. Br." He is doubtless here referring to E. transvaalicum var. hanningtonii (N. E. Br.) Meikle.

Citations: ETHIOPIA: H. F. Mooney 9012 (S, Z).

ERIOCAULON DENSUM Mart.

Bibliography: Colla, Herb. Pedem. 5: 483--484. 1836; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938.

The original description of this taxon is: "Mart: in sched: (Brasil:). Plantula densissime caespitosa, folia omnia radicalia in globulum diam: vix pollicari fasciculata linearia leviter striata uti scapi puberula, scapi palmares et ultra erecti tenuissime filiformes ac fere capillares levissime spiraliter sexangulati, capitulum pauciflorum squamis extimis vacuis involucralibus ovatis scariosis floralibus duplo longioribus radiantibus lanceolatis glaberrimis niveis; ab flosculorum tenuitatem neque in hac neque in sequenti staminum numerum et capsulae structuram determinare potui."

Nothing is known to me about this taxon except what is given in the above description. It is not accounted for in Ruhland's monograph (1903).

ERIOCAULON DEPAUPERATUM Merr.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 5: 336. 1910; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and pr. 2, 82. 1938; Moldenke, Known Geogr. Distrib. Erioc. 26 & 34. 1946; Moldenke, Résumé 184 & 480. 1959; Moldenke, Phytologia 17: 496. 1968.

Mrs. Clemens found this species forming a sod in a pond at 8500 feet altitude, flowering and fruiting in December. The H. Bruce 9, distributed as E. depauperatum, is actually E. cristatum Mart.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: M. S. Clemens 18711 (Ca--374780, S), s.n. [Dec. 15, 1923] (Ca--244071); E. D. Merrill 6590 (N--cotype); Ramos & Edaño s.n. [Herb. Philip. Bur. Sci. 40523] (B).

ERIOCAULON DEPRESSUM R. Br.

Synonymy: Eriocaulon deustum R. Br., Prod. Fl. Nov. Holl. 1: 255. 1810. Randalia depressa Beauv. & Desv. apud Kunth, Enum. Pl. 3: 571, in syn. 1841. Randalia densa Beauv. & Desv. apud Kunth, Enum. Pl. 3: 571, in syn. 1841. Randalia depressa Beauv. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 681, in syn. 1895. Randalia densa Beauv. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 681, in syn. 1895. Eriocaulon depressum "Br. ex Sm." apud Britten, Journ. Bot. 38: 481 & 482, in syn. 1900. Randalia deusta Beauv. & Desv. ex Moldenke, Résumé 342, in syn. 1959.

Bibliography: R. Br., Prod. Fl. Nov. Holl. 1: 255. 1810; Desv., Ann. Sci. Nat. Paris, sér. 1, 13: 47. 1828; Kunth, Enum. Pl. 3: 571. 1841; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 681. 1895; Britten, Journ. Bot. 38: 481 & 482. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 33, 38, 39, & 285. 1903; F. M. Bailey, Comprh. Cat. Queensl. Pl. 584. 1913; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 681. 1946; Moldenke, Known Geogr. Distrib. Erioc. 27 & 34. 1946; Moldenke, Résumé 209, 287, 342, & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 681. 1960.

Kunth (1841) distinguishes Robert Brown's two supposed species as follows: E. deustum -- "Scapo angulato-striato (sesquiunciali), foliis compresso-fistulosis vix longiore; capitulo depresso; squamis fere omnibus floriferis: extimis rotundatis; reliquis mucronulatis; utrisque imberbibus; perianthii feminei exterioribus foliolis lateralibus carina dilatato-alata." E. depressum -- "Scapo multistriato (spithamaeo), foliis fistulosis compressis longiore; capitulo florido depresso; squamis omnibus floriferis, imberbibus: extimis rotundatis; perianthii feminei exterioribus foliolis lateralibus carina dilatato-alata." Both specific epithets are sometimes written with an uppercase initial letter, for no valid reason.

Although Kunth (1841) and Jackson (1895) both cite the Randalia combinations to Desv., Ann. Sci. Nat. Paris, sér. 1, 13: 47 (1828), they are actually not made there, being only implied. Jackson (1893) reduces E. heterogynum F. Muell. to synonymy under E. depressum.

Citations: AUSTRALIAN REGION: AUSTRALIA: Queensland: Banks & Solander s.n. [New Holland, 1770] (B--isotype, Z--isotype); Storr 13013 (Qu).

ERIOCAULON DESLANDESII Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. [1] & 421, pl. 253. 1928;

A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Moldenke, Known Geogr. Distrib. Erioc. 7 & 34. 1946; Moldenke, Phytologia 3: 322. 1950; Reitz, Sellowia 7: 124. 1956; Moldenke, Résumé 88 & 480. 1959; Reitz, Sellowia 11: 31 & 103 (1959) and 13: 52, 53, 72, & 90. 1961.

Illustrations: Alv. Silv., Fl. Mont. pl. 253. 1928.

Common names recorded for this plant are "capim manso", "capipoatinga", "gravatá manso", and "semprevivas do campo".

Additional citations: BRAZIL: Santa Catarina: Reitz 3505 (S), 4696 (Le); Reitz & Klein 857 (Le), 5428 (Z); Smith & Klein 8204 (W--2248752).

ERIOCAULON DIAGUISSENSE Bourdu

Bibliography: Bourdu, Bull. Soc. Bot. France 104: 156, fig. A--F. 1957; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1957: 33. 1958; Moldenke, Résumé 426 & 480. 1959; Moldenke, Résumé Suppl. 1: 8. 1959; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

This species is apparently endemic to the Republic of Guinea (formerly French Guinea) and is characterized by sessile flowers in a basal rosette of leaves. It is illustrated in the original publication.

ERIOCAULON DIANAE Fyson

Synonymy: Eriocaulon dianae var. typicum Fyson, Journ. Indian Bot. 2: 259. 1921.

Bibliography: Fyson, Journ. Indian Bot. 1: 50 (1919) and 2: 259--260, pl. 11 & 12. 1921; A. W. Hill, Ind. Kew. Suppl. 6: 78 (1926) and 7: 88. 1929; C. E. C. Fischer, Kew Bull. Misc. Inf. 1931: 261. 1931; C. E. C. Fischer in Gamble, Fl. Presid. Madras 9: 1614--1615 & 1620. 1931; Moldenke, Known Geogr. Distrib. Erioc. 23, 34, & 61. 1946; Razi, Journ. Mysore Univ. 7 (4): 77. 1946; Moldenke, Phytologia 3: 323. 1950; Moldenke, Résumé 162, 165, 287, & 480. 1959; Moldenke, Résumé Suppl. 1: 13. 1959; G. L. Shah, Bull. Bot. Surv. India 4: 236. 1962; Moldenke, Résumé Suppl. 6: 8. 1963; Thanikaimoni, Pollen & Spores 7: 184. 1965; Moldenke, Résumé Suppl. 16: 9 & 21. 1968; Moldenke, Phytologia 17: 461. 1968.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 11 & 12. 1921.

The original description of this taxon by Fyson (1921) is as follows: "Caulis perbrevis. Folia lanceolata, 3--7 cm. longa, 4--6 mm. lata, plana, glabra. Pedunculi complures, 7--15 cm. aut longiores, glabra. Capitula 5--8 cm. hemisphaerica; bractae involucrantes stramineae et glabrae, quam capitulo longiores aut aequantes, aut demum reflexae. Bractae flores superantes obovato-cuneatae, summo-dorse puberulae, viridi nigrescentes. Flores trimeri. Flos ♂: sepala in spatham antica fissam, connata, antherae nigrae. Flos ♀: sepala inaequalia, duo navicularia dorso puberula, unum planum, lanceolatum aut linearium, et quam ceteris brevius. Plate 11. Peninsular India; Western Ghats from Mt. Abu and Bombay to Calicut. I include in this species a large number

of forms the extremes of which are sufficiently distinct to be considered good species, were it not for the intermediates which grade into each other, for even the 7 varieties given below are not easily separated." As type of the species he appears to designate Fyson 3819 "at Rudrasiri".

He describes his var. typicum as "Bractae involucrantes quam capitulo longiores. ♀ floris tertius sepalum planum, oblanceolatum .....Bractae involucrantes quam capitulo longiores, femini floris tertium planum. Plate 12. Salsette to S. Kanara. A beautiful little plant, the tips of the involucral bracts showing beyond the margin of the head when seen from above. The head itself may be nearly flat, hemispherical, globose, or even ovoid, taller than broad, depending apparently on local conditions. The third female sepal is flat but not much shorter than the other and not linear as in the other varieties. The larger heads can be distinguished only by the female sepals (the two larger being much more boat-shaped and the third flat) from E. quinquangulare L."

For his unnamed "Var. e" he notes "Folia quam var. a etc. angustiora, etiam linearia; capitula globosa, alba aut nigrescentia; bractae reflexae. Hills near Bombay. Leaves acicular. Heads small, globose with reflexed bracts, connects var. a to the next [f. triloboides]."

It is worth noting here that E. dianae var. triloboides Fyson, referred to above, is now regarded as a synonym of E. collinum Hook. f.

Recent collectors have found E. dianae growing at 3500 feet altitude. Shah reports it to be "common in rice fields and moist places", Santapau says "common in cultivated fields", and Herbert notes "very common and abundant in paddy fields" in Bombay. It has been collected in anthesis from November to January and in March. The Meebold 10320, cited below, was actually identified as this species by Fyson himself.

Material has been misidentified and distributed in herbaria as E. quinquangulare L. and E. truncatum Hamilt. On the other hand, the Ramaswamy 1745 distributed as E. dianae is actually E. cinereum R. Br., while Fyson 3819 is E. dianae var. longibracteatum Fyson.

Additional citations: INDIA: Bombay: R. R. Fernandez R.465 (Xa), R.2175 (Xa), R.2176 (Xa); P. S. Herbert 1048 (Xa), 1222 (Xa); Patel 6 (Lw); Santapau 10263 (N, Xa), 17953 (Xa); G. L. Shah 1179 (Xa, Xa), 1803 (Xa), 7928 (Xa), 7938 (Xa), 8056 (Xa). Mysore: Meebold 10320 (S, Z). THAILAND: E. J. Schmidt 250 (Cp), 302a (Cp).

ERIOCAULON DIANAE var. LONGIBRACTEATUM Fyson

Synonymy: Eriocaulon dianae var. longi-bracteata Fyson, Journ. Indian Bot. 2: 259—260, pl. 13. 1921. Eriocaulon dianae var. longibracteata Fyson ex C. E. C. Fischer, Kew Bull. Misc. Inf. 1931: 261. 1931. Eriocaulon dianae var. longebracteatum Fyson

ex Santapau, Bull. Bot. Surv. India 8: 48. 1967.

Bibliography: Fyson, Journ. Indian Bot. 2: 259--260, pl. 13. 1921; C. E. C. Fischer, Kew Bull. Misc. Inf. 1931: 261. 1931; C. E. C. Fischer in Gamble, Fl. Presid. Madras 9: 1620. 1931; Razi, Journ. Mysore Univ. 7 (4): 77. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23 & 34. 1946; Moldenke, Phytologia 3: 323. 1950; Santapau & Raizada, Indian For. Rec. 4 (6): 167. 1955; Moldenke, Résumé 162, 287, & 480. 1959; Moldenke, Résumé Suppl. 1: 13. 1959; G. L. Shah, Bull. Bot. Surv. India 4: 237. 1962; Santapau, Bull. Bot. Surv. India 8: 48. 1967; Moldenke, Résumé Suppl. 16: 9 & 21. 1968; Moldenke, Phytologia 17: 489. 1968.

Fyson (1921) describes this taxon as "♀ floris tertius sepalum linearium.....Bractae involucrantes quam capitulo multo longiores; floris sepalum tertius latum aut linearium. Calicut. Plate 13. Leaves 2--2 1/2 in. by 1/5 in. and scapes about twice as long. Heads 1/4 in. diam. with bracts spreading below over 1/2 in. across in all. Corresponds to var. martiana of E. quinquangulare and might be considered that plant with one sepal smaller and flat."

Recent collectors describe the flowers as white and have found the plant blooming in October, growing at 300 meters altitude. It is recorded from Saurashtra by Santapau (1967), who says that it is "not common in rice fields" or "very abundant in some rice fields" in Bombay. He and Raizada (1955) call it "A very rare plant, collected on moist soil" in the same state, while Smitinand reports it "common in damp localities in dry deciduous forests" in Thailand.

Material has been misidentified and distributed in herbaria as E. collinum Hook. f., E. dianae Fyson, E. sexangulare L., and E. stellulatum Körn. The Fyson 3819 specimen in the Stockholm herbarium, cited below, was first identified by the collector as E. stellulatum and then changed to "E. dianae sp. nov." If it is truly a part of the type collection of E. dianae Fyson and not a mixture with it, then it cannot be taken as representative of var. longibracteatum. It should be re-examined and compared with more specimens of the same collection number.

Additional citations: INDIA: Bombay: D'Almeida 218.1 H (Xa); J. Fernandez 624c (Xa), 664 (Xa); Patel 8 (Lw); Santapau 10278 (N, Xa), 10279 (N, Xa), 15118 (Xa), 17120 (Xa), 17121 (Xa), 17204 (Xa), 17463 (Xa), 17464 (Xa), 17465 (Xa), 17466 (Xa), 17467 (Xa), 17521 (Xa), 17522 (Xa, Z), 17529 (Xa); G. L. Shah "A" (Xa). Mysore: Fyson 3819 (S); Gopalaswamy s.n. [Castle Rock, 7-10-51] (Bn--3244). THAILAND: Larsen 8397 (Cp), 8402 (S); Smitinand 3065a [Royal Forest Dept. 18263] (Sm).

ERIOCAULON DIANAE var. PARVIFLORUM Fyson

Synonymy: Eriocaulon dianae var. parviflora Fyson, Journ. Indian Bot. 2: 260. 1921.

Bibliography: Fyson, Journ. Indian Bot. 2: 260. 1921.

Fyson (1921) describes this taxon as follows: "Bractae involucrantes quam capitulo nex longiores.....Bractae involucrantes capitulo aequantes; floris tertius sepalum planum aut linearium. Coorg and N. Kanara. The head has no rays, the bracts being short, and the flowers are much smaller than in var. a and b. Possibly a poor form of var. b but apparently distinct." His "var. a" is typical E. dianae Fyson, while his "var. b" is E. dianae var. longibracteatum Fyson.

ERIOCAULON DIANAE var. RICHARDIANUM Fyson

Synonymy: Eriocaulon dianae var. richardiana Fyson, Journ. Indian Bot. 2: 260, pl. 14. 1921.

Bibliography: Fyson, Journ. Indian Bot. 2: 260, pl. 14. 1921; C. E. C. Fischer, Kew Bull. Misc. Inf. 1931: 261. 1931; C. E. C. Fischer in Gamble, Fl. Presid. Madras 9: 1616 & 1620. 1931; Moldenke, Known Geogr. Distrib. Erioc. 23 & 34. 1946; Razi, Journ. Mysore Univ. 7 (4): 77 (1946) and 11 (1): 6. 1950; Moldenke, Phytologia 3: 323. 1950; Moldenke, Résumé 162, 287, & 480. 1959; Thanikaimoni, Pollen & Spores 7: 184. 1965.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 14. 1921.

Fyson (1921) describes this taxon as follows: "Planta robustior; pedunculi 20--25 cm; folia 15--20 cm.; capitula globosa; bractae involucrantes breviores, reflexae. Plate 14. S. Kanara. A robust plant with globose unrayed heads. Stem 1/4 in. thick and 1/2 in. long. Scape up to 14 inches very slightly pubescent in the most robust specimens. The third female sepal much shorter than the others and linear. Seeds oblong light yellow."

Razi (1950) cites the type of this taxon, again, as Fyson 3819, of which he says there are three sheets in the Mysore University herbarium. Since no type is cited in the original description, Razi's material should ordinarily be considered as lectotype material. However, Fyson designates "Fyson. No. 3819 at Rudrasiri" as the type of E. dianae as a species and therefore, by implication, of his var. typicum. I have annotated a specimen of this number at Stockholm as var. longibracteatum. If Razi is correct in his assertion that three sheets of the same number in the Mysore University herbarium are var. richardianum, it would appear that the number perhaps represents a mixture.

Both Santapau and Wagh describe var. richardianum as "rare". It has been collected in ditches, the inflorescence erect, growing at 2800 feet altitude, flowering in October.

Additional citations: INDIA: Andhra: Santapau 21388 (Xa); S. K. Wagh 4697 (Xa). Bombay: Sedgwick & Bell 5048 (N, Xa).

ERIOCAULON DICLINE Maxim.

Bibliography: Maxim., Bull. Acad. Sci. St. Pétersb. [Dec. Pl. Asiat.] 8: 7. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158 & 501. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 65, 94, & 285. 1903; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 64. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158 & 501.

1941; Moldenke, Known Geogr. Distrib. Erioc. 25 & 34. 1946; Moldenke, Résumé 173 & 480. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158 & 501. 1959.

ERIOCAULON DICTYOPHYLLUM Körn.

Synonymy: Paepalanthus dictyophyllus Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 486, in syn. 1863. Eriocaulon fluviatile Bong. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959 [not E. fluviatile Trimen, 1885]. Eriocaulon dictyophyllum Mart. ex Moldenke, Résumé Suppl. 12: 9, in syn. 1965. Eriocaulon fluviatile Mart., in herb.

Bibliography: Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 485--486. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 51, 59, & 285. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 7, 34, & 47. 1946; Moldenke, Phytologia 3: 323. 1950; Reitz, Sellowia 7: 124. 1956; Angely, Fl. Paran. 10: 14. 1957; Moldenke, Résumé 88, 324, & 480. 1959; Reitz, Sellowia 11: 31 & 103. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Rennó, Levant. Herb. Inst. Agron. 68. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Angely, Fl. Paran. 16: 51 (1960) and 17: 24. 1961; Moldenke, Résumé Suppl. 12: 9. 1965; Dombrowski & Kuniyoshi, Araucariana 1: 15. 1967.

The binomial, E. fluviatile Mart., is apparently based on L. Riedel 2303 from São Paulo, which is also a cotype collection of E. dictyophyllum Körn., while Paepalanthus dictyophyllus Mart. is based on Martius s.n. from Minas Gerais. Eriocaulon fluviatile Trimen is a valid species from Ceylon.

Recent collectors have found E. dictyophyllum growing at 750 meters altitude, flowering in January, and record the vernacular names "capim manso", "capipoatinga", "gravatá manso", and "sempreviva do campo". The Hatschbach 1191 & 2057 and Reitz 5281, distributed as E. dictyophyllum, are actually Paepalanthus tessmannii Moldenke.

Additional citations: BRAZIL: Minas Gerais: Martius s.n. [Macbride photo 18686] (N--photo of cotype, W--photo of cotype). Santa Catarina: Reitz 4518 [Herb. Reitz 4740] (Le, S), 5218 (N); Smith & Reitz 9187 (N, Z); Smith, Reitz, & Sufridini 9451 (W--2248756); Ule 1382, in part (B, Z). São Paulo: L. Riedel 2303 (B--cotype, Ut--329--cotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON DIMORPHOELYTRUM Koyama

Synonymy: Eriocaulon dimorphoelytron Koyama ex Moldenke, Résumé 480, sphalm. 1959.

Bibliography: Koyama, Journ. Jap. Bot. 31: 7--9, fig. 2. 1956; Moldenke, Résumé 173 & 480. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 183. 1964; Moldenke, Résumé

Suppl. 12: 9. 1965; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

Illustrations: Koyama, Journ. Jap. Bot. 31: 7, fig. 2. 1956.

The type of this species was collected by Hiroshi Hara in a swampy place at Akatashiro, Ozegahara, in the province of Kodzuke, Honshu, Japan, on August 20, 1955, and is deposited in the herbarium of the University of Tokyo. Koyama (1956) says of this species "Visum extradium huius speciei E. decemfloro Maxim. quod flores dimeras habet. plus minus propincuum videtur, sed omnibus speciebus similibus huc usque ex Asia orientali descriptis floribus perfecte trimeris, calyce floris foeminei albido praeter margine apicis parte dorsalique glaberrimo, corolla floris masculi lobis inaequalibus etc. valde dissimilis est." He records the vernacular name "yuki-imunohige".

ERIOCAULON DIMORPHOPETALUM Moldenke

Bibliography: Moldenke, Phytologia 3: 323. 1950; Moldenke, Fieldiana Bot. 28: 116--117. 1951; J. A. Steyerm., Fieldiana Bot. 28: 1157. 1957; Moldenke, Résumé 71 & 480. 1959; G. Taylor, Ind. Kew. Suppl. 12: 55. 1959; Moldenke, Résumé Suppl. 1: 5. 1959; J. A. Steyerm., Act. Bot. Venez. 1: 195. 1966.

Additional citations: COLOMBIA: Cundinamarca: Karsten s.n. [Llanos de la Quebrada] (V).

ERIOCAULON DIOECUM Ruhl.

Bibliography: Ruhl. in Fedde, Repert. Sp. Nov. 22: 29. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 88. 1929; Moldenke, N. Am. Fl. 19 (1): 18 & 22. 1937; Moldenke, Phytologia 1: 316. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 34. 1946; León, Fl. Cuba 1: 280. 1946; Moldenke, Résumé 51 & 480. 1959.

Additional citations: CUBA: Pinar del Río: Ekman 12807 (N--photo of type, S--type, Z--photo of type).

ERIOCAULON DISEPALUM Ridl.

Bibliography: H. N. Ridl., Journ. Fed. Malay States Mus. 10: 155. 1920; H. N. Ridl., Fl. Mal. Penins. 5: 136. 1925; A. W. Hill, Ind. Kew. Suppl. 6: 78 (1926) and 7: 88. 1929; Moldenke, Known Geogr. Distrib. Erioc. 26 & 34. 1946; Moldenke, Résumé 180 & 480. 1959.

This species is known thus far only from Kelantan, Malaya.

ERIOCAULON DREGEI Hochst.

Bibliography: Hochst., Flora 28: 341. 1845; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 62, 75, & 285. 1903; H. Lecomte, Bull. Soc. Bot. France 55: 571 (1908) and 55: 644. 1909; Arwidsson, Bot. Notiser 1934: 83. 1934; Moldenke, Known Geogr. Distrib. Erioc. 22 & 34. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 323--324. 1950; Moldenke, Résumé 153 & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Killick, Bot. Surv. S. Afr. Mem. 34: 87 & 119. 1963; R. H. Compton, Journ. S. Afr. Bot. Suppl. 6: 19

& 33. 1966; Batten & Bokelmann, Wild Fls. East. Cape Prov. 3, pl. 5 (3). 1966; Moldenke, Résumé Suppl. 16: 8. 1968.

Illustrations: Batten & Bokelmann, Wild Fls. East. Cape Prov. pl. 5 (3) [in color]. 1966.

Batten & Bokelmann (1966) tell us that this is a perennial herb, to 25 cm. tall, found in marshes and damp places at the coast and at higher altitudes near King William's Town and also in the coastal belt of Natal, flowering in December. Killick (1963) calls it a component of the "flush community of hydrosere that occurs over the eyes of streams". The Lakyre de Vilers s.n. [Tamatave, 1887], distributed as E. dregei, is actually E. fenestratum Bojer.

Additional citations: SOUTH AFRICA: Cape of Good Hope: Drège 4101 (S--isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON DUTHIEI Hook. f.

Bibliography: Hook. f., Fl. Brit. Ind. 6: 579. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 103, 106, & 285. 1903; Fyson, Journ. Indian Bot. 2: 200, pl. 7. 1921; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Moldenke, Known Geogr. Distrib. Erioc. 23 & 34. 1946; Moldenke, Résumé 162 & 480. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158. 1959; Thanikaimoni, Pollen & Spores 7: 184. 1965.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 7. 1921.

Fyson (1921) describes this species as follows: "Stem 0. Leaves 3/4 in. long, broadly oblanceolate acute from a 1/6 in. wide base. Scapes numerous 1 to 6 in. slender. Heads 1/6 in. Involucral bracts pale, not projecting beyond the floral. Floral bracts oblong cuspidate, nearly glabrous. Receptacle tall, glabrous or with a few hairs. Sepals 2 only, in both sexes. Female petals narrow, nearly glabrous. Seeds oval, yellowish brown with darker markings. Male flowers. -- Sepals 2; otherwise normal, anthers black. Plate 7. Central Provinces, one collection only seen. The scapes are taller, the heads smaller and the involucres less horizontal than in E. truncatum."

The original place of publication of this species' name is sometimes cited as "1894", but pages 449--672 of that volume of Hooker's work were actually issued in 1893.

Additional citations: INDIA: Madhya Pradesh: Duthie 8436 (B--isotype, Z--isotype).

ERIOCAULON EBERHARDTII H. Lecomte

Bibliography: H. Lecomte, Not. Syst. 2: 215. 1912; Moldenke, Known Geogr. Distrib. Erioc. 26 & 34. 1946; Moldenke, Résumé 176 & 480. 1959; Moldenke, Phytologia 17: 498. 1968.

Lecomte (1912) describes this species as follows: "Caulis elongatus, 8 cm. longus, foliosus. Folia 8--10 cm. longa, numerosa, linearia, fenestrata, 3--4 nervia, basi 1--1,5 lata, apice acuta. Pedunculi complures, 13--30 cm. longi, vix torti, 6-

costati, glabri. Vaginae laxae, oblique fissae, 4 cm. longae. Capitula villosa, fere sphaerica, 6--7 mm. lata. Bracteae involucrantes oblongae, 2 mm. longae, apice villosae. Flos ♂: sepala 3, libera, duo plus minus carinata, apice dorso villosa; petalorum tubus apice lobis 3, inaequalibus, villosis, glandulosis instructus; antherae nigrae. Flos ♀: sepala 3, linearia, libera, apice villosa, petala 3, spathulata, villosa, glandulosa. Annam: Dalat à Da-ninh, no. 1430 (Lecomte et Finet). L'Eriocaulon Eberhardtii est une plante des mares, avec une tige assez longue, couverte de feuilles lineaires-allongées. Cette espèce se distingue de l'E. rivulare Dalz. par ses hampes a 6 côtes au lieu de 10 et par les anthères noires au lieu d'être blanches."

ERIOCAULON ECHINACEUM Van Royen

Bibliography: Van Royen, Blumea 10: 131. 1960; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

This species is said to be endemic to Celebes.

ERIOCAULON ECHINOSPERMOIDEUM Ruhl.

Bibliography: Ruhl. in Fedde, Repert. Sp. Nov. 22: 31. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 88. 1929; Moldenke, N. Am. Fl. 19 (1): 19 & 27--28. 1937; Moldenke, Phytologia 1: 316. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 34. 1946; León, Fl. Cuba 1: 281. 1946; Moldenke, Résumé 51 & 480. 1959.

Additional citations: CUBA: Las Villas: Ekman 17082 (N--isotype, N--photo of type, S--type, Z--photo of type).

ERIOCAULON ECHINOSPERMUM C. Wright

Bibliography: Sauv., Fl. Cub. 162. 1868; Sauv., Anal. Acad. Ci. Habana 7: 716. 1871; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 35, & 285. 1903; Prain, Ind. Kew. Suppl. 4, pr. 1, 82. 1913; Moldenke, N. Am. Fl. 19 (1): 19 & 26. 1937; Prain, Ind. Kew. Suppl. 4, pr. 2, 82. 1938; Moldenke, Phytologia 1: 316. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 34. 1946; León, Fl. Cuba 1: 279--280. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 324. 1950; Moldenke, Résumé 51 & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Phytologia 17: 384. 1968.

It should be noted here that Prain (1913) cites the original description of this taxon as "1870", but the late Dr. J. H. Barnhart assured me that 1871 is the correct date.

Additional citations: CUBA: Pinar del Río: Ekman 18127 (S), 18128 (S), 18767 (S); C. Wright 3738 (S--isotype). Province undetermined: C. Wright s.n. (S).

ERIOCAULON ECHINULATUM Mart.

Bibliography: Mart. in Wall., Pl. Asiat. Rar. 3: 29. 1832; Wall., Numer. List 208 ["207"]. 1832; Kunth, Enum. Pl. 3: 569. 1841; Körn. in Mart., Fl. Bras. 3 (1): 475. 1863; Jacks. in Hook.

f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Hook. f., Fl. Brit. Ind. 6: 579. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 103, 106, & 285. 1903; Fyson, Journ. Indian Bot. 2: 317, pl. 37. 1921; H. Lecomte, Fl. Gén. Indochine 7: 14. 1922; Moldenke, Known Geogr. Distrib. Erioc. 24--26 & 34. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 324. 1950; Koyama, Philip. Journ. Sci. Bot. 84: 368--369. 1955; Moldenke, Résumé 165, 166, 169, 176, 178, 184, 201, 287, & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 179. 1964; Thanikaimoni, Pollen & Spores 7: 184. 1965.

Kunth (1841) describes this plant as follows: "Digitale; glabrum; rhizomate annuo; scapis quadrangulis, folia angusto-linearia acuminata triplo quadruplo superantibus; capitulis globosis, per bracteas subrhombeas longe mucronatas rigidulas echinulatis, pallidis. Mart. — Tavoy. — Bracteae semi-lineam longae, firmulae, siccae, mucrone totius longitudinis dimidium aequante. Flores minimi; masculi: calyx exterior: petala lateralia carinata, carina sat prominula; interior tubaeformis; laciniis cum staminibus brevioribus alternantibus. Antherae globosae, nigricantes. Flores feminei virescentes, stipati pilis septatis: sepala exteriora lateralia oblique carinata, elongato-rhombea. Ovarium longe stipitatum. Stylus tripartitus. (Ex Mart.)"

Fyson (1921) says of it: "(Wall. Cat. 6082 in Herb. Calc!).... Leaves acute or aculeate, 1/2 -- 3 in. Scapes many, 3--6 in., slender. Heads 1/6 in. globose except for the horizontal base, very echinate by the acuminate floral bracts. Female sepals 2 only, winged down the back; petals 0. Male flowers normal, 3-merous. Plate 37. Burma: Kelaben, Tavoy."

The E. echinulatum var. seticuspe (Ohwi) Ohwi is herein discussed under E. seticuspe Ohwi.

Koyama (1955) says "Siam: Nakay (B. Hayata, sin. num.!) — Cochin-china, Cambodgia, Tonkin, Philippines, China (Kwantung), Burma. Note. This is a very distinct species chiefly by awned bracts and 2 herbaceous scaly sepals ending in an awnlike tip. It is of great interest that an Eriocaulon which bears a very close resemblance to this species has been reported from Kiushu, the southwesternmost part of Japan, by Dr. Ohwi recently. Its name is E. seticuspe."

Recent collectors have found E. echinulatum growing in paddy fields, at altitudes of 100--1300 meters, with white or greenish (immature) flowers, in anthesis in September and October. Brass reports it "common on wet plains" in Papua, while Smitinand describes it as a "common herb on rocks in damp places" and "common in savannas together with E. achiton" in Thailand. The specific epithet is sometimes written with its initial letter uppercased for no valid reason. M. Ramos s.n. [Herb. Philip. Bur. Sci. 41340] is a mixture with E. gracile var. puberulentum Moldenke and with something not eriocaulaceous.

Additional citations: BURMA: Tenasserim: W. Gomez 7 (Br—iso-

type, N--photo of isotype, Z--photo of isotype); T. Philippi 18 (B). CHINA: Kwangtung: Hance s.n. [Near Canton] (T); Sampson 13453 (B). THAILAND: B. Hayata s.n. [Nakay, 16/XII/1921] (Ss); Smitinand 1934 [Herb. Royal Forest Dept. 9424] (Ss), 1934a [Herb. Royal Forest Dept. 11525] (Z), 1983 [Herb. Royal Forest Dept. 9450] (Ss), 3605 [Herb. Royal Forest Dept. 18241] (Sm), 3678 [Herb. Royal Forest Dept. 15467] (Sm); Sørensen, Larsen, & Hansen 6325 (S), 7257 (Cp); Vesterdal 5e (Cp). INDOCHINA: Annam: Schmid 1410 (N). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Culion: M. Ramos s.n. [Herb. Philip. Bur. Sci. 41340, in part] (Ca--239520). MELANESIA: NEW GUINEA: Papua: Brass 7823 (N).

ERIOCAULON EDWARDII Fyson

Synonymy: Eriocaulon edwardsii Fyson ex Moldenke, Known Geogr. Distrib. Erioc. 23 & 34, sphalm. 1946.

Bibliography: Fyson, Journ. Indian Bot. 1: 50 (1919) and 2: 313, pl. 34. 1921; Haines, Bot. Bihar & Orissa 6: 1067, 1070, & 1071. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 78 (1926) and 7: 89. 1929; Moldenke, Known Geogr. Distrib. Erioc. 23 & 34. 1946; Moldenke, Phytologia 3: 324. 1950; Razi, Rec. Bot. Surv. India 18: 19. 1959; Moldenke, Résumé 162, 287, & 480. 1959; Moldenke, Résumé Suppl. 3: 17. 1962.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 34. 1921.

Fyson (1921) describes this plant as follows: "(Clarke No. 34327 in Herb. Calc!) Caulis perbrevis. Folia 2—5 cm. longa, 4--6 mm. basi lata, acuta, glabra, tenuia. Pedunculi 6—20 cm. tenues. Capitula 3--5 mm obconica sed demum globosa, bractae involucrantes nec reflexae, 4 mm. longa, scariosae, glabrae, ellipto-acutae, quam bractis flores superantibus paulo longiores. Haec bractae glabrae, obovate-acutae, pallido-nigrae. Receptaculum altum villosum. Flos ♀ sepala 2, tenuia; petala 2 linearia, aut 0. Semina 3. Flos ♂ sepala 2? in spatham connata; petala 0. antherae 6, nigrae. Plate 34. Himalayas: Sikkim; Bengal; Chota Nagpur. Scapes 3—4 times the leaves. Heads globose or nearly so, in bud over-topped by the acute involucral bracts. This species stands in much the same relation to the other two members of this section as E. minutum to the first two species of the next section. It represents a corresponding stage in the reduction of the floral parts accompanied by a lengthening of the involucral bracts. It is possible that var. minor and minima of the previous species [E. hamiltonianum] should be included in it. The whole series forms a perfect example of gradual reduction in the floral parts."

The species is said to grow at Ranchi in Madhya Pradesh, India.

ERIOCAULON EDWARDII var. CLARKEI Haines

Bibliography: Haines, Bot. Bihar & Orissa 6: 1071. 1924.

Haines (1924) describes this taxon as follows: "To this species [E. edwardii] I refer provisionally Clarke's No. 24788 col-

lected at Giridih (Hazaribagh), which was left unnamed by Hooker for the F. B. I. as being too young. It appears to be a variety with very acutely cuspidate bracts, involucre bracts erect .12" as long as whole head, about 6, oblong, pale, finely acuminate. Fl. bracts .1" fuscous, almost awned. Fem. sep. 2, narrowly linear. Petals 0 but stipes sometimes apparently villous above the sepals! Male sepals spathaceous, sometimes 3-toothed (but Fyson described his type as spathaceous with a '?', and I think it is either a matter of age, or position in the head, as I found obviously 2 free sepals in the type), staminal column clavate with about 3—5-stamens and a black gland, petals 0 or 1 minute linear. In the villous stipes it appears allied to the Brazilian E. griseum."

ERIOCAULON EHRENBERGIANUM Klotzsch

Additional synonymy: Eriocaulon benthamii Schlecht. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877, in syn. 1893 [not E. benthamii Kunth, 1903]. Eriocaulon nanum Klotzsch ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959 [not E. nanum R. Br., 1810].

Bibliography: Schlecht., Linnaea 18: 434. 1844; Seem., Bot. Voy. Herald 221. 1854; Körn. in Mart., Fl. Bras. 3 (1): 491—492. 1863; Hemsl., Biol. Centr. Am. Bot. 3: 443. 1885; Sessé & Moc., Fl. Mex. 17. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 & 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 49, 56, 60, 284, & 285. 1903; H. B. Davis, Life & Works Pringle 219. 1936; Moldenke, N. Am. Fl. 19 (1): 20 & 35. 1937; Moldenke, Phytologia 1: 316. 1939; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 & 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4, 32, & 34. 1946; Moldenke, Phytologia 3: 324. 1950; Moldenke, Résumé 35, 41, 286, & 480. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 & 878. 1960; Moldenke, Résumé Suppl. 3: 9 (1962) and 4: 4. 1962; Moldenke, Phytologia 17: 394 & 483. 1968.

It should be noted here that this species was originally based on Berlandier 760, Ehrenberg & Aschenborn 531, and Schiede s.n., not on Ehrenberg 57 as stated by me in my 1950 work. However, in my 1937 work I designated the Schiede s.n. collection as lectotype. The species has been collected more recently in grassy seeps, at 2650—3000 meters altitude, flowering and fruiting in July. The E. nanum of Klotzsch is based on Ehrenberg s.n. in the herbarium of the Botanisches Museum at Berlin; E. nanum R. Br. is a valid species of Australia.

Although Jackson (1893) accredits the binomial, E. benthamii Schlecht., to Schlechtendal, Linnaea 18: 434 (1844), the binomial is there plainly written E. benthami and plainly accredited to Kunth.

Material has been misidentified and distributed in herbaria as E. benthami Kunth and Paepalanthus sp.

Additional & emended citations: MEXICO: Chiapas: Breedlove 9240 (Ac); E. W. Nelson 3235 (W—233538). Durango: F. W. Pennell

18386 (W--1641097). Federal District: Aschenborn 531 (B--cotype, B--cotype). Hidalgo: Pringle 8989, in part [Canales Station] (Ca --168293, S, S). Jalisco: Collector undesignated s.n. [Sept. 6, '92] (F--354591); R. McVaugh 13593 (Mi), 14414 (Mi); Pringle 2665 (Ca--115174). México: Berlandier 760 (B--cotype); C. A. Ehrenberg 57 (B, N); Gilly, Alexander, & Hernandez Xolocotzi 83 [E. J. Alexander 1958] (Z); J. G. Schaffner 226, in part (V--270500). Michoacán: Hitchcock & Stanford 7201 (Ca--710750). Oaxaca: W. H. Camp 2265 (Mi). Puebla: Pringle 8989, in part [near Honey Station] (S). State undetermined: C. A. Ehrenberg s.n. (B); Hahn 14 [Lake Avalco] (B). GULF ISLANDS: Monserrate: C. A. Purpus 10179 (W--1209427). GUATEMALA: Chimaltenango: Salvin s.n. [Vol. de Fuego] (V--8392).

ERIOCAULON EKMANNII Ruhl.

Synonymy: Eriocaulon ekmanii Ruhl. ex León, Fl. Cuba 1: 280--281. 1946.

Bibliography: Ruhl. in Fedde, Repert. Sp. Nov. 22: 30. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Moldenke, N. Am. Fl. 19 (1): 19 & 30. 1937; Moldenke, Phytologia 1: 317. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 34. 1946; León, Fl. Cuba 1: 280--281. 1946; Moldenke, Phytologia 3: 324--325. 1950; Moldenke, Résumé 51 & 480. 1959.

Additional citations: CUBA: Pinar del Río: Ekman 17888 (N--photo of type, S--type, Z--photo of type).

ERIOCAULON ELEGANTULUM Engl.

Bibliography: Engl., Abh. Preuss. Akad. Wiss. 1894: 14. 1894; Engl., Pflanzenw. Ost-Afr. C: 133. 1895; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 63, 81, & 285. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Moldenke, Known Geogr. Distrib. Erioc. 21, 22, & 34. 1946; Moldenke, Résumé 140, 144--146, 150, & 480. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158. 1959.

Recent collectors have found this plant growing in grassy areas on cracking soil in river valley flats, at altitudes of 32-400 meters, flowering in February, June, and October. Drummond & Hemsley describe it as an annual, a few cm. tall, with the inflorescence pale bluish-gray.

Citations: CHAD: Schweinfurth III.223 (B, S). TANGANYIKA: Drummond & Hemsley 3063 (S); H. G. Faulkner 902 (B, S); A. Peter 52044 [IV.326] (B); Schlieben 2348 (B). ZANZIBAR: Hildebrandt 1056 (B--lectotype, Z--isotype). PORTUGUESE EAST AFRICA: Quilimane: H. G. Faulkner K.256 (N).

ERIOCAULON ELENORAE Fyson

Synonymy: Eriocaulon eleanorae Fyson, Journ. Indian Bot. 1: 50, nom. nud. 1919.

BOOK REVIEWS

Alma L. Moldenke

"ROCKY MOUNTAIN FLORA" by William A. Weber, viii & 437 pp., illus., University of Colorado Press, Boulder, Colorado 80302. 1967. $9.40.

This fine work with great appeal to both the professional botanist and the interested amateur is the updated and illustrated revision of the "Handbook of Plants of the Colorado Front Range" by the same author and press in 1953 and in 1961 and is the result of twenty years of intensive field, herbarium and teaching work in this area. It will be a creditable replacement for Rydberg's classic which is now out-of-date and virtually unavailable.

The Front Range Area consists of the first rugged chain of mountains visible from the east of Denver from the Rocky Mountain National Park on the north to Pike's Peak on the south and west to the Continental Divide. This geographically small area claims half (1,400 in the text and over 1,500 on the dust jacket) of the species of higher plants reported for the state. It ranges from 5,000 to 14,000 feet in altitude from grassy plains, irrigated and cultivated piedmont valleys, transitional mesas, wooded foothills to 8,000 feet and montanes to 9,000 feet, subalpine areas to 11,000 feet abundant in wild flowers and evergreens, and finally to the treeless alpine tundra to 14,000 feet with matted and deep-rooted willows and glumaceous plants. Here is a meeting ground of the plants of the Arctic regions of America and Eurasia, the southwestern American deserts, the midwestern prairies and the high mountains of central Asia. Some of the species are carry-overs from Tertiary geologic times. The book is a guide not only for this limited area but also for the larger peripheral one covering much of Colorado and adjacent bits of Wyoming and New Mexico.

While spending a few days this summer in Denver and the Rocky Mountain National Park, I found this book highly satisfactory to carry and to use for checking known species and for naming unknowns. The keys are very well constructed. The language is simple and precise. Technical terms are explained clearly in a well illustrated glossary.

The classification is modern especially at the genus level. The larger, older family groups and terms as Leguminosae and Compositae are still retained. The families are arranged alphabetically and not "Englerically" under ferns, gymnosperms, dicots and monocots.

Prof. Yocom's 346 illustrations add considerably to the text. Verbesina is misspelled on the last page of the index but not in the text.

The success that this work is sure to achieve is due primarily to two facts -- the author's excellence as a teacher and his excellence as a field naturalist. One of the highlights of my three decades of teaching biology goes back to Bill Weber's high school days when he brought another teacher and myself to a swamp on the edge of New York City to see killdeer nesting. Now this swamp area is "improved" by draining, a modified highway cloverleaf and rowboats for hire in a small puddle.

- - - - - - - - - - - - - - - -

## BOOK REVIEW

Otto & Isa Degener

For size and ecological diversity, the Hawaiian Archipelago is rather poorly represented by native grass species - estimated by Dr. Peter P. Rotar, Associate Professor at the University of Hawaii, at about 60 - but by more than 500 introduced species according to this same authority in his "Grasses of Hawaii", published in 1968. This work from the University of Hawaii Press comprises 355 pages with 140 full-page plates.

With a present grass flora of 500 species, an illustrated book describing each species separately would be unwieldy. Hence this work describes "the Grass Plant" for the first ten pages; and for the next 12, the "Taxonomy"! A key to 29 tribes follows before complete descriptions of 112 genera ends with page 311. Under each genus are listed the species known from the Islands, with their commoner synonymy. No species descriptions are given.

Table 3, comprising 23 pages, gives a burd's eye view of the "Botanical Name, Common Name, Putative Origin or Native Country, Date of First Record."

A work of this kind is of value to botanists, biology teachers and ranchers not only in the Hawaiian Islands but throughout warm and tropical regions because of the many pan-tropic grasses involved. It is unfortunate, therefore, that the edition is limited to 1,500 copies with a resulting high price of $12.00 per volume. As new grasses are being continuously introduced into the Hawaiian Islands, such as the giant Thysanolaena maxima (Roxb.) O. Ktze., omitted from the present edition, the reviewers look forward to a revised edition of "Grasses of Hawaii" when the present one has been sold out.

# PHYTOLOGIA

*Designed to expedite botanical publication*



Vol. 18 February, 1969 No. 2

CONTENTS



Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, $1; per volume, $6.75 in advance, or $7 at close of volume

Due to unexpected delays in printing and transportation, Vol. 17, No. 7, was not officially issued until January 14, 1969

# NOTES ON THE GROWTH OF ULVA AS A FUNCTION OF AMMONIA NITROGEN

THOMAS WAITE AND CONSTANTINE GREGORY *

Research on Ulva latissima is being carried out at NOrtheastern University's Marine Science Center under the direction of Dr. Nathan P. Riser. The research is part of a study to investigate the effects of water pollution on marine ecology.

The equipment utilized in the study (Fig. #1) is designed to maintain environments of different ammonia nitrogen concentrations. All other factors such as light, phosphorous and temperature are held constant. The artificial lighting used consists of both incandescent and fluorescent sources. The fluorescent light source is a special plant grow-type bulb with most of its energy in the range of 650 mμ. The entire lighting system is on a cycle of 12 hours light, and 12 hours darkness.

Samples of Ulva latissima were cut at random from various parts of thalli of different pieces of Ulva. The samples were cut out with a 3/4" diameter cork bore. These circular pieces were then sewn to slate blocks which were then placed in the pans containing ammonia and sea water. As is noted in Fig. #1 the entire system is a flow through set up. The chemical feed pump delivers set concentrations of ammonia nitrogen at predetermined rates. This flow is balanced with the flow of sea water in the mixing tanks. The result is a constantly flowing system producing

*Graduate Student Department of Civil Engineering, Northeastern University
*Professor of Environmental Science, Northeastern University, Boston

concentrations in the sample pans varying from 0.4 mg/l to 1.2 mg/l. It was felt that this open system would give more useful information than a closed culturing experiment.

Three experiments each of 40 days duration have been completed. The first and second runs were begun in August and October with water temperatures of 65° and 60° F. Growth of the plants was measured in vegetative growth only, and the high water temperatures during the runs caused most of the samples to become reproductive. This made results reported as vegetative growth difficult to understand, because as the Ulva reproduced the thallus degenerated.

The third run has just been completed and offers the most understandable results. Water temperatures during this last test remained close to 55° F, thus all the samples, exhibited only vegetative growth. Fig. #2 shows the results obtained. It is interesting to note the apparent peak of growth at 0.7 mg/l ammonia nitrogen. The growth of ULva in the pans containing ammonia nitrogen in concentrations greater than 0.7 mg/l exhibited considerably slower growth. The decrease in growth after 0.7 mg/l appears to be dependent on the amount of ammonia nitrogen as does the increase in growth up to 0.7 mg/l.

It should also be noted that this peak is probably dependent on the phosphate concentration. The phosphate as measured by the Stannous Chloride Method is 0.4 mg/l in all the pans. Chlorides were determined to be 19,200 mg/l in the water coming to the marine station. Further research is now

being carried on to determine both the relation of this ammonia peak to phosphate concentrations, and the relationship between nutrients, temperature and reproductivity.

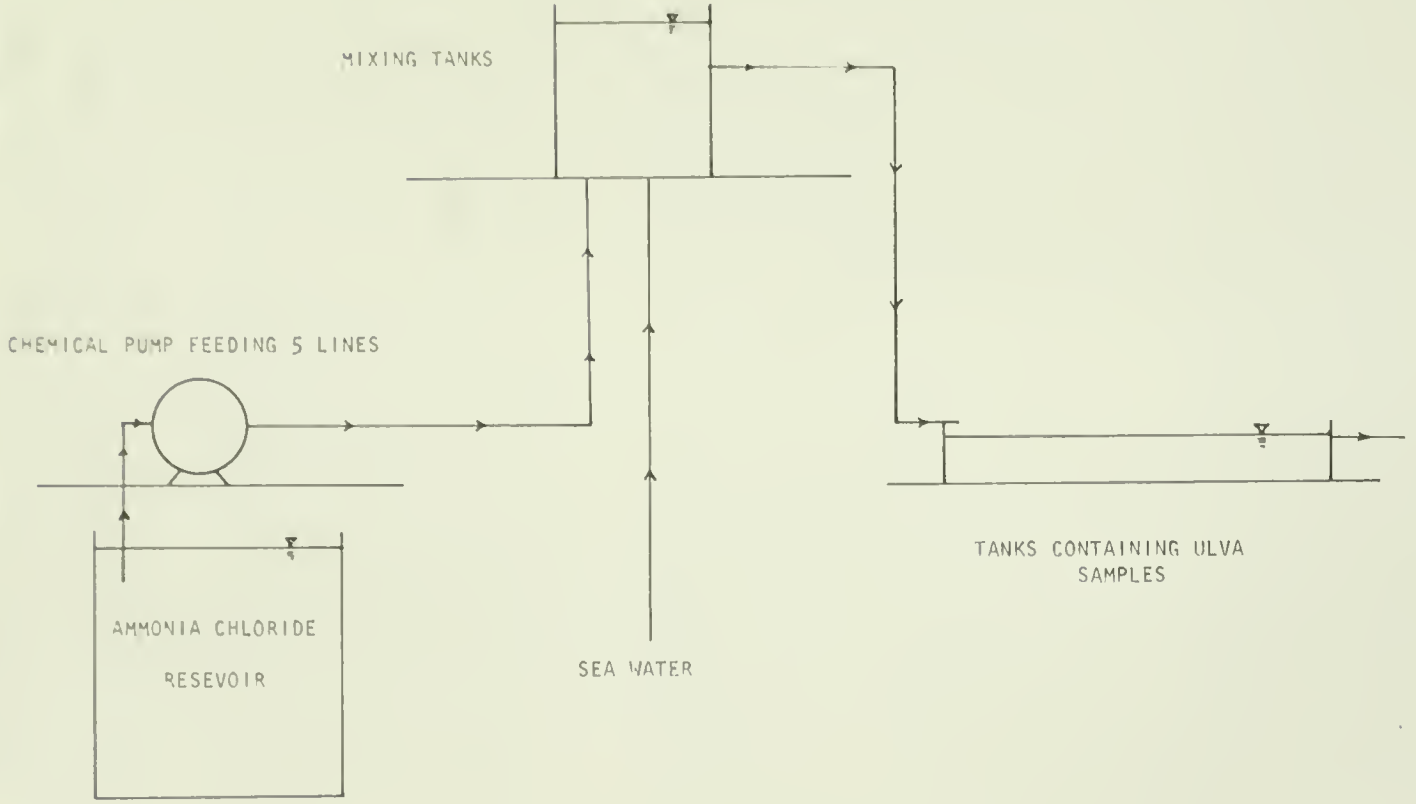



FIGURE #1

EQUIPMENT SET-UP FOR GROWING ULVA LATISSIMA AT DIFFERENT CONCENTRATIONS OF AMMONIA NITROGEN

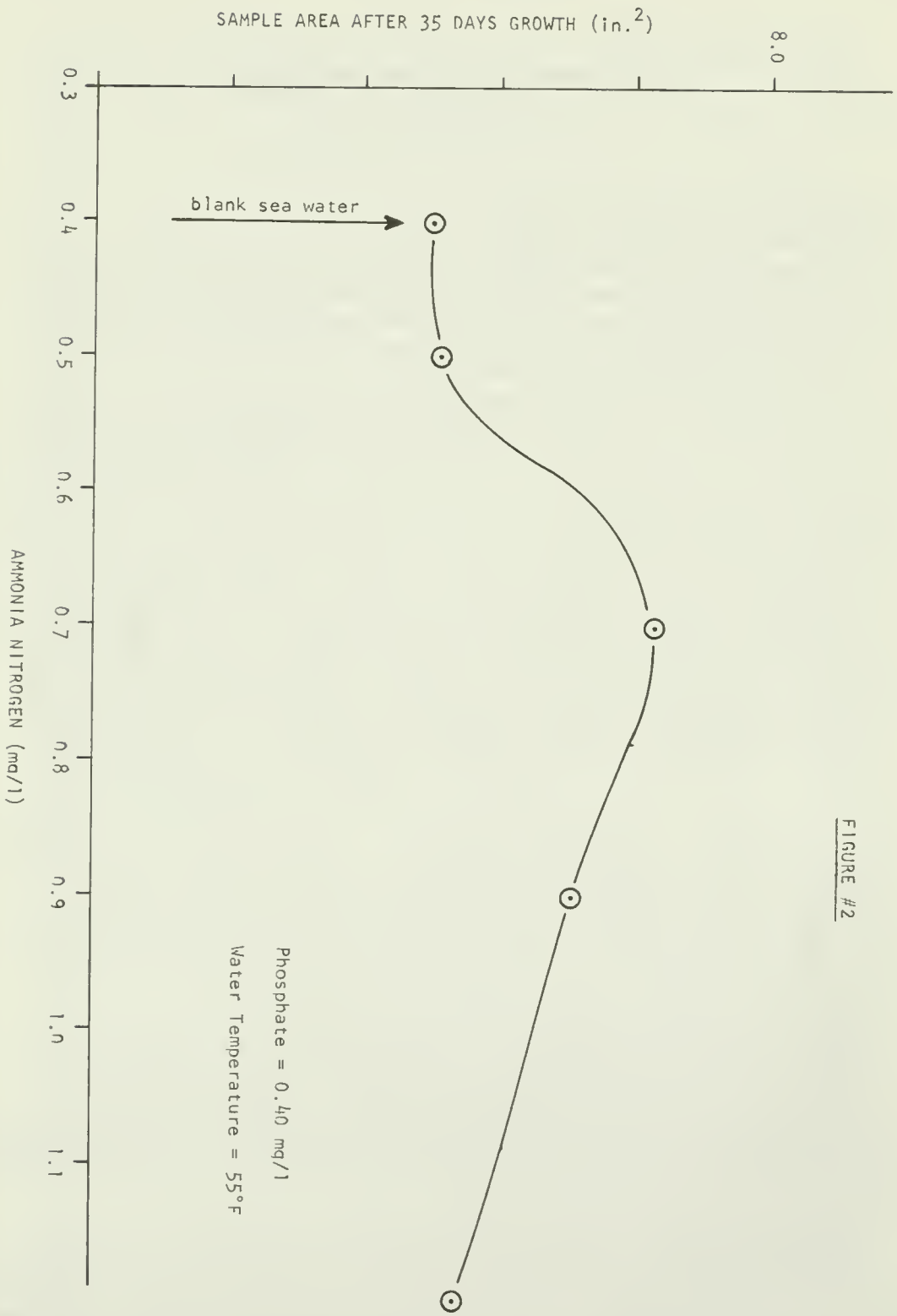

SAMPLE AREA AFTER 35 DAYS GROWTH (in.$^2$)
0.3
8.0
blank sea water
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
AMMONIA NITROGEN (mg/l)
Phosphate = 0.40 mg/l
Water Temperature = 55°F

FIGURE #2

# FIVE NOVELTIES IN THE VERBENACEAE

Harold N. Moldenke

CITHAREXYLUM ALAINII Moldenke, sp. nov.

Frutex, usque ad 2 m. altus; ramis ramulisque obtuse tetragonis griseis glabris lenticellatis; foliis oppositis; petiolis gracilibus elongatis glabris; laminis subcoriaceis oblanceolatis utrinque glabris nitidisque ad apicem obtusis ad basin in petiolo longiter attenuatis, in sicco marginibus revolutis; inflorescentiis terminalibus abbreviatis pauciforis.

Shrub, 1.5--2 m. tall; branches and branchlets rather slender, gray, glabrous, obtusely tetragonal, often infested with various species of lichens, lenticellate; twigs much more slender, slightly brownish, more conspicuously tetragonal, glabrous; leaf-scars corky, enlarged, ascending, appressed; leaves decussate-opposite, numerous on the twigs; petioles slender, elongate, 7--10 mm. long, glabrous, more or less margined upwards; leaf-blades subcoriaceous, bright-green above, lighter beneath, shiny on both surfaces, oblanceolate, 3.5--6.5 cm. long, 8--18 mm. wide, obtuse and slightly mucronulate at the apex, entire, long-attenuate into the petiole at the base, glabrous on both surfaces, the margins decidedly revolute in drying; midrib very slender, decidedly impressed above, sharply prominent beneath; secondaries about 5 per side, short, widely divaricate, decidedly impressed above and prominulous beneath; inflorescence terminal on the young twigs, abbreviated, 1--4 cm. long, few-flowered, simple, spicate; peduncles 5--10 mm. long, angulate, brownish, glabrous; rachis similar to the peduncle in all respects; pedicels very slender, about 1 mm. long, bracteolate, glabrous, angulate; calyx obconic, about 4 mm. long during anthesis and 2 mm. wide at the apex, glabrous, shiny, 5-ribbed, the rim truncate and entire or minutely 5-apiculate; corolla hypocrateriform, white, the tube about 5 mm. long, the limb 5-lobed, the lobes rounded, about 1--1.5 mm. long and wide.

The type of this distinctive species was collected by Brother Alain H. Liogier (no. 11205) -- in whose honor it is named -- on exposed rocks on the top of the limestone ridge, Cordillera de Yaroa, at an altitude of 800--850 meters, in the province of Puerto Plata, Dominican Republic, on May 11, 1968, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector notes that the species is "rare".

CITHAREXYLUM ILTISII Moldenke, sp. nov.

Frutex, ramulis sarmentisque gracilibus glaberrimis tetragonis nitidis, marginibus elevatis perspicuis; foliis oppositis tenuiter subcoriaceis; petiolis brevibus glabris; laminis foliorum utrinque glaberrimis nitidisque ellipticis, subtus minutissime resinoso-punctatis, margine acute serratis, dentibus antrorso-adpressis; inflorescentiis terminalibus brevissimis.

Shrub; branches rather slender, gray, obtusely tetragonal, glabrous, flattened and annulate at the nodes; branchlets and twigs very slender, prominently tetragonal, very glabrous and shiny, ridged, the angles prominently elevated; leaves decussate-opposite; petioles very short, mostly about 1 mm. long, glabrous, difficult to differentiate from the base of the blade; leaf-blades elliptic, thinly subcoriaceous, bright-green on both surfaces, very glabrous and shiny on both surfaces, 2--5.5 cm. long, 1--3 cm. wide, acute at the apex, regularly serrate with antrorse teeth from below the middle to the apex (the teeth appressed), acute and running into the petiole at the base, densely but very minutely resinous-punctate beneath, the venation slightly impressed above and prominulous beneath in drying; inflorescence terminal on the twigs, very short, 1--2 cm. long, racemiform in fruit, probably spicate or subspicate during anthesis, about 10--12-flowered and -fruited; fruiting pedicels less than 1 mm. long, minutely puberulent, but the rachis glabrous and shiny; flowers and fruit not seen.

The type of this distinct species was collected by Hugh H. Iltis -- in whose honor it is named -- and Donald Ugent (no. 678) in rock hedgerows and thickets (remnants of former Escallonia cloud forest) between fields, with heavily pollarded trees of Escallonia, shrubby Salvia, Solanum, Lycium, Calceolaria, Eupatorium, Passiflora, Bomaria, etc., in a small chacra (field) at km. 20 on the Cuzco road, about 6--7 km. north-northeast (by air) from Abancay, at 3100 meters altitude, in the province of Abancay, Apurimac, Peru, on December 19, 1962, and is deposited in the herbarium of the University of Wisconsin. The collectors describe the plant as a shrub 2 m. tall.

GMELINA SALOMONENSIS var. ELLIPTICA Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum regulariter lateque ellipticis ad basin angustatis acutisque recedit.

This variety differs from the typical form of the species in having its leaf-blades regularly broadly elliptic, narrowed to the distinctly acute base.

The type of the variety was collected by R. Teona in a primary forest on a hillside 190 feet above sealevel along the Kolokofa river, on northwestern Santa Ysabel, Solomon Islands, on April 6, 1966, and is deposited in the United States National Herbarium at Washington. The collector describes the plant as a tree, 60 feet tall, with a trunk girth of 4 feet, the bole straight, buttresses present, thick, and equal, to about 2 feet wide, the bark surface light-brown and scaly, the slash wood hard and white, the slash bark hard, fawn-colored inside, flecked with light-brown outside, and the flowers (corollas) white on the outside, pink inside.

LANTANA RETICULATA f. ALBIFLORA Moldenke, f. nov.

Haec forma a forma typica speciei corollis albis recedit.

The form differs from the typical form of the species in having

white corollas.

The type of the form was collected by Brother Alain H. Liogier (no. 12666) in thickets near the top of the limestone hill at Piedra Gorda, about 20 miles west of Santiago, on the Moa road, at an altitude of 200--300 meters, Dominican Republic, on September 14, 1968, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector describes the plant as shrubby, slender, about 1 meter tall or less, with white flowers.

PETREA PUBESCENS f. ALBICALYX Moldenke, f. nov.

Haec forma a forma typica speciei calycibus albis recedit.

This form differs from the typical form of the species in having its calyxes white.

The type of the form was collected by George S. Bunting (no. 2369) in cultivation on the east side of the highway running from La Fria to San Cristobal, north of San Juan de Colón, Tachira, Venezuela, on September 27, 1967, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector describes the plant as a tree, 8 m. tall, with a long trunk, more or less slender and open crown, very asperate leaves, white calyxes, and blue-purple corollas.

- - - - - - - - - - - - - - - -

## ADDITIONAL NOTES ON THE ERIOCAULACEAE. XVIII

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional synonymy: Eriocauleae L. C. Rich. ex Kunth, Enum. Pl. 3: 492. 1841. Eriocauleae Benth. & Hook. f., Gen. Pl. 3: 1019. 1883. Eriocaulonaceae Kuntze, Rev. Gen. Pl. 2: 745. 1891. Eriocaulea Kunth apud Masamune, Mem. Fac. Sci. Agr. Taihoku Univ. 11, Bot. 4: 536, in syn. sphalm. 1934. Eriocauloneae L. C. Rich. apud Masamune, Mem. Fac. Sci. Agr. Taihoku Univ. 11, Bot. 4: 536, in syn. 1934.

Additional & emended bibliography: L., Gen. Pl., ed. 2, 35 (1742) and ed 2 [3], 29. 1743; Gled., Berl. 5: 133. 1749; L., Phil. Bot., ed. 1, 28. 1751; L., Gen. Pl., ed. 4, 29 (1752) and ed. 5, pr. 1, 38. 1754; L., Syst. Nat., ed. 10, 880. 1759; L., Sp. Pl., ed. 2, 1: 128. 1762; Adans., Fam. Pl. 2: 283. 1763; Gled., Syst. Pl. 23. 1764; L., Gen. Pl., ed. 6, 40 & Ord. Nat. P.p.5.I.Bur. 1764; L., Syst. Nat., ed. 12, 2: 103. 1767; L., Gen. Pl., ed. 6 nov., 40 & Ord. Nat. P.p.5.I.Bur. 1767; J. Hill, Hort. Kew., ed. 2, 159. 1769; L., Mant. Pl. Alt. 107. 1771; J. A. Murr. in L., Syst. Veg., ed. 13, 109. 1774; Planer, Gatt. Pfl. 2: 865—866 & 1060. 1775; Reichard in L., Gen. Pl., ed. 8, 42. 1778; J. A. Murr. in L., Syst. Veg., ed. 14, 127. 1784; Schreb. in L., Gen. Pl., ed. 8 [9], 1: 56. 1789; Neck., Elem. Bot. 1: 116. 1790;

Gaertn., Fruct. & Sem. Pl. 2: 14. 1791; J. F. Gmel. in L., Syst. Nat., ed. 13, 2: 206. 1791; Schreb. in L., Gen. Pl., ed. 8 [9], 2: 852. 1791; Haenke in L., Gen. Pl., ed. 8 [10], 1: 90 (1791) and 2: 796. 1791; Gis., Carl. Linn. Prael. Ord. Nat. 170. 1792; Pers. in L., Syst. Veg., ed. 15, 132. 1797; Willd. in L., Sp. Pl., ed. 4, 1: 485--487. 1797; Batsch, Tab. 152. 1802; Cram., Dispos. Syst. Pl. 182. 1803; J. St.-Hil., Expos. 1: 108. 1805; Pers., Syn. Pl. 1: 110. 1805; R. Br., Prod. Nov. Holl. 1: 252--255. 1810; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 56--57 & 861--870. 1817; Spreng., Anleit., ed. 2, 1: 187. 1817; J. E. Gray, Brit. Pl. 2: 158. 1821; Poir., Dict. 5: 24. 1822; K. A. Agardh, Aphor. Bot. 157. 1823; W. Hamilt., Prod. Pl. Ind. Occ. 16. 1825; Vell., Fl. Flum. 35--36. 1825; Spreng. in L., Syst. Veg., ed. 16, 3: 774. 1826; Nees in R. Br., Prodr. Nov. Holl., ed. 3, 109. 1827; Vell., Fl. Flum. Icon. 1: pl. 86. 1827; Reichenb., Consp. 28. 1828; Spreng. in L., Gen. Pl., ed. 9 [10], 2: 683. 1831; Bong., Mém. Acad. Sci. St. Pétersb., ser. 6, 1: 1-74 & 601--656, pl. 1--19 & 39. 1831; Royle, Illustr. Bot. Himal. 409 & 410. 1840; Kunth, Enum. Pl. 3: [492]--580, 612--615, 624--625, 633, & 634. 1841; Lindl., Veg. Kingd., ed. 1, 122. 1847; Thwaites & Hook. f., Enum. Pl. Zeyl. 341. 1864; Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 162--164 & 239. 1867; Vell., Arch. Mus. Nac. Rio Jan. 5: 36--37. 1881; Maxim., Bull. Acad. Sci. St. Pétersb. [Dec. Pl. Asiat.] 8: 7. 1893; Hook. f. in Trimen, Handb. Fl. Ceylon 5: [1]--11 & 412. 1900; Schinz, Bull. Herb. Boiss., sér. 2, 1: 779. 1901; Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1102--1105. 1901; J. R. Perkins, Fragm. Fl. Philipp. 1: 136. 1904; Prain, Ind. Kew. Suppl. 3: 26. 1908; H. N. Ridl., Journ. Fed. Malay States Mus. 6: 191--192. 1915; Rendle in Gibbs, Contrib. Phytogeogr. & Fl. Arfak Mts. 100. 1917; Ruhl., Notizbl. Bot. Gart. Berlin 10: [1040]--1044 & 1060. 1930; Herzog in Fedde, Repert. Sp. Nov. 29: 202--213, pl. 120 & 121. 1931; Miyabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. 27 [Fl. Hokk. & Saghal. 3]: 286--288. 1932; Hand.-Mazz., Symb. Sin. 7: 1245--1246. 1936; Miyabe & Tatew., Trans. Sapporo Nat. Hist. Soc. 15: 47. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 37 & 105. 1938; L. B. Sm., Contrib. Gray Herb., new ser., 124: 5. 1939; Honda, Nom. Pl. Jap. 461--463. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 1--88, fig. 1--40. 1940; Miyabe & Satake, Acta Phytotax. & Geobot. Kyoto 13: 280--281. 1943; Moldenke in Maguire & al., Bull. Torrey Bot. Club 75: 194--195. 1948; E. D. Merr., Ind. Rafin. 82. 1949; Core, Pl. Tax. 267--268. 1955; Koyama, Philip. Journ. Sci. Bot. 84: 369--371, 377, & 378, pl. 2, fig. 2, & pl. 5, fig. C. 1955; R. McVaugh, Bull. N. Y. State Mus. 360: 93. 1958; L., Gen. Pl., ed. 5, pr. 2, 38. 1960; Perring & Walters, Atlas Brit. Fl. 311. 1962; Radford, Ahles, & Bell, Guide Vasc. Fl. Carol. 106--107. 1964; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 175--185, pl. 48, fig. 303--311. 1964; P. K. K. Nair, Pollen Gr. West. Himal. Pl. 35 & 92, pl. 15, fig. 194. 1965; Davis & Cullen, Ident. Flow. Pl. Fam. 67 & 103. 1965; S. A. Manning, Syst. Guide Flow. Pl. 24 & 237--238. 1965; Lakela, Fl. Northeast. Minn. 110--111. 1965; Moldenke, Résumé

Suppl. 17: [1]--13. 1968; H. N. & A. L. Moldenke, Ellery Lake [3]. 1968; Freer, Castanea 33: 168. 1968; Carter & Jones, Castanea 33: 197. 1968; Anon., Biol. Abstr. 49 (21): S.62. 1968; Moldenke, Phytologia 18: 44--62 (1968) and 17: 473--506 & 508--511. 1969.

Masamune (1934) credits the group name, Eriocauloneae, to L. C. Richard in Ann. Mus. Hist. Nat. Paris 17: 62 (1811) while Nakai & Honda (1940) credit it to page 52 of the same volume. I have searched this volume from cover to cover and cannot find the name on either of these pages nor anywhere else in the volume, although the French designation "Eriocaulées" occurs on page 465. This appear to be the only mention of the group in the volume.

It is perhaps worth mentioning here that Persoon's Synopsis Plantarum (1805) is sometimes cited in older bibliographies as "Pers. Ench.", referring to a subtitle of the work.

BLASTOCAULON Ruhl.

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 11, 14, 15, 19, 20, 24, 25, 29, 30, 159, 223--225, & [283], fig. 32. 1903; Prain, Ind. Kew. Suppl. 3: 26. 1908; Nakai & Honda, Nov. Fl. Jap. 6: 4 & [86]. 1940; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 (1946) and pr. 3, 1: 877. 1960; Moldenke, Phytologia 17: 450 (1968) and 17: 506. 1969.

BLASTOCAULON ALBIDUM (Gardn.) Ruhl.

Synonymy: Paepalanthus albidus Gardn. in Hook. f., Icon. Pl. 6 [new ser., 2]: pl. 525. 1843. Eriocaulon albidum Steud., Pl. Glum. 2 (Cyp.): 278. 1855.

Additional bibliography: G. Gardn. in Hook. f., Icon. Pl. 6 [new ser., 2]: pl. 525. 1843; Steud., Syn. Pl. Glum. 2 (Cyp.): 278. 1855; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 (1893) and 2: 401. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 225, [283], & 284. 1903; Prain, Ind. Kew. Suppl. 3: 26. 1908; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 (1946) and 2: 401 (1946) and pr. 3, 1: 877 (1960) and 2: 401. 1960; Moldenke, Phytologia 17: 373--374. 1968.

Illustrations: G. Gardn. in Hook. f., Icon. Pl. 6 [new ser., 2]: pl. 525. 1843.

The type of this species is G. Gardner 5273 from Minas Gerais, Brazil.

BLASTOCAULON PROSTRATUM (Körn.) Ruhl.

Additional bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 223, 224, & [283]. 1903; Prain, Ind. Kew. Suppl. 3: 26. 1908; Moldenke, Phytologia 17: 374. 1968.

BLASTOCAULON RUPESTRE (Gardn.) Ruhl.

Additional synonymy: Eriocaulon rupestre Steud., Syn. Pl. Glum. 2 (Cyp.): 278. 1855.

Additional bibliography: G. Gardn. in Hook. f., Icon. Pl. 6

[new ser., 2]: pl. 525. 1843; Steud., Syn. Pl. Glum. 2 (Cyp.): 278. 1855; Ruhl. in Engl., Pflanzenreich 13 (4-30): 223, 224, [283], & 287, fig. 32. 1903; Prain, Ind. Kew. Suppl. 3: 26. 1908; Moldenke, Phytologia 17: 374. 1968.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 224, fig. 32. 1903.

The type of this species is G. Gardner 5272 from Minas Gerais, Brazil. The species is described, but not illustrated, in the Gardner reference cited above.

BLASTOCAULON SPELEICOLA Alv. Silv.

Additional bibliography: A. W. Hill, Ind. Kew. Suppl. 9: 37. 1938; Moldenke, Phytologia 17: 374. 1968.

ERIOCAULON Gron.

Additional synonymy: Eriocavlon Gron. ex Reichard in L., Gen. Pl., ed. 8, 42. 1778. Schoenocaulon Reichenb. apud Pfeiffer, Nom. Bot. 1 (2): 1239, in syn. 1874 [not Schoenocaulon A. Gray, 1837].

Additional & emended bibliography: L., Gen. Pl., ed. 2, 35 (1742) and ed. 2 [3], 29. 1743; Gled., Berl. 5: 133. 1749; L., Phil. Bot., ed. 1, 28. 1751; L., Gen. Pl., ed. 4, 29 (1752) and ed. 5, pr. 1, 38. 1754; L., Syst. Nat., ed. 10, 880. 1759; L., Sp. Pl., ed. 2, 1: 128. 1762; Adans., Fam. Pl. 2: 283. 1763; Gled., Syst. Pl. 23. 1764; L., Gen. Pl., ed. 6, 40 & Ord. Nat. Pl. P.p.5.I.Bur. (1764) and ed. 6 nov., 40 & Ord. Nat. Pl. P.p. 5.I.Bur. 1767; L., Syst. Nat., ed. 12, 2: 103. 1767; J. Hill, Hort. Kew., ed. 2, 159. 1769; L., Mant. Pl. Alt. 107. 1771; J. A. Murr. in L., Syst. Veg., ed. 13, 109. 1774; Planer, Gatt. Pfl. 2: 865--866 & 1060. 1775; Reichard in L., Gen. Pl., ed. 8, 42. 1778; J. A. Murr. in L., Syst. Veg., ed. 14, 127. 1784; A. L. Juss., Gen. Pl. 44 & 447. 1789; Schreb. in L., Gen. Pl., ed. 8 [9], 1: 56. 1789; Neck., Elem. Bot. 1: 116. 1790; Gaertn., Fruct. & Sem. Pl. 2: 14. 1791; J. F. Gmel. in L., Syst. Nat., ed. 13, 2: 206. 1791; Schreb. in L., Gen. Pl., ed. 8 [9], 2: 852. 1791; Haenke in L., Gen. Pl., ed. 8 [10], 1: 90 (1791) and 2: 796. 1791; Gis., Carl. Linn. Prael. Ord. Nat. 170. 1792; Pers. in L., Syst. Veg., ed. 15, 132. 1797; Willd. in L., Sp. Pl., ed. 4, 1: 485--487. 1797; Batsch, Tab. 152. 1802; Cram., Dispos. Syst. Pl. 182. 1803; J. St.-Hil., Expos. 1: 108. 1805; Pers., Syn. Pl. 1: 110. 1805; Spreng., Anleit., ed. 2, 1: 187. 1817; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 56--57 & 861--870. 1817; J. E. Gray, Brit. Pl. 2: 158. 1821; Poir., Dict. 5: 24. 1822; K. A. Agardh, Aphor. Bot. 157. 1823; Vell., Fl. Flum. 35--36. 1825; W. Hamilt., Prodr. Pl. Ind. Occ. 16. 1825; Spreng. in L., Syst. Veg., ed. 16, 3: 774. 1826; Nees in R. Br., Prodr. Nov. Holl., ed. 3, 109. 1827; Vell., Fl. Flum. Icon. 1: pl. 86. 1827; Reichenb., Consp. 28. 1828; Spreng. in L., Gen. Pl., ed. 9 [10], 2: 683. 1831; Bong., Mém. Acad. Sci. St. Pétersb., ser. 6, 1: 1--74 & 601--656, pl. 1--19 & 39. 1831; Royle, Illustr. Bot. Himal. 409 & 410. 1840; Kunth, Enum.

Pl. 3: [492]—580, 612—615, 624—625, 633, & 634. 1841; Lindl., Veg. Kingd., ed. 1, 122. 1847; Thwaites & Hook. f., Enum. Pl. Zeyl. 314. 1864; Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 162—164 & 239. 1867; Pfeiffer, Nom. Bot. 1 (2): 1239—1240 & 1150. 1874; Vell., Arch. Mus. Nac. Rio Jan. 5: 36—37. 1881; Maxim., Bull. Acad. Sci. St. Pétersb. [Dec. Pl. Asiat.] 8: 7. 1893; Hook. f. in Trimen, Handb. Fl. Ceylon 5: [1]—11 & 412. 1900; Schinz, Bull. Herb. Boiss., sér. 2, 1: 779. 1901; Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1102—1105. 1901; J. R. Perkins, Fragm. Fl. Philipp. 1: 136. 1904; Prain, Ind. Kew. Suppl. 3: 26 & 69—70. 1908; H. N. Ridl., Journ. Fed. Malay States Mus. 6: 191—192. 1915; Rendle in Gibbs, Contrib. Phytogeogr. & Fl. Arfak Mts. 100. 1917; Ruhl., Notizbl. Bot. Gart. Berlin 10: [1040]—1044 & 1060. 1930; Herzog in Fedde, Repert. Sp. Nov. 29: 202—205 & 209, pl. 120. 1931; Miyabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. 27 [Fl. Hokk. & Saghal. 3]: 286—288. 1932; Hand.-Mazz., Symb. Sin. 7: 1245—1246. 1936; Miyabe & Kudo, Trans. Sapporo Nat. Hist. Soc. 15: 47. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 37 & 105. 1938; L. B. Sm., Contrib. Gray Herb., new ser., 124: 5. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 1—88, fig. 1—40. 1940; Miyabe & Satake, Acta Phytotax. & Geobot. Kyoto 13: 280—281. 1943; Moldenke in Maguire & al., Bull. Torrey Bot. Club 75: 194—195. 1948; E. D. Merr., Ind. Rafin. 82. 1949; Core, Pl. Tax. 268. 1955; R. McVaugh, Bull. N. Y. State Mus. 360: 93. 1958; L., Gen. Pl., ed. 5, pr. 2, 38. 1960; Perring & Walters, Atlas Brit. Fl. 311. 1962; Radford, Ahles, & Bell, Guide Vasc. Fl. Carol. 106—107. 1964; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 175—185, pl. 48, fig. 303—311. 1964; P. K. K. Nair, Pollen Gr. West. Himal. Pl. 35 & 92, pl. 15, fig. 194. 1965; Lakela, Fl. Northeast. Minn. 110—111. 1965; S. A. Manning, Syst. Guide Flow. Pl. 237—238. 1965; Freer, Castanea 33: 168. 1968; Carter & Jones, Castanea 33: 197. 1968; Moldenke, Résumé Suppl. 17: [1]—11 & 13. 1968; Anon., Biol. Abstr. 49 (21): S.62. 1968; Moldenke, Phytologia 18: 44—62 (1968) and 17: 475—505, 508, 510, & 511. 1969.

It should be noted here that Reichard (1778) apparently always used a "V" in place of the letter "U", although in the unpaged index to his work the generic name is written "Eriocaulon" as originally proposed. Planer (1775) employed the German vernacular name "Eckenhalm" for this genus and its members.

The Schoenocaulon of Reichenbach was actually proposed by him (1828) as a section of the genus Eriocaulon, but Pfeiffer on page 1239 of the work cited above (1874) lists it as a generic synonym. The Schoenocaulon of Gray is a genus in the Melanthaceae. It is perhaps worth noting here, too, that Persoon's work (1805), cited in the bibliography above, is sometimes cited in older bibliographies as "Pers. Ench."

ERIOCAULON ACANTHOCEPHALUM Griff.

Additional bibliography: Moldenke, Résumé Suppl. 17: 8. 1968; Moldenke, Phytologia 17: 477. 1969.

ERIOCAULON AFZELIANUM Wikstr.

Additional bibliography: Moldenke, Résumé Suppl. 17: 4. 1968; Moldenke, Phytologia 17: 478. 1969.

ERIOCAULON ALPESTRE Hook. f. & Thoms.

Additional bibliography: Ruhl., Notizbl. Bot. Gart. Berlin 10: 1041. 1930; Hand.-Mazz., Symb. Sin. 7: 1246. 1936; Satake, Journ. Jap. Bot. 15: 629. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 43, 46, & [86]. 1940; Moldenke, Phytologia 17: 478. 1969.

The E. alpestre Ruhl. of some authors is a synonym of E. robustius (Maxim.) Mak.

ERIOCAULON ALPINUM Van Royen

Additional bibliography: Moldenke, Résumé Suppl. 17: 6. 1968; Moldenke, Phytologia 17: 478. 1969.

D. Walker 5217, from Northeastern New Guinea, is said by Walker (1968) to represent this taxon.

ERIOCAULON AMBOENSE Schinz

Synonymy: Eriocaulon amboënse Schinz apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 112 & 284. 1903.

Additional & emended bibliography: H. Hess, Bericht. Schweitz. Bot. Gesell. 65: 160—161, fig. 1, 174—178, pl. 9, fig. 3. 1955; Koyama, Philip. Journ. Sci. Bot. 84: 369—371, 377, & 378, pl. 2, fig. 2, & pl. 5, fig. C. 1955; Moldenke, Résumé Suppl. 17: 9. 1968; Moldenke, Phytologia 17: 479. 1969.

Ruhland (1903) "corrected" the specific epithet of this species by adding a dieresis which Schinz did not use in his original publication. In my previous publications I did not realize this and therefore followed Ruhland's unjustified orthography. The Index Kewensis supplements in recent years have also been making similar "corrections". I see no valid reason for changing an author's original orthography.

ERIOCAULON ANTUNESII Engl. & Ruhl.

Additional bibliography: Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1104. 1901; Moldenke, Phytologia 17: 480. 1969.

ERIOCAULON APICULATUM H. Lecomte

Additional bibliography: Moldenke, Résumé Suppl. 17: 4. 1968; Moldenke, Phytologia 17: 480. 1969.

ERIOCAULON ATRATUM Körn.

Additional bibliography: Thwaites & Hook. f., Enum. Pl. Zeyl. 341. 1864; Hook. f. in Trimen, Handb. Fl. Ceylon 5: [1], 3—5, & 412. 1900; Moldenke, Phytologia 17: 481. 1969.

ERIOCAULON ATRATUM var. MAJOR Thwaites

Additional & emended bibliography: Thwaites & Hook. f., Enum. Pl. Zeyl. 341. 1864; Hook. f. in Trimen, Handb. Fl. Ceylon 5: [1], 3, & 412. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 68,

69, & 284—286. 1903; Moldenke, Phytologia 17: 481. 1969.

The original description of this taxon (1864) reads as follows: "var. major — E. caulescens H. f. & T. mss. — C.P. 131. Hab. Central Province, at an elevation of 5000 to 7000 feet. Parce caulescens. Folia vaginis valde dilatatis. Sepala exteriora multum latiora quam in E. cristato, cui alioquin haec species simillima est."

ERIOCAULON ATROIDES Satake

Additional & emended bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 69, 71, 72, 81, & [86], fig. 37. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 59—60, pl. 12, fig. 23. 1940; Moldenke, Phytologia 17: 481. 1969.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 72, fig. 37. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 12, fig. 23. 1940.

ERIOCAULON ATROIDES f. NANUM Satake

Additional & emended bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 73 & [86]. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 60. 1940; Moldenke, Phytologia 17: 390. 1968.

ERIOCAULON ATRUM Nakai

Additional synonymy: Eriocaulon atorum Masamune, Mem. Sci. Fac. Agr. Taihoku Univ. 11, Bot. 4: 538, sphalm. 1934.

Additional & emended bibliography: Masamune, Mem. Sci. Fac. Agr. Taihoku Univ. 11, Bot. 4: 538. 1934; Satake, Journ. Jap. Bot. 15: 629 & 632. 1939; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 57 & 60—61, pl. 12, fig. 24. 1940; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 62, 63, 65, 69—71, 73, 77, 81, & [86], fig. 38. 1940; Miyabe & Satake, Acta Phytotax. & Geobot. Kyoto 13: 280 & 281. 1943; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 184—185 & 429, fig. 126 (2) & pl. 48, fig. 310. 1964; Moldenke, Résumé Suppl. 17: 9 & 10. 1968; Moldenke, Phytologia 17: 481. 1969.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 73, fig. 38. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 12, fig. 24. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 184, fig. 126 (2). 1964.

The E. atrum credited to Miyabe & Kudo by some authors is a synonym of E. kusiroense Miyabe & Kudo.

ERIOCAULON ATRUM var. INTERMEDIUM Nakai

Additional & emended bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 14, 74, & [86]. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 61—62. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185 & 429. 1964; Moldenke, Phytologia 17: 391. 1968.

ERIOCAULON ATRUM var. PLATYPETALUM Satake

Synonymy: Eriocaulon glaberrimum var. platypetalum (Satake) Satake in Miyabe & Satake, Acta Phytotax. & Geobot. Kyoto 13: 281. 1943.

Additional bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 14, 74, 75, & [86], fig. 39. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 62--63. 1940; Miyabe & Satake, Acta Phytotax. & Geobot. Kyoto 12: 281. 1943; Moldenke, Phytologia 17: 391. 1968; Moldenke, Résumé Suppl. 17: 10. 1968.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 74, fig. 39. 1940.

A vernacular name recorded for this plant is "tanna-kuroinunohige".

ERIOCAULON AUSTRALASICUM (F. Muell.) Körn.

Additional bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 20 & [86]. 1940; Moldenke, Phytologia 17: 482. 1969.

ERIOCAULON AUSTRALE R. Br.

Additional bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 868--869. 1817; Moldenke, Phytologia 17: 482. 1969.

ERIOCAULON BANANI H. Lecomte

Additional bibliography: Moldenke, Résumé Suppl. 17: 4. 1968; Moldenke, Phytologia 17: 482. 1969.

ERIOCAULON BARBEYANUM Ruhl.

Additional bibliography: Moldenke, Résumé Suppl. 17: 5. 1968; Moldenke, Phytologia 17: 482. 1969.

ERIOCAULON BAURI N. E. Br.

Emended synonymy: Eriocaulon baurii N. E. Br. ex Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1102 & 1103. 1901.

Additional bibliography: Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1102 & 1103. 1901; Moldenke, Résumé Suppl. 17: 4 & 9. 1968; Moldenke, Phytologia 17: 482. 1969.

ERIOCAULON BIFISTULOSUM Van Heurck & Muell.-Arg.

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 18, 64, 90, & 284--287. 1903; Moldenke, Résumé Suppl. 17: 4. 1968; Moldenke, Phytologia 17: 483. 1969.

Additional citations: SÉNÉGAL: Couey 1 (An).

ERIOCAULON BONGENSE Engl. & Ruhl.

Additional bibliography: Moldenke, Résumé Suppl. 17: 4. 1968; Moldenke, Phytologia 17: 484. 1969.

ERIOCAULON BREVIFOLIUM Raf.

In Phytologia 17: 484--485 (1969) I indicated that this binomial would be discussed further by me. E. D. Merrill, in his Ind. Rafin. 82 (1949), reduces it to synonymy under Syngonanthus

flavidulus (Michx.) Ruhl., but this disposition of it seems out of the question since the latter species does not occur either in New Jersey nor Texas (the localities given by Rafinesque for his plant). The only pipewort that occurs in both states is E. compressum Lam., but his description does not fit that taxon. It seems most likely that Rafinesque's name applies to the very variable E. pellucidum Michx., which is known from southern New Jersey and to which his description applies quite well. His Texan plant was probably a case of misidentification. I have no hesitation in placing E. brevifolium Raf. in the synonymy of E. pellucidum Michx.

ERIOCAULON BREVIPEDUNCULATUM Merr.

Additional bibliography: Moldenke, Résumé Suppl. 17: 9. 1968; Moldenke, Phytologia 17: 485. 1969.

ERIOCAULON BROMELIOIDEUM H. Lecomte

Additional bibliography: Moldenke, Résumé Suppl. 17: 5 & 9. 1968; Moldenke, Phytologia 17: 485. 1969.

ERIOCAULON BROWNIANUM Mart.

Additional & emended bibliography: Thwaites & Hook. f., Enum. Pl. Zeyl. 341. 1864; Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 6--7, & 412. 1900; Moldenke, Phytologia 17: 485. 1969.

ERIOCAULON BRUNONIS Britten

Additional & emended bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 869. 1817; Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 38, 285, & 287. 1903; Moldenke, Résumé Suppl. 17: 6 & 12. 1968; Moldenke, Phytologia 17: 485. 1969.

The E. scariosum J. Sm., referred to in the synonymy of this taxon, is a valid species.

ERIOCAULON BUERGERIANUM Körn.

Additional & emended bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 1, 13, 51, 52, 80, [86], & 87, fig. 23. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 183 & 429, fig. 125 (2) & pl. 48, fig. 306. 1964; Moldenke, Phytologia 17: 486. 1969.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 52, fig. 23. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 183, fig. 125 (2) & pl. 48, fig. 308 [in color]. 1964.

The E. buergerianum accredited to Miyabe & Kudo and to Nemoto by some writers are both synonyms of E. robustius (Maxim.) Mak.

ERIOCAULON CALLOSUM Raf.

Merrill, in his Rafinesquian index (1949) was unable to assign this name to any known species of pipewort in Alabama and so left it to remain as a probably valid taxon. I have no hesitation in reducing it to E. compressum var. harperi Moldenke, which see.

ERIOCAULON CARSONI F. Muell.

Emended synonymy: Eriocaulon carsonii F. Muell. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 65, 98, 281, & 285. 1903.

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 65, 98, 117, 281, 285, & 287. 1903; Moldenke, Phytologia 17: 487. 1969.

The E. submersum Welw., referred to in the synonymy of this taxon, is a valid species.

ERIOCAULON CAULIFERUM Mak.

Additional & emended bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 12, 27, 78, & [86], fig. 10. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 17--19. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 178 & 429, fig. 120 (2). 1964; Moldenke, Phytologia 17: 487. 1969.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 27, fig. 10. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 177, fig. 120 (2). 1964.

ERIOCAULON CELEBICUM Van Royen

Additional bibliography: Moldenke, Résumé Suppl. 17: 6. 1968; Moldenke, Phytologia 17: 487. 1969.

ERIOCAULON CEYLANICUM Körn.

Additional & emended synonymy: Eriocaulon cristatum var. Thwaites in Thwaites & Hook. f., Enum. Pl. Zeyl. 1: 341. 1864. Eriocaulon zeylanicum Körn. ex Hook. f. in Trimen, Handb. Fl. Ceylon 5: 3--4. 1900.

Additional & emended bibliography: Thwaites in Thwaites & Hook. f., Enum. Pl. Zeyl. 1: 341. 1864; Hook. f. in Trimen, Handb. Fl. Ceylon 5: [1], 3--4, & 412. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 63, 64, 68, 83, 87, 285, 287, & 288. 1903; Moldenke, Résumé Suppl. 17: 9. 1968; Moldenke, Phytologia 17: 487 & 496. 1969.

Thwaites' unnamed variety of E. cristatum is described by him (1864) as follows: "Var. bracteis floralibus denticulatis et longiuscule cuspidato-acuminatis. -- C.P. 789. Hab. Rambodde, in the Central Province, Gardner. This may possibly be a distinct species. The flowers are monoecious, and the flower bracts are different in shape from those of the ordinary form of E. cristatum; but the two plants are so conformable in other respects, that I cannot venture to separate them."

ERIOCAULON CHINOROSSICUM Komarov

Additional bibliography: Moldenke, Résumé Suppl. 17: 4. 1968; Moldenke, Phytologia 17: 487. 1969.

ERIOCAULON CINEREUM R. Br.

Emended synonymy: Eriocaulon sexangulare Auct. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 21 & 287, in syn. 1903 [not E. sexangulare Fyson, 1959, nor Heyne, 1832, nor L., 1753, nor

Willd., 1841]. Eriocaulon sexangulare Mart. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 21 & 287, in syn. 1903. Eriocaulon cinereum Merr. apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 21--23 & [86], in syn. 1940. Eriocaulon sieboldianum Linn. ex P. K. K. Nair, Pollen Gr. West. Himal. Pl. 35 & 92, pl. 15, fig. 194. 1965.

Additional & emended bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 869. 1817; Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 10--11, & 412. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 11, 13, 21, 22, 104, 111--114, 116, 117, & 285, fig. 15 A--G & 112. 1903; Masamune, Mem. Fac. Sci. Agr. Taihoku Univ. 11, Bot. 4: 537 & 538. 1934; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 8--12, 20--23, 78, [86], & 87, fig. 1F, 3B, 4B, 5F, & 8. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 11--14. 1940; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 175 & 176. 1955; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 178--179, 429, & 430, fig. 121 (1) & pl. 48, fig. 304. 1964; P. K. K. Nair, Pollen Gr. West. Himal. Pl. 35 & 92, pl. 15, fig. 194. 1965; Moldenke, Résumé Suppl. 17: 11. 1968; Moldenke, Phytologia 18: 52 (1968) and 17: 488. 1969.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): fig. 15 A--G & 112. 1903; Setake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 8, 9, 11, & 22, fig. 1F, 3B, 4B, 5F, & 8. 1940; C. M. & D. S. Patel, Vidya 7: 67--70, fig. 1--59. 1964; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 179, fig. 121 (1), & pl. 48, fig. 304 [in color]. 1964; P. K. K. Nair, Pollen Gr. West. Himal. Pl. 92, pl. 15, fig. 194. 1965; Kral, Sida, 2: 310. 1966.

The E. sexangulare L., referred to in the synonymy of this taxon, is a valid species, but the E. sexangulare accredited to Heyne is E. wightianum Mart., while the homonyms attributed to Fyson and to Willdenow are E. willdenovianum Moldenke.

Satake (1940) does not feel that Merrill is correct in reducing E. sieboldtianum Sieb. & Zucc. to synonymy under E. cinereum R. Br.

Nair (1965) describes the pollen grains of this plant as spiraperturate spheroidal, 23 mu in diameter, with the exine 1 mu thick and psilate.

ERIOCAULON COERULEUM Van Royen

Additional bibliography: Moldenke, Phytologia 17: 463. 1968; Moldenke, Résumé Suppl. 17: 6. 1968.

ERIOCAULON COLLINUM Hook. f.

Additional bibliography: Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 10, & 412. 1900; Moldenke, Phytologia 18: 52 & 53 (1968) and 17: 488--489. 1969.

ERIOCAULON COMPRESSUM Lam.

Additional bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 864--866. 1817; E. D. Merr., Ind. Rafin. 82. 1949;

Radford, Ahles, & Bell, Guide Vasc. Fl. Carol. 106 & 107. 1964; Carter & Jones, Castanea 33: 197. 1968; Moldenke, Résumé Suppl. 17: [1], 9, & 10. 1968; Moldenke, Phytologia 18: 44 (1968) and 17: 489--493, 498, & 500—502. 1969.

It should be noted here that there are several phrases in Rafinesque's original description of his E. longifolium which seem to point to E. compressum rather than to the E. decangulare L. to which Merrill (1949) refers it. Yet the leaf characters given by Rafinesque for his New Jersey plant certainly cannot by any stretch of the imagination apply to E. compressum.

Carter & Jones (1968) record E. compressum from Forrest County, Mississippi.

ERIOCAULON COMPRESSUM var. HARPERI Moldenke

Additional synonymy: Eriocaulon callosum Raf., Autikon Bot., pr. 1, 188. 1840.

Additional bibliography: Raf., Autikon Bot., pr. 1, 188 (1840) and pr. 2, 188. 1943; E. D. Merr., Ind. Rafin. 82. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé Suppl. 17: 9. 1968; Moldenke, Phytologia 17: 486, 490, 492—493, 501, & 502. 1969.

A careful perusal of Rafinesque's description of E. callosum indicates that there is nothing except E. compressum var. harperi to which it could apply in Alabama and it is therefore hereby reduced to synonymy under that taxon. His description reads as follows: "fol. gramineis semipedalibus latiusculis apice obt. callosis, scapis fol. longior basi vaginatis contortis sulcatis, capit. depressis, bract. subrot. acutis vel obt. flavis glabris, fl. cinereis — Alabama, leaves broader at base, scape ultrapedal, heads small, fls. cinereous."

ERIOCAULON CRISTATUM Mart.

Additional bibliography: Thwaites & Hook. f., Enum. Pl. Zeyl. 1: 341. 1864; Hand.-Mazz., Symb. Sin. 7: 1245. 1936; Moldenke, Phytologia 18: 49 (1968) and 17: 495—496. 1969.

ERIOCAULON CRISTATUM var. MACKII Hook. f.

Additional bibliography: Hand.-Mazz., Symb. Sin. 7: 1245. 1936; Moldenke, Phytologia 17: 496. 1969.

ERIOCAULON CUSPIDATUM Dalz.

Additional bibliography: Moldenke, Résumé Suppl. 17: 5. 1968; Moldenke, Phytologia 17: 497. 1969.

ERIOCAULON CUSPIDATUM var. BRACTEATUM Fyson

Additional bibliography: Moldenke, Résumé Suppl. 17: 5. 1968; Moldenke, Phytologia 17: 497. 1969.

ERIOCAULON DALZELLII Körn.

Additional & emended bibliography: Hook. f. in Trimen, Handb. Fl. Ceylon 5: 11 & 412. 1900; Ruhl. in Engl., Pflanzenreich 13

(4-30): 18, 65, 91, 285, & 287. 1903; Moldenke, Phytologia 18: 58 (1968) and 17: 497--498. 1969.

ERIOCAULON DECANGULARE L.

Additional synonymy: Eriocavlon decangulare L. apud Willd. in L., Sp. Pl., ed. 4, 1: 486. 1797.

Additional bibliography: Willd. in L., Sp. Pl., ed. 4, 1: 486. 1797; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 864. 1817; Radford, Ahles, & Bell, Guide Vasc. Fl. Carol. 106 & 107. 1964; Moldenke, Résumé Suppl. 17: 9--12. 1968; Moldenke, Phytologia 18: 44--46. 1968; Carter & Jones, Castanea 33: 197. 1968.

The Mississippi county name spelled "Forest" in Phytologia 18: 44 (1968) should be spelled "Forrest". Radford, Ahles, & Bell (1964) tell us that this species inhabits bogs, savannas, and low pinelands scattered throughout North Carolina and in the central part of South Carolina.

ERIOCAULON DECANGULARE var. LATIFOLIUM Chapm.

Additional bibliography: Moldenke, Phytologia 18: 45. 1968; Moldenke, Résumé Suppl. 17: 9. 1968.

ERIOCAULON DECEMFLORUM Maxim.

Additional & emended bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 1, 9, 11, 12, 14, 15, 78, & [86], fig. 5A. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 177--178 & 429, fig. 120 (1), & pl. 48, fig. 303. 1964; Moldenke, Résumé Suppl. 17: 6 & 9. 1968; Moldenke, Phytologia 18: 46--48 & 56. 1968.

Emended illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 11, fig. 5A. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 177, fig. 120 (1), & pl. 48, fig. 303 [in color]. 1964.

ERIOCAULON DECEMFLORUM f. COREANUM (H. Lecomte) Nakai

Additional & emended synonymy: Eriocaulon decemflorum var. coreanum Nakai apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 15 & [86], in syn. 1940. Eriocaulon decemflorum var. genuinum f. coreanum Nakai apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 15 & [86], in syn. 1940.

Additional bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 15 & [86]. 1940; Moldenke, Phytologia 18: 47 & 48. 1968; Moldenke, Résumé Suppl. 17: 9. 1968.

ERIOCAULON DEIGHTONII Meikle

Additional bibliography: Moldenke, Phytologia 18: 49. 1968; Moldenke, Résumé Suppl. 17: 4. 1968.

ERIOCAULON DENSUM Mart.

Additional bibliography: Moldenke, Phytologia 18: 49. 1968; Moldenke, Résumé Suppl. 17: 3. 1968.

ERIOCAULON DEPRESSUM R. Br.
Additional bibliography: Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 870. 1817; Moldenke, Phytologia 18: 50. 1968; Moldenke, Résumé Suppl. 17: 9 & 12. 1968.

ERIOCAULON DIANAE Fyson
Additional bibliography: Moldenke, Phytologia 18: 51—54. 1968; Moldenke, Résumé Suppl. 17: 5 & 9. 1968.

ERIOCAULON DIANAE var. PARVIFLORUM Fyson
Additional bibliography: Moldenke, Phytologia 18: 53—54. 1968; Moldenke, Résumé Suppl. 17: 5 & 9. 1968.

ERIOCAULON DICLINE Maxim.
Additional bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 1, 77, & [86]. 1940; Moldenke, Phytologia 18: 54—55. 1968.

ERIOCAULON DICTYOPHYLLUM Körn.
Additional bibliography: Moldenke, Phytologia 18: 55. 1968; Moldenke, Résumé Suppl. 17: 9. 1968.

ERIOCAULON DIMORPHOELYTRUM Koyama
Additional & emended bibliography: Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 183 & 429. 1964; Moldenke, Résumé Suppl. 17: 9. 1968; Moldenke, Phytologia 18: 55—56. 1968.

ERIOCAULON DUTHIEI Hook. f.
Additional bibliography: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 20 & [86]. 1940; Masamune, Trans. Nat. Hist. Soc. Taiwan 33: 13. 1943; Moldenke, Phytologia 18: 57. 1968.

ERIOCAULON ECHINACEUM Van Royen
Additional bibliography: Moldenke, Phytologia 18: 58. 1968; Moldenke, Résumé Suppl. 17: 6. 1968.

ERIOCAULON ECHINULATUM Mart.
Additional & emended bibliography: Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 179 & 429. 1964; Moldenke, Phytologia 18: 58—60. 1968.

ERIOCAULON EDWARDII Fyson
Additional bibliography: Moldenke, Phytologia 18: 60—61. 1968; Moldenke, Résumé Suppl. 17: 5. 1968.

ERIOCAULON EDWARDII var. CLARKEI Haines
Additional bibliography: Moldenke, Phytologia 18: 60—61. 1968; Moldenke, Résumé Syppl. 17: 5. 1968.

ERIOCAULON EHRENBERGIANUM Klotzsch
Additional bibliography: Moldenke, Phytologia 18: 61—62. 1968; Moldenke, Résumé Suppl. 17: 9 & 10. 1968.

ERIOCAULON EKMANNII Ruhl.

Additional bibliography: Moldenke, Phytologia 18: 62. 1968; Moldenke, Résumé Suppl. 17: 9. 1968.

ERIOCAULON ELENORAE Fyson

Bibliography: Fyson, Journ. Indian Bot. 1: 50 (1919) and 2: 316—317, pl. 35. 1921; A. W. Hill, Ind. Kew. Suppl. 6: 78 (1926) and 7: 89. 1929; C. E. C. Fischer in Gamble, Fl. Presid. Madras 9: 1612 & 1619. 1931; Moldenke, Known Geogr. Distrib. Erioc. 23 & 34. 1946; Moldenke, Résumé 162 & 480. 1959; Razi, Rec. Bot. Surv. India 18: 19. 1959; G. L. Shah, Bull. Bot. Surv. India 4: 237. 1962; Thanikaimoni, Pollen & Spores 7: 184. 1965; Moldenke, Résumé Suppl. 13: 5 (1966), 14: 8 (1966), and 16: 21. 1968.

Shah found this plant submerged in water ditches and "common" in moist places in Bombay, growing "to 6 in. tall", flowering in September. Razi (1959) records it from Madras.

Fyson (1921) originally described this species as follows: "(Gudalus 15 XI 88, in Herbi Madras!) Proxime affinis E. Margaretae, sed sepala feminis floris inaequalibus. Plantae robustiores. Folia latiore, ad 2.5 mm. Capitula majora, ad 3--4 mm. lata. Receptaculam altius, villosum. Bractae involucrantes acutae aut cuspidatae. Sepala floris ♀ inaequalia, primum et secundum carinata; tertium paulum brevius, valde angustius carinatum. Flos ♂ antherae nigrae, petala et sepala 3. Plate 35. Peninsular India; on the Western Ghats at Mahabaleshwar, Castle Rock, etc., Gudalur. Leaves 1--3 in. by 1/16 -- 1/10 in. at the middle, 5- or 6-nerved. Scapes numerous, variable in height 2--5 in., glabrous 4 or 5-ribbed. Involucral bracts elliptic-acute, at first horizontal later reflexed. Floral similar, slightly acuminate, sparingly pubescent. Receptacle tall, hairy. Female sepals 3 unequal, one much the largest, the smallest not crested. These last two species are very closely connected and might perhaps be considered one species, but E. Elenorae seems to be always the robuster, and in E. Margaretae I have never found the female sepals at all unequal." It should be noted that he originally published the name as E. "eleanorae" in 1919, but as a nomen nudum and therefore invalid under the present rules of nomenclature. When he validated the name he spelled it E. "elenorae".

Citations: INDIA: Bombay: R. R. Fernandez R.742 (Xa), R.1518 (Xa); Patel 2 (Lw), 4 (Lw), 5 (Z); Santapau 9604 (N, Xa), 9605 (N, Xa), 9606 (N, Xa), 9607 (N, Xa), 9608 (N, Xa), 10280 (N, Xa), 10281 (N, Xa), 10447 (N, Xa), 11547 (Xa), 11653 (Xa), 11655 (Xa), 13801 (Xa), 14982 (Xa), 15990 (Xa); G. L. Shah 4968 (Xa), 7439 (Xa). West Bengal: Bennet 1012 (Ac), 1013 (Ac).

ERIOCAULON ELICHRYSOIDES Bong.

Synonymy: Eriocaulon elychrysoides Bong. ex Steud., Nom. Bot., ed. 2, 1: 585. 1840. Eriocaulon pardinum D. Dietr., Syn. Pl. 5: 263. 1852. Eriocaulon helichrysoides Bong. apud Ruhl. in Engl.,

Pflanzenreich 13 (4-30): 41, 43, & 285. 1903 [not E. helichrysoides Steud., 1903].

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 631. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 548. 1841; D. Dietr., Syn. Pl. 5: 263. 1852; Steud., Syn. Pl. Glum. 2 (Cyp.): 269 & 283. 1855; Körn. in Mart., Fl. Bras. 3 (1): 476 & 483. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 41, 43, 167, 285, & 286. 1903; Alv. Silv., Fl. Mont. 1: [397]. 1928; Moldenke, Known Geogr. Distrib. Erioc. 8, 35, & 38. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Angely, Fl. Paran. 10: 5. 1957; Moldenke, Résumé 89, 291, & 481. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; Moldenke, Résumé Suppl. 6: 8 (1963), 16: 5 & 6 (1968), and 17: 3, 7, & 10. 1968.

It should be noted here that E. elichrysoides Kunth is a synonym of E. kunthii Körn., while E. helichrysoides Steud. is Paepalanthus elongatus var. helichrysoides (Kunth) Ruhl. Kunth (1841) notes that the leaves of E. gomphrenoides Kunth resemble those of what he called E. elichrysoides (not E. kunthii). Angely (1957) records E. elichrysoides as cultivated in Brazil. Steudel (1855) regarded Dupatya ligulata Vell. as a synonym of E. elichrysoides. Silveira (1928) cites his no. 606.

The plate 27 supposed to have illustrated this taxon in Bongard's original work does not occur in the New York Botanical Garden library's copy of the separately paged reprint. There seems to be doubt that it was ever published.

Material has been misidentified and distributed in herbaria as E. gomphrenoides Kunth and E. magnum Abbiatti.

Citations: BRAZIL: Minas Gerais: Silveira 573 (B, Z). PARAGUAY: Hassler 11348 (N). MOUNTED ILLUSTRATIONS: drawings and notes by Körnicke (B).

ERIOCAULON ENSIFORME C. E. C. Fischer

Bibliography: C. E. C. Fischer, Kew Bull. Misc. Inf. 1930: 159—160. 1930; C. E. C. Fischer in Gamble, Fl. Presid. Madras 9: 1607 & 1618. 1931; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Moldenke, Known Geogr. Distrib. Erioc. 23 & 34. 1946; Moldenke, Résumé 162 & 480. 1959; Razi, Rec. Bot. Surv. India 18: 19. 1959.

This species is known thus far only from Madras, India.

ERIOCAULON EPAPILLOSUM Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 50, 57, & 285. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Moldenke, Known Geogr. Distrib. Erioc. 7 & 34. 1946; Moldenke, Phytologia 3: 325. 1950; Moldenke, Résumé 88 & 480. 1959; Rennó, Levant. Herb. Inst. Agron. 68. 1960.

The Paris herbarium label on the specimen of Ule 231 in that herbarium is inscribed "Goyaz", but the collector's original la-

bel has this word crossed out and replaced by "Minas-Geraes". Since it was also collected at the type locality for the species, "Ufer der Uberabinha", it would appear that this locality is actually in Minas Gerais, rather than in Goiás.

The J. E. Oliveira 934 [Herb. Jard. Bot. Belo Horiz. 42431], cited by me in my 1950 work, appears on re-examination actually to be E. gibbosum var. mattogrossense Ruhl.

Additional citations: BRAZIL: Goiás: Fróes 30127 (Hk, Z); Sick B.648 [Herb. Pabst 4500] (Bd). Minas Gerais: Ule 231 (P), 3156 [Macbride photos 10557] (B--type, N--photo of type, W--photo of type, Z--isotype).

ERIOCAULON EQUISETOIDES Van Royen

Bibliography: Van Royen, Blumea 10: 132. 1960; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966; Moldenke, Résumé Suppl. 17: 6. 1968.

This species is said to be endemic to Java.

ERIOCAULON EURYPEPLON Körn.

Bibliography: Körn., Linnaea 27: 685. 1854; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 102, 104, & 285. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23 & 34. 1946; Moldenke, Résumé 162 & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960.

Citations: INDIA: Bombay: Stocks, Law, &c. s.n. [Malabar, Concan &c] (B, Z).

ERIOCAULON FABERI Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 65, 95, & 285. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Moldenke, Known Geogr. Distrib. Erioc. 25 & 34. 1946; Moldenke, Résumé 169 & 480. 1959.

Although Ruhland, in his original description of this taxon, does not cite a number for the type collection, it seems obvious that Faber 206, from the Ningpo Mountains, flowering in August, is the collection intended and it is so regarded by me.

Citations: CHINA: Chekiang: Faber 206 (B--isotype, Z--isotype).

ERIOCAULON FENESTRATUM Bojer

Bibliography: Körn., Linnaea 27: 671. 1856; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Bot. Jahrb. 27: 81. 1899; Ruhl. in Engl., Pflanzenreich 13 (4-30): 63, 81, & 285. 1903; H. Lecomte, Bull. Soc. Bot. France 55: 571. 1908; Moldenke, Known Geogr. Distrib. Erioc. 22 & 34. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke in Humbert, Fl. Madag. 36: [23] & 27--28, fig. 3 (5--9). 1955; Moldenke, Résumé 156, 157, & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Phytologia 18: 57. 1968.

Leaves cespitose, linear-lanceolate, thin-membranous, flat, 5-15 cm. long, 0.8--1 cm. wide at the base, 2--5 mm. wide at the midpoint, long-narrowed into a rather obtuse apex, pellucid, fen-

estrately 8--11-veined, glabrous; peduncles usually solitary, rarely 2, slender, fragile, 20--40 cm. long, about 9-striate, hardly twisted, glabrous; sheaths lax, slender, fenestrate, 4--14 cm. long, obliquely split, obtuse, the mouth soon lacerated; heads finally globose, 8--10 mm. wide, loose-flowered, compressed in drying, white-villous, sometimes proliferous; involucral bractlets ovate, greenish-stramineous, membranous, obtuse at the apex, glabrous; receptacle glabrous; receptacular bractlets cuneate-obovate, olivescent and cuspidate-acuminate at the apex, keeled, densely pilose at the apex on the back; staminate florets: sepals 3, connate almost to the apex into an anteriorly split spathe, obovate, pale gray-green, abruptly acute at the apex, densely short-pilose at the apex on the back; petal-tube with medium-sized unequal lobes at the apex, the lobes obtuse at the apex, densely pilose on the inner surface, brown-glandulifferous at the apex; anthers dark-olivaceous; pistillate florets: sepals 3, separate, obovate, concave, olivaceous, acute at the apex, rather thick-keeled, pilose on the keel and at the apex; petals 3, inserted high, separate, spatulate, whitish, rather spongy, obtuse at the apex, pilose on the inner surface, with a dark gland below the apex of each.

The type of this species was collected by Wenzel Bojer at or near Emirna, Madagascar, and is deposited in the herbarium of the Naturhistorisches Museum in Vienna. The species is known only from Madagascar and Mauritius. The Baron 645 specimen in the Paris herbarium shows proliferous heads.

In Madagascar this species is said to inhabit "Lieux marécageux, cuvettes tourbeuses, ruisselets, de 1.300 à 2.700 m. alt.; fl.: octobre à juin et peut-être toute l'année". More recently it has been gathered at only 600 m. altitude. Material has been misidentified and distributed in herbaria as E. dregei Hochst.

Citations: MADAGASCAR: Baron 645 (P), 4299 (B); Bojer s.n. [Hab. in Emirna] (N--photo of isotype, P--isotype, Z--photo of isotype); D'Alleizette 736m (P); Decary 5990 (P), 6810 (P), 7598 (P), 13574 (P); Grandidier 1876 (P); Herb. Jard. Bot. Tanan. 1264 (S), 1305 (S); Herb. Mus. Paris. s.n. [interior. ins. Madagascar] (P); Humbert 3903 (P), 6188 (P, P), 13488 (P), 13665 (P), 18393 (P); Humbert & Cours 22780 (Cb), 23856 (Z); Ljungqvist 40 (S); La Myre de Vilers s.n. [Tamatave, 1887] (P), s.n. [Emyrna, 1889] (P); Perrier de la Bâthie 2124 (N, P), 7249 (P), 13546 (P), 13961 (P), 16949 (P); Viguier & Humbert 1532 (P); Waterlot s.n. [Janvier 1918] (P). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON FILIFOLIUM Hand.-Mazz.

Bibliography: Hand.-Mazz., Sinensia 7: 619. 1936; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé Suppl. 17: 5. 1968.

Nothing is known to me of this taxon except that it is said to

be endemic to Kwangsi, China.

ERIOCAULON FISTULOSUM R. Br.

Synonymy: Randalia fistulosa Beauv. & Desv. apud Kunth, Enum. Pl. 3: 571, in syn. 1841. Randalia fistulosa Beauv. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 681, in syn. 1895.

Bibliography: R. Br., Prodr. Fl. Nov. Holl. 255. 1810; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 869. 1817; Desv., Ann. Sci. Nat. Paris, sér. 1, 13: 47. 1828; Kunth, Enum. Pl. 3: 571. 1841; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 681. 1895; Britten, Journ. Bot. 38: 481 & 482. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 33, 38, & 285. 1903; F. M. Bailey, Compreh. Cat. Queensl. Pl. 584. 1913; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 681. 1946; Moldenke, Known Geogr. Distrib. Erioc. 27 & 34. 1946; Moldenke, Résumé 209, 342, & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 681. 1960; Moldenke, Résumé Suppl. 17: 12. 1968.

Kunth (1841) describes this species as follows: "Scapo multistriato (spithamaeo), foliis fistulosis compressis longiore; capitulo florido convexo, nigricante; squamis exterioribus vacuis, obtusis paleisque conformibus, imberbibus; perianthii feminei exterioris foliolis lateralibus carina dilatato-alata. Brown. Randalia fistulosa Beauv. et Desv. in Ann. de sc. nat. 1828. 47. — Nova Hollandia tropica."

The specific epithet is sometimes uppercased as to its initial letter for no valid reason. Kunth (1841) and Jackson (1895) both accredit the Randalia fistulosa binomial to Desvaux (1828), but the combination is not actually made there — only implied!

Citations: AUSTRALIAN REGION: AUSTRALIA: Queensland: Banks & Solander s.n. [New Holland, 1770] (B, Z).

ERIOCAULON FLUMINEUM Moldenke

Bibliography: Moldenke, Phytologia 3: 411--412. 1951; Moldenke in Humbert, Fl. Madag. 36: 15 & 18--19, fig. 2 (16--20). 1955; G. Taylor, Ind. Kew. Suppl. 12: 55. 1959; Moldenke, Résumé 156 & 480. 1959.

According to Humbert (1955) this species is found in "Rivières à courant rapide ou calme; fl.: août--septembre (?)." The Decary 10602 collection, cited below, is a form with linear-filiform leaves.

Citations: MADAGASCAR: Decary 5001 (P), 5423 (N--isotype, N--photo of type, P--type, P--isotype, Z--photo of type), 10443 (P), 10602 (P).

ERIOCAULON FLUVIATILE Trimen

Bibliography: Trimen, Journ. Bot. 23: 270. 1885; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 10, & 412. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 115 & 285. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr.

Distrib. Erioc. 24 & 35. 1946; Moldenke, Résumé 167 & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Phytologia 18: 55. 1968.

The E. fluviatile Bong. and E. fluviatile Mart. are synonyms of E. dictyophyllum Körn.

ERIOCAULON FRIESIORUM Bullock

Synonymy: Eriocaulon friesorum Bullock ex Moldenke, Known Geogr. Distrib. Erioc. 21, sphalm. 1946.

Bibliography: Bullock, Kew Bull. Misc. Inf. 1932: 507. 1932; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Moldenke, Known Geogr. Distrib. Erioc. 21. 1946; Moldenke, Résumé 146 & 480. 1959; Moldenke, Résumé Suppl. 3: 16 & 32. 1962.

Bullock's original description (1932) of this species reads as follows: "E. Schimperi Koernicke ex Engl. affinis, foliis angustioribus apice subacute angustatis, bracteis involucri nigris vel brunneo-nigris majoribus haud demum reflexis differt. Herba robusta, acaulescens. Folia numerosa, late linearia, plana, 5--15 cm. longa, circiter medium 7--9 mm. lata, glabra, apicem versus subacute angustata. Pedunculi 2--4, circiter 7-sulcati, 5--25 cm. longi, 1.5 mm. diametro; vaginae usque 7 cm. longae, apice limbo 2-lobato ornatae, lobis 2 cm. longis triangularibus acutis. Capitula 1--1.5 cm. diametro, semi-globosa, monoica, receptaculo glabro. Involucri bracteae nigrae vel brunneo-nigrae, 2--3-seriatae, ovatae vel ellipticae, vel interiores apicem versus ovato-spathulatae, circiter 3 mm. longae et 1.5 mm. latis, interdum extra apicem versus albido-pilosae; bracteae floriferae nigrae, oblongo-spathulatae, 3.5 mm. longae et 1.5 mm. latae, apicem versus dense albido ciliatae et pilosae, apice acutae. Flores foeminei subsessiles, sepalis late ellipticis vel ovatis 3 mm. longis et 1.5 mm. latis acutis saturate nigro-viridibus apicem versus pilis albidis barbatis, petalis lineari-oblanceolatis vel spathulatis 2.5 mm. longis et 0.5 mm. latis apicem versus glandulo nigro ornatis et albido-pilosis. Flores masculi similes, sed petalis in tubum coalitis. Stamina 2--4, exserta; antherae globosae, nigrae. Fructus non visi."

The type of the species was collected by Klas Robert Elias Fries and Thore Christian Elias Fries (no. 2402) -- in whose joint honor it is named -- in a swamp in the upper bamboo zone, at an altitude of about 10,000 feet, in the Aberdare Mountains, Kenya, on March 17, 1922, and is deposited in the herbarium of the Royal Botanic Gardens at Kew. Bullock cites also Gardner 1159 and Lugard 673 from Kenya. The species has also been found in moorland glades, at altitudes of 8000 to 10,200 feet, flowering in February, March, and July, fruiting in July. Hedberg found it on moist ground along small streams in the moorlands.

Additional citations: KENYA: Fries & Fries 2402 (S--isotype, Z--isotype); Hedberg 1602 (S, Z).

ERIOCAULON FULIGINOSUM C. Wright

Bibliography: Griseb., Cat. Fl. Cub. 226. 1866; Sauv., Anal. Acad. Ci. Habana 7: 715—716. 1871; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 35, 36, 285, & 287. 1903; Prain, Ind. Kew. Suppl. 4, pr. 1, 82. 1913; Moldenke, N. Am. Fl. 19 (1): 19 & 28. 1937; Prain, Ind. Kew. Suppl. 4, pr. 2, 82. 1938; Moldenke, Phytologia 1: 317. 1939; Moldenke, Carnegie Inst. Wash. Publ. 522: 141. 1940; Moldenke, Known Geogr. Distrib. Erioc. 4, 35, 39, & 40. 1946; León, Fl. Cuba 1: 280. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 325. 1950; Moldenke, Résumé 43, 51, 53, 292, 293, & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960.

Recent collectors have found this plant growing in shallow water, flowering in February and November, fruiting in November. Gentle describes the heads as "white"; Hunt says "occasional in damp places by plantation pipelines". C. Wright 3237 is a mixture with the type collection of Syngonanthus lagopodioides (Griseb.) Ruhl., while Gentle 4238b is a mixture with Paepalanthus lamarckii Kunth. The León, Victorin, & Alain 19626, cited by me in my 1950 work as from "Province undetermined", is actually from Pinar del Río, Cuba.

It should be noted here that Prain (1913) cites the original publication of E. sphaerospermum C. Wright as "1870", but the late Dr. J. H. Barnhart assured me that 1871 is the correct date for the publication in question.

Additional & emended citations: CUBA: Oriente: Howard 6019 (Um--47673). Pinar del Río: Ekman 17864 (S); León 19502 (Um—9921); C. Wright 3237, in part (S), 3238 (S), 3239 (S--isotype, S--isotype). Province undetermined: C. Wright s.n. (S). ISLA DE PINOS: Killip 42852 (Le), 45222 (Z). BRITISH HONDURAS: Gentle 993 (F—699370, S, S), 4238 (Rf), 4238b (Ld), 8323 (Ld); D. R. Hunt 383 (W); Pelly 73 (F—695022).

ERIOCAULON FULVUM N. E. Br.

Bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 248. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 66, 101, & 285. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Moldenke, Known Geogr. Distrib. Erioc. 20, 21, & 35. 1946; Moldenke, Résumé 136, 138, & 480. 1959; Hepper, Bull. Inst. Fond. Afr. Noire 27: 420. 1965; Berhaut, Fl. Sénégal, ed. 2, 312. 1967; Moldenke, Résumé Suppl. 16: 7. 1968.

Recent collectors have found this plant growing in seasonally inundated ricefields in Northern Nigeria. Berhaut (1967) cites his no. 1175 from Sénégal.

Additional citations: NIGERIA: Northern: Barter s.n. [Nupe] (B—isotype, Z--isotype).

ERIOCAULON FUSIFORME Britton & Small

Bibliography: N. L. Britton, Bull. Torrey Bot. Club 44: 32.

1917; A. W. Hill, Ind. Kew. Suppl. 6: 78. 1926; Moldenke, N. Am. Fl. 19 (1): 19 & 31. 1937; Moldenke, Phytologia 1: 317—318. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 35. 1946; León, Fl. Cuba 1: 280. 1946; Moldenke, Résumé 53 & 480. 1959.

Recent collectors have found this plant growing in white-sand savannas, flowering in January.

Additional citations: ISLA DE PINOS: Britton, Britton, & Wilson 14951 (S--isotype); Killip 45392 (Z).

ERIOCAULON GAMBLEI C. E. C. Fischer

Bibliography: C. E. C. Fischer, Kew Bull. Misc. Inf. 1930: 160—161. 1930; C. E. C. Fischer in Gamble, Fl. Presid. Madras 9: 1617—1618 & 1620. 1931; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; C. E. C. Fischer, Kew Bull. Misc. Inf. 1935: 159. 1935; Moldenke, Known Geogr. Distrib. Erioc. 23 & 35. 1946; Razi, Rec. Bot. Surv. India 18: 19. 1959; Moldenke, Résumé 162 & 480. 1959; Thanikaimoni, Pollen & Spores 7: 184. 1965.

Fischer (1935) cites E. Barnes 865.

ERIOCAULON GIBBOSUM Körn.

Synonymy: Eriocaulon gibbosum var. brevifolium Körn. in Mart., Fl. Bras. 3 (1): 489—490. 1863. Eriocaulon gibbosum var. longifolium Körn. in Mart., Fl. Bras. 3 (1): 489—490. 1863.

Bibliography: Körn., Linnaea 27: 600. 1854; Körn. in Mart., Fl. Bras. 3 (1): 489—490 & 500, pl. 42, fig. 1. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Pilg. in Engl., Bot. Jahrb. 30: 146 & 147. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43. 54. 55. 57, & 285. 1903; Luetzelb., Estud. Bot. Nordéste 3: 147 & 150. 1923; Alv. Silv., Fl. Mont. 1: [397]. 1928; Malme, Phanerog. 3: 7. 1933; Moldenke, Known Geogr. Distrib. Erioc. 7 & 35. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 325—326. 1950; Moldenke in Dawson, Los Angeles Co. Mus. Contrib. Sci. 7: 5. 1957; Moldenke, Résumé 88, 288, & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 6: 6 (1963) and 11: 4. 1964; Melchior in Engl., Syllabus Pfl., ed. 12, 2: 556, fig. 230 E & F. 1964.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 42, fig. 1. 1863; Melchior in Engl., Syllabus Pfl., ed. 12, 2: fig. 230 E & F. 1964.

Recent collectors have found this plant growing on the banks and margins of small streams running through cerrado, at 600 m. altitude, the inflorescence to 10 cm. tall and the heads light-gray, flowering in March and May. The species is said to be found from Amapá and Goiás southward through Bahia and Minas Gerais to Rio de Janeiro and west to Matto Grosso. The Archer & Gehrt 112 and Herb. Inst. Bot. S. Paulo 36368, distributed as E. gibbosum, are actually var. mattogrossense Ruhl.

Additional citations: BRAZIL: Amapá: Murça Pires, Rodrigues, & Irvine 50900 (N, Z). Goiás: E. Y. Dawson 14881 (Z); G. Gard-

ner 4383 (B, N, W—936285, W—1066873); Irwin, Maxwell, & Wasshausen 21632 (Rf); L. Riedel 2416 (B, S, Ut—330); Weddell 2128 [4] (Br, N, N—photo, Z—photo). Matto Grosso: Malme 1572 (S, S), 1572* (S), 3223 (N, S), 3223a (S). Minas Gerais: Burchell 5650 (Br); G. Gardner 5275 (B—cotype, N—cotype, N—photo of cotype, S—cotype, Z—photo of cotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B, B).

ERIOCAULON GIBBOSUM var. MATTOGROSSENSE Ruhl.

Bibliography: Pilg. in Engl., Bot. Jahrb. 30: 146—147. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 55 & 285. 1903; Moldenke, Known Geogr. Distrib. Erioc. 7 & 35. 1946; Moldenke, Résumé 88 & 480. 1959; Moldenke, Résumé Suppl. 1: 6 (1959) and 11: 4. 1964.

The type of this taxon is Pilger 586 from Matto Grosso, Brazil. Material has been misidentified and distributed in herbaria as E. epapillosum Ruhl. and E. gibbosum Körn.

Citations: BRAZIL: Matto Grosso: Archer & Gehrt 112 [Herb. Inst. Bot. S. Paulo 36368] (W—1740800); Pilger 586 (B—type, B—isotype, Z—isotype). Minas Gerais: J. E. Oliveira 934 [Herb. Jard. Bot. Belo Horiz. 42431] (N). São Paulo: Eiten, Eiten, Felippe, & Freitas Campos 3018 (N).

ERIOCAULON GILGIANUM Ruhl.

Synonymy: Dichrolepis pusilla Welw., Apont. 542. 1859 [not Eriocaulon pusillum R. Br., 1819, nor Bong., 1831, nor Poepp., 1841, nor Willd., 1841]. Eriocaulon ciliisepalum Rendle, Cat. Afr. Pl. Welw. 2: 98. 1899.

Bibliography: Welw., Apont. 542. 1859; Ruhl. in Engl., Bot. Jahrb. 27: 84. 1899 [April 7]; Rendle, Cat. Afr. Pl. Welw. 2: 98. 1899 [probably May or June]; Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1104 & 1105. 1901; N. E. Br. in Oliv., Fl. Trop. Afr. 8: 256—257. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 66, 99—100, & 285, fig. 13 A. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; H. Lecomte, Bull. Soc. Bot. France 55: 647. 1909; Hand.-Mazz., Symb. Sin. 7: 1246. 1936; Moldenke, Known Geogr. Distrib. Erioc. 21, 33, & 35. 1946; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 158—160, fig. 4—6 & 12, 161—162, & 270—271, pl. 8, fig. 11 & 12. 1955; Moldenke in Humbert, Fl. Madag. 36: [7] & 10, fig. 1 (22 & 23). 1955; Moldenke, Résumé 147, 149, 156, 278, 287, & 480. 1959; Moldenke, Résumé Suppl. 3: 16. 1962; Moldenke, Phytologia 17: 479 & 486. 1969.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): fig. 13 A. 1903; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: fig. 4—6 & 12, pl. 8, fig. 11 & 12. 1955; Moldenke in Humbert, Fl. Madag. 36: fig. 1 (22 & 23). 1955.

Leaves cespitose, filiform-linear, 8—30 mm. long, 0.25—0.5 mm. wide at the midpoint, acute at the apex, 1-veined, glabrous; peduncles few, aggregate, filiform or very slender, 1.5—4 cm. long, glabrous; sheaths rather loose, 0.6—1 cm. long, glabrous, obliquely split, the blade acute, entire; heads subglobose, at

first stramineous, finally with a black disk, truncate at the base, 1--2 mm. wide, glabrous; involucral bractlets oblong-lanceolate, greenish or grayish-stramineous, equaling the disk, rather obtusish or acute at the apex, glabrous; receptacular bractlets obovate-lanceolate, rather dark, acute at the apex, glabrous; staminate florets: sepals 3, connate into a spathe that is split anteriorly, 2- or 3-dentate, pale gray-fuscous, glabrous or subglabrate; petal-tube with 3 tiny glanduliferous lobes at the apex or these lobes obsolete; anthers black; pistillate florets: sepals lanceolate-ovate, grayish-fuscous, concave, acute at the apex, sparsely ciliate; petals linear, acute at the apex, glabrous, non-glanduliferous.

Hess (1955) gives the following interesting discussion of this species: "Das Material zu Eriocaulon ciliisepalum Rendle, gesammelt von Welwitsch, im Mai 1860, unter Nr. 2445 bei Lopollo, Huilla, Angola, wurde mir von der Universidade de Lisboa zugestellt, und ich konnte es mit dem Typus-Material von E. Gilgianum Ruhl. aus dem Botanischen Museum Berlin-Dahlem vergleichen. Die Untersuchung ergab Übereinstimmung der beiden Typen. Der Name E. Gilgianum Ruhl. hat gegenüber E. ciliisepalum Rendle die Priorität, weil der Name wenige Monate älter ist. Bereits Ruhland (1903) hat E. ciliisepalum unter der Synonymie von E. Gilgianum aufgeführt.

"Brown (1901) weist im Anhang zur Diagnose von Eriocaulon subulatum darauf hin, dass die Art E. ciliisepalum nahe verwandt sei. Er führt als Unterschiede nur einige Habitus-Merkmale an, wie Zahl der Halme und deren Höhe, Durchmesser der Blütenköpfe usw. Nach der Diagnose in der Monographie von Ruhland (1903) können die beiden Arten nicht unterschieden werden. Ruhland sagt, dass er von E. subulatum kein Material gesehen habe.

"Aus dem Herbarium von Royal Botanic Gardens, Kew, erhielt ich Vergleichsmaterial von Eriocaulon subulatum, das von R. D. Meikle bestimmt ist (25.5.1949) und das nach brieflicher Mitteilung von Herrn Milne-Redhead als authentisch zu gelten hat. Die Pflanzen stammen aus dem Herbarium der East African Agricultural Research Station, Amani, und wurden an den Victoria Falls (Gebiet des locus classicus für E. subulatum) am 31.7.1941 gesammelt. Höhe ca. 900 m. Greenway 6244.

"Die Untersuchung der Pflanzen hat gezeigt, dass diese genau mit dem Typus von Eriocaulon Gilgianum Ruhl. und mit meinen Einlagen aus Angola übereinstimmen.

"Eriocaulon subulatum ist deshalb als ein Synonym von E. Gilgianum Ruhl. zu betrachten.

"Auf dem Bogen mit dem Typus-Material von Eriocaulon Gilgianum aus Berlin-Dahlem sind 2 Pflanzen aufgeklebt, wovon die eine genau mit dem Übersichtsbild in Ruhland (1903) übereinstimmt. Eine Kopie dieser Zeichnung ist zudem noch auf dem Bogen aufgeklebt. Im weiteren sind auf dem Bogen genaue Detailzeichnungen der ♂ und ♀ Blüten von E. Gilgianum vorhanden, die wahlscheinlich von Ruhland selber stammen, sicher aber von ihm beschriftet

wurden. Untersucht man nun die Blüten der im Habitus gezeichneten Pflanze, so stimmt diese in keiner Weise mit den Detailzeichnungen und der Diagnose von E. Gilgianum überein. Die ♀ Blüten haben zwei Sepalen und zwei Petalen; die Pflanze gehört zu E. angustisepalum H. Hess, die in dieser Arbeit, gestützt auf selbst gesammeltes Material, als neu beschrieben ist.

"Die Untersuchung der zweiten Pflanze zeigt, dass diese zu den Blütenzeichnungen und der Diagnose gehört.

"Trotz dieser Konfusion entstehen keine nomenklatorischen Probleme. Aus den Detailzeichnungen und der Diagnose geht eindeutig hervor, welche der beiden Pflanzen Ruhland unter Eriocaulon Gilgianum verstanden hat. Für die Übersichtszeichnung hat Ruhland dann eine immerhin auch habituell verschiedene Pflanze gewählt, deren Blüten er vorher nicht untersuchte.

"Das eigentliche Typus-Material ist sehr spärlich; die Pflanze trägt nur einen wohlentwickelten Blütenkopf. Es konnten so nur wenige Blüten untersucht und ausgemessen werden. Im Folgenden ist eine ergänzende Diagnose zusammengestellt.

"Diagnose: Die Wurzeln sind büschelig; es ist kein Rhizom vorhanden. Die Blätter sind in einer Rosette angeordnet; sie sind 1—2 cm long, bis 0,5 mm breit, flach, in eine feine Spitze ausgezogen, dreinervig und kahl. Die Halme sind etwa 4 cm hoch, 0,3 --0,4 mm dick, gerillt, gedreht und kahl. Die Scheiden sind ungefähr 1 cm hoch, schief abgeschnitten und spitz. Die Köpfchen mit reifen Früchten sind kugelig, haben einen Durchmesser von 1,5--2,5 mm und sind hellgrau oder grau-braun. Die Hüllbrakteen sind verkehrt-oval, spitz, ca. 1,5 mm lang und 0,7 mm breit, gelb-braun oder fast weiss, stets kahl. Die Brakteen der Blüten sind ebenfalls verkehrt-oval, konkav und spitz, etwa 1,1--1,2 mm lang und 0,4--0,5 mm breit; sie sind grau-braun und kahl. Der Blütenboden ist zerstreut behaart.

"♀ Blüten: Die drei Sepalen sind frei und von gleicher Form und Grösse; sie sind bootförmig, oft scharf gekielt, spitz, 0,9—1,0 mm lang, die grösste Breite vom Kiel bis an den Rand misst 0,2--0,3 mm. Der Rand ist behaart, die Fläche aber ist kahl. Die Sepalen sind grau oder grau-braun bis schwärzlich. Die drei Petalen sind frei; sie sind lanzettlich, spitz, tragen an der Spitze oft zwei kleine Zähne, sind 0,9—1,0 mm lang und 0,1—0,2 mm breit, hyalin, an der Spitze oft grau, ohne Drüsen und stets kahl.

"♂ Blüten: Die Sepalen sind zu einem aufgeschlitzten, grauen, kahlen, 0,8—0,9 mm langen Tubus verwachsen. Die drei Zipfel sind spitz und kahl. Die Petalen sind zu kleinen, kahlen Zipfeln reduziert (0,1 mm lang), die eine längliche, schwarz-braune Drüse tragen. Die 6 Antheren sind schwarz, fast kugelig, 0,15 mm lang und 0,1 mm breit. Die Frucht entwickelt drei Samen; diese sind ellipsoidisch, 0,4 mm lang und 0,2 mm breit. Der Griffel ist etwa 0,5 mm lang und die drei Narben erreichen eine Länge von 0,3 mm."

The type of the species was collected by Antunes (no. 168a) in the Chela Mountains, Huila, in southern Angola, although Ruh-

land cites it as "168". Welwitsch 2445b, from Morro de Lopollo, Huila, collected in May, 1860, is the type of E. ciliisepalum.

Recent collectors have found this species growing in rain forests, at 960 to 1100 meters altitude, flowering in May. Milne-Redhead & Taylor found it growing among Rotala sp. and Lipocarpha sp. in dense vegetation by rocks on ground subject to flooding, and describe it as "leaves numerous, bright-green, spreading in all directions; sheaths green; scape pale-green below, green above; heads radiating in various directions; outer open bracts pale brownish-gray, inner blackish; anthers greenish-black; some of the larger plants flaccid and drawn up by other vegetation."

Material has been misidentified and distributed in herbaria as Heleocharis sp.

If Hess is correct in his statements quoted above, then obviously the abundant collections identified and distributed by many botanists in various institutions and by myself as E. subulatum will have to be re-identified and at least the ones from Madagascar re-named.

Hess (1955) cites his nos. 50/82 from Malange and 52/1621, 52/1719a, 52/1836, and 52/2017a from Huila, Angola. He notes that "Alle Proben aus dem Süden des Landes wuchsen auf sehr feuchtem, sandig-lehmigen Boden. Die Art ist zwischen Cyperaceen und Gramineen oft schwer zu sehn. Eriocaulon Gilgianum wächst in Onthite zusammen mit E. amboënse Schinz. In der Guanhama kommt die Art vermischt mit E. Welwitschii Rendle und E. Buchananii Ruhl. vor.

"An der Fällen von Bragança bilded Eriocaulon Gilgianum dichte Teppiche auf nacktem Urgestein am Fusse der 106 m hohen Wasserfälle. Durch den Wasserstaub ist der Standort immer tropfnass."

He speaks also of variability in this species, as follows: "Die Zahl der Halme schwankt bei Nr. 52/1621 zwischen 20 und 50. Durchschnittlich sind die Halme 4—6 cm hoch. Der Duchmesser der Blütenköpfe misst 2—2,5 mm.

"Die Pflanzen der Nr. 52/1719a sind noch jung und tragen auf den etwa 1 cm hohen Halmen noch keine Blütenköpfe mit reifen Früchten. Die Halme sind wenig zahlreich (1—6).

"Die Exemplare der Nr. 52/1836 entwickelten sich submers in 1—2 cm tiefen Wasser. Die Blätter sind bis 5 cm lang und in der Mitte 0,3—0,5 mm breit. Sie stimmen in der Form genau mit jenen der vorhergehenden Nummern überein; sie sind aber wegen der Entwicklung im Wasser schlaff. Auffallend an diesem Material ist die verschiedene Farbe der Blütenköpfe: es gibt Pflanzen mist fast weissen Köpfen, andere wieder sind grau oder schwarzlich, wie dies für Eriocaulon Gilgianum charakteristisch ist. Irgend welche Unterschiede im Blütenbau sind aber nich zu finden, so dass alle Pflanzen zu E. Gilgianum gestellt werden müssen.

"Die an den Fällen von Bragança gesammelten Pflanzen sind in

allen Teilen grösser als jene aus dem Süden des Landes. Die Blätter sind bis 4 cm lang, in der Mitte 1—1,5 mm breit, ebenfalls in eine feine Spitze ausgezogen. Die Halme mit fruchtenden Blütenköpfen sind 5—6 cm hoch. Die Zahl der Halme pro Pflanze schwankt zwischen 30 und 80. Die Köpfe haben einem Durchmesser von 3—3,5 mm. Die Abmessungen an den Blüten mit reifen Früchten stimmen gut mit den Werten vom Typus-Material überein: die Sepalen der ♀ Blüten sind 0,8—0,9 mm lang, die Breite vom Kiel bis an den Rand misst 0,2—0,3 mm. Die Petalen sind 1,0—1,2 mm lang und 0,15 mm breit. Die Spitze ist meist zwei-zähnig. Auch in den ♂ Blüten ergeben die Messungen übereinstimmende Resultate. Die Blütenmorphologie aller Proben stimmt mit dem Typus-Material überein."

As to the geographic distribution of the species, he says: "Eriocaulon Gilgianum war bisher von nahe beieinander liegenden Fundorten im Gebiete von Huila bekannt; ein weiterer Fundort kommt nun aus dem Norden von Angola hinzu. Leconte (1908) erwähnt die Art auch aus Kindia in französisch Guinea (Westafrika). Berücksichtigt man, dass Eriocaulon subulatum N. E. Br. ein Synonym ist, so erweitert sich das Verbreitungsareal auf Nord- und Süd-Rhodesiens und Moçambique....Eriocaulon Gilgianum ist mit E. aristatum H. Hess nächst verwandt."

Hess cites also F. A. Rogers 3049 & 5806 from Victoria Falls, deposited in the Berlin herbarium.

Additional citations: TANGANYIKA: Milne-Redhead & Taylor 9996 (B). RHODESIA: A. Peter 30805 [V.27] (B). ANGOLA: Huila: Antunes 168a (B—type); Welwitsch 2445b (B, Z). Malange: H. Hess 50/82 (B, Z). MADAGASCAR: Waterlot 494 (P), 748 (N, P, P).

ERIOCAULON GLABERRIMUM Miyabe & Satake

Synonymy: Eriocaulon glaberrimum Satake apud Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185. 1964.

Bibliography: Miyabe & Satake, Acta Phytotax. & Geobot. Kyoto 13: 280—281. 1943; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185 & 429. 1964; Moldenke, Résumé Suppl. 12: 8 (1965) and 17: 6 & 10. 1968.

A vernacular name recorded for this plant is "nemuro-hosikusa"!

ERIOCAULON GLABRIFLORUM Ridl.

Bibliography: H. N. Ridl., Journ. Fed. Malay States Mus. 10: 155. 1920; H. N. Ridl., Fl. Malay Penins. 5: 135. 1925; A. W. Hill, Ind. Kew. Suppl. 6: 78 (1926) and 7: 89. 1929; Moldenke, Known Geogr. Distrib. Erioc. 26, 35, & 61. 1946; Moldenke, Résumé 178—180 & 480. 1959.

ERIOCAULON GLAUCESCENS Griff.

Bibliography: W. Griff., Notul. 3: 116. 1851; Moldenke, Résumé Suppl. 17: 8. 1968.

Nothing is known to me about this taxon except the detached characters mentioned by Griffith in the reference cited above. The binomial was never recorded in the Index Kewensis.

ERIOCAULON GLAUCUM Griff.

Bibliography: W. Griff., Notul. 3: 113—114. 1851; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 115 & 285. 1903; Moldenke, Known Geogr. Distrib. Erioc. 24 & 35. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Résumé 165 & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960.

It should be noted that the E. glaucum Körn. homonym is a synonym of E. subglaucum Ruhl. Griffith's plant is said to inhabit "E. India, Mergui" and is based on W. Griffith 254. Mergui is actually in Tenasserim, Burma.

It is possible that the name, E. glaucescens Griff., may be a a slip of the pen for E. glaucum and should be reduced to synonymy here.

ERIOCAULON GLAZIOVII Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 42, 51, & 285. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Alv. Silv., Fl. Mont. 1: [397]. 1928; Moldenke, Known Geogr. Distrib. Erioc. 7 & 35. 1946; Moldenke, Résumé 88 & 480. 1959.

Citations: BRAZIL: Minas Gerais: Glaziou s.n. [Rio Corumba; Macbride photos 10558] (B--type, N--photo of type, Z--isotype).

ERIOCAULON GOMPHRENOIDES Kunth

Bibliography: Kunth, Enum. Pl. 3: 548. 1841; Körn. in Mart., Fl. Bras. 3 (1): 481—483. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 41, 45, & 285. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 8 & 35. 1946; Moldenke, Résumé 88 & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 11: 4. 1964.

Kunth (1841) describes this species as follows: "Acaule; foliis e basi lata linearibus, obtusiusculis, planis, obsolete et subtilissime fenestrato-multinerviis, basim versus vix pellucidis, pedunculis vaginisque glabris; his folio brevioribus, truncatis; illis 8—9-sulcatis; bracteis involucrantibus acutis, flores stipantibus acuminatis; floribus masculis hexandris; femineis trigynis; sepalis masculis exterioribus distinctis; interioribus inferne tubuloso-connatis, superne piloso-ciliatis; antico vix majore. -- Brasilia meridionalis. (Sellow.) -- Folia 6—7-pollicaria, versus medium 3—4 lineas lata, basi lanuginosa. Pedunculi 4—9-pollicares. Vaginae laxae, integrae, membranaceae, truncatae, laete virides, 2 1/2 — 4-pollicares. Capitula hemisphaerica, 4 — 4 1/2 lineas lata. Bracteae involucrantes ovato-oblongae, acutae, planiusculae, stramineo-pallidae, glabrae;

bracteae flores stipantes lanceolatae, acuminatae, straminco-pallidae, rigidulae, dorso adpresso-pilosae, uninerviae, flores paulo superantes. Flores masculi pedicellati: Sepala 3 exteriora obovato-spathulata, acutiuscula, navicularia, grisea, apicem versus dorso pilosa, subaequalia; 3 interiora inferne in tubum infundibularem farctum connata, superne libera, oblonga, obtusa, hyalina, margine pilosa, versus medium glandula sessili conico-cylindracea nigra instructa, anticum vix majus. Stamina 6, summo tubo inserta: 3 ante sepala. Filamenta albida. Antherae biloculares, apertae subrotundae, nigrae. Corpuscula 3 glandulis mox descripsit simillima in centro tubi calycis. Flores feminei marginales suppetentes valde juveniles: Sepala 3 exteriora masculis similia, inaequalia; 3 interiora breviora, angusta, superne hirsuta, interne versus medium glandula conico-cylindracea nigra instructa. Ovarium valde juvenile, sessile, ovato-conicu. Styli 3, breves, subulati. Pili bractearum et calycum crassiusculi, obtusiusculi, articulati, subopaci, nivei. Quoad folia E. elichrysoidi simile." The initial letter of the specific epithet is sometime uppercased.

The Silveira 573, distributed as E. gomphrenoides, is actually E. elichrysoides Bong.

Citations: BRAZIL: Rio Grande do Sul: Pabst 6302 [E. Pereira 6475; Herb. Brad. 21958] (Lw). Santa Catarina: Smith, Reitz, & Klein 7683 (N, Z). State undetermined: Sellow 3890 [Macbride photos 10559] (B--type, B--isotype, Br--isotype, N--isotype, N--photo of type, W--photo of type). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON GRACILE Mart.

Synonymy: Eriocaulon gracile Heyne ex Mart. in Wall., Pl. Asiat. Rar. 3: 29. 1832 [not E. gracile Bong., 1831]. Eriocaulon infirmum Steud., Syn. Pl. Glum. 2 (Cyp.): 271. 1855. Eriocaulon sericans Hook. f., Fl. Brit. Ind. 6: 577. 1894 [not E. sericans Heyne, 1832, nor Mart., 1893]. Eriocaulon gracile typica Fyson, Journ. Indian Bot. 2: 264. 1921.

Bibliography: Mart. in Wall., Pl. Asiat. Rar. 3: 29. 1832; Wall., Numer List 208 ["207"]. 1832; Kunth, Enum. Pl. 3: 558. 1841; Steud., Syn. Pl. Glum. 2 (Cyp.): 271. 1855; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Hook. f., Fl. Brit. Ind. 6: 577. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 62, 78, & 285--287. 1903; H. Lecomte, Journ. de Bot. 21: 109. 1908; Fyson, Journ. Indian Bot. 2: 264, pl. 19. 1921; Moldenke, Known Geogr. Distrib. Erioc. 23, 35, 36, & 40. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 326. 1950; Moldenke, Résumé 162, 165, 176, 288, 289, 292, & 480. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; G. L. Shah, Bull. Bot. Surv. India 4: 237. 1962; Moldenke, Résumé Suppl. 3: 21 & 24 (1962), 13: 5 (1966), and 17: 10. 1968; Moldenke, Phytologia 18: 59. 1968.

Kunth (1841) gives a detailed description of this species:

"Acaule; foliis e basi lata linearibus, subensiformibus, subulato-angustatis, fenestrato-5-7-nerviis, pellucidis, supra pilis brevissimis punctuliformibus substrigulosis; vaginis folia duplo superantibus pedunculisque glabris; his 6-sulcatis; capitulis albido-villosis; bracteis involucrantibus obovatis, apice rotundatis, flores stipantibus subacuminatis; floribus masculis 6-andris; femineis trigynis; calyce masculo interiore subbilabiato-trilobo: tubo glabro; lobis pilosis, eglandulosis; sepalis masculis exterioribus postice cohaerentibus; femineis interioribus superne pilosis, eglandulosis; seminibus reticulato-hirtellis. — In montibus Prome, ad ripas fluminis Irawaddi. ex Mart. — Folia plana, laete viridia, 8--10 lineas longa, inferne 3/4 lin. lata. Vaginae laxae, fenestrato-nervosae, apice acutiusculae et bilobae, glabrae, 14--15 lineas longae. Pedunculi filiformes, sexsulcati (quinquangulares Mart.), subseptempollicares (spithamaei Mart.). Capitula subglobosa, magnitudine grani piperis nigri. Bracteae involucrantes obovatae, apice rotundatae, convexae, stramineo-pallidae, puberulae; bracteae flores stipantes rhombeo-cuneatae, subacuminatae, stramineo-cinereae, apice cucullato-inflexae ibique externe albo-pilosae. Flores masculi pedicellati: Sepala 3 exteriora subspathulata, argenteo-cinerea, postice usque supra medium cohaerentia, superne libera, obtusa, apice pilosa, lateralia carinata; 3 interiora in tubum superne ampliatum farctum glabrum connata: limbo trilobo; lobis ovatis, obtusis, pilosis, eglandulosis, antico paulo majore. Stamina 6, summo tubo inserta; tria longiora lobis opposita. Antherae biloculares, subrotundo-reniformes, nigro-olivaceae. Pistillorum rudimentum capitellatum, trilobum. Flores feminei breviter pedicellati: Sepala 3 exteriora argenteo-cinerea: lateralia oblonga, carinata, acutiuscula, dorso pilosa: posticum spathulatum, obtusum, planiusculum, ad apicum pilosum; 3 interiora ab exterioribus remota eaque paulo superantia, lanceolato-spathulata, acutiuscula, eglandulosa, alba, superne utrinque pilosa, anticum longius et duplo latius. Ovarium stipitatum. Stylus brevis. Stigmate 3, elongata, filiformia, simplicia. Capsula subrotunda, tricocca, membranacea, olivacea. Semina subgloboso truncatulis subhyalinis, per series complures reticulato-conjunctas dispositis obsita. Ab E. argenteo vix distinctum: foliis pellucidis, vaginis folia superantibus, bracteis latioribus et brevius acuminatis, sepalis interioribus masculis et femineis eglandulosis, antheris reniformibus et? seminibus hirtellis." The E. argenteum Mart. to which he refers here is a synonym of E. quinquangulare L.

Fyson (1921) describes E. gracile as follows: "Annual (Mart.). Leaves 1/2 — 1 1/4 by 1/8 in., tapering to the acute apex. Scapes 8--12 in. glabrous, very slender. Heads 1/4 in. globose snow-white. Involucre pale-yellow, pubescent. Floral bracts acute or cuspidate, darkish, pubescent. Female flower: -- Sepals boat-shaped, narrow. Petals nearly glabrous, broadly oblanceolate without glands, unequal, longer than the sepals. Male flower normal. Plate 19. Burma; Prome, on the banks of the Ira-

waddy (Mart). There is a second sheet Wall. Cat. 6082 in Herb. Calc. very similar in external appearance, but the female petals larger and more unequal. Ruhland said this species is not the same as E. sericans Mart. and that the latter is E. Wightianum Mart. as also did Koernicke."

It should be noted that E. gracile Bong. is a synonym of Syngonanthus gracilis var. olivaceus Ruhl., while E. sericans Heyne and E. sericans Mart. are E. wightianum Mart. Eriocaulon gracile Heyne is based on Wallich 1827.

Recent collectors have found this plant growing at 400 meters altitude, flowering in March and October. Smitinand & Seidenfaden describe it as a "tufted plant common in bogs" in Thailand. Material has been misidentified and distributed in herbaria as E. odoratum Dalz., E. quinquangulare L., and E. setaceum L. On the other hand, the Falconer 1194 and Sedgwick & Bell 5091, identified as E. gracile, are actually E. quinquangulare L., while Pételot 8972 & 8973 are E. sollyanum Royle.

Additional citations: INDIA: Bombay: Santapau 9611 (N, Xa), 9630 (N, Xa). Mysore: Begum 1 (Mf), 2 (Mf); S. N. Ramaswamy 7 (Ac), 11 (Rf), 23 (Rf). Uttar Pradesh: Strachey & Winterbottom 4 (Br), 6 (Br). West Bengal: Bennet 489 (Ac). State undetermined: Wight 2369 (V--270286). BURMA: Upper Burma: Martius 20 (Br--type, N--isotype, N--photo of type, Z--photo of type); Wallich 6079 (B). INDOCHINA: Annam: Schmid 79 (N). Cambodia: Poilane 14437 (Mg). Laos: Vidal 1947 (Z). THAILAND: Smitinand & Seidenfaden 5531 (Gg); Sørensen, Larsen, & Hansen 5235 (S), 6083 (Cp), 6326 (S). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated s.n. (S).

ERIOCAULON GRACILE var. KURZII Fyson

Bibliography: Fyson, Journ. Indian Bot. 2: 264, pl. 20. 1921; Moldenke, Résumé 165 & 481. 1959; Thanikaimoni, Pollen & Spores 7: 183 & 185, tabl. 1. 1965.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 20. 1921; Thanikaimoni, Pollen & Spores 7: 183, tabl. 1. 1965.

Fyson's original description (1921) of this taxon is as follows: "Kurz. 2638 in Herb. Calc.! Plate 20. Stem and leaves as in E. gracile typica. Scapes about 5 in. glabrous. Heads 1/4 in. hemispheric. Involucre horizontal bracts oblong, projecting well beyond the margin, pale, glabrous. Floral bracts shortly cuspidate, pubescent. Female sepals short and narrow. Female petals unequal, one much the largest and projecting beyond the bracts, glands small. Seeds reddish, broadly oval. Burma, Rangoon."

ERIOCAULON GRACILE var. PUBERULENTUM Moldenke

Bibliography: Moldenke, Phytologia 4: 128. 1952; Moldenke, Biol. Abstr. 27: 984. 1953; Moldenke, Résumé 201 & 481. 1959; Moldenke, Résumé Suppl. 3: 21 & 24. 1962; Moldenke, Phytologia

18: 59. 1968.

This variety differs from the typical form of the species in having the involucral bractlets densely puberulous.

The type of the variety was collected by Leonard John Brass (no. 7822) on wet grass plains at Lake Daviumbu, Middle Fly River, Papua, New Guinea, in September 1936, and is deposited in the Britton Herbarium at the New York Botanical Garden. The Ramos collection, cited below, is a mixture with E. echinulatum Mart. and with something non-eriocaulaceous.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Culión: M. Ramos s.n. [Herb. Philip. Bur. Sci. 41340, in part] (Ca-239520). MELANESIA: NEW GUINEA: Papua: Brass 7822 (N--type).

ERIOCAULON GRAPHITINUM F. Muell. & Tate

Synonymy: Eriocaulon graphitinum Tate apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 117 & 285. 1903. Eriocaulon graphiticum Tate ex Moldenke, Known Geogr. Distrib. Erioc. 27 & 35, sphalm. 1946.

Additional & emended bibliography: F. Muell. & Tate, Trans. Roy. Soc. S. Austral. 19: 82. 1895; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 117 & 285. 1903; Ewart & Cookson in Ewart & Davies, Fl. N. Terr. 67. 1917; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Moldenke, Known Geogr. Distrib. Erioc. 27 & 35. 1946; Moldenke, Phytologia 3: 326. 1950; Moldenke, Résumé 209, 288, & 481. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158. 1959; Moldenke, Résumé Suppl. 17: 10. 1968.

The species appears to be endemic to South Australia.

ERIOCAULON GREGATUM Körn.

Bibliography: Körn., Linnaea 27: 606. 1854; Hook. f., Fl. Brit. Ind. 6: 581. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 60, 67, & 285. 1903; Fyson, Journ. Indian Bot. 2: 198, pl. 5. 1921; Moldenke, Known Geogr. Distrib. Erioc. 23, 25, & 35. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 326. 1950; Moldenke, Résumé 162, 169, & 481. 1959; Moldenke, Résumé Suppl. 1: 11. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Thanikaimoni, Pollen & Spores 7: 185. 1965; Moldenke, Phytologia 17: 477. 1969.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 5. 1921.

Fyson (1921) describes this species as follows: "Stem slender, tufted 1/2--1 in. Leaves 1 — 1 1/2 in. by 1/20 in., acute. Scapes solitary to each stem or branch, twice the leaves. Heads 1/8 -- 1/6 in; involucral bracts obtuse, pale with broad black margin. Female flower: sepals 3, two boat-shaped, one flat; petals broadly oblanceolate, obtuse with large glands. Male flowers normal. Plate 5. Khasia at 4--5000 ft."

Recent collectors have found this plant growing on boulders in forest openings in Assam, blooming in September, at altitudes of 4000--5000 feet. The Hooker & Thomson s.n. specimen in the

Meisner Herbarium has one of the flower-heads proliferous. Material has been misidentified and distributed in herbaria as E. achiton Körn.

Additional citations: INDIA: Assam: Koelz 23724 (Mi). Khasi States: C. B. Clarke 16101 (B); Griffith 40 (B--type, Z--isotype); Hooker & Thomson s.n. [Hab. Mont. Khasia, 4000 ped.] (B, Br, M, S, Ut--308). CHINA: Kwangsi: Ching 8100 (N), 8149 (N); Tsang 24507 (N), 24571 (N).

ERIOCAULON GRISEUM Körn.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 475, 479, & 500, pl. 40, fig. 3. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 13, 103, 110, 112, & 285, fig. 15 H & J. 1903; Haines, Bot. Bihar & Orissa 1071. 1924; Moldenke, Known Geogr. Distrib. Erioc. 8 & 35. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Résumé 89 & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Melchior in Engl., Syllabus Pfl., ed. 12, 2: 556, fig. 230 H. 1964; Moldenke, Phytologia 18: 61. 1968.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 40, fig. 3. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 112, fig. 15 H & J. 1903; Melchior in Engl., Syllabus Pfl., ed. 12, 2: fig. 230 H. 1964.

Haines (1924) suggests that the Indian E. edwardii var. clarkei Haines is related to E. griseum because of its "villous stipes".

Citations: BRAZIL: Piauhy: Martius s.n. (B--isotype). MOUNTED ILLUSTRATIONS: original drawings for Mart., Fl. Bras. pl. 40, fig. 3 (B, B); notes & drawings by Körnicke (B).

ERIOCAULON GUADALAJARENSE Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 49, 60, & 285. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Moldenke, N. Am. Fl. 19 (1): 20 & 35. 1937; Moldenke, Phytologia 1: 318. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 35. 1946; Moldenke, Phytologia 3: 326. 1950; Moldenke, Résumé 35 & 481. 1959.

Pennell found this plant growing in seepy places along a river, at an altitude of 850--900 meters, flowering in August.

Additional citations: MEXICO: Jalisco: Pringle 1734 (B--type, Ms--15463--isotype, S--isotype). Nayarit: F. W. Pennell 19933 (W--1642118).

ERIOCAULON GUYANENSE Körn.

Synonymy: Eriocaulon guianense Körn. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 36, 37, & 285. 1903.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 475 & 478. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 36, 37, & 285, fig. 4. 1903; Moldenke, Known Geogr. Distrib. Erioc. 7 & 35. 1946;

Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 326. 1950; Moldenke in J. A. Steyerm., Fieldiana Bot. 28: 823. 1957; Moldenke, Résumé 66, 71, 75, 78, 89, 419, & 481. 1959; Moldenke, Résumé Suppl. 1: 17 (1959) and 2: 4. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 12: 9. 1965; J. A. Steyerm., Act. Bot. Venez. 1: 195. 1966; Moldenke, Résumé Suppl. 17: 2. 1968.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 37, fig. 4. 1903.

Recent collectors have found this plant growing in exposed swamps and around pools of water in igneous rock outcrops, at 200 meters altitude, flowering in September. Allen describes it as 6 inches tall, with white flowers. The F. W. Pennell 1430, cited below, was identified by A. C. Smith as Syngonanthus llanorum Ruhl. by comparison with the type of the latter species in the Berlin herbarium, but I have also compared the two collections and find that they are not at all alike, although both are from the same locality.

Material has been misidentified and distributed in herbaria as Syngonanthus biformis (N. E. Br.) Gleason and S. llanorum Ruhl.

Additional & emended citations: COLOMBIA: Magdalena: C. Allen 611 (E--1015276). Méta: F. W. Pennell 1430 (N, W--1041738). VENEZUELA: Amazonas: J. A. Steyermark 58518 (N, S); Vareschi & Maegdefrau 6550 (Ve--42905). Guarico: Lasser 146 (N, Ve--18470). BRITISH GUIANA: C. B. Clarke s.n. [1897] (N). FRENCH GUIANA: Collector undesignated [Herb. Mus. Paris.] 173 [Macbride photos 22274] (B--cotype, N--photo of cotype, W--photo of cotype); Jelski s.n. [Cayenne] (B, Z). BRAZIL: Rio Branco: Black 51-12572 (Z); Ule 7667 [Herb. Mus. Goeldi 12776] (K, Z). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON HAMILTONIANUM Mart.

Synonymy: Eriocaulon cinereum Hamilt. ex Wall., Numer. List 207, in syn. 1832 [not E. cinereum R. Br., 1810, nor Merr., 1940]. Eriocaulon cinereum Buch.-Ham. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877, in syn. 1893. Eriocaulon halmiltonianum Mart. ex H. Lecomte, Bull. Soc. Bot. France 55: 572, sphalm. 1908. Eriocaulon hamiltonianum var. typica Fyson, Journ. Indian Bot. 2: 213. 1921. Eriocaulon hamiltoniana Mart. ex Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 204, sphalm. 1949.

Bibliography: Wall., Numer. List 207. 1832; Wall., Pl. Asiat. Rar. 3: 29. 1832; Kunth, Enum. Pl. 3: 552. 1841; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 & 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 13, 103, 107, & 285. 1903; H. Lecomte, Bull. Soc. Bot. France 55: 572. 1908; Fyson, Journ. Indian Bot. 2: 313, pl. 33. 1921; Moldenke, Known Geogr. Distrib. Erioc.

23, 35, & 38. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 & 878. 1946; Moldenke, Known Geogr. Distrib. Verbenac., ed. 2, 204. 1949; Moldenke, Résumé 162, 288, 290, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 & 878. 1960; Moldenke, Résumé Suppl. 3: 20 (1962), 11: 5 (1964), and 17: 9 & 10. 1968; Moldenke, Phytologia 18: 60 (1968) and 17: 488. 1969.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 33. 1921.

Kunth (1841) describes this plant as "Glabrum; rhizomate simplici, perenni; scapis 6-pollicaribus, striatis, folia linearilanceolata acuminata plus duplo superantibus; capitulis globosis, nitidulis, testaceis, glabris; bracteis oblongis, involucralibus obtusiusculis, interioribus breviter mucronulatis; calycibus femineis vix corollis latioribus. Mart. E. cinereum Hamilt. herb. -- Gualpara. -- Stylus trifidus. E. sexangulari affine. (Mart.) An recte huc collocatum?"

Fyson (1921) says of it "F. B. I. as E. oryzetorum l. c. Ruhl. No. 179. Perennial (Mart.) Leaves 1 1/2 -- 2 1/2 in. Sheaths shorter, scapes numerous very slender. Heads conical, 1/6 in. Involucral bracts, blunt; floral acute, hardly acuminate. Sepals narrow, 2 only; petals 3 oblanceolate. Plate 33. Var a typica. Assam & southwards to Tavoy."

Smitinand says that this plant is a common herb in damp localities in dry deciduous forests, at 300 meters altitude, in Thailand, with white flowers in October.

The E. cinereum R. Br., referred to in the synonymy above, is a valid species, with the E. cinereum credited to Merrill in its synonymy.

Citations: INDIA: Assam: Hamilton s.n. [Gualpara] (Br--isotype, N--isotype, N--photo of isotype, Z--photo of isotype). THAILAND: Smitinand 3065 [Herb. Roy. Forest Dept. 17246] (Bk, Z).

ERIOCAULON HAMILTONIANUM var. MINIMUM Fyson

Synonymy: Eriocaulon hamiltonianum var. minima Fyson, Journ. Indian Bot. 2: 313. 1921.

Bibliography: Fyson, Journ. Indian Bot. 2: 313. 1921; Moldenke, Résumé 162, 288, & 481. 1959; Moldenke, Résumé Suppl. 11: 5. 1964; Moldenke, Phytologia 18: 60 (1968) and 17: 494. 1969.

Fyson (1921) describes this variety as follows: "(Meebold 9898!) leaves linear 1/2 — 1 1/2 in. Scapes capillary 1--4 in. Heads 1/8 in. Flowers few. Peninsular India; Western Ghats at Castles Rock. If the sheet Wall. Cat. 6069 in Herb. Calc. given this name is correctly so-numbered, the plant is quite distinct from E. oryzetorum, not an immature state as given in F. B. I. l. c. Varieties a [=typica], b [=minor] and c [=minimum] appear to me to grade into each other, though a and c would certainly seem distinct."

Material has been misidentified and distributed in herbaria as E. conicum (Fyson) C. E. C. Fischer.

Citations: INDIA: Mysore: Ramaswamy 1830 (Z).

ERIOCAULON HAMILTONIANUM var. MINOR Fyson

Bibliography: Fyson, Journ. Indian Bot. 2: 313. 1921; Moldenke, Résumé 162 & 481. 1959; Thanikaimoni, Pollen & Spores 7: 185. 1965; Moldenke, Phytologia 18: 60. 1968.

Fyson's original description (1921) of this variety is "(King at Siliguri 1878 in Herb. Calc.); Leaves 1/2 -- 1 in. Scapes 1-2 in. Heads 1/8 in. Assam; Siliguri."

ERIOCAULON HANANOEGOENSE Masamune

Synonymy: Eriocaulon hananoegoënse Masamune apud A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938. Eriocaulon atrum Masamune apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 68 & [86], in syn. 1940 [not E. atrum Miyabe & Kudo, 1940, nor Nakai, 1911]. Eriocaulon hananoegoensis Masamune ex Hara, Outline Phytogeog. Japan 83, sphalm. 1959.

Bibliography: Masamune, Prel. Rep. Veg. Yakus. 51. 1929; Masamune, Mem. Fac. Sci. Agr. Taihoku Univ. 11, Bot. 4: 537--538. 1934; Nemoto, Suppl. Fl. Jap. 1038. 1936; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Honda, Nom. Pl. Jap. 462. 1939; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 57--58. 1940; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 68, 69, 71, 81, & [86], fig. 35. 1940; Sugimoto, Amat. Herb. 18: 7. 1957; Moldenke, Résumé 173, 286, 288, & 481. 1959; Hara, Outline Phytogeogr. Japan 83. 1959; Moldenke, Résumé Suppl. 3: 18 & 21. 1962; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 184, 185, & 429, pl. 48, fig. 311, & text fig. 126 (3). 1964; Moldenke, Résumé Suppl. 17: 10. 1968; Moldenke, Phytologia 17: 481. 1969.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 69, fig. 35. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 184, fig. 126 (3), & pl. 48, fig. 311 [in color]. 1964.

Satake (1940) gives a detailed description of this species: "Planta humilis, acaulis, annua. Radix fibrosa, alba, transverse septata. Folia pauca, rosulata, linearia, 1.5--4 cm longa, 1--1.5 mm lata, 3-fenestrato-nervia, apice subcallosa, acutiuscula. Pedunculi graciles, 2--4 cm alti, 4-costati, parce vel haud torti. Vaginae laxiusculae, 1 cm longae, apice oblique fssae. Capitula minora, campanulata, 2--2.5 mm longa et lata, pauci-flora. Bracteae involucrantes usque 4, ovatae, obtusae vel acutiusculae, glabrae, stramineae, 2 mm longae 1 mm latae, capitulo aequilongae. Receptaculum glabrum. Flos ♂: fere 3; bractea obovato-oblanceolata, acuta, nanicularis, olivaceo-nigricans, apicem dorso albo-puberula, pilis claviformibus 2-cellulatis; sepala in spatham oblanceolatam antice apertam connata, apice trilobulata, lobulis lateralibus acutis, lobulo medio obtuso, glabra, atro-olivacea; petala basi in tubum connata, apice campanulata trilobata, lobis minute parvis glabris intus apicem glandula nigra unica coronatis; stamina 6, subaequilonga, antheris atris rotundatis. Flos ♀: fere 4; bractea obovata, apice obtusiuscula, glabra, olivaceo-atrata; sepala in spatham

antice apertam connata, apice tridentata, apicem margine pilis albo-unicellulatis puberula, intus longe pilosa, olivaceo-nigricantia; petala 3, libera, oblanceolato-spathulata, basi subcuneata, apicem intus glandula atra unica coronata, margine albo-puberula, extus glabra intus longe albo-pilosa, spongiosa, cellulis irregulariter hexangularibus composita; germen 3-coccum; stylus germine paulo brevior; stigmate 3, stylo breviora; semina ignota." He records the vernacular name "yakusima-hosikusa" and cites Koidzumi s.n., Masamune s.n., Tagawa 1993, and Tasiro s.n. from Yakushima Island in the Ryukyu Island Archipelago, where the species is apparently endemic.

Hatusima found the plant at 1800 meters altitude, flowering in April, in the bog known as Hananoegoe, and comments "The plants growing in the high mountains of this island are famous for their smaller size -- often several times -- than those from other parts of Japan, possibly owing to the constant cloudiness of the island. I suppose that the eriocaulons of the island seem to be diminutive forms of the species from Hondo or Kyusyi already known."

The E. atrum of Nakai is a valid species, while the homonym attributed to Miyabe & Kudo, referred to in the synonym above, is actually E. kusiroense Miyabe & Kudo.

Citations: WESTERN PACIFIC ISLANDS: RYUKYU ISLAND ARCHIPELAGO: SATSUNAN ISLANDS: Yakushima: Hatusima 14687 (Kg, Z), 14844 (Kg).

ERIOCAULON HAYATANUM Koyama

Bibliography: Koyama, Philip. Journ. Sci. Bot. 84: 369--370, 377, & 378, pl. 2, fig. 3, & pl. 5, fig. B 1--6, 11, & 12. 1956; Moldenke, Résumé 176 & 481. 1959; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

Illustrations: Koyama, Philip. Journ. Sci. Bot. 84: 377 & 378, pl. 2, fig. 3, & pl. 5, fig. B 1--6, 11, & 12. 1956.

The type of this species was collected by Bunzô Hayata (no. 101) -- in whose honor it is named -- at Dalat, Annam, on June 4, 1921, and is deposited in the herbarium of the University of Tokyo. Hayata 8, from the same locality, is also cited by Koyama in the original description (1956). He notes that "This taxon is distinguishable from E. collinum by completely free sepals of male flowers, female sepals emarginate at apex and much longer sheaths of the base of peduncles." The original publication is sometimes cited as "1955", the volume date, but the number containing Dr. Koyama's paper was not actually issued until March 21, 1956, as is plainly stated in the table of contents.

ERIOCAULON HELEOCHARIOIDES Satake

Bibliography: Satake, Journ. Jap. Bot. 15: 627--628. 1939; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 24--25, pl. 3, fig. 6. 1940; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6--9, 12, 34--36, 79, & 87, fig. 1G, 2K, 3C, 4C, 14, & 15. 1940; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Résumé 173 & 481. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 179, 180, & 429, fig. 122 (3). 1964.

Illustrations: Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 3, fig. 6. 1940; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6--9, 35, & 36, fig. 1G, 2K, 3C, 4C, 14, & 15. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 179, fig. 122 (3). 1964.

Satake (1940) describes this species as follows: "Biennis? Rhizoma erectum, breve rapiforme, 7--11 mm crassum 10--15 mm longum. Raduces albae fibrosae, 1 mm latae, septis confertis instructae. Folia rosulata, linearia, usque 7--15 cm longa, medio 2--3 mm lata, apice sensim angustata, glabra, 5--7 fenestrato-nervia. Pedunculi caespitosi, 12--28 cm alti, 2 mm crassi, teretes, leviter 9--10 sulcati, haud vel parce torti. Vaginae teretes laxae, 5--8 cm longae, 3 mm latae, apice oblique vel irregulariter fissae. Capitula conico-ovoidea, 6--7 mm alta, 5 mm lata, glabrata; bracteae involucrantes usque 14, late obovatae, apice acutiusculae, 2 mm longae lataeque, apice sub concavae, glabrae, capitulo breviores. Flores multi, masculi (fere 26) et feminei (fere 76) mixti; receptaculum glabrum. Flos ♂: 2 mm longus; bractea late oblanceolata, apice acuta, navicularis, apicem margine 1-cellulato-ciliata, flori fere aequans; sepala in spatham antice apertam apice obscure trilobatam vel irregulariter minute denticulatam connata, glabra, apicem margine sparsissime ciliolata, ciliis unicellulatis intus granulatis, flore paulo breviora; petala in tubum apice trilobatum connata, lobis lanceolatis apice ciliis unicellulatis intus granulatis instructis, apicem intus glandula nigra unica coronatis, lobo uno interiore lobis lateralibus distincte majore crassioreque; stamina 6; filamenta alba, oppositipetala vix longiora; antherae albae rotundatae. Flos ♀: 2 mm longus; bractea late obovato-cuneata, apice acuta, navicularis, 1.5 mm. lata, flori aequens, apicem margine ciliolata ciliis unicellulatis intus granulosis; sepala in spatham antice apertam minute trilobatam connata, omnia glabra, fere olivaceo-atrata; petala 3, libera, oblanceolato-spathulata, basi connata, apice obtusiuscula, apicem infra glandula nigra unica instructa, glabra sed intus sparse pilosa pilis albis glabris 2--3-cellulatis, albo-spongiosa, cellulis compresse hexagonis composita, petalo anteriore vix longiore; capsula 3-cocca; stylus capsula dimidio brevior; stigmate 3 stylo paulo longiora; semina oblongo-obovoidea, luteo-fulva, usque 1 mm longa, 0.5 mm lata, minute hamato-papillosa."

Satake also records the vernacular name "kosigaya-hosikusa", and cites Maekawa s.n. and Satake s.n. from Kosigaya, in the province of Musasi, Honshu, Japan, the latter being the type collection, deposited in the herbarium of the University of Tokyo. The species is apparently endemic.

ERIOCAULON HENRYANUM Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 64, 86, & 285. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Ruhl., Notizbl. Bot. Gart. Berlin 10: [1040]. 1930; Hand.-Mazz., Symb. Sin. 7: 1245 & 1246. 1936; Moldenke, Phytologia 3: 326. 1950; Moldenke, Résumé 169, 176, 178, & 481. 1959; Moldenke, Résumé

Suppl. 1: 12 (1959), 3: 17 (1962), and 4: 7. 1962.

Chand describes this plant as 12 inches tall, with grayish-white flowers. Recent collectors have found it growing in swampy ground, old fields, and pine-dipterocarp forests, at altitudes of 33 to 4000 meters, flowering and fruiting in February, April, June, August, and October. Smitinand refers to it as a "common herb in damp places in savannas and pine forests, the flowers white" in Thailand, while he and Floto call it a "tufted herb common in savannas" in the same country. A vernacular name recorded for it is "ya dawk khao". The sheet of Hansen, Seidenfaden, & Smitinand 11279 in the Copenhagen herbarium has one head proliferous.

Additional citations: INDIA: Assam: Chand 7997 (Mi). Madhya Pradesh: Schlagintweit s.n. [Malva, central India] (S). CHINA: Kwangtung: Herb. Sun Yatsen Univ. 11753 (B). Yünnan: Ducloux 1089 (Ca--385973); Forrest 27861 (Ut--53253b); A. Henry 9443 (B--type, N--isotype); Maire 3417 (Ca--388805, Ca--389086), 3524 (Ca--389087), 3965 (Ca--389089, N); J. F. Rock 24927 (B, Ca--516404, N, S). INDOCHINA: Annam: Souchère 2 (N). Tonkin: Pételot 1322 (Ca--236723). THAILAND: Din 167 [Herb. Roy. Forest Dept. 5731] (Ss); Floto 7347 (S), 7472 (Cp), 7473 (S); Hansen, Seidenfaden, & Smitinand 10814 (Ac, Cp), 10976 (Ac, Cp), 11239 (Ac, Cp), 11279 (Ac, Cp); Smitinand 119 [Herb. Roy. Forest Dept. 6163] (Bk), 2051 [Herb. Roy. Forest Dept. 11526] (Z); Smitinand & Floto 5936 [Herb. Roy. Forest Dept. 24089] (Gg); Sørensen, Larsen, & Hansen 2257 (Cp), 6161 (Cp).

xERIOCAULON HESSII Moldenke

Bibliography: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 173--174, pl. 9, fig. 2. 1955; Moldenke, Phytologia 5: 338. 1956; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1955: 30 (1956) and 1956: 28. 1957; Moldenke, Résumé 147, 284, & 481. 1959; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

It should be noted that Hess (1955) does not approve of the use of binomial names for hybrids, saying "Es ist überflüssig, den Bastard mit einem binären Namen zu belegen und damit die Literatur zu belasten". However, it is the general practice among a considerable proportion of taxonomists today to do so and since Hess has supplied an excellent description of the plant in Latin the application of the binomial, xE. hessii, meets all the requirements of the present rules of nomenclature. The type of the hybrid is Hess 52/1773, collected "Am Stausee von Humpata", at an altitude of 1950 meters, in the Chela Mountains, Huila, Angola, on May 16, 1952. He notes that "Auf Sandboden, der mit Schlamm von Algen überzogen ist, wächst der Bastard in den gemischten Kolonien von Eriocaulon angustisepalum und E. mutatum."

ERIOCAULON HETEROCHITON Körn.

Bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. Bat. 3: 240.

1867; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Bot. Jahrb. 27: 79. 1899; Ruhl. in Engl., Pflanzenreich 13 (4-30): 13, 103, 109, & 285. 1903; H. Lecomte, Bull. Soc. Bot. France 55: 647. 1909; Masamune, Trans. Nat. Hist. Soc. Taiwan 33: 13. 1943; Moldenke, Known Geogr. Distrib. Erioc. 22 & 35. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke in Humbert, Fl. Madag. 36: 12--13 & 15, fig. 2 (1 & 2). 1955; Moldenke, Résumé 156 & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960.

Illustrations: Moldenke in Humbert, Fl. Madag. 36: 15, fig. 2 (1 & 2). 1955.

Leaves rosulate, linear-oblong, abruptly acute at the apex, 1--1.6 cm. long, 1.5--2 mm. wide at the midpoint, somewhat curvate, subcanaliculate, rather thick-textured, not pellucid except at the fenestrate-veined base, green, glabrous; peduncles many, herbaceous, 4--6.5 cm. long, many times surpassing the leaves, hardly costate, not twisted, glabrous; sheaths loose, 1--1.5 cm. long, green, fenestrate-veined at the base, not pellucid above, glabrous, obliquely split, the blade rather abruptly acute, soon lacerate; heads semiglobose, sordid-gray, 2.5--3 mm. wide, glabrous; involucral bractlets few, subequal, membranous, yellowish-green, obovate or cuneate-obovate, at first equaling the disk, later somewhat shorter, forming a sort-of cup but not hiding the florets, rather broad, rounded-obtuse at the apex, glabrous; receptacular bractlets cuneate-obovate, the outer ones broadly so, nigrescent, somewhat surpassing the florets, concave, very obtuse at the apex, glabrous; receptacle sparsely pilose; staminate florets: sepals 2, slightly connate at the very base, spatulate-oblong, falcate, concave, nigrescent (especially above), obtuse or obtusish at the apex, glabrous; petal-tube with 3 small and equal lobes at the apex, which are acutish, slightly ciliolate, and glanduliferous; pistillate florets: sepals 3, separate, narrowly oblong, nigrescent, falcate, rather obtuse, canaliculate, glabrous; petals 3, somewhat longer than the sepals, linear-oblong or spatulate, whitish, rather spongy, obtuse at the apex, sparsely ciliolate along the margins at the middle, otherwise glabrous, glanduliferous.

In my 1955 publication it is stated that this species grows in "Marais, rochers humides; fl.: mai" and is endemic to Madagascar. It should be noted that A. heterochiton A. Chev. is a synonym of E. plumale N. E. Br.

Citations: MADAGASCAR: K. R. Afzelius s.n. [Majunga, 10.5. 1912] (S); Kaudern s.n. [Majunga, April 1912] (S); Perrier de la Bâthie 849 (N, P, P), 849 bis (N, P), 17944 (N, P).

ERIOCAULON HETEROCHITON var. ACUMINATUM Moldenke

Bibliography: Moldenke, Phytologia 3: 412--413. 1951; Moldenke in Humbert, Fl. Madag. 36: 13 & 15, fig. 2 (3--5). 1955; Moldenke, Résumé 156 & 481. 1959.

Illustrations: Moldenke in Humbert, Fl. Madag. 36: 15, fig. 2 (3--5). 1955.

This variety differs from the typical form of the species in having the involucral bractlets lanceolate-elongate, 2.5--3 mm. long, surpassing the disk, attenuate-acute or acuminate at the apex, and the fruiting heads ovate-cylindric, to 6 mm. long, brown, with the receptacular bractlets very conspicuous, as large as the reflexed involucral ones, conspicuously acuminate.

Citations: MADAGASCAR: Perrier de la Bâthie 7241 (N--isotype, N--photo of type, P--type, Z--photo of type).

ERIOCAULON HETERODOXUM Moldenke

Bibliography: Moldenke in Maguire & al., Bull. Torrey Bot. Club 75: 194--195. 1948; Moldenke, Phytologia 3: 326--327. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 75 & 481. 1959.

This species has been collected on sandy forested shores below the hightide line on river tidal flats, and is said to be "local" in distribution -- apparently like E. parkeri B. L. Robinson, which grows in similar situations in the eastern United States. Sandwith describes the heads as "greenish-white or dirty-cream". It has been found in flower in May and September and is a most unusual species because of the trimerous pistillate and (at least sometimes) dimerous staminate florets in the same head.

Citations: BRITISH GUIANA: Maguire & Fanshawe 23570 (N--type); N. Y. Sandwith 1603 (N, S).

ERIOCAULON HETEROGYNUM F. Muell.

Bibliography: F. Muell., Fragm. 1: 93--94. 1859; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Britten, Journ. Bot. 38: 481 & 482. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 33, 38, & 285. 1903; Moldenke, Known Geogr. Distrib. Erioc. 27 & 35. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Résumé 209, 342, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Phytologia 18: 50. 1968.

Jackson (1893) reduces this taxon to synonymy under E. depressum R. Br., but the most recent monographer, Ruhland (1903), keeps them separate.

ERIOCAULON HETEROLEPIS Steud.

Bibliography: Steud., Syn. Pl. Glum. 2 (Cyp.): 271. 1855; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 61, 74, & 286. 1903; Moldenke, Known Geogr. Distrib. Erioc. 23, 27, & 35. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Résumé 162 & 481. 1959; Moldenke, Résumé Suppl. 1: 11. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 3: 17 (1962), 4: 7 (1962), and 15: 8. 1967.

Material of this species has been misidentified and distributed in herbaria as E. xeranthemum Mart.

Citations: INDIA: Chota Nagpur: C. B. Clarke 34327 (B). Kerala: Stocks, Law, &c. s.n. [Malabar, Concan &c.] (B, C, S, Ut--318).

# ANNOTATED LIST OF FUNGI ON VERBENACEOUS HOSTS FROM THE "MYCOLOGIA INDEX"↓

Alma L. Moldenke

The recent appearance of this useful index offers easy access to the literature covered in the first 58 volumes of MYCOLOGIA, dating from 1909 through 1966. The following listings include all mention of the Verbenaceae (including the now segregated family, Avicenniaceae). On the left hand margin the volume numbers, page numbers, and year of publication are given for each reference. The genera are listed in alphabetic sequence.

AEGIPHILA

52: 689-690 1960 — M. J. Thirumalachar in "Critical Notes on Some Plant Rusts III" mentions a rust on Aegiphila sp. in Ecuador, named by Arthur in 1918 as a Cleptomyces. He reduces this generic name to synonymy under the earlier (1899) name, Stereostratum P. Magn., and identifies the species in question as S. lagerhamianus (Diet.) Thirumalacher, comb. nov. The host could be any one of 19 species and varieties of Aegiphila known from Ecuador.

AVICENNIA

12: 318 1920 — C. E. Chardon in "A List of the Pyrenomycetes of Porto Rico Collected by H. H. Whetzel and E. W. Olive" mentions Meliola sepulta Pat. on Avicennia nitida Jacq. [Pina 612]. This host name, however, is now rejected in favor of the earlier A. germinans (L.) L.

17: 139 1925 — R. A. Toro in "New and Noteworthy Porto Rican Pyrenomycetes" separates from the genus Meliola those species devoid of setae and refers them to the genus Irene. He lists Irene sepulta (Pat.) Toro, comb. nov., on Avicennia nitida Jacq., deposited in the herbarium of the Insular Experiment Station [Toro 333]. Refer to the preceding item for the correct name of the host.

49: 489 1957 — S. P. Meyers in "Taxonomy of Marine Pyrenomycetes" lists Metasphaeria australiensis Cribb & Cribb on A. marina var. resinifera (Forst.) Bakh. from Redcliff, Australia.

53: 582 1961 — W. B. Cooke in "The Genus Schizophyllum" lists S. commune (Fr.) Fr. on a long list of woody and herbaceous plants without locality, including Avicennia sp.

BOUCHEA

52: 523-524 — A. G. Kevorkian in a note entitled "Elsinöe on

Bouchea prismatica (L.) Kuntze in Cuba" recapitulates his previous report in PHYTOPATHOLOGIA 43: 406 (1960) of spot anthracnose disease and its effects on the stems, leaves & petioles of B. prismatica in Cienfuegos, Cuba, and proposes the name Elsinöe boucheae Kevorkian, sp. nov., with a validating description.

53: 437-438 1961 The same author here publishes illustrations of Elsinöe boucheae on Bouchea prismatica (L.) Kuntze.

CALLICARPA

16: 154 1924 J. Dearness in "New and Noteworthy Fungi III" lists Meliola cookeana Speg. in the Hypodermataceae on living leaves of Callicarpa americana L. The specimen was collected in 1923 by W. L. Nuttall. The asci are mostly 2-spored, but some are 4-spored with each sporidium showing a distinct pair of asci pairs.

16: 175 1924 In a continuation of the same paper Dearness describes the hypomycete, Atractilina callicarpae Dearn. & Barth., sp. nov., on Callicarpa americana L. from Miami, Florida.

34: 561 1942 W. W. Ray in "Notes on Oklahoma Cercosporae II" lists Cercospora callicarpae Cooke on Callicarpa americana L., the specimen deposited in the herbarium of the Oklahoma A. & M. University.

42: 793 1950 G. B. Cummins in "Uredinales of Continental China Collected by S. Y. Cheo I" reports the not previously recorded Kuehneola callicarpae Syd. on Callicarpa sp. from Kwangsi, San Kiang Hsien, Sept. 1933 [Cheo 2766]. The host could be any one of 23 species and varieties of Callicarpa known from that province.

45: 110 1953 M. T. Cook in "Species of Synchytrium in Louisiana VIII" describes S. callicarpae Cook, sp. nov., on Callicarpa americana L. from Baton Rouge. He states that it makes numerous, small, thick-walled, green galls which project from both sides of the leaves, illustrating these in cross-section in fig. 34-36 on page 111.

32: 373 1940 G. B. Cummins in "Uredinales of New Guinea" lists Uredo callicarpae Petch on Callicarpa pedunculata R. Br. from the collections of M. S. Clemens at Wareo [nos. 1368, 1452, & 1453] and at Yunzaing [3264a & s.n.]. The fungus has epiphyllous, subcuticular pycnia encircled by paraphysate, similar, uredinoid aecia. Actually, the host specimens were collected by both members of the Clemens missionary family working together; the identification of most of the numbers has been checked by H. N. Moldenke.

42: 230 1950 M. J. Thirumalachar in "Some Noteworthy Rusts III" lists his collection of Uredo callicarpae Petch on the leaves of Callicarpa lanata L. from Kemmangundi,

Mysore, India. The host plant is now more correctly called C. tomentosa (L.) Murr.

CITHAREXYLUM

32: 400 1940 — F. J. Seaver and J. M. Waterston in "Contributions to the Mycoflora of Bermuda I" introduce to the literature Ascospora citharexyli Seav. & Waterston, sp. nov., found on dead leaves of Citharexylum spinosum L. It was collected by the second author at Somerset in 1938 [no. 212] and is a member of the Sphaerales whose erumpent black perithecia are thickly scattered over both surfaces of the host's leaves.

34: 521 1942 — The same authors in part III of their paper mention the pyrenomycete Penzigia bermudensis which J. H. Miller collected a second time as an abundant growth on dead twigs of C. spinosum L. in 1940 [no. 371].

34: 523 1942 — The same authors in the same part III mention the basidiomycete Auricularia polytricha (Mont.) Sacc. as first identified by E. M. Wakefield on an old stump of fiddlewood, C. spinosum L.

19: 73 1927 — R. A. Toro in "Fungi of Santo Domingo I" gives the initial report of Irene longipoda (Gaill.) Toro on Citharexylum fruticosum L. from La Vega [no. 211] and from Santiago [no. 281] in 1926. Today we know this area as the Dominican Republic.

37: 710 1945 — H. H. Whetzel in "A Synopsis of the Genera and Species of the Sclerotiniaceae, a Family of Stromatic Inoperculate Discomycetes" includes Lambertella jasmini Seav. & Whetzel in the generic host index as occurring on Citharexylum without indicating any particular species or locality of collection.

50: 691 1958 — R. T. Moore in "Deuteromycetes I: The Sporidesmium Complex" proposes the new name Piricauda paraguayense (Speg.) Moore, comb. nov., cites material examined, including a Bubak collection from Brazil on "Citharexylon" [Ule 948], and illustrates it in fig. 1 & 3 on p. 683 and in fig. 14 on p. 690. The host's generic name is now written Citharexylum, which is the original spelling, and there are 18 species and varieties known from Brazil.

DURANTA

50: 691 1958 — In the above-mentioned paper by R. T. Moore the same fungus, Piricauda paraguayense (Speg.) Moore, is listed on the basis of a Patouillard collection from the Pululahua Crater in Ecuador on Duranta leaves. This collection is actually the type of Sporidesmium durantae Pat., but this name is here reduced to synonymy.

36: 434-435 1944 C. Garcés Orejuela in "New or Heretofore Unreported Species of the Higher Ascomycetes from Colombia and Venezuela" transfers Irenopsis pittieri Toro to Irenina pittieri (Toro) Garcés, comb. nov., because newer collections showed no perithecial setae. It is reported on Duranta repens L. from Miranda, Venezuela [M. F. Barrus & A. S. Muller 3664], and from Boyacá, Colombia [R. Obregón 1180].

20: 219 1928 F. J. Seaver in "Studies in Tropical Ascomycetes V -- Species of Phyllachora" describes Phyllachora fusicarpa Seav. on D. repens L. from the Bahamas and Puerto Rico. Plate 23, fig. 3, shows a spot-infected leaf and a drawing of an enlarged 8-celled ovoid ascus.

LANTANA

24: 63 1932 H. S. Jackson in "The Rusts of South America Based on the Holway Collection VI" lists Aecidium lantanae Mayor on Lantana lilacena Desf. from Petropolis in Rio de Janeiro [Holway 1268] and from Belo Horizonte in Minas Gerais [no. 1353], Brazil, on L. rugulosa H.B.K. from Cuenca in Azuay [no. 985] and on Lantana sp. from Quito in Pichincha [no. 947], Ecuador. He mentions that this fungus was reported previously only from Colombia, Nicaragua and Panama. He suggests that this rust may actually not be distinct from A. verbenae Speg. It should be noted that the "Lantana lilacena" referred to above is a misspelling for L. lilacina Desf., a name now placed in synonymy under L. fucata Lindl. The unidentified Lantana from Ecuador could be any one of 5 species of the genus known from Pichincha.

25: 452 1933 F. D. Kern, H. W. Thurston Jr. & H. H. Whetzel in "Annotated Index of the Rusts of Colombia" list Aecidium lantanae Mayor on "L. hispida H.B.K." [Mayor 213], noting that they are following the classification mentioned in the Jackson paper referred to above even though Arthur has combined the two taxa in NORTH AMERICAN FLORA 7: 635. 1924. Actually, the true L. hispida is not known to grow in Colombia, being confined to Central America. The host could be any one of 25 other species and varieties of the genus known from Colombia.

56: 886 1964 L. S. Olive in "A New Member of the Mycetozoa" reports Cavostelium apophysatum Olive, sp. nov., as growing in the amoebal form in bacterial cultures and as isolated from mature or dead plant parts including old ears and tassels of corn, glumaceous inflorescences, legume pods, capsules, cotton bolls, dead flowers and old fleshy fruits of Lantana, etc., in

tropical and warm temperate regions of much of the world. A new family, the Cavosteliaceae, is proposed here for this genus because of its several distinctive features.

23: 375 1931 — W. G. Solheim & F. L. Stevens in "Cercospora Studies II -- Some Tropical Cercosporae" describe Cercospora guianensis Stev. & Solh., sp. nov., as found on leaves of Lantana sp. from Rockstone, British Guiana [no. 253], the type being deposited in the herbarium of the University of Illinois. The conidia are illustrated by them on p. 374. Thirteen species and varieties of the host genus are known from what is now the republic of Guyana.

35: 89 1943 — J. H. Miller & M. G. Burton in "Studies in Some Venezuelan Ascomycetes Collected by C. E. Chardon and A. S. Muller" have set up Epiphyma nervisequens (Chardon) Miller & Burton, comb. nov., as distinct generically from Dimeriellina nervisequens Chardon because of its paraphysoids instead of paraphyses and its non-fascicled asci. This fungus is a parasite on the leaves of Lantana camara L. in Venezuela. Fig. 7 on p. 92 shows a longitudinal section of the type [Chardon 2611].

37: 341 1945 — F. J. Seaver in "Photographs and Descriptions of Cup-Fungi XXXIX - The Genus Godronia and its Allies" proposes the name Godronia lantanae (Cash) Seav., comb. nov., for Scleroderris lantanae Cash. The fungus has been found on fallen branches of Lantana camara L. and is known thus far only from the type locality, the Kaluaaha Valley, Molokai, Hawaii. It is illustrated in MYCOLOGIA 30: 99, fig. 4. It should be noted that the true L. camara L. is not known from Molokai; the host is probably L. camara var. aculeata (L.) Moldenke, the only representative of the genus known from that island.

19: 74 1927 — R. A. Toro in "Fungi of Santo Domingo I" lists Meliola ambigua Pat. & Gaill., a member of the Perisporiaceae, on Lantana trifolia L. from Bajabonica [no. 264] and from Santiago [no. 263] in what we now know as the Dominican Republic.

36: 436 1944 — C. Garcés Orejuela in "New or Heretofore Unreported Species of the Higher Ascomycetes from Colombia and Venezuela" reports Meliola lantanae Syd. on L. fucata Lindl., a new host, from Antioquia, Colombia, at Quebrada Iguaná [no. 1533] at 1700 meters altitude and at Robledo [no. 1841]. This is a rather common species of fungus, already reported from Colombia, where the type was collected.

15: 111 1923 — J. Vizioli in "Some Pyrenomycetes of Bermuda" lists Melomastia mastoidea (Fries) Schroet. as found on two

specimens of decorticated branches of Lantana involucrata L. (?) [Paget s.n. & Whetzel 145].

32: 393-394 1940 F. J. Seaver & J. M. Waterston in "Contributions to the Mycoflora of Bermuda I" discuss the interesting problem of Nectria lantanae Seav., which seems to be endemic to the islands even though its host plant, which they identify as L. odorata L., was introduced into the Bermuda islands from the Bahamas prior to 1800. The fungus has not yet been found elsewhere, although its host is widely distributed in the West Indies, nor on other plant species. It is recognized grossly by the red dots or perithecia on fallen leaves that have been spotted abundantly in several sites in the Bermudas. It should be noted that the correct name for the host is now L. involucrata var. odorata (L.) Moldenke.

34: 516 1942 These same two authors in part III of the above-mentioned work, reporting on their fourth visit, declare that parasitic species and those occurring on decaying plant materials tend to be constant in their appearance, citing, as an example, Nectria lantanae Seav. on Lantana.

30: 103 1938 E. K. Cash in "New Records of Hawaiian Discomycetes" lists Patellaria atrata (Hedw.) Fr. on the stems of Lantana sp. from Waialua, Oahu, Hawaii [Stevens & Shear 574]. There are 4 species and varieties of the host genus known from Oahu.

21: 315 1929 N. E. Stevens & C. L. Shear in "Botryosphaeria and Physalospora in the Hawaiian Islands" inform us that both of these genera are rare in those islands and that P. fusca was collected four times there on four different hosts, including L. aculeata L. Heretofore this fungus had been known only from a few collections in western Cuba. This expansion of its known range suggests that it may be generally distributed through the tropics, as its host now is. The correct name for the host is now L. camara var. aculeata (L.) Moldenke.

10: 121 1918 J. C. Arthur in "Uredinales of Costa Rica Based on the Collections of W. D. Holway" lists Prospodium tuberculatum (Speg.) Arth. on Lantana camara L. from Cartago [Holway 277]. This rust species is known from the tropical parts of both North and South America. It is recorded again on p. 153 in the host index. The true L. camara is not known from Cartago, so it seems probable that the host here is the very similar L. glandulosissima Hayek.

18: 47 1926 F. D. Kern and H. H. Whetzel in "Some New and Interesting Porto Rican Rusts" also report Prospodium tuberculatum (Speg.) Arth. on Lantana camara L. at Martin Pêna [Seaver & Chardon 1369]. This constitutes the

first record of the fungus from Puerto Rico; it was previously known only from central Mexico, Costa Rica and Cuba.

24: 65 1932 H. S. Jackson in "The Rusts of South America Based on the Holway Collections VI" reports Prospodium tuberculatum (Speg.) Arth. on L. camara L. from La Paz, Bolivia [Holway 465], from Nor Yungas, Bolivia [no. 706] and from São Paulo, Brazil [nos. 1532 & 1688]. It is also reported from "L. mixta L." from São Paulo, Brazil [no. 1811]. According to H. N. Moldenke, the true L. camara L. is not known from the Bolivian areas referred to above and the host there is probably the related L. cujabensis Schau. or L. glutinosa Poepp. The name, L. mixta L., is a synonym of what is now known as L. camara var. mista (L.) L. H. Bailey, and Holway's nos. 1532 & 1811 have been so identified.

32: 295 1940 H. W. Thurston Jr. in "The Rusts of Minas Geraes, Brazil, based on Collections of A. S. Müller" lists Prospodium tuberculatum (Speg.) Arth. on L. camara var. aculeata (L.) Moldenke from Ita [Müller 361] and on L. camara L. from Viscosa [no. 742].

35: 438 1943 F. D. Kern and H. W. Thurston Jr. in "Additions to the Uredinales of Venezuela II" include Prospodium tuberculatum (Speg.) Arth. on Lantana achyranthifolia Desf. from Caracas [Whetzel & Müller 2864]. This is the only species of Prospodium known to occur on Lantana. Cummins, in his monograph of this fungus genus in LLOYDIA 3: 15 (1940), lists the host species of Lantana, but does not include L. achyranthifolia.

7: 243-244 1915 J. C. Arthur in "Uredinales of Porto Rico Based on Collections by F. L. Stevens" lists Puccinia lantanae Farl. on L. camara L. from Guanica [nos. 358 & 6607], from Lares [no. 4926] and from Guayanilla [nos. 5952 & 6603], and also on L. involucrata L. from Bogueron [no. 354], from Arecibo [no. 1781], from Quebradillos [no. 5017], from San German [no. 5763], from Mona Island [no. 6440] and without locality [no. 6823]. These collections were made in 1913. The author says that he has not personally seen this fungal species in Puerto Rico, but points out that it has been collected on other West Indian islands -- in Cuba on L. camara L., L. involucrata L., and L. trifolia L., in Jamaica on L. crocea Jacq. and L. stricta Sw., and on St. Thomas on L. aculeata L.

In this work L. odorata L. is given as a straight synonym of L. involucrata, but actually it is now kept separate as L. involucrata var. odorata (L.) Moldenke. Also, L. stricta Sw. is now known as L. angustifolia Mill., L. crocea Jacq. is now known as L. urticaefolia

Mill., and L. aculeata L. is more correctly called L. camara var. aculeata (L.) Moldenke.

52: 821 1960 — L. S. Olive in "Acrasiales of the West Indies" describes the orange Protostelium mycophaga L. S. Olive & Stoianovitch as probably the simplest of the cellular slime molds and one of the most common. In the Caribbean area it has been isolated from several different kinds of dead flowers and decaying fruits, including those of Lantana. It is recorded from Grenada, St. Lucia and Martinique.

9: 82 1917 — J. C. Arthur in "Uredinales of Porto Rico Based on Collections by H. H. Whetzel and E. W. Olive" lists Puccinia lantanae Farl. on Lantana involucrata L. from Yauco [no. 325]. The identification of the host has been verified by H. N. Moldenke.

10: 133 1918 — J. C. Arthur in "Uredinales of Costa Rica Based on Collections by E. W. D. Holway" lists Puccinia lantanae Farl., a short cycle rust common in the warmer parts of America, on three species of Lantana - L. camara L. from San José [nos. 303 & 352], L. hispida H.B.K. from San José [no. 244] and Cartago [no. 278], and Lantana sp. from Orotina [no. 338]. Lantana is also listed in the host index on p. 153.

The specimen from Orotina could be on any one of 9 species and varieties of Lantana known from the province of San José.

16: 11 1924 — F. J. Seaver in "The Fungous Flora of St. Thomas" records Puccinia lantanae Farl. for the first time on this island, growing on Lantana camara L. (?) from the vicinity of St. Peter. It was collected by Dr. J. N. Rose.

18: 137 1926 — F. J. Seaver in "Mycological Work in the Bermuda Islands" mentions Puccinia lantanae Farl. as common on the leaves of Lantana involucrata L. and as one of the first fungi collected there.

19: 288 1927 — W. R. Hunt in "Miscellaneous Collections of North American Rusts" includes his collection of Puccinia lantanae Farl. on L. involucrata L. in Bermuda in 1926.

20: 72 1928 — F. D. Kern in "Fungi of Santo Domingo II - Uredinales" reports Puccinia lantanae Farl. (syn. Micropuccinia, NORTH AMERICAN FLORA 7: 559) on L. involucrata L. from Barahona [M. F. Barrus 7] and also on Priva lappulacea (L.) Pers. from Bajabonico [no. 65], San Cristobal [no. 36] and Los Ranchos [Chardon 378].

24: 63-64 1932 — H. S. Jackson in "The Rusts of South America Based on the Holway Collections VI" lists Puccinia lantanae Farl. on Lantana brasiliensis Link from São Paulo, Brazil [no. 1667] and on L. trifolia L., also from São Paulo [no. 1483]. The host of the last-mentioned col-

lection has been verified by H. N. Moldenke.

This fungus was also reported on two other verbenaceous plants - Lippia rhodocnemis Mart. & Schau. and Lippia triflora L. The former record is based on a collection made by both of the Holways [no. 406] and the host was verified by H. N. Moldenke. The Lippia triflora given as the host for the second record appears to be a deplorable typographic error for Lantana trifolia L., into whose synonymy it must be inserted. The host plant in this case has also been verified by the above-mentioned monographer.

This very common microform has a wide distribution extending from Florida and Mexico throughout the West Indies and Central America to Argentina in South America. Mesospores often predominate in the sori, and this explains why the fungus was first mistaken for a species of Uromyces.

25: 471-472 1933 F. D. Kern, H. W. Thurston Jr. and H. H. Whetzel in "Annotated Index of the Rusts of Colombia" list Puccinia lantanae Farl. on Lantana camara L. [Toro 180], on L. hispida H.B.K. [Mayor 212], on L. tiliifolia Cham. [Mayor 28] and on L. trifolia L. [Mayor 214a].

It should be pointed out here that L. hispida H.B.K. and L. tiliifolia Cham. are not known from Colombia. It is probable that the hosts will prove, on examination, to be L. armata Schau. and/or L. glandulosissima Hayek.

32: 300 1940 H. W. Thurston Jr. in "The Rusts of Minas Geraes, Brazil, Based on the Collections of A. S. Müller" includes Puccinia lantanae Farl. on L. trifolia L. from Viscosa [no. 666]

30: 98 1938 E. K. Cash in "New Records of Hawaiian Discomycetes" mentions Schizoxylon insigne (DeN.) Rehm. on stems of Lantana sp., a new host for this fungus species. It was found in the Manoa Valley, Oahu [Stevens & Shear 553]. Six species and varieties of the host genus are known from Oahu island.

30: 101 1938 In the same paper Scleroderris lantanae Cash, sp. nov., is described, being illustrated in fig. 4 on the preceding page. It was found on a fallen branch of Lantana camara L. in the Kaluaaha Valley, Molokai [no. D3032]. The true L. camara, however, is not known from that island. The host was probably L. camara var. aculeata (L.) Moldenke.

7: 334 1915 P. Garman in "Some Porto Rican Parasitic Fungi" describes Septoria lantanae Garman, sp. nov., from the leaves of Lantana camara L. [TYPE 221x]. This fungus species differs decidedly from S. verbenae in the character of the leaf spot, which lacks the white center.

LIPPIA

32: 170-171 1940 B. H. Davis in "A New Cercospora on Lippia cardiostegia" describes a previously unidentified fungus from Kellerman's Guatemalan collections as Cercospora cardiostegiae Davis, sp. nov., from the host plant's leaves. In the specimen examined no definite leaf spots were formed. The upper surface is light brown. Fruiting is hypophyllous, effuse and presenting small darkened areas with conidiophores. The fungus species differs from C. lippiae, described by Ellis and Everhart, from L. nodiflora [=Phyla nodiflora (L.) Greene] in these traits. Type material is deposited in the herbaria of both Ohio State University and Cornell University. In Fig. 1 stroma, conidia and conidiophores are illustrated.

3: 12 1911 F. D. Heald and F. A. Wolf in "New Species of Texas Fungi", as part of a plant disease survey of the San Antonio-Austin area, describe Cylindrosporium lippiae Heald & Wolf, sp. nov., from the leaves of what they refer to as Lippia ligustrina (Lag.) Britton from Llano [TYPE 1756]. The fungus produces 3 or 4 circular spots on each leaf, each spot with a gray center showing numerous conidial tufts inside and outside a narrow brown border edged with a tinge of yellow.

The correct name for the host plant is Aloysia gratissima (Gill. & Hook.) Troncoso.

10: 151 1918 J. C. Arthur in "Uredinales of Costa Rica Based on Collections of E. W. D. Holway" cites Prospodium lippiae (Speg.) Arth. on Lippia myriocephala Schl. & Cham. from the road to Volcán de Poas [no. 372 II & III] and also on Lippia sp. from San José [no. 364 II & III] and from San Ramón [no. 417 II]. The spores in this material are somewhat smaller and less strongly developed than usual. This is a common species in tropical America.

The undetermined Lippia host from San José could be any of 5 species of this genus known from that province, while that from San Ramón could be any of 6 species.

24: 65 1932 H. S. Jackson in "The Rusts of South America Based on the Holway Collections VI" cites this same Prospodium lippiae (Speg.) Arth. on Lippia hemisphaerica Jacq. from Guayaquil, Ecuador [no. 807] and on L. ligustrina (Lag.) Britton from Cochabamba, Bolivia [nos. 326 & 327]. Examination of the first host by H. N. Moldenke shows it to be L. americana f. pilosa Moldenke; the second is more properly called Aloysia gratissima (Gill. & Hook.) Troncoso

25: 449 1933 F. D. Kern, H. W. Thurston Jr. and H. H. Whetzel in "Annotated Index of the Rusts of Colombia" re-study

some Baker specimens reported by Earle in 1899 and claim that "what was supposed to be Prospodium appendiculata (Wint.) Arth. on some Bignoniaceae turns out to be Prospodium von gunteni (Mayor) Kern & Whetzel on Lippia sp. Mayor in MEM. SOC. NEUCH. SCI. NAT. 5: 490. 1913 lists this as Puccinia von guteni on Lippia americana L. for his 368 and on Lippia sp. for Baker's 93.

"Through the kindness of Dr. Samuelsson, of Stockholm, we have had a part of the Baker collection for study. Dietel (BULL. TORREY CLUB 26: 632. 1899) studied this specimen. He thought it was on some Bignoniaceae and remarked that although the appendages on the teliospore pedicels were poorly developed or wanting he did not doubt its determination as Puccinia appendiculata. A note on the original says 'on a shrubby herb - one of the Myrsinaceae?'. Our examination of the rust shows that the teliospores have one whorl of appendages and that both teliospores and uredospores agree with Prospodium von gunteni. A detailed study of the fragmentary specimen also shows that the veining, margin, and pubescence of the leaf are so nearly identical with those of Mayor's 368 that there seems no doubt about the possibility of its being a species of Lippia." Nine species and varieties of Lippia are known from Colombia.

10: 133-134 1918 J. C. Arthur in "Uredinales of Costa Rica Based on Collections of E. W. D. Holway" describes Puccinia elatipes Arth. & Holw., sp. nov., on Lippia sp. growing on hills southwest of San José [no. 307 II & III]. The host specimen has been examined by H. N. Moldenke and proves to be Lippia costaricensis Moldenke. Arthur comments that the host resembles L. umbellata Cav., and this is true, but the latter species is known only from Mexico.

Arthur states further that the fungus species "is especially characterized by flattened urediniospores and by exceedingly large and inflated pedicels to the teliospores. The type was collected by Prof. Holway in Guatemala on Lippia myriocephala Schlecht. & Cham. along the road between Quezaltenango and Colomba in 1917 [no. 831 0, III]. The host genus is listed in the index on p. 151.

24: 64 1932 H. S. Jackson in "The Rusts of South America Based on the Holway Collections - VI" lists Puccinia lantanae Farl. on Lippia rhodocnemis Mart. & Schau. from Rio de Janeiro, Brazil [no. 1006] and on L. triflora L. from Nor Yungas, Bolivia [no. 711]. H. N. Moldenke has examined both of these host plants and identifies the first as Lantana hypoleuca Briq. and the second as Lantana trifolia L.

This very common microform fungus has a wide distribution extending from Florida, Mexico, the West Indies, and Central America less commonly, through much of South America. Mesospores are often predominant in the sori and the species therefore often resembles one of Uromyces.

The author then goes on to describe Puccinia mariae Jackson, sp. nov., in honor of Mrs. Holway who did much collecting with her husband. It was found on Lippia sp. at Prata, São Paulo, Brazil [no. 1719]. Twenty species and varieties of the host genus are found in São Paulo state.

3: 289
1911

F. D. Kern in "The Rusts of Guatemala II" lists Puccinia lippiae Speg. on Lippia myriocephala Schlecht. & Cham. (as determined by John Donnell Smith) from Laguna in Amatitlan, at an altitude of 1200 meters [no. 5209]. According to H. N. Moldenke, this host is not known from that province. The fungus was more probably collected on L. callicarpaefolia H.B.K., the only Lippia known from Amatitlan.

The teliospores are distinctive because of the whorls of branched appendages near the bases of the pedicels.

10: 134
1918

J. C. Arthur in "Uredinales of Costa Rica Based on Collections of E. W. D. Holway" describes Puccinia permagna Arth. & Holw., sp. nov., on L. myriocephala Schlecht. & Cham. from San José [no. 404], deposited in the Farlow herbarium at Harvard University.

"The fungus was found only on fresh shoots coming up from stumps of the shrubs cut to make the trail. The growth was very luxuriant and the leaves much larger than on shoots of slower growth. Such preference seems to be common for rusts on shrubs and trees."

The fungus is similar to P. elatipes Arth. & Holw. on presumably the same host, except for the absence of uredinia, the numerous and darker pycnia, and the larger telial sori, spores, and pedicels.

The host is listed again in the index on p. 151. It should be pointed out that Lippia myriocephala is not known to occur in San José, but 4 other species of the genus do grow there.

PETITIA

9: 62
1917

J. C. Arthur in "Uredinales of Porto Rico Based on Collections of H. H. Whetzel and E. W. Olive" describes Olivea petitiae Arth., sp. nov., on Petitia domingensis Jacq. from mountainous Mariaco along the Rio Grande [no. 349]. The fungus has remarkable balls of paraphyses enclosing the urediniospores. Crushing these balls releases the colorless teliospores which are often already germinated.

7: 333
1915 P. Garman in "Some Porto Rican Parasitic Fungi" describes Septoria petitiae Garman, sp. nov., on leaves of Petitia domingensis Jacq. from Cabo Rojo [nos. 6470 TYPE & 9756]. The fungus makes suborbicular spots 1--2 mm. in diameter with white centers and fuscous margins.

PRIVA

17: 9
1925 F. J. Seaver in "The Fungous Flora of St. Croix" lists among the Phyllostictales a Cincinnobolus sp. reported by Ferdinandsen and Winge on Priva lappulacea (L.) Pers.

14: 18
1922 J. C. Arthur in "Uredinales Collected by Fred J. Seaver in Trinidad" lists Puccinia lantanae Farl. on Priva lappulacea (L.) Pers. [nos. 2955, 2970, & 3397].

20: 72
1928 F. D. Kern in "Fungi of Santo Domingo - II Uredinales" lists Puccinia lantanae Farl. on Priva lappulacea (L.) Pers. from Bajabonico [no. 65], from San Cristobal [no. 36] and from Los Ranchos [C. E. Chardon 378].

STACHYTARPHETA

24: 63
1932 H. S. Jackson in "The Rusts of South America Based on the Holway Collections - VI" lists Endophyllum stachytarphetae (P. Henn.) Whetzel & Olive on S. dichotoma Vahl from the Reserva Florestal, São Paulo, Brazil [no. 803].

The author claims that the genus Endophyllum should be maintained as distinct from Aecidium, from which it is obviously developed, and that there is the possibility that both may exist even in the same region.

Stachytarpheta dichotoma Vahl is now regarded as a synonym of S. cayennensis (L. C. Rich.) Vahl.

16: 11
1924 F. J. Seaver in "The Fungous Flora of St. Thomas" lists Puccinia urbaniana P. Henn. among the Uredinales on Stachytarpheta sp., a record first reported by Crown. Three species of the this genus are known from that island.

17: 260
1925 H. Sydow in "Rusts of British Guiana and Trinidad" also lists Puccinia urbaniana P. Henn. on Stachytarpheta sp. from Tumatumari, British Guiana [now the Republic of Guyana] [no. 131]. Eight species and varieties of the host genus are know from that country.

TECTONA

23: 399
1931 W. G. Solheim and F. L. Stevens in "Cercospora Studies II - Some Tropical Cercosporae" list Cercospora tectoniae Stev. on leaves of Tectona grandis L. f. from the type locality of the fungus, Honolulu, Oahu [no.

52]. Specimens are filed in the herbaria of the Hildebrand Gardens in Oahu and the University of Illinois. The fungus produces amphigenous, angular and at times confluent, vein-limited, reddish-brown spots on the leaves of the host.

40: 361 1948 — M. J. Thirumlachar and C. Chupp in "Notes on Some Cercosporae of India" list this same C. tectoniae Stev. on Tectona grandis L. f. from a Bangalore collection made by the first author.

VERBENA

28: 299 1936 — H. Brandriff in "The Development of the Ascocarp of Acrospermum compressum Tode" mentions that this, the type species of this dothidiaceous genus, is of common occurrence on a number of herbaceous plants in the United States and in Europe. Collections in the herbarium of the New York Botanical Garden include one on the stems of Verbena urticifolia L., the host verified by H. N. Moldenke.

24: 62 1932 — H. S. Jackson in "The Rusts of South America Based on the Holway Collections - VI" lists Aecidium verbenae Speg. on Verbena litoralis H.B.K. from Petropolis [no. 1272], Therezopolis [no. 1180] and Friburgo [no. 1454], all in Rio de Janeiro, Brazil.

It is also listed on Verbena sp. from Barbacena, Minas Gerais [no. 1380], and from São Paulo [no. 1479], Brazil.

Spegazzini considered his Aecidium verbenae to be the aecial stage of Puccinia elongata Speg. "The latter, however, seems from the description to be a short cycled form."

It should be noted here that H. N. Moldenke has examined the host specimens for some of the above-mentioned records. He finds that Holway's numbers 1180 and 1454 are actually Verbena bonariensis L., while no. 1272 is V. brasiliensis Vell.

8: 147-148 1916 — P. C. Standley in "Fungi of New Mexico" mentions Erysiphe cichoracearum DC. as reported by T. D. A. Cockerell on Verbena macdougalii Heller from Pecos [no. 5194].

10: 250 1918 — C. E. Fairman in "New or Noteworthy Ascomycetes and Lower Fungi from New Mexico" includes Ophiobolus collapsus Sacc. & Ellis on old stems of V. macdougalii Heller [Standley 13644].

21: 329 1929 — J. Dearness in "New and Noteworthy Fungi VI" lists Ophiotrichum verbenae Dearn. & Barth, sp. nov., one of the hypomycetes, on living leaves of Verbena urticifolia L. from Birmingham, Alabama [E. Bartholomeo 8951 & Dearness 5651].

Grayish brown spots are visible only on the lower surface of the leaves. These spots are 0.5 cm. wide and are bounded by the strong veinlets of the leaf.

The host specimens should be re-examined because Verbena urticifolia L. is not otherwise known from Jefferson County, Alabama (the county of Birmingham), although it is known from Baldwin and DeKalb Counties. Eighteen species of Verbena are known from Alabama.

9: 120 1917 B. C. Tharp in "Texas Parasitic Fungi - New Species and Amended Descriptions" describes Phyllosticta verbenicola Tharp, sp. nov., on living leaves of Verbena bipinnatifida Nutt. from Austin, based on an unnumbered specimen collected by himself and I. M. Lewis.

The spots are marginal or central, gray with purplish border, 2--6 mm. across.

11: 71 1919 P. J. Anderson in "Index to American Species of Phyllosticta" notes P. verbenicola Tharp among 324 records, growing on Verbena bipinnatifida Nutt., but claims that "The specific name is untenable because [it has been] previously used, cf. P. verbenicola Martin, J. M. 2: 26. 1886."

Verbena is mentioned again in the host index on p. 78.

32: 298 1940 H. W. Thurston Jr. in "The Rusts of Minas Geraes, Brazil, Based on Collections of A. S. Müller" lists Puccinia elongata Speg. on "Verbena brasiliense" Vell. at Vicosa [nos. 1 & 944 I & II], noting that it and Aecidium verbenae are stages of the same fungus as Müller's no. 944 specimen shows. It bears abundant compact telia arising within and around the aecia. The aecial stage has been most frequently collected. It may be a repeating stage. Pycnia are lacking. Herein Thurston supports Spegazzini's earlier hypothesis mentioned above.

13: 238 1921 J. C. Arthur in "Memoranda and Index of Cultures of Uredineae 1899 - 1917" records among the heteroecious species grown successfully on alternate host cultures at the Purdue University Experiment Station Puccinia verbenicola (E. & K.) Arth., with P. vilfae Arth. & Holw. given as a synonym, on Verbena stricta Vent. and on V. urticifolia L. as aecial hosts and on Sporobolus longifolius Wood [now known as S. asper (Michx.) Kunth] as the telial host during the years 1899, 1902, 1904 and 1905.

30: 100 1938 E. K. Cash in "New Records of Hawaiian Discomycetes" lists Stictis stellata var. philippensis Rehm. among the Stictidaceae on stems of Verbena bonariensis L. from Kokee [Shear & Stevens 543] as the first record of this fungal genus on Verbena. The fungus has the same thickness and septation as found in the Philip-

pine variety elsewhere.

VITEX

32: 349 1940 — C. J. Alexopoulos in "Some Fungi from Greece" lists Phoma viticis Celotti, a member of the Sphaerioidaceae, on leaves of Vitex agnus-castus L. from Daphni, Attica.

32: 199-200 1940 — C. E. Chardon, J. H. Miller and A. S. Müller in "Ascomycetes from the State of Minas Geraes, Brazil" list Phyllachora toruma Speg. on Vitex cymosa Bert. from Vicosa [Müller 166] and from Maria da Fa [Müller 225].

53: 584 1961 — W. B. Cooke in "The Genus Schizophyllum" lists S. commune (Fr.) Fr. as being found throughout the treed area of the world on hundreds of genera and species, including Vitex lucens T. Kirk.

14: 21 1922 — J. C. Arthur in "Uredinales Collected by Fred J. Seaver in Trinidad" lists Uredo viticis Juel on Vitex sp. [no. 3293]. Four species and varieties of this host genus are found in Trinidad.

52: 902 1960 — A. E. Liberta in "A Taxonomic Analysis of Section Athele of the Genus Corticium I - Genus Xenasma" proposes Xenasma vermiferum (Bourd.) Liberta, comb. nov., and reports it from the stems and decayed wood or bark of Vitex lucens T. Kirk among others. Penline sketches of a cystidium, basidia and spores are found on Fig. 11 on p. 901.

Specimens were examined from Hawaii [D. P. Rogers 1961], from California [H. E. Parks 4028] and from New Zealand [S. D. Baker PDD13737].

The California and Hawaiian specimens must have been taken from cultivated specimens of the host, since V. lucens T. Kirk is endemic to North Island, New Zealand.

1. "MYCOLOGIA INDEX, VOLUMES 1--58, 1909--1966" edited by Clark T. Rogerson, New York Botanical Garden Publishers, New York, 1968.

# Additional records for Porella pinnata in Southeastern United States

Clyde F. Reed*

Recently Conard (1) reviewed the distribution and ecology of Porella pinnata in North America. In the Reed Herbarium there are specimens from nine states in southeastern United States, namely, Delaware, Maryland, Virginia, West Virginia, Kentucky, Oklahoma, Alabama and Florida; also a specimen from Mississippi, a state from which Conard had not seen specimens. In the United States National Herbarium there are specimens from South Carolina also. The ecology recorded on the specimens cited herein varies from damp rocks in forests to inundated rocks in streams in the mountains and Piedmont regions to muddy banks and cypress trunks in the Coastal regions.

Alabama: On wet rock, 8-Acre Rock near Vance, Tuscaloosa Co. July 31, 1948. P.O.Schallert 1701 (det. Andrews).

Delaware: On inundated rocks in streams, Naamans Creek near Claymont, New Castle Co. Oct. 30, 1894. Albert Commons; Allopakus Run opp. Bancrofts Mill, Wilmington, New Castle Co. April-May 1891. Albert Commons.

Florida: Tallahassee. March 1963. Ruth Breen.

Kentucky: Crevices of wet rocks, Coxton, Harlan Co. June 7, 1947. Reed 7038.

Maryland: On mossy boulders in Cabin Branch, Rt. 94, ½ mi N of Annapolis Rock Road, Howard Co. Feb. 2, 1964. Reed 65719; along stream, Toll Gate Road, 2 mi W of Rt. US #1, Harford Co. Oct. 13, 1963. Reed 64951; on rocks along stream, Catoctin Mts., Foxville-Deerfield Rds., Frederick Co. Mar. 25, 1967. Reed 74621; base of Cypress along Pocomoke River, above Pocomoke City in Somerset Co. Aug. 11, 1947. Reed 9734; Garrett Co. Aug. 1876. J.D.Smith (US). Also known from Montgomery Co., Maryland and the District of Columbia.

Mississippi: Muddy bank of Okatoma Creek, 1 mi N of Saratoga, Simpson Co. Sept. 4, 1953. Henry J. Jacobs 1533 (Det. H. Robinson).

Oklahoma: On rocks beside river, Beaver's Bend State Park, McCurtain Co. Aug. 26, 1960. H.A.Stark 1157A. (Det. H. Robinson).

South Carolina: Slopes among rocks at base of cliff along Savannah River, 2½ mi NW of Oak Hill Dam. June 29, 1949. W.H.Duncan 9812 (US).

---

* Reed Herbarium, 10105 Harford Road, Baltimore, Maryland, 21234.

1. Conard, H.S. Porella pinnata in North America. Bryologist, 71: 29-30. 1968.

Virginia: Woods, Rt. 58 to Rt. 700 to Rt. 634, Abrams Falls, NW of Bristol, Washington Co. June 15, 1964. Reed 67362; low woods, Pole Branch at Rt. 58, 1 mi NE of Boydton, Mecklenberg Co. Apr. 14, 1966. Reed 74131; in stream in cypress swamp, Rt. 611 near Grizzard at Sussex-Greenville Co. line. May 7, 1965. Reed 69678; dripping face of schist bluff, White Oak Canyon, Blue Ridge Mts., Madison Co. Aug. 22, 1958. F.J.Hermann 14825 (US); Vances Cove, Geo. Washington Nat. For., Shenandoah Co. Apr. 16, 1966. H. Robinson (US). Also known from Smyth, Giles, Page, Rappahannock, Fairfax and Middlesex Counties.

West Virginia: Base of trees, woods along Greenbrier River, Rt. 12, 5 mi S of Alderson, Summers Co. May 30, 1967. Reed 78566. Also known from Hardy, Monongalia, Preston, Fayette, Greenbrier, Summers, Logan, Wyoming and McDowell Counties.

- - - - - - - - - - - - - - - -

## BOOK REVIEWS

Alma L. Moldenke

"DICTIONARY OF ECONOMIC PLANTS" by J. C. Th. Uphof, 2nd edition, revised & enlarged, ii & 591 pp., Verlag von J. Cramer, Lehre, Germany. 1968. D.M.70.

This is an even more valuable storehouse of information than the long since sold-out first edition of 1959 because it has updated and corrected many entries, added over 3,000 more entries, and enriched its bibliography which is arranged by products, plant types and geographical areas.

In a short time the copies of this edition will also become "dog-eared" from much use by all kinds of grateful readers, botanists and non-botanists alike. It is hoped that the highly competent author will be spared and induced to prepare an even larger third edition relatively soon, -- one in which more care will be given to checking galley and/or page proof for spellings, one in which the taxonomy is more updated, and one in which more cross references are given. A few of the spelling errors in the present edition include Castanea on p. 266, trunks on p. 316, Hindu on page 336, Dominica on p. 398, rudders on p. 428, emmenagogue on p. 498, Té de Pais on p. 512, Costa Rica on p. 518, V. thapsus on p. 541, astringents on p. 541 and Identity on p. 574.

Since we had to check this work thoroughly for mention of members of the Verbenaceae we noted: (1) Avicennia alba Blume is not a synonym of A. marina (Forsk.) Vierh., but is a distinct species; A. tomentosa Jacq. is not a synonym of A. marina var. resinifera (Forst.) Bakh., but only the misapplications of this name by R.

Brown and by Sieber (in part) may be so considered; A. nitida Jacq. is now correctly called A. germinans (L.) L.

(2) Gmelina arborea is not known either wild or cultivated from the Fiji Islands -- references there must apply to G. vitiensis Seem. instead.

Gmelina leichhardtii (F. Muell.) F. Muell. is the corrected orthography of this name.

Gmelina macrophylla Benth. is now more correctly known as G. dalrympleana (F. Muell.) H. J. Lam.

The binomial, G. moluccana, is more correctly written G. moluccana (Blume) Backer.

(3) Callicarpa candicans (Burm. f.) Hochr. is the name we now use for what Uphof refers to as C. cana L., and C. tomentosa (L.) Murr. is the correct name for what he calls C. lanata L.

(4) Vitex compressa Turcz. is the "Guiana chaste tree"; V. divaricata Sw. does not grow there.

Similarly, V. parviflora A. L. Juss. is the "Timor chaste tree"; the V. littoralis Cunningh. to which he refers this name does not grow in Timor. What he refers to as V. littoralis Cunningh. is the tree we now correctly know as V. lucens T. Kirk and is endemic to North Island, New Zealand.

(5) Citharexylum spinosum L. is the correct name for what he refers to as C. quadrangulare Jacq. The generic name is spelled in three ways on pp. 133, 541 and 554, each incorrect!

(6) Clerodendrum buchanani (Roxb.) Walp. is the accepted name and orthography now for what he refers to as Clerodendron Buchananii Walp. and C. Blumeana Schau.

Similarly, Clerodendrum glabrum E. Mey. and Clerodendrum serratum (L.) Moon are the accepted names now for what he calls Clerodendron glabrum E. Mey. and Clerodendron serratum Spreng.

(7) The Yucatán plant to which he refers is Cornutia pyramidata var. isthmica Moldenke; the typical form of the species does not grow there.

(8) Dicrastylis exsuccosa (F. Muell.) Druce is the correct name for what he refers to as D. ochrostricta F. v. Muell. (a misspelling of D. ochrotricha F. Muell.)

(9) The plant referred to as Lantana microphylla Mart. is most assuredly Lippia microphylla Cham.

(10) Lippia adoënsis Hochst. is now more correctly called L. abyssinica (Otto & Dietr.) Cuf.

His Lippia Berlandieria Schauer is a misspelling for L. berlandieri Schau., but this is now regarded as a synonym of L. graveolens H.B.K.

The plant he refers to as Lippia citriodora Kunth is now better known as Aloysia triphylla (L'Hér.) Britton, and his Lippia dulcis Trév. is better known as Phyla scaberrima (A. L. Juss.) Moldenke.

His Lippia geminata H.B.K. is now correctly known as L. alba (Mill.) N. E. Br., while his L. ligustrina (Lag.) Britt. and L. lycioides Steud. are both now known as Aloysia gratissima (Gill. & Hook.) Troncoso.

Lippia pseudo-thea (A. St.-Hil.) Schau. is the correct orthography of this name.

Lippia substrigosa Turcz. (he has misspelled the authority abbreviation), L. pringlei Briq., and L. chiapasensis Loes. (he has misspelled the specific epithet) are not all synonyms of L. umbellata Cav., but instead are all valid species.

(11) The name, Peronema canescens, is to be accredited to Jack, not Jacquin.

(12) Petitia poeppigii Schau. (he has misspelled the authority's name) is probably only a hairy variety of P. domingensis Jacq.

(13) According to Fosberg, Premna obtusifolia R. Br., not P. integrifolia L., is the name which must be accepted for this very common and widely distributed species.

(14) The proper accredition for Stachytarpheta angustifolia is "(Mill.) Vahl" and that for S. jamaicensis is "(L.) Vahl".

(15) The name, Tectona grandis, should be accredited to "L. f.," son of the famous Linnaeus. This genus, most important economically of all the 76 accepted genera of Verbenaceae, has been omitted for the list of genera in this family on p. 541. In this connection it should be pointed out that the genus Avicennia is now segregated by many authorities as the family Avicenniaceae Endl., while the genus Dicrastylis is one of the genera segregated in the family Dicrastylidaceae J. Drumm. [Chloanthaceae J. Hutch.].

(16) Teijsmanniodendron pteropodum (he has misspelled the generic name) should more properly be accredited to "(Miq.) Bakh."

(17) Vitex agnus-castus L. is the correct orthography for this well-known name.

The tree which he refers to as Vitex celebica Koord. is now more correctly known as V. quinata var. puberula (H. J. Lam) Moldenke.

Vitex doniana Sweet is the accepted name now for what he calls V. Cienkowskii Kotschy & Perr.

The New Zealand tree which he calls Vitex littoralis Cunningh. is correctly called V. lucens T. Kirk.

Vitex pinnata L. is the correct name for what he calls V. pubescens Vahl.

Vitex erioclona is a name that should be accredited to H. J. Lam, not to Lamarck.

Over two score common names given in the book for members of the Verbenaceae do not appear in cross reference positions. How is one to identify "guairo santo"? If one hunts for the identity of "titi" one is referred to Cliftonia monophylla or Cyrilla

racemiflora and not to Gmelina moluccana. Yet on p. 246 this is given as a common name for the latter species.

Quantitatively more verbiage has been offered here in constructive criticism than in praise, but not qualitatively, for this work by Uphof is much appreciated by the reviewer.

"PLANT IMMUNITY - Biochemical Aspects of Plant Resistance to Parasitic Fungi" by L. V. Metlitskii and O. L. Ozeretskovskaya, translated from the Russian, 114 pp., illus., Plenum Press, New York, N. Y. 10011. 1968. $12.50.

On the basis of study of most of the pertinent current literature and the laboratory work of the A. N. Bakh Institute of Biochemistry of the U. S. S. R. the authors discuss the phenomena of phyto-immunity involving those chemical substances of parasite and/or host plant that play a protective role against infection and involving an understanding of the biochemical processes responsible for their formation, conversion and interaction.

Phytoncides are bactericidal, fungicidal and protisticidal regular plant products that are often volatile, often specific, and productive of other reactions also. Phytoalexins are produced de novo or upon activation on parasite contact, nonspecific, associated with necrosis, and inhibit mycelial growth. Both phytoncides and phytoalexins are deemed plant tissue metabolites representing diverse chemical compounds. The authors prefer dividing all antibiotic substances of plants into constitutional inhibitors which are present in a plant before contact with a parasite and into induced inhibitors that arise within a plant after contact with a parasite.

They provide convincing evidence that raised energy levels are essential in susceptible plant varieties for the successful development of obligate parasites since many are incapable of generating macroergs and must use energy from the host.

They show how plant reactions to wounding - other than succumbing to the invading pathogens - involve localizing the infection, protein regeneration, synthesis of phenolic compounds, accumulation of RNA and DNA, cell division connected with the wound periderm and additional energy obtained through mitochondria. The protective role of necrotic reactions is dependent upon both the products of polyphenol oxidation and on antibiotics, especially phytoalexins.

In treating the tracheomycotic diseases the authors deal with the "pros" and "cons" of the "plug theory" and the "toxin theory" and conclude that neither can explain either the nature of the disease or the resistance of the plant but that in the course of disease development interactions occur among various metabolites of fungus and host so constituting different defense reactions.

Throughout this small book material is well arranged and succinctly presented. The print is easy to read. The price is fantastically high.

"PLANT PROPAGATION - Principles and Practices" by Hudson T. Hartmann and Dale E. Kester, 2nd edition, x & 702 pp., illus., Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632. 1968. $14.00.

Just as the first edition did, so will this updated and revised one serve as the definitive and an encyclopedic treatment of all phases of plant propagation principles and techniques. New material appears throughout the easily readable text and the useful bibliographies at the end of chapters, and is highlighted in the tissue and organ culture section.

The greatest asset of this text is its careful, simple and scientifically accurate explanations of all basic principles involved. These add the rationale for the "how to" parts of the book which are also explained simply, thoroughly, and effectively and are illustrated by excellent and ample black and white photographs, line drawings or diagrams.

There are only a few minor items of criticism. The paper seems too gray, possibly from the use of too much newsprint. The index is far from complete and consequently less useful than it should be. On p. 697 Phytophthora is misspelled and two of its page references are erroneous. An infinitive is split in the legend on p. 48.

Throughout the otherwise excellent directions for all types of orchid propagation, no mention, let alone explanation, is made about the obligate fungal-root relationship.

"INTRODUCTORY PLANT SCIENCE" by Henry T. Northen, 3rd edition, viii & 586 pp., illus., Ronald Press, New York, New York 10016. 1968. $9.50.

This is definitely one of the better or best of college botany texts. Because the author states so effectively in his preface his outstanding and all encompassing goals in teaching botany through the medium of this book, he convinces this reviewer that he must be an excellent teacher and botanist and that the following quotation will offer worthwhile direction and scope especially to those entering the teaching of this wonderful field of information.

"My purpose in writing this textbook of botany is to present to the beginning student a view of the plant world that will leave a lasting and vivid impression. The presentation aims, by its direct approach, to give the student an understanding not only of the plants themselves but also of their relationship to people here and around the world. The contributions of botany to our past, its accelerated contributions to the present-day world, and the urgent need for basic research to fill the needs of the future are interwoven throughout the book with discussions of the established fundamentals. I have tried to alert the student to such worldwide problems as hunger, disease, pollution, and thirst, and the role of botany in the relief of human suffering. I hope

to make the subject come alive to the general student and develop a sound and enthusiastic foundation for the potential botanist.

"To make the book teachable and readable, the material is presented in a form commensurate with the beginning student's background. Knowledge gained in the fields of electron microscopy and molecular biology enables us more fully to understand cell structure, genes, gene action, function, plant development, and evolution. Such knowledge, obtained from the study of both higher and lower plants, is included in this revision, and I believe that the topics have been written and illustrated in an understandable manner, one that does not presuppose organic chemistry or biochemistry.

"New information about space biology, biological clocks and calendars, phytochrome, flowering, respiration, photosynthesis, growth regulators, tissue culture, chemical taxonomy, the marine habitat, and world plant formations has been included. In line with the more sophisticated equipment now available for laboratory work, I have substituted quantitative methods for some qualitative ones in studying photosynthesis, respiration, and transpiration.

"I have tried to maintain a balance between the molecular and the descriptive, and I have not favored the one over the other. The book is a balanced presentation of all aspects of botany. The plant as a whole and its relationship to the environment have been a central theme. The chapters on plant communities and conservation have been expanded."

Above the author mentions wherein the 1953 and 1958 editions have been enlarged and modernized. The copious illustrations are excellent as educational tools. The section on conservation stresses that "We are a part of nature, not apart from nature", a concept essential to survival, yet so little comprehended in urban and suburban areas especially. The author's language presents ideas and information in readily comprehensible forms. The type is easily readable. The glossary and index are helpful. The review questions at the ends of chapters might well have been omitted since they are mostly too obvious and redundant because the author mentions that there "is an excellent and accurate companion for laboratory instruction" -- "Laboratory Studies in General Botany" by William M. Carlton and from the same Ronald Press. The space could better have been devoted to appropriate topical bibliography. It is almost inconceivable that a text of this high quality would offer no additional reading guides for the students.

"FLORA OF ALASKA and Neighboring Territories - A Manual of the Vascular Plants" by Eric Hultén, vii & 1008 pp., illus., Stanford University Press, Stanford, California 94305. 1968. $35.00.

The United States provided an outstanding university press for speedy and beautiful printing, clean proof-reading, thorough indexing, and funding for much of the research. Sweden provided the

author, dean of circumpolar botany for about half a century, and photographer of the exquisite color plates, the Riksmuseum as the center for these studies and manuscript preparation, and the Kartografiska Institutet for the range maps and drawings. What a worthwhile result for which botanists and the botanically interested will be grateful for years to come!

All flowering plants and vascular cryptogams known to occur in Alaska, the Yukon, the Mackenzie district and the eastern extremity of Siberia comprise 1974 taxa belonging to 89 botanical families, 412 genera, 1559 species conservatively considered and the balance in subspecific rank for geographic isolates, established self-perpetuating apomicts, etc. There are over a million square miles in the area covered by the book. For almost all of these taxa there are provided clear-cut diagnostic line drawings, maps giving the geographic distribution in this prescribed area and companion maps giving the circumpolar distribution picture, synonymy, descriptions, relationships to other species, habitats, and often ethnobotanical notes.

The introduction to the book carefully records the geological and botanical history of this Beringia area which reveals the overlapping of the floras of the two continents influenced by much westward and a small amount of eastward migration.

Keys, carefully constructed and reasonably easy to follow, lead to the major groups, the families, and then to the genera. Keys to the species are given at the beginning of each generic treatment.

At the end of the book there is a helpful glossary, an annotated list of all authors whose names appear in the text, as well as an annotated list of persons for whom taxa have been named, a comprehensive bibliography with direction to even more published material, and a thorough 5-columned index.

A new state flora has thus been added to the list - and much, much more!

"SOUTHERN SEASHORES - a World of Animals and Plants" by William M. Stephens, 192 pp., illus., Holiday House, New York, New York 10022. 1968. $3.95.

Even though this is a pleasant "popular" book with an easy reading style and print, it is crammed with fascinating accurate tales and descriptions of scientific interest. And unlike so many other "popular" books, this one has its material readily available for quick reference through a decent index. It describes the interactions of many seashore organisms to their sandy beach, coral reef, rocky shore, island, bay, harbor, or tangled mangrove shore environments. It covers the area from the Carolinas, Georgia, Florida and the Bahamas through the Gulf Coast mainly, with occasional interesting references to other exotic places.

The author is a fine marine naturalist and an excellent photographer. Most of the biota mentioned are animals, but a few plants are also discussed.

# PHYTOLOGIA

*Designed to expedite botanical publication*

Vol. 18 March 1969 No. 3

CONTENTS





Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, $1; per volume, $6.75 in advance, or $7 at close of volume

T

# NOTES ON BROMELIACEAE, XXIX

Lyman B. Smith

## AECHMEA

AE. DICHLAMYDEA Baker var. PARIAENSIS Pittendrigh, var. nov.. A var. dichlamydea bracteis primariis inferioribus suboblongis apice rotundatis apiculatisque, firmis, quam ramorum basibus sterilibus paulo brevioribus vel longioribus differt. Pl. I, fig. 1: Lower primary bract x 1.

VENEZUELA: SUCRE: Mountains above Cristobal Colon, 1944, Pittendrigh 1094 (US, type); 1092, 1093, 1095 (US).

Dr. C. S. Pittendrigh has kindly consented to the publication of the above variety in order to clear the way for the Bromeliaceae of the "Flora de Venezuela".

AE. TONDUZII Mez & Pittier, Bull. Herb. Boiss. II. 3: 132. 1903, emend. L. B. Smith. Sepalis valde asymmetricis, suborbicularibus, 6 mm longis sine mucrone, basi brevissime connatis; petalis 13 mm longis, ligulis binis fimbriatis auctis; staminibus inclusis, antheris oblongis, 5 mm longis; pollenis granulis biporatis; ovario globoso, 7 mm diametro; placentis apicalibus. Pl. I, fig. 2: Sepal x 5; fig. 3: Petal x 5.

COSTA RICA: PUNTARENAS: San Vito de Java, R. G. Wilson 64-738 (US).

## DEUTEROCOHNIA

D. DIGITATA L. B. Smith, sp. nov. A D. strobilifera Mez, cui verisimiliter affinis, scapi bracteis supremis integris, inflorescentia digitata vel subdigitata vel simplici, bracteis primariis parvis integrisque differt.

D. strobilifera sensu Castellanos, Gen. & Sp. Pl. Argent. 3: 194, pl. 44, 126-b. 1945; as to Argentine plants and the illustrations.

PLANTS forming rings, the flowering shoot 15-25 cm high. LEAVES rosulate, 10-20 cm long; sheaths short but ample; blades 18 mm wide, covered with a whitish or silvery coat of scales, laxly serrate with spines 2 mm long. SCAPE erect, slender, nearly equaling the leaves; scape-bracts exceeding the internodes, the upper narrowly lanceolate, entire. INFLORESCENCE digitate or subdigitate from a few spikes or rarely simple, glabrous; primary bracts much shorter than the spikes, entire; spikes slenderly cylindric, dense, to 5 cm long. FLORAL BRACTS ovate, acute, slightly shorter than the sepals; flowers sessile or subsessile. SEPALS elliptic, ca. 8 mm long; petals narrowly elliptic, obtuse, bearing a single scale at base, about equaling the stamens; style slightly exserted.

ARGENTINA: SALTA: Cerros de Cachi, 7 February 1943, Castellanos s. n. (BA 46636, type); Cachi to Los Molinos, January 1897, Spegazzini s. n. (BA).

DYCKIA

3. D. SELLOA (K. Koch) Baker.
BRAZIL: RIO GRANDE DO SUL: Rio Cai, 17 January 1964, Pereira 8468 & Pabst 7743 (LP).
Rio Cai is north of Pôrto Alegre in the area where Sellow spent over six months collecting. No verification of the occurence of the species in Uruguay has been found and it seems likely that the record for the type was an error in labelling.

HECHTIA

H. MACDOUGALLII L. B. Sm ith, sp. nov. A H. rosea E. Morr. ex Baker atque H. meziana L. B. Smith, quibus affinis, bracteis primariis ramorum bases steriles superantibus, petalis masculinis spathulatis subunguiculatis differt.
PLANT flowering about 1 m high, red except the leaves. LEAVES to 7 dm long, very narrowly triangular, 8 cm wide, appressed-lepidote throughout, coarsely repand-serrate. SCAPE elongate; scape-bracts vaginiform, the upper ones about equaling the internodes. INFLORESCENCE laxly bipinnate, ca. 7 dm long, 3 dm in diameter, glabrous; primary bracts lanceolate or ovate, acuminate, much exceeding the short sterile bases of the branches, thin; branches spreading, slender, sublaxly flowered. Floral bracts broadly ovate, apiculate, much exceeding the 2 mm long pedicels; only the staminate flowers known, spreading. SEPALS broadly subelliptic, acute, 4 mm long; petals spatulate, subunguiculate, 7 mm long; stamens barely exceeding the petals; anthers elliptic, 2.5 mm long; remnant of the ovary largely inferior, making the pedicel appear nearly 4 mm long. Pl. I, fig. 4: Sepal x 5; fig. 5: Petal and stamen x 5; fig. 6: Section of pedicel and ovary remnant x 5.
MEXICO: OAXACA: Part shade, in soil on steep bank, Zapotitlán, December 1949, MacDougall s. n. (US, type); Nizanda, 24 February 1951, MacDougall 2 (US).

NEOREGELIA

8a. N. MCWILLIAMSII L. B. Smith, sp. nov. A N. carolinae (Beer) L. B. Smith, cui affinis, foliis ex sicco minute pallido-maculatis, sepalis lanceolatis acutis differt.
LEAVES over 32 cm long; sheaths broadly elliptic, pale green, 14 cm long, subdensely vestite with appressed brown-centered scales; blades ligulate, broadly rounded and apiculate, 55 mm wide, entire or nearly so, inconspicuously pale-lepidote throughout, green near apex, below red with small green spots. SCAPE 3 cm long. INFLORESCENCE ca. 30-flowered, 35 mm in diameter, wholly dark red. FLORAL BRACTS lanceolate, attenuate, thin, about equaling the sepals; pedicels slender, to 5 mm long. SEPALS lanceolate, acute, slightly asymmetric, 32 mm long, connate for 6 mm. Pl. I, fig. 7: Inflorescence x 1/2; fig. 8: Sepal x 1.

BRAZIL: RIO DE JANEIRO: Large boulder pile near shore, northeast of Paratí, 13 February 1968, L. B. Smith & E. L. McWilliams 15432 (US, type; MICH, R, isotypes).

PITCAIRNIA

216a. P. COLIMENSIS L. B. Smith, sp. nov. A P. puberula Mez & Smith ex Donn. Smith, cui affinis, sepalis alatis differt.

PLANT stemless, flowering 45 cm high. LEAVES fasciculate in a bulbous rosette; outer sheaths broadly ovate, castaneous, the inner longer and narrower and paler; blades dimorphic, some persistent and reduced to slender flat serrate spines, others foliaceous (inferred from the median scape-bracts), linear, attenuate, deciduous along a straight transverse line, spinose-serrate below the line. SCAPE erect, slender, at first appressed-tomentose with white finely divided scales; scape-bracts erect, equaling or exceeding the internodes, entire, the lowest vaginiform, lanceolate, acuminate, the median foliaceous, to 3 dm long, 10 mm wide, the upper narrowly triangular, filiform-caudate. INFLORESCENCE simple, laxly few-flowered, tomentose-lepidote when young. FLORAL BRACTS narrowly triangular, slightly longer or shorter than the pedicels; pedicels divergent, slender, to 10 mm long. SEPALS linear, 20 mm long, acuminate, the posterior ones broadly alate especially toward apex; petals naked, red; ovary 3/4 superior; ovules caudate. Pl. I, fig. 9: Sepal x 1.

MEXICO: COLIMA: Steep bluffs above Río Salado, 5 miles south of Colima, alt. 400 m, 17 July 1957, McVaugh 15509 (MICH, type; US). Open dry limestone cliffs, base of Cerro de San Gabriel, 19° 05' N, 103° 48' W, alt. 600-700 m, 1-4 August 1960, Iltis, Koeppen & Iltis 676 (MICH, US, WIS).

66. P. MEGASEPALA Baker, Journ. Bot. 19: 229. 1881. P. theae Mez in DC. Mon. Phan. 9: 376. 1896.

COSTA RICA: Boruca, Tonduz in herb. Pittier 6868 (BR, GH photo, type of P. theae Mez).

Contrary to the description, P. theae has alate sepals, leaving no distinction between it and the earlier P. megasepala.

63a. P. RUDERALIS L. B. Smith, sp. nov. A P. tarapotensi Baker, cui affinis, bracteis primariis parvis sed ramorum bases steriles superantibus, ramis brevibus subdense secundique florigeris differt.

PLANT stemless, flowering 1.5 m high. LEAVES all persistent; sheaths broadly ovate, the outer dark castaneous, completely covered with brown scales, the inner paler and apically attenuated; blades dimorphic, some much reduced but still green, serrate toward apex, others foliaceous, slightly narrowed at base, linear, attenuate, 4-5 dm long, 14 mm wide, flat, pale-lepidote beneath but very soon wholly glabrous. SCAPE erect, 5 mm in diameter at apex, glabrous; upper scape-bracts oblong to triangular, caudate or apiculate, much shorter than the internodes, pale-lepidote. INFLORESCENCE very laxly bipinnate, 4 dm long;

axis glabrous; primary bracts triangular, to 3 cm long, much exceeding the very short naked sterile bases of the branches; branches divergent, to 8 cm long, subdensely flowered. FLORAL BRACTS ovate or elliptic, 4 mm long, thin; flowers erect-secund, glabrous; pedicels slender, to 18 mm long. SEPALS linear-lanceolate, broadly subacute and apiculate, 17 mm long, ecarinate; petals 4 cm long, red, naked; ovary 2/3 superior; ovules caudate. Pl. I, fig. 10: Flower and floral bract x 1; fig. 11: Sepal x 1.

PERU: LORETO: On pajonal (high grass fallow ground) edge or old chacra, Obenteni in Gran Pajonal, Coronel Portillo, alt. 1150 m, 13 August 1966, Christowski 66-5B (WIS, type, US).

PUYA

Pourretia R. & P. Fl. Peruv. Prodr. 46, pl. 7. 1794; Fl. Peruv. 3: 33. 1802. Lectotype: Pourretia lanuginosa R. & P. Fl. Peruv. 3: 33. 1802.

The typification of Pourretia R. & P. is quite complicated and I am following the precedent of Bullock (Kew Bull. 40. 1960) in selecting that element which seems to have been the authors' intention.

In the Prodromus, Ruiz andPavon indicate that there are four species in Pourretia, but mention only one by name, P. sympaganthera. At the same time they say that it is atypical, and later in the Flora call it Guzmania while naming the other three species as Pourretia lanuginosa, pyramidata, and coarctata. The illustration of Pourretia in the Prodromus is none of the four species thus accounted for but rather a species of Pitcairnia, most likely Pitcairnia paniculata R. & P.

Although he did not make a choice between Pourretia lanuginosa and P. pyramidata (DC. Mon. Phan. 9: 489. 1896), Mez used the name, Pourretia, for a subgenus of Puya and excluded P. coarctata from consideration. It therefore remains to choose between them, and since other considerations appear equal, I will take the first, Pourretia lanuginosa R. & P.

154a. PUYA CASTELLANOSII L. B. Smith, sp. nov. A P. chilensi Molina atque P. berteroniana Mez, quibus verisimiliter affinis, foliorum laminis utrinque dense tomentoso-lepidotis differt.

P. fiebrigii sensu Castellanos, Gen. & Sp. Pl. Argent. 3: 200, pl. 47. 1945; as to Argentine plants and the illustration.

PLANTS forming dense masses, flowering 1-2 m high. LEAVES many in a spreading rosette; sheaths reniform, 8 cm wide; blades narrowly triangular, 6-8 dm long, 45 mm wide, broadly channeled, densely lepidote on both sides, serrate with retrorse and antrorse curved spines about 5 mm long and 15 mm apart. SCAPE 6 dm long, 35-40 mm in diameter, lepidote; scape-bracts deltoid, lepidote. INFLORESCENCE amply bipinnate, pyramidal, densely tomentose-lepidote; primary bracts ovate, acute or acuminate, many times shorter than the branches; branches divergent to spreading, over 15 cm long, the lower half to two-two-thirds subdensely floriferous, the remainder sterile with numerous bracts. FLORAL

BRACTS lanceolate, all but the lowest much exceeded by the sepals; pedicels divergent, 15 mm long. SEPALS triangular-ovate, acute, to 30 mm long; petals to 40 mm long, much exceeding the stamens. CAPSULES subglobose, acute, shorter than the sepals.

ARGENTINA: SALTA: Brealito, Valles Calchaquies, 20 November 1942, Castellanos s. n. (BA 45819, type); July 1945, Meyer 9164 (LIL); Arroyo de la Quesería, Cachi to La Poma, 9 February 1943, Castellanos s. n. (BA 46640); Molinos, January 1897, Spegazini s. n. (BA, LP 519).

## WITTROCKIA

W. BRAGARUM E. Pereira & L. B. Smith, sp. nov. A W. superba Lindm. foliorum vaginis oblongo-ellipticis, sepalis obtusis, petalis magnis apice azureis alte appendiculatis, ab alteris speciebus foliis coriaceis grosse serratis differt.

LEAVES many, rosulate, to 35 cm long, coriaceous; sheaths oblong-elliptic, 12 cm long, entire, purplish, densely vestite on both sides with fine subappressed dark brown scales; blades ligulate, broadly rounded and cuspidate, slightly contracted at base, 4 cm wide, glabrous above, obscurely appressed-lepidote beneath, subdensely serrate with coarse spreading dark brown spines 3 mm long. SCAPE short, densely bracteate. INFLORESCENCE sunk in the center of the rosette, simple, few-flowered, involucrate with broadly elliptic outer bracts. FLORAL BRACTS small, narrow, exceeded by the ovaries; flowers slenderly short-pedicellate. SEPALS lance-ovate, obtuse, 35 mm long, connate for 10 mm; petals 65 mm long, high-connate, the appendages highly adnate to the claw, the blades narrowly elliptic, blue at apex; stamens included; ovary ellipsoid, 8 mm long; placenta central, globose. Pl. I, fig. 12: Sepal x 1; fig. 13: Petal x 1.

BRAZIL: RIO DE JANEIRO: Epiphytic and terrestrial in sunny places, Morro das Torres de Televisão, Teresópolis, 28 January 1968, P. I. S. Braga 64 (RB, type, US).

W. CAMPOS-PORTOI L. B. Smith, Smithsonian Misc. Coll. 126: 36, 186, fig. 89. 1955, emend. Smith & McWilliams. Bracteis florigeris exterioribus sepala aequantibus, interioribus brevioribus; petalis apice fulgide aurantiacis.

BRAZIL: RIO DE JANEIRO: Steep wooded ledge, Angra dos Reis, 1 February 1968, L. B. Smith & E. L. McWilliams 15369 (MICH, R, US).

Since the type of Wittrockia campos-portoi is a cultivated plant of unknown origin, the above collection serves to place the species geographically. It is more than likely topotypical.

Plate I

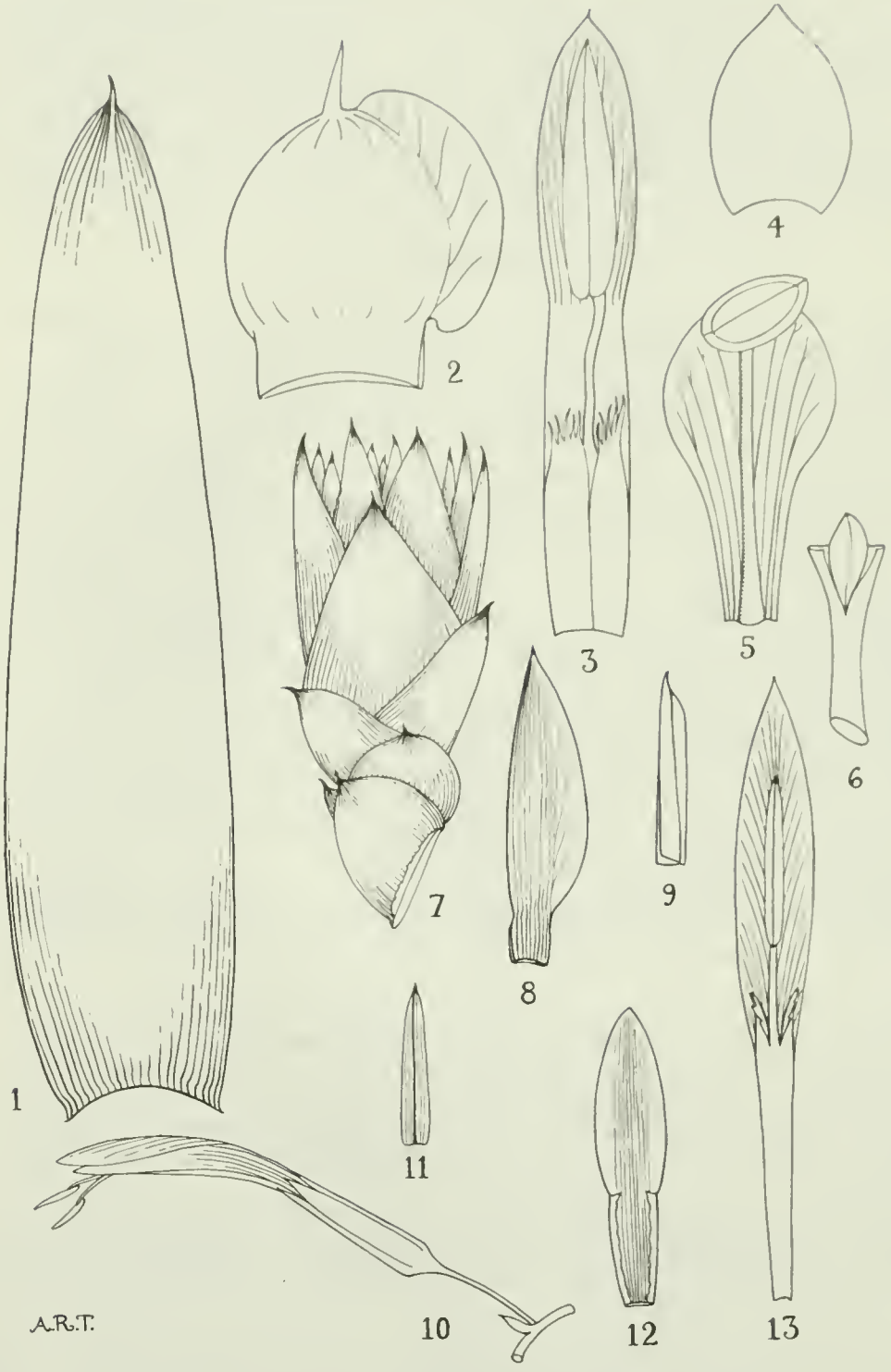



Fig. 1: Aechmea dichlamydea var. pariaensis; 2, 3: Ae. tonduzii; 4-6: Hechtia macdougallii; 7, 8: Neoregelia mcwilliamsii; 9: Pitcairnia colimensis; 10, 11: P. ruderalis; 12, 13: Wittrockia bragarum.

# MIMOSA BAHAMENSIS, A BAHAMA - YUCATAN DISJUNCT

Velva E. Rudd

An interesting shrub with attractive, unique pods is known in the Bahamas as Mimosa bahamensis Benth. and on the Yucatan Peninsula as Mimosa hemiendyta Rose & Robinson. After examining specimens, including the types, I see no reason for maintaining two species. All material should be assigned to M. bahamensis.

In North American Flora, as Pteromimosa, Britton and Rose gave as contrasting, key characters: "Legume sessile or nearly so; leaflets glabrous," for M. bahamensis, and "Legume long-stipitate; leaflets pubescent when young," for M. hemiendyta. These might be good characters if consistent and supported by other distinctions, but they are not.

The holotype of M. bahamensis, a flowering specimen, bears young, pubescent leaflets; the older leaflets are subglabrous, often retaining some pubescence along the midvein. In general, specimens from the Bahamas are fairly uniform. Collections from the Yucatan Peninsula are more variable as to degree of pubescence and length of fruit stipe. No specimens are known from the Greater Antilles, lying between those two areas (Fig. 1).

The disjunct distribution of this species is noteworthy, possibly the result of human transport. It seems unlikely that disseminules carried by natural agents, such as wind and water, would bypass Cuba. A ship, however, could easily have carried viable material from one area to the other. It is my guess that the direction was from Yucatan to the Bahamas. Because of the unusual pods, fruiting material or branches suitable for propagation could have been collected, either intentionally or casually, and later dispersed as an intended planting or accidentally, even by shipwreck. That the two areas of occurrence might be relicts of a greater range seems unlikely in view of the fact that the land areas of the southern Bahamas and the Yucatan Peninsula are younger than similar limestone areas of Cuba where, for example, M. bahamensis would be expected but, apparently, is lacking.

Mimosa bahamensis does not show obviously close relationship with any one species although, for a given character, similarities to other species can be noted. As mentioned in the original description of M. hemiendyta, the fruit most nearly resembles that of M. lacerata Rose.

MIMOSA BAHAMENSIS Benth. Journ. Bot. Hook. 4: 408. 1842: Hook. Icon. ser. 3, 9: pl. 1802. 1889. Type: Swainson s.n. Bahamas.
Mimosa hemiendyta Rose & Robins. in Rose, Contr. U. S. Nat. Herb. 8: 32. 1903. Type: Goldman 513. Mexico.
Pteromimosa bahamensis (Benth.) Britton in Britton & Rose, Fl. No. Amer. 23: 172. 1928.
Pteromimosa hemiendyta (Rose & Robins.) Britton in Britton & Rose, Fl. No. Amer. 23: 172. 1928.

Shrub or small tree, to about 9 m. tall; branches and inflorescence densely ferrugino-tomentulose when young, glabrate with age, terete, sparsely aculeate with recurved spines 1-2 mm. long; leaves eglandular, with 2-5 pairs of pinnae, the pinnae with 4-8 pairs of leaflets; stipules acicular, 1-4 mm. long; stipels (?) paired, gland-like, about 0.5 mm. long; leaflets suborbicular to oblong, about 3-7 mm. long and 2.5 mm. wide, the surfaces glabrous or puberulent with crispate hairs, the apex obtuse or retuse, the base cuneate to subcordate, asymmetrical, the margin entire, the midvein slightly excentric, the secondary veins inconspicuous; flowers numerous, pink to whitish, in globose heads 8-15 (-20) mm. in diameter at anthesis; calyx puberulent, 1 mm. long or less with 4 or 5 acute teeth; corolla glabrous, about 2 mm. long, 4- or 5-lobed; stamens 8 or 10 with filaments 4-8 mm. long; fruit ferrugino-tomentose, usually 4-8-articulate, oblong, acuminate, 4-7.5 cm. long including stipe 2-7 mm. long, and 12-20 mm. wide including lacerate margins 1-5 mm. wide; seeds lenticular, compressed, grayish-brown, 3.5 mm. long and 2.5 mm. broad.

Fig. 1 - Geographic distribution of Mimosa bahamensis Benth.

*Pl 1802*


Mimosa bahamensis, Benth.

Fig. 2 - Copy of plate 1802, Hooker's Icones Plantarum, series 3, 9. 1889.

Specimens examined:

MEXICO:
Campeche: Apagote, near Yohaltún, Goldman 513 ( GH fragment, US holotype of M. hemiendyta). Tuxpeña, Lundell 825 (A, F, GH, K, NY, US), 1113 (A, F, GH, NY, US). Tenabo, Janzen 1114 (US). 40 mi. E. of Campeche, Saunders 104 (US), 118 (US).
Yucatan: Without exact locality, Gaumer 23965 (A, BM, F, GH, K, UPS, US), 24261 (F, US); Steggerda 12 (F). Izamal, Gaumer 738 (A, BM, F, K, NY, UPS, US), 23176 (F), 23186 (F), 23405 (F, GH, NY, US). Suitún, Gaumer 23430 (F, NY, US). Mérida, Schott 895 (BM); Collins 36 (F, US). Mérida- Progreso road, km. 23, Lundell & Lundell 8196 (A, F, US). Pisté - Yokdzonoot road, Lundell & Lundell 7875 (A, F, US). Pisté, Steggerda 108 (F). Itzimná, Greenman 337 (F). Uxmal, Steere 2076 (F); Rudd 2031 (US). Chichen Itzá, Steere 1098 (BM, F), 1421 (BM, F). 25 km. S. of Uman on highway 180, Roe, Roe, & Mori 1310 (NY).
Quintana Roo: Chichankanab, Gaumer 1934 (BM, F, GH, US). Felipe Carillo Puerto, Janzen 1087 (US).

GUATEMALA:
Peten: Dos Arroyos, Bartlett 12109 (US). Carmelita, Egler 42-210 (F).

BRITISH HONDURAS: Without exact locality, Heyder 13 (US).
Corozal: "High ridge", Gentle 436 (A, BM, F, US). Freshwater Creek Reserve, Pelly 6 (F).
Orange Walk: Irish Creek, Record B.H. 39 (NY, US). Hillbank, Winzerling 104 (F, US), s.n. (K). Honey Camp, Lundell 44 (F, K).

BAHAMAS: Without exact locality, Swainson s.n. (K holotype).
Acklin: Brace 4248 (F, NY); Britton & Millspaugh 6172 (F, NY).
Caicos: West Caicos, Wilson 7753 (F, K, NY). North Caicos, Kew, & vicinity, Wilson 7706 (F, GH, K, NY). South Caicos, Millspaugh & Millspaugh 9226 (F, NY); Wilson 7590 (F, K); Proctor 8944 (A).
Fortune: Eggers 3806 (BM, K, US); Brace 89 (F), 443 (NY); Rothrock 265 (F, NY); Hitchcock s.n. in 1890 (F).
Inagua: Hitchcock s.n. in 1890 (F); Nash & Taylor 891 (F, NY), 1273 (US), 1444 (NY).
Long Cay: Brace 443 (F, K), 40001 (F, NY, US).
Rum Cay: Brace 3984 (F, NY); Fairchild 21 (A, K, US).
Watling (San Salvador): Wilson 7299 (F, GH, K, US).

Local names: Boxcatzim, saccatzim, sac haasin, sackatzim, zaccatzim (Yucatan);bastard logwood, catseem logwood, citsim, katsím, logwood brush, white logwood brush (British Honduras); haulback, holdback (Bahamas).

# CERTAMEN MELASTOMATACEIS XIII.

John J. Wurdack
Dept. of Botany, U. S. National Museum

MONOCHAETUM URIBEI Wurdack, sp. nov.

Ut videtur M. pringlei Rose affinis, floribus minoribus ovarii setulis glanduliferis differt.

Frutex 0.4-1 m altus; ramuli quadrangulati ad nodos pilis laevibus erectis modice praediti. Petioli 0.15-0.25 cm longi, glabri, basibus in ramulis persistentibus tumidis; lamina 0.8-1.2 X 0.15-0.25 cm anguste lanceata apice basique acuto, rigidiuscula, triplinervata, nervis primariis lateralibus supra invisis nervis secundariis ubique invisis, supra et subtus in superficie plerumque glabra subtus glandulis sessilibus sparse induta, apice setulis plerumque tribus ca. 0.5 mm longis armato. Flores in ramulis terminales solitarii, pedicellis 6-9 mm longis sicut hypanthiis sparse strigulosis, pilis 0.2-0.4 mm longis laevibus ca. 3 per mm quadr. Hypanthium ca. 5 mm longum; calycis lobi persistentes 6.5-7 mm longi lanceati extus per costam sparsissime strigulosi unilateraliter ciliolati ciliolis 0.1-0.2 mm longis. Petala 11-12 X 7 mm elliptico-obovata glanduloso-ciliolata. Stamina dimorphica glabra, thecis subulatis, poro dorsaliter inclinato; filamenta 8-10 mm longa. Stamina maiora: thecae 7-9 mm longae; connectivum 1 mm prolongatum; appendix dorsalis 4.5 X 0.4-0.5 mm, apice rotundato. Stamina minora: thecae 5.5-6 mm longae; connectivum non vel vix (0.3 mm) prolongatum; appendix dorsalis 4.5-5 X 0.3-0.5 mm, apice hebeti-acuto. Stigma truncatum; stylus ca. 10 X 0.25-0.4 mm, glaber; ovarii apex setulis glanduliferis ca. 1 mm longis modice armatus.

MONOCHAETUM URIBEI var. URIBEI

Internodia omnino glabra; folia (apice excepta) glabra non ciliata.

Type Collection: L. Uribe 6078 (holotype US 2534301; isotype COL), collected at Villa de Leiva, on the trail to La Capilla, Depto. Boyacá, Colombia, elev. 2700 m, 10 Feb. 1968. "Arbusto de 1 m, entre matorral al comienzo de la selva. Bellas flores rosadas con estambres de color amarillo limón."

MONOCHAETUM URIBEI var. ARCABUCENSE Wurdack, var. nov.

Internodia primum sparse strigulosa demum glabrata; foliorum margines sparse appresso-ciliolatae, venis primariis subtus sparsissime strigulosis.

Type Collection: L. Uribe 5631 (holotype US 2534300; isotype COL), collected northeast of Arcabuco, Depto. Boyacá, Colombia, elev. 2650-2700 m, 8 June 1966. "Arbustillo de 0.5-1 m de altura, a orilla de los senderos entre el bosque. Tallos, pecíolos y nervios foliares de color rosado intenso. Hipantio y

sépalos rosado-granates. Pétalos violetas. Estambres con anteras y apéndices conectivales amarillos. Estilo rosado.

Paratype (topotypical): Uribe 5437, Oct. 1965 (in old fruit).

The suggested Mexican relative has (usually) larger leaf blades and somewhat larger flowers (small stamen thecae, dry, 6.5-7.5 mm long; large stamen appendages 0.7-1 mm wide) with eglandular ovarial hairs. Gleason's key (Am. Jour. Bot. 16: 593. 1929) gives obvious differences from the other species of his Pringleae. The other Central American species with somewhat the aspect of M. uribei, M. deppeanum (S. & C.) Naud. and M. alpestre Naud., both have barbellate stem and hypanthium hairs. No close South American relatives of M. uribei are apparent, with all the Hartwegianae having much larger leaves, and M. strigosum Cogn. (ex char.) showing barbellate hairs and relatively broader leaves as well as shorter oblong sepals. All floral measurements for M. uribei were taken from dry material to conserve the few flowers at anthesis. It is again a great pleasure to honor Padre Uribe, with his discriminating eye for variants, who has contributed so much to the knowledge of the Melastomataceae of Colombia.

ADELOBOTRYS INTONSA (Gleason) Wurdack, comb. nov.

Meriania intonsa Gleason, Bull. Torrey Club 58: 223. 1931.

The rufous malpighian hairs on the stems, leaf veins (beneath), and hypanthia, as well as (qualitatively) the simple foliar pubescence, are like that in A. scandens (Aubl.) DC.; the narrow hypanthium, flaring calyx limb, and anthers are all as in Adelobotrys. However, A. intonsa differs from the generotype in the rather stouter hairs on the upper leaf surfaces, scantier hypanthial pubescence, and rigid long terminal setae on the calyx lobes. Klug 1940, from Putumayo, Colombia, which was distributed as M. intonsa, seems better placed as A. scandens.

GRAFFENRIEDA TAMANA Wurdack, sp. nov.

G. emarginatae (R. & P.) Triana affinis, foliis ad basim non cordatis subtus sicut ramis inflorescentiisque resinoso-glandulosis floribus fructibusque pedicellatis differt.

Frutex vel arbor 6-7 m altus; rami robusti quadrisulcati inter petiolos crasse annulati (annulo 1-2 mm alto) sicut folia subtus inflorescentia hypanthiaque modice resinoso-glandulosa glandulis sessilibus 0.05 mm diam. Petioli 2.5-3.5 cm longi; lamina (15-)23-27 X (8-)16-21 cm late elliptica vel paulo ovato-elliptica, utrinque obtusa, rigide membranacea, integra, glandulis exceptis glabra, 7-nervata nervis secundariis plerumque 0.5-0.7 cm inter se distantibus nervulis subtus subplanis laxe reticulatis. Panicula ca. 20 cm longa lataque multiflora; flores 4-meri, pedicellis crassis ca. 1 mm longis, alabastris maturis solum cognitis. Hypanthium (ad torum) 2.5 mm longum; calyx 2 mm longus in alabastro clausus ad anthesim usque ad 0.5 mm supra torum in lobis 3-4 ovatis persistentibus dehiscens. Petala glabra, immatura ca. 2.8-3 X 2.8-3 mm obtusa. Stamina

isomorphica glabra; thecae 2.5 X 0.5 X 0.6-0.7 mm oblongae paulo curvatae poro 0.15 mm diam., connectivo 0.4-0.5 mm prolongato, calcari dorsali acuto 0.7-0.8 mm longo. Stigma punctiforme; ovarium 4-loculare, apice truncato vel paullulo (0.1 mm) emarginato sparsissime resinoso-glanduloso.

Type Collection: J. A. Steyermark 57301 (holotype F 1201281; isotype NY), collected in rich moist woods at the base of the Páramo de Tamá, 4-10 km above Betania, Edo. Táchira, Venezuela, elev. 2500-2895 m, 15 July 1944. "Leaves coriaceous, dark green and shining above, dull brown below with prominent raised nerves beneath. Rachis inclined or drooping, dull red; calyx pale green; petals white."

Paratype: Steyermark, Dunsterville, & Dunsterville 98777 (US, VEN), from below the Páramo de Tamá near the Colombia-Venezuela frontier, Táchira, elev. 2750-2950 m, 20-23 May 1967 (fruiting).

Graffenrieda emarginata has markedly cordate leaf blade bases, vegetative and inflorescence pubescence of granulose-pinoid hairs 0.1-0.3 mm long, and sessile flowers; in internal floral features, the two species are similar. Typical G. emarginata has been sporadically collected in Colombia (Antioquia, Huila), Ecuador (Santiago-Zamora), and Peru (San Martín and Piura, fide Macbride; Amazonas, Huánuco). However, some variants (or distinct species) from Colombia and Bolivia have been distributed as G. emarginata (Cuatrecasas 8581, Metcalf & Cuatrecasas 30129, Bang 849, Buchtien 1100). In both G. tamana and G. emarginata, the petioles are often verrucose (parasitized?).

PLATYCENTRUM CLIDEMIOIDES Naud. subsp. ECUADORENSE Wurdack, subsp. nov.

Folia ubique pilis gracilibus laxis plus minusve patentibus 1-1.5 mm longis persistentibus modice induta.

Type Collection: E. Asplund 19422 (holotype S), collected at the forest edge, Vera Cruz, Prov. Napo-Pastaza, Ecuador, elev. 900 m, 18 Feb. 1956. "Low slender shrub. Inflorescence with reddish violet hairs; petals white; filaments red; anthers yellow."

Paratype: P. C. D. Cazalet & T. D. Pennington 7693 (NY, US), from the rainforest at Taisha, Prov. Santiago-Zamora, Ecuador, elev. 460 m. "3' shrub, hispid. Hairs red on stems, white on leaves. Petals white; stamens reddish."

PLATYCENTRUM CLIDEMIOIDES Naud. subsp. BOLIVIENSE Wurdack, subsp. nov.

Folia supra sparse strigulosa, subtus pilis gracilibus erectis 0.7-1 mm longis persistentibus modice induta.

Type Collection: O. Buchtien 1136 (holotype US 1692086; isotype NY), from San Carlos, Mapiri region, Bolivia, elev. 850 m, 28 Jan. 1927.

Paratypes (both topotypical): O. Buchtien 996 and 997.

The typical subspecies has leaves sparsely to very sparsely

and caducously strigulose with appressed surface hairs only 0.2-0.3 mm long. Within subsp. clidemioides, there is considerable variability in hypanthial pubescence and floral dimensions but reasonable consistency in vegetative indument. The Cazalet and Pennington collection was distributed as Leandra cf. rufescens (DC.) Cogn., while the Buchtien specimens had been filed under the undetermined species of Miconia. The Mapiri subspecies has somewhat the vegetative aspect of several species of Miconia Sect. Cremanium (M. brachyanthera Triana, M. brittonii Cogn.). From the features of gland-tipped inflorescence hairs and patelliform stigmas, M. rhonhofiae Mgf., placed in this part of Sect. Cremanium in the original description, is not the same as the Ecuadorian subspecies of Platycentrum. Probably Platycentrum is not generically distinct from Leandra; for a discussion of distribution and synonymy, see Mem. N. Y. Bot. Gard. 10(5): 161. 1964.

LEANDRA CUNEATA (Mart.) Cogn.

Hitherto known only from Baía, Brazil, this species has twice been recently collected in British Guiana: Kopinang Falls, Maguire, Maguire, & Wilson-Browne 46071; Kako River, Tillett & Tillett 45446, earlier misdetermined by me as Miconia centrodesma Naud. Certainly L. cuneata bears a remarkable resemblance to M. centrodesma in pubescence, foliage, and ovary; it is distinguishable by the completely eciliate leaves, larger flowers, exappendiculate anthers, and 4-5-celled ovaries. On the youngest buds available in the British Guiana and Baía collections (Luschnath s. n., US, annotated by Cogniaux), I could not see an apiculum such as is characteristic of the calyptrate calyx tip in M. centrodesma. The external calyx teeth in L. cuneata are marked by stellate hair fascicles and are not setuliform as in M. centrodesma. In L. cuneata, the petals are bluntly acute, the torus puberulous within, and the ovary apex sparsely stellulate-furfuraceous (not glabrous as cited by Cogniaux). Of 43 countable flowers in the Kopinang collection, 29 were 5-merous and 14 were 4-merous. The many similarities between the two species would indicate that they are congeneric (but not conspecific), but further collections are desirable. The British Guiana-Baía disjunction in the distribution of L. cuneata is matched elsewhere in the Melastomataceae, probably only a reflection of the great expanse of unvisited terra firme on both sides of the Amazon lowlands in northeastern South America.

MICONIA AMACURENSIS Wurdack

Recently described from eastern Venezuela, this species has also been collected in Pernambuco, Brazil: Recife, Dois Irmãos, J. L. S. de Lima 11 (Herb. Tavares 1738), S. Tavares 919; Tapera, B. Pickel 2996. The vegetative resemblance to M. melinonis Naud. is remarkable; that French Guiana species, however, has 5-merous flowers, definite calyx lobes, relatively narrower anthers with obscurely glandular connectives, sparsely puberulous filaments,

and basally glandular-puberulous (and intermixed stellulate-puberulous) styles. For M. melinonis, Melinon s. n. (anno 1842) (US), from French Guiana and Museu Goeldi 10857 (US), from the Rio Acará, Pará, Brazil, have been studied. From Gleason's dissection notes at Kew, Sagot 987 may well be M. amacurensis, rather than M. melinonis as cited by Cogniaux. Macbride photograph 17108 is not of M. melinonis, but rather of a small-flowered species of Sect. Miconia (perhaps M. surinamensis Gleason, which may be only varietally distinct from M. poeppigii Triana). I had originally identified Tavares 919 as M. cf. jucunda (DC.) Triana; that austral species may well be the closest relative of M. amacurensis, but differs in the leaf venation, the 5-merous flowers, and the 3-celled ovaries.

MICONIA AMPLA Triana, Trans. Linn. Soc. Bot. 28: 101. 1871.
M. involucrata Donn. Sm., Bot. Gaz. 37: 209. 1904.
M. megaphylla Gleason, Bull. Torrey Club 59: 363. 1932.

From the present accumulation of collections, none of Gleason's criteria for the species separation (Bull. Torrey Club 59: 362. 1932) are valid. The degree of retention of the pale amorphous indument on the lower leaf surfaces is quite variable, the mature leaves being essentially concolorous in collections from Trinidad, British Guiana, and southern Venezuela. The number of well-developed (reaching nearly or quite to the leaf apex) primary leaf nerves ranges from 5 to 7, with varying numbers of fainter basal nerves depending on the leaf size. In floral dimensions there also is considerable variation, the Pará (Brazil) and British Honduras collections showing the largest flowers. As broadly defined, M. ampla is known from Guatemala, British Honduras, Jamaica (Bull. Inst. Jam. Sci. 16: 41. 1967), Trinidad, Venezuela (Steyermark 61367, 90722, 99938, Wurdack & Adderley 43530), British Guiana, Suriname (Maguire 24087), Brazil (Pará), Peru (San Martín), and Bolivia. Miconia fissa Gleason is weakly distinguishable from M. ampla by having only 3 (excluding the tenuous marginals) primary leaf veins; the floral distinctions cited in the original description are not satisfactory, even the type and paratype collections having predominantly 6-merous flowers and the sepal tooth carination variable. Two recent Colombian collections of M. fissa are Schultes & Cabrera 16406 (Río Miritiparaná, Amazonas) and García-Barriga 13780 (Río Kananari, Vaupés).

One additional species, M. decurrens Cogn., the type collection (MG) of which I have studied, should be added to the above-mentioned species group studied by Gleason; it was erroneously placed originally in Sect. Laceraria. The obvious affinity of M. decurrens is with M. stellulata Gleason of Bolivia. Recent collections of M. decurrens are: Steyermark 95717, from Río Nichare, Bolívar, Venezuela; Cuatrecasas 11396 and Schultes & Smith 3047, both from between Mocoa and Sachamates, Putumayo, Colombia; Cazalet & Pennington 7546 and

7551 from Taisha, Santiago-Zamora, Ecuador; Williams 3410, from Río Itaya, Loreto, Peru; and (probably) Krukoff 10725, from Tuiri, La Paz, Bolivia. Klug 3342 (distributed as M. mucronata) perhaps represents an undescribed species close to M. decurrens, but with the flowers multiclustered at the branchlet ends rather than racemose on the short branchlets. Miconia pachydonta Gleason, of Amazonian Peru, is easily distinguished from M. decurrens by the very shortly acuminate leaf apices and larger flowers, but perhaps is not really separable from M. ampla. From the description and type photograph, M. pubicalyx of Bolivia, placed in Sect. Jucunda, surely belongs elsewhere and perhaps is M. stenostachya DC.

MICONIA KAVANAYENSIS Wurdack, sp. nov.

In aspectu vegetativo M. dispari Benth. affinis, ramis alato-quadrangulatis inflorescentiae ramis primariis verticillatis floribus non secundis differt.

Rami tetragoni (alis ca. 1.5 mm altis 1 mm crassis) sicut petioli foliorum subtus venae primariae inflorescentiaque pilis stellato-pinoideis usque ad 0.3 mm longis omnino obducti in nodis pilis gracilibus flexuosis 1-2 mm longis caducis dense obsiti. Petioli (2-)4-7 cm longi; lamina (17-)25-42 X (7-)10-15 cm oblongo-elliptica apice subgradatim vel abrupte per 1-4 cm acuminato basi obtusa, subcoriacea et undulato-denticulata dentibus 2-4 mm inter se distantibus, supra glabra et opaca, subtus pilis stellatis cinereis ca. 0.4 mm diam. densissime induti, 5-nervata pari exteriore tenui inframarginali nervis secundariis 0.6-1 cm inter se distantibus nervulis supra invisis subtus paulo elevatis reticulatisque. Panicula 20-32 cm longa multiflora, ramis primariis plerumque 4-8-verticillatis, bracteis ca. 5 mm longis ovato-ellipticis valde caducis; flores 5-meri sessiles in ramulis interrupto-glomerati, bracteolis ca. 1 mm longis linearibus caducis. Hypanthium (ad torum) 2 mm longum extus densissime et intus sparse stellulato-puberulum; calycis tubus 0.5 mm altus intus sparsissime stellulato-puberulus, lobis interioribus 0.1 mm altis remotis, dentibus exterioribus deltoideis ca. 0.3 mm eminentibus. Petala (vix matura) 1.6-1.7 X 1.1-1.3 mm obovato-oblonga inconspicue granulosa, apice rotundato vel paulo emarginato. Stamina dimorphica glabra; thecae 1.3-1.5 vel 1 X 0.25 mm lanceatae uniporosae, connectivo 0.1-0.2 mm prolongato, appendice basali cordiformi 0.3 X 0.3 mm vel trilobulata 0.2 X 0.2 mm. Stylus glaber; ovarium 3-loculare 4/5 inferum, apice conico dense stellulato-puberulo.

Type Collection: T. Lasser 1879 (holotype VEN 36521; isotype NY), collected in the Selva de Oparuma, Kavanayén, Edo. Bolívar, Venezuela, 30 May 1946. "Arbol pequeño de frutos verdosos amarillentos."

Paratype: J. A. Steyermark 60598 (F, NY), from dense forest along Río Karuai near the base of Ptari-tepuí, Bolívar, Venezuela, elev. 1220-1375 m, 27 Nov. 1944 (with young inflorescences). "Tree 35 feet tall; leaves deep green above,

silvery buff below with buff midrib."

Miconia dispar has obtusely quadrangular branches, short opposite primary inflorescence branches, and secund flowers, but the same pubescence, foliage, and general floral structure (however, the anthers 2-2.8 mm long, the ovary only $\frac{1}{2}$ inferior). In Cogniaux' system, M. kavanayensis would perhaps key to near M. martiniana Gleason and M. maroana Wurdack; both species differ vegetatively and in flowers, the latter having much larger stamens and a barely inferior ovary.

MICONIA UMBRIENSIS Wurdack, sp. nov.

M. wittii Ule affinis, foliis maioribus tenuioribusque petalis minoribus ovariorum apicibus glabris differt.

Ramuli primum valde compressi demum teretes sicut folia subtus inflorescentia hypanthiaque indumento stellulato-lepidoto appresso persistente omnino obducti. Folia in quoque pari in dimensionibus paulo (1: 0.5-0.7) anisophylla; petioli 2.5-5.5 cm longi; lamina (10-)18-30 X (6-)10-16 cm elliptica apice per 1-2.5 cm subabrupte acuminato basi acuta, tenuis et integra, supra glabra, trinervata (pari inframarginali tenui neglecto), nervis secundariis 0.5-1 cm inter se distantibus nervulis subtus laxiuscule (areolis ca. 0.5 mm latis) irregulariterque anastomosantibus ob pilos saepe occultis. Panicula 16-20 X 12-17 cm multiflora, ramis oppositis; flores 5-meri sessiles ad ramulorum apices 6-12-aggregati, bracteolis ca. 0.3 mm longis triangularibus caducis. Hypanthium (ad torum) 1.1-1.5 mm longum teres; calycis tubus 0.2-0.3 mm altus, dentibus 0.1 mm altis remotis vix perspicuis. Petala glabra 1.5-2 X 0.75-1.1 mm oblongo-obovata, apice asymmetrice rotundato vel paulo retuso. Stamina paulo dimorphica glabra; filamenta 2.5-3.8 mm longa; antherarum thecae anguste oblongae 1.3-1.4 vel 1.1-1.3 X 0.2-0.25 mm poro 0.2 mm lato ventraliter inclinato, connectivo 0.2-0.5 mm prolongato ventraliter non vel paullulo bilobulato dorsaliter dente hebeti vel hebeti-acuto 0.2-0.4 mm longo armato. Stigma paulo expansum 0.2-0.4 mm diam.; stylus 3-6 X 0.15-0.2 mm glaber in ovarii apicem 0.1 mm immersus; ovarium 3-loculare 2/3 inferum glabrum pauciovulatum.

Type Collection: G. Klug 1926 (holotype US 1456657), collected at Umbría, Putumayo, Colombia, elev. 325 m, Jan.-Feb. 1931. "Tree 8 m; flowers white."

Paratype: Cuatrecasas 11261, from rain forest between Puerto Asís and Umbría, Putumayo, elev. 270-350 m, 23 Dec. 1940. "Arbolito; pétalos blancos."

Miconia wittii has thin-coriaceous leaf blades up to only 20 X 8 cm, rather definite deltoid calyx lobes 0.5-0.7 mm long, petals 2.7-3.3 X 1.5-1.7 mm, and ovary apices moderately lepidote-pubescent. Both collections of M. umbriensis had been distributed as M. hypoleuca (Benth.) Triana, a species differing greatly (hexagonal branchlets, indiscrete cobwebby tomentum on the lower leaf surfaces, rimose anthers). Other species with large leaves covered beneath by stellulate-lepidote hairs can distinguished by inflorescence (secund flowers) or floral

features.

MICONIA IDROBOI Wurdack, sp. nov.

Sect. Miconia. M. argenteae (Sw.) DC. affinis, foliis obovato-ellipticis subtus sicut hypanthiis sparsiuscule stellulato-lepidotis differt.

Ramuli superiores ancipites hinc et inde valde compressi sicut petioli foliorum subtus venae primariae secundariaeque inflorescentiaque dense lepidibus 0.1-0.15 mm diam. i. s. pallide brunneis omnino induti. Petioli 2-3.5 cm longi; lamina (13-)18-24 X 7-12 cm paulo obovato-elliptica apice subabrupte breviterque (0.5-1 cm) acuminato basi late acuta vel obtusa, fragilis et tenuiter sed distincte undulato-serrulata dentibus ca. 0.2-0.3 mm profundis et 2-3 mm inter se distantibus, supra glabra, subtus in superficie densiuscule lepidibus ciliolatis 0.15-0.2 mm diam. obsiti superficie inter pilos visibili, breviter 5-plinervata pari interiore 0.5-1 cm supra laminae basin divergente nervis secundariis plerumque 5-7 mm inter se distantibus, tertiariis subtus inconspicue evolutis non vel laxissime reticulatis. Panicula multiflora, 10-15 cm longa; flores 5-meri sessiles in inflorescentiae ramulis interrupto-glomerati non secundi, bracteolis 0.5-0.7 X 0.2-0.4 mm usque ad anthesim plerumque persistentibus. Hypanthium (ad torum) 1.3-1.6 mm extus dense stellulato-lepidotum; calycis tubus 0.3 mm altus, limbo 5-undulato 0.1 mm alto, dentibus exterioribus obscuris omnino adhaerentibus non eminentibus. Petala glabra 2.3-2.5 X 1.3-1.6 mm oblongo-obovata, apice paulo retuso. Stamina paullulo dimorphica glabra; filamenta 2.4-2.6 vel 2 mm longa; antherarum thecae 1.5-2 X 0.35-0.4 X 0.4 mm vel 1.3-1.7 X 0.3-0.35 X 0.4-0.45 mm oblongae vel obcuneatae, apice paulo emarginato, poro lato 0.35-0.4 mm diam. ventraliter inclinato, connectivo 0.2-0.3 mm prolongato ventraliter paulo bilobulato vel simplici dorsaliter non appendiculato. Stigma expansum 0.5 mm diam.; stylus 3.8-4 X 0.3-0.4 mm glaber in ovarii apicem 0.2-0.3 mm immersus; ovarium 3-loculare 1/3-1/2 inferum apice conico 0.5 mm alto glabro.

Type Collection: J. M. Idrobo & R. E. Schultes 837 (holotype US 2029617), collected along the trail from Río Güejar to Caño Guapayita, base of Cordillera Macarena, Meta, Colombia, elev. 500-600 m, 20-28 Dec. 1950. "Small tree."

Paratype: Philipson, Idrobo, & Fernandez 1712, from Río Guapaya, Meta, elev. 450 m, 2 Dec. 1949. "Tree 13 m; inflorescence large, white; stigma yellow; fruit red."

Miconia argentea has elliptic to ovate-elliptic leaf blades minutely fleshy-auriculate at the base, hypanthia and lower leaf surfaces completely covered with fringed-lepidote hairs, and flowers secund on the short ultimate branchlets of the inflorescence; in the ancipital young branchlets, stamens, and pistil, the species are alike. Surely M. argentea is to be expected in northwestern Colombia, but I have seen no collections as yet. In inflorescence pattern, M. idroboi resembles

M. elata (Sw.) DC.; that species however has sulcate-quadrangular young branchlets, a tomentum of smaller hairs completely covering the lower leaf surfaces, and densely stellulate-puberulous ovary apices. Miconia elata ranges from southern Mexico to Panama in Central America and is recorded from Cuba and Jamaica in the West Indies; in South America, the distribution is limited to the eastern base of the Cordillera Oriental in Colombia (Norte de Santander: Sarare, elev. 500-700 m, Cuatrecasas 13300. Meta: San Juan de Arama, elev. 500 m, Idrobo 511. Caquetá: Florencia-Venecia, elev. 400 m, Cuatrecasas 8955), thus overlapping that of M. idroboi. The two collections of M. idroboi were grossly misidentified by me in 1957 as M. hypoleuca (Benth.) Triana.

MICONIA TETRASPERMOIDES Wurdack, sp. nov.

M. tetraspermae Gleason affinis, foliorum pilis stellulatis maioribus foliis undulato-denticulatis calycibus brevioribus differt.

Arbor 7-15 m alta; ramuli teretes sicut petioli foliorum venae primariae subtus inflorescentiarum axesque dense et foliorum subtus superficies pedicelli hypanthiaque sparse caduceque pilis stellulatis ca. 0.15-0.2 mm diam. induti. Petioli 1-2 cm longi; lamina (5-)8-14 X (2-)3.5-5 cm oblongo-lanceata, apice subgradatim per 0.5-1.5 cm hebeti-acuminato, basi late acuta, firme membranacea et distanter undulato-serrulata (dentibus 4-8 mm separatis), supra glabra, subtus sparse nigro-punctata, trinervata, nervis secundariis 0.5-0.9 cm inter se distantibus subtus crebre elevatis, nervulis obscuris. Panicula 5-9 cm longa submultiflora, ramis ramulisque plerumque 4-6-verticillatis divaricatis; flores 5-meri, pedicellis 1.5-3 mm longis gracilibus, bracteolis 0.2-0.3 mm longis linearibus valde caducis prope hypanthii basim insertis. Hypanthium (ad torum) 1.8 mm longum; calyx 3 mm altus vix (0.1 mm) 5-undulatus post anthesim caducus, dentibus exterioribus inconspicuis non eminentibus. Petala granulosa 1.9-2.2 X 1-1.1 mm ovato-oblonga, apice late acuto. Stamina paulo dimorphica glabra; filamenta 2.5-2.6 vel 2.2-2.3 mm longa; antherarum thecae 1.3-1.4 vel 1.2-1.3 X 0.3 mm anguste lineares, poro unico 0.2 mm diam., connectivo 0.6 vel 0.3-0.4 mm prolongato dorsaliter dente hebeti 0.3 vel 0.1 mm longo ornato ventraliter simplice vel paulo bilobulato. Stigma truncatum non expansum; stylus glaber; ovarium 3(-4)-loculare 3-4-ovulatum 0.6 inferum, apice granuloso.

Type Collection: T. Lasser 1874 (holotype NY), collected in the Selva de Oparuma, Kavanayén, Edo. Bolívar, Venezuela, 30 May 1946. "Flores blancas, pequeñas."

Paratypes: A. L. Bernardi 1481 (NY), from Río Apacará near Urimán, Bolívar, Venezuela, elev. 450-550 m, 17 Aug. 1954 (fruiting); Tillett & Tillett 45511 (NY, US), from near falls of Kako River, upper Mazaruni River basin, British Guiana, elev. 550 m, 23 Sep. 1960 (fruiting); J. C. Lindeman 5254 (US), from Jodensavanne-Mapane Kreek region (Suriname River), Suriname, 18 Dec. 1953 (in bud).

Miconia tetrasperma has the leaf margins entire, the foliar hairs 0.07-0.1 mm diam., and calyces 0.6-0.7 mm long (from the torus) and splitting irregularly at anthesis; a recent Colombian collection is Schultes 3737, from the Río Caucaya, Putumayo (distributed as M. eugenioides). The general aspect of M. tetraspermoides is like that of M. eugenioides Triana, a Guayana species differing in the entire leaf margins, longer calyx (0.7-0.8 mm from the torus), and multiovulate ovary cells (3-4 in each of the three locules). Several collections from Humaitá on the Rio Madeira in Brazil (Krukoff 6818 and 6880; Prance, Pena, & Ramos 3508) may be referable to M. tetraspermoides, but the specimens are too incomplete to really confirm this geographic disjunction.

MICONIA CRASSINERVIA Cogn.

Although previously I had expressed doubts (Mem. N. Y. Bot. Gard. 10[4]: 37. 1961) as to the distinctness of this species from M. argyrophylla DC., examination of very complete material of Riedel 1396 (LE) has dispelled these misgivings, at least for M. argyrophylla sensu Cogniaux. Miconia crassinervis differs in the thicker leaf blades with the first pair of lateral primaries running only 1/2-2/3 the distance from the costa to the margins (rather than 3/4-4/5), somewhat closer-spaced secondaries, and densely reticulate veinlets, as well as the costa edges beneath lacking the belt of woolly tomentum so characteristic of the deCandolle species; the ultimate inflorescence branchlets are much shorter, with pinoid-stellulate hairs on the inflorescence and hypanthia; the anthers are smaller, the small ones as well as the large ones with a distinctly prolonged connective; and the stigma is not expanded. The branchlets of M. crassinervia are rounded-quadrangular, rather than sharply quadrate as in the typical subspecies of M. argyrophylla. I still believe that the sporadic longitudinal splitting of the anthers in M. crassinervia is not genetic; such splitting occurs towards the base of the thecae, rather than progressing from the pore downward as in typical species of Miconia Sect. Chaenanthera. Recent materials of M. crassinervia that have been compared with the Riedel collection include Killip & Smith 30010 and 30142 from Manaos, Brazil (both maldistributed as M. parviflora), as well as several collections from the Gran Sabana in Venezuela (Bernardi 2739; Bernardi 6630; Steyermark 60628, distributed as M. hypoleuca).

MICONIA PALEACEA Cogn.

Tococa grandifolia Standley, Field Mus. Publ. Bot. 4: 319. 1929.

As treated in the Flora of Guatemala (Fieldiana Bot. 24: 488. 1963), the synonymization of M. paleacea under M. platyphylla (Benth.) L. Wms. is unwarranted, the floral characters being quite diverse and the species probably not closely related. The floral features of M. paleacea may be summarized as follows: hypanthium 3-3.5 mm long, externally

moderately stellulate-puberulous when young; calyx 0.7-1 mm long with essentially truncate limb, the inframarginal external teeth (and also the toral zone more or less) externally with several-numerous stramineous setae 1-1.5 mm long, the torus within gland-edged; petals 3.5-4 X 2 mm, obovate-oblong and obliquely rounded at the apex, gland-edged marginally towards the base but otherwise glabrous; stamens slightly dimorphic, the sparsely glandular-puberulous filaments 4-5.5 or 3-4.5 mm long, the subulate thecae 4.5-5 or 4-4.5 mm long and with an oblique ventrally (large anthers) or dorsally (small anthers) tilted pore, the connective not prolonged and simple or obscurely bilobulate ventrally; stigma slightly enlarged; style glabrous; ovary 3-celled, ca. 1/3 inferior, sparsely to moderately glandular on the free apex. Cogniaux cited the ovary as 4-celled, but the numerous ovaries or fruits dissected by me were all 3-locular.

The growth habit and development of robust setae in M. paleacea are approximately duplicated in sympatric species in other melastome genera (Conostegia, Tococa, Clidemia) and are probably the result of rainforest-directed convergent evolution. At present, I have no particular convictions as to the proper generic disposition and doubt the sectional assignment (Octomeris) suggested by Cogniaux, but certainly the affinity with Tococa platyphylla (vide infra) is tenuous. Also I do not believe that there is any intimate connection with M. mazanana Macbride (known from Peru as well as the Rio Solimões in Brazil, Froes 23901) nor the enigmatic M. stylosa Cogn. (with petals 8-10 mm long). Collections of M. paleacea examined (all US) include: Honduras, Standley 52870 and 54556 and P. Wilson 227; Costa Rica, Tonduz 7652, 8576, and 9602, as well as Standley & Valerio 45056 and 45221; Colombia (Putumayo), King & Guevara 6093; Ecuador (Napo-Pastaza), Grubb, Lloyd, Pennington, & Whitmore 1445 and 1660; Peru, Ferreyra 4483 (San Martín), 2197 (Huánuco), Killip & Smith 26381 (Junín). This pattern of geographic distribution is roughly paralleled elsewhere in Miconia (M. lamprophylla Triana, M. nutans Donn. Smith).

TOCOCA MERIDENSIS Wurdack, sp. nov.

T. platyphyllae Benth. affinis, foliis minoribus petiolis non longe setosis petalis staminibusque minoribus differt.

Suffrutex ubique glandulis clavatis 0.05 mm longis plus minusve caducis sparse ornatus; caulis primum quadrisulcatus demum teres infra radicans usque ad 40 cm longus (vel ultra?) sicut petioli foliorum venae primariae basim versus subtus inflorescentia hypanthiaque sparse vel sparsissime glanduloso-setulosus (setulis 0.5-1 mm longis rigidis demum caducis) et modice vel densiuscule setulis gracilibus flexuosis 0.3-0.7 (-1) mm longis suberectis (in ramis praecipue in angulis in hypanthiis praecipue basim versus) ornatus. Petioli (3-)6-10 cm longi; lamina (5-)8-12 X (4-)6-9 cm late elliptico-ovata apice late hebeti-acuto basi paulo (ca. 0.5 cm) cordata, rigide membranacea et integra sed distanter inconspicueque

appresso-ciliolata, ubique in superficie demum glabrata, subtus in venulis modice pilis gracilibus subappressis 0.2 mm longis obsita, supra i. s. subplana, 5(-7)-nervata nervis secundariis 0.5-0.7 cm inter se distantibus nervulis supra obscuris subtus planis laxe reticulatis. Panicula multiflora 4-7 cm longa; flores 5-meri in ramulis ultimis conferto-secundi, bracteolis ellipticis 0.7-1 mm longis subpersistentibus, pedicellis 0.7-1.5 mm longis. Hypanthium (ad torum) 2.5 mm longum; calycis tubus 0.3 mm longus, lobis interioribus oblatis 1.2 X 1.8-2 mm basim versus 0.2 mm imbricatis, dentibus exterioribus 1 mm longis robustis inframarginaliter divaricatis; torus intus glanduliferus. Petala 7 X 3.5 mm obovato-oblonga (apice rotundato et 0.1 mm mucronulato) basim versus glandulis marginata alioqui glabra. Stamina glabra in dimensionibus paulo dimorphica; filamenta 4.5 mm longa; thecae 3 vel 2 X 0.6 mm valde curvatae, poro terminali 0.25 mm diam., connectivo nec prolongato nec appendiculato. Stigma capitatum 0.7 X 1 mm; stylus 6 X 0.4 mm basim versus sparse glanduloso-setulosus setulis 0.1 mm longis; ovarium 5-loculare 3/4 inferum, apice conico glabro 0.4 mm alto.

Type Collection: J. A. Steyermark 55766 (holotype US 1933484; isotypes F, NY), collected between Los Corales and Las Cuadras, Edo. Mérida, Venezuela, elev. 1490-3210 m, 25 March 1944. "Herb, in colonies; common ground cover on moist wooded slopes; leaves deeply rugose both sides, rich green above, pale green below; main nerves on older leaves dull lavender; younger leaves below, as stems, petioles, rachis, pedicels, and calyx deep wine purple. Petals waxy white; filaments and style orchid-lavender; anthers lilac."

Paratype: A. Jahn 421 (US), from the Páramo de Piñango, Mérida, elev. 2600 m, 17 March 1915.

Tococa platyphylla has the petioles setose with hairs 5-10 mm long, leaf blades mostly 15-22 X 15-20 cm, petals 10-12 mm long, and anther thecae 3.9-4.5 mm long. Although similar in gross vegetative aspect to Miconia paleacea (and sympatric with it in Costa Rica, Colombia, and Ecuador), T. platyphylla can be distinguished by the lack of stellulate hairs on the inflorescence and primary veins on the lower leaf surfaces, very fine flexuous hairs and lack of robust setae towards the base of the primary leaf veins beneath, sparsely glandular-setose hypanthia, distinctly lobed calyx, much larger petals, glabrous filaments, large capitate stigmas, and 5-celled ovaries. Costa Rican collections of T. platyphylla (all US) are Pittier 2535, Tonduz 13063, Standley 36463 and 37604, and Schnell 613; I have seen no material from elsewhere in Central America.

TOCOCA PERCLARA Wurdack, sp. nov.

T. broadwayi Urban affinis, foliorum subtus pilis inframarginalibus inconspicuis 0.1-0.2 mm longis caducis foliis minus distincte plinervatis calycis dentibus exterioribus densissime flexuoso-setulosis differt.

Frutex 1-3 m altus; rami robusti primum compressi demum teretes, internodiis primum in lateribus duobus oppositis

densiuscule flexuoso-setosis (pilis usque ad 4 mm longis mox caducis), nodis densissime setosis (pilis robustis 8-12 mm longis persistentibus), alioqui glabri. Petioli robusti (4-)7-20 cm longi subapicaliter per 1-3 cm sicut laminae costa subtus per 1-2 cm dense pilis robustis erectis 5-8 mm longis armati; lamina 35-60 X 20-40 cm oblongo-elliptica apice rotundato, basi rotundata vel obtusa, rigide membranacea et obscure distanterque undulato-serrulata obscure appresso-ciliolata, subtus in costa distaliter primum sparsissime flexuoso-setulosa demum glabrata, supra et subtus in venulis superficieque glandulis minutis clavatis paucis exceptis glabra, inconspicue 5-plinervata pari interiore 0.5-1.5 cm supra basim divergente nervis secundariis 1-1.5 cm inter se distantibus sicut nervulis subtus crebre elevatis nervulis laxe reticulatis areolis irregularibus 1-2 mm latis. Panicula 10-20 cm longa oblonga in nodis gracilisetosa; flores 5-meri sessiles vel subsessiles, bracteolis ca. 5 mm longis ellipticis sicut bracteis persistentibus. Hypanthium (ad torum) 3 mm longum glandulis clavatis 0.05 mm longis sparse indutum sed non setosum; calycis tubus 0.4 mm altus, lobis interioribus 2 mm longis ovato-oblongis (apice rotundato et ciliolato), dentibus exterioribus densissime crispulo-setulosis lobos interiores subaequantibus. Petala 8 X 4.5 mm obovato-oblonga (apice rotundato) apicem versus glandulis marginata alioqui glabra. Filamenta 4.3 mm longa sicut ovarii apex stylusque sparse vel modice glandulis clavatis 0.1 mm longis ornata; antherarum thecae 4.5 X 0.8 mm paulo subulatae, poro terminali 0.2 mm diam. Stigma capitatum 1.3 mm diam.; stylus 5.5 X 0.2-0.7 mm; ovarium 5-loculare $\frac{1}{2}$ inferum; semina 0.6-0.7 X 0.4-0.5 mm numerosa muriculata.

Type Collection: J. A. Steyermark 87078 (holotype US 2338566, 2338567; isotype VEN), collected along a moist forested quebrada in the Selva de Guatopo, 43 km NNW of Altagracia de Orituco and 41.5 km SE of Santa Teresa, Edo. Miranda, Venezuela, elev. 500 m, 11 Sep. 1960. "Shrub 2-3 m, very showy; leaves subcoriaceous, deep green and shining above, pale green below with wine-purple nerves or completely wine red-purple beneath; rachis, hypanthium, and calyx lobes rose-red; petals, filaments, stigma, and style white; anthers purple."

Paratypes: Aristeguieta 837, 1740, 1758 and Steyermark 97560, all from the rain forest along the Río Santa Cruz, highway between Santa Teresa and Altagracia de Orituco, Parque Nacional de Guatopo, Edo. Miranda, elev. 600-700 m.

Tococa broadwayi has the inframarginal zones of the leaf blades beneath densely covered with flexuous hairs ca. 0.5 mm long, the petioles only sparsely setose apically, the inner pair of primary veins on well-developed leaves diverging 3-7 cm above the blade base, and the external calyx teeth sparsely to moderately setulose and 0.5-1 mm shorter than the interior lobes. My doubts as to the specific distinctness of the two taxa have been subdued by the repeated assurances of both Steyermark and Aristeguieta as to the different aspect of living plants, as well as recent collections of T. broadwayi from Tobago (Cowan

1481, Snow 4) and the Paria Peninsula in eastern Venezuela (Steyermark 94999, Steyermark & Rabe 96086); the Paria material shows more rounded leaf bases than the topotypes. Both T. broadwayi and T. perclara are obviously related to T. platyphylla and T. meridensis, differing in the glandular-puberulous filaments as well as the absence of rigid glandular setae on the hypanthia and basal portions of the primary leaf veins on the lower surface. All four relatives have the flowers crowded-secund on the short inflorescence branches, thus differing from Miconia paleacea.

LOREYA MAGUIREI Wurdack, sp. nov.

L. acutifoliae Berg ex Triana affinis, foliis pseudo-triplinervatis inflorescentiis magis dichotomis stigmate capitellato differt.

Ramuli primum inconspicue quadrangulati mox teretes sicut folia inflorescentia hypanthia calyces ubique petalaque densiuscule appresso-furfuracei glabrati. Petioli 1-1.5 cm longi; lamina 9-14 X 4-6 cm elliptica apice hebeti-acuto basi acuta et in petiolo anguste decurrente, fragilis et integra eciliata, triplinervata (pari inframarginali debili neglecto) nervis primariis lateralibus 0.7-1.1 cm supra basin divergentibus, nervis secundariis 4-6 mm inter se distantibus nervulis subtus planis laxiuscule reticulatis areolis ca. 0.7 mm latis. Cymae submultiflorae 2-3-dichotomae 3-4 cm longae; flores 5-meri, pedicellis 4-6 mm longis, bracteolis triangularibus 0.3-0.5 mm longis ante anthesim caducis plerumque paulo supra pedicellorum bases insertis. Hypanthium (ad torum) 3.3 mm longum urceolatum; calyx truncatus vel obscure 5-undulatus 0.7 mm altus. Petala 8 X 3.5 mm obovato-oblonga intus ca. 2.5 mm infra apicem transverse porcata, apice asymmetrice obtuso. Filamenta 4.5 mm longa glabra; antherae 4.3-4.7 X 2 mm lateraliter compressae poris duobus minutis ventraliter inclinatis, connectivo exappendiculato non prolongato dorsaliter ad basin paullulo (0.1-0.2 mm) elevato. Stigma capitatum 5-sulcatum 1.9 mm latum 1 mm altum; stylus 9 X 0.8-1 mm glaber; ovarium 5-loculare omnino inferum, apice glabro.

Type Collection: Bassett Maguire & Louis Politi 28164 (holotype NY; isotype US), collected near Base Camp on the Río Cuao, Terr. Amazonas, Venezuela, elev. 120 m, 3 Jan. 1949. "Large tree. Flowers red."

Loreya acutifolia has distinctly 5-nerved leaves, flowers subumbellate (occasionally with a short dichotomy) on the peduncle, and a flattened stigma only 0.8-1 mm diam. The inflorescence and flowers of L. maguirei are much like those of L. arborescens (Aubl.) DC.; that Amazonian species has relatively broader leaves with obtuse to rounded apices and 5 distinct primary veins. The Cuao collection was distributed as L. minor Cogn., which differs in the obtuse-based leaves and solitary few-fasciculate flowers.

LOREYA SUBANDINA Wurdack, sp. nov.

L. spruceanae Triana affinis, ramulis juvenilibus petiolis hypanthiisque modice strigulosis petalis extus dense minuteque strigulosis differt.

Arbor parva 6-15 m alta; ramuli novelli rotundato-quadrangulati demum teretes sicut petioli supra hypanthiaque modice pilis appressis (0.3-)0.5-0.7(-1) mm longis et dense pube granuloso-furfuracea induti. Petioli 2-5 cm longi; lamina 17-30 X 7-17 cm elliptica vel ovato-elliptica apice anguste acuto basi late acuta, membranacea et obscure distanterque undulato-serrulata, supra in nervis primariis basim versus primum sparse strigulosa demum glabrata alioqui glabra cystolithis linearibus obscure evolutis, subtus in nervis primariis secundariisque sparse strigulosa (pilis 0.2-0.4 mm longis) in superficie glabra, subalternatim (5-)7-plinervata pari interiore 4-8.5 cm supra basim divergente nervulis subtus planis laxiuscule reticulatis. Flores 5-meri in ramis multifasciculati (usque ad 9-flori), pedunculo non vel obscure (usque ad 3 mm) evoluto, bracteolis basalibus 0.5-1 mm longis deltoideis subpersistentibus, pedicellis 0.7-1.2 cm longis. Hypanthium (ad torum) 5-6 mm longum; calyx 3-4 mm longus ad anthesim in lobis paucis oblatis usque ad 2 mm irregulariter ruptus intus densissime strigulosus pilis gracilibus usque ad 1.5 mm longis. Petala 13-15 X 7-9 mm oblongo-obovata apice late acuto et extus subapicaliter minute mucronulato, unilateraliter auriculata, intus 3.5-5 mm supra basim transverse porcata, utrinque minute granulosa extus superficie in alabastris exposita dense pilis 0.1-0.2 mm longis flexuosis furfuracea. Filamenta 7 mm longa; antherarum thecae 5.5 X 1.5 mm, poris duobus 0.1 mm longis ventralibus, connectivo ad apicem 0.5 mm eminente ad basim 1.5-1.8 mm lato dorsaliter paulo elevato. Stigma expansum 5-sulcatum 3 mm diam.; stylus ca. 13 X 1-1.5 mm; ovarium 10-loculare omnino inferum, apice glabro circum stylum non prolongato.

Type Collection: O. Buchtien 1034 (holotype US 1399144), collected near Sarampiuni, San Carlos, Mapiri region, Bolivia, elev. 600 m, 15 Jan. 1927. "Ziemlich hoher Baum; Blüten rot."

Paratypes: Asplund 9181 and 9463, both from near Tena, Napo-Pastaza, Ecuador; Killip & Smith 27455, from Iquitos, Loreto, Peru, elev. 100 m; R. S. Williams 662, from "San Buena Ventura", La Paz (?), Bolivia.

Loreya spruceana has a very minute external pubescence of fine hairs 0.2-0.25 mm long, anther connectives (dry) only about 0.8-1 mm wide at the base, and petals merely granulose-pulverulent; however, the calyx densely strigulose within and long-protracted above the torus is similar to that in L. subandina. The general facies of L. subandina is like that of L. collatata (vide infra); all of the specimens had been distributed as L. spruceana. The 10-celled ovary of L. subandina would suggest a position in Bellucia, but the resemblances to L. spruceana seem more relevant.

LOREYA COLLATATA Wurdack, sp. nov.

L. spruceanae Triana affinis, ramis juvenilibus petiolis supra densiuscule strigulosis, calycibus 1.5-2 mm longis intus modice pilis brevissimis strigulosis differt.

Arbor parva 4-8 m alta; ramuli novelli subquadrati demum teretes sicut petioli supra foliorum venae primariae subtus pilis gracilibus 0.3-0.5(-3) mm longis densiuscule strigulosi. Petioli 2-6 cm longi; lamina 15-26 X 7-21 cm ovato-elliptica apice breviter acuminato basi late acuta vel obtusa, membranacea et obscure distanterque undulato-serrulata, ubique primum sparse vel sparsissime laxo-strigulosa (pilis ca. 0.2 mm longis) supra mox glabrata subtus demum glabrata, 5(-7)-plinervata pari interiore 1-4.5 cm supra basim divergente nervulis subtus laxiuscule reticulatis subplanis. Flores 5-meri in ramis multifasciculati (fasciculis usque 9-floris), pedunculo non evoluto, bracteolis basalibus 0.5 mm longis ovatis subpersistentibus, pedicellis 7-11 mm longis sicut hypanthiis dense pilis gracilibus appressis 0.15-0.2 mm longis et pube furfuracea indutis. Hypanthium (ad torum) 6-7 mm longum; calyx 1.8-2 mm longus truncatus vel paullulo 5-undulatus intus modice pilis 0.1-0.15 mm longis gracilibus strigulosus. Petala ubique minute pruinoso-granulosa 10 X 6 mm ovato-oblonga, apice oblique obtuso et brevissime mucronulato (ungue ca. 3-4 mm longo vix conspicuo), intus 1.5-2 mm supra basim inconspicue transverso-porcata. Filamenta 4-5 mm longa; antherarum thecae 5-6 X 1-1.5 mm, poro unico minuto ventraliter inclinato, connectivo ad basim 1 mm crasso ventraliter obtusate crasseque bilobulato. Stigma expansum 2.5-2.6 X 2.5-2.8 mm 5-sulcatum; stylus 12-15.5 X 1-1.5 mm; ovarium 5-loculare omnino inferum, apice glabro circum stylum non prolongato.

Type Collection: H. A. Allard 22575 (holotype US 2025563), collected in jungle on ridge east of Tingo María, Depto. San Martín, Peru, elev. 625-1100 m, 30 Oct. 1949-19 Feb. 1950. "Forest tree. Flowers white, fragrant."

Paratypes: Maguire & Fanshawe 22967, from Garroway Stream, Potaro River, British Guiana; Bernardi 2104 (NY), from 30 km south of El Dorado, Bolívar, Venezuela; Breteler 4046, from Barinas-San Cristóbal road, Barinas, Venezuela, elev. 350 m; Steyermark 99940, from southeast of Machiques, Zulia, Venezuela, elev. 325-350 m; Steyermark & Rabe 96690, from west of El Piñal, Táchira, Venezuela, elev. 250-300 m; Cazalet & Pennington 7724, from Taisha, Santiago-Zamora, Ecuador, elev. 450 m.

Both L. spruceana and L. subandina (vide supra) differ in the longer calyces which are very densely strigulose inside (the hairs to 1.5 mm long). Vegetatively, L. collatata is quite like L. subandina, but the petals are merely granulose and the stamen connective only about 1 mm wide at the base. All of the collections except Cazalet & Pennington 7724, Breteler 4046, and Maguire & Fanshawe 22967 had been named previously as L. spruceana; these three had been distributed as L. mespiloides Miquel. Loreya mespiloides differs from L. collatata in the greater vegetative pubescence development, much longer

hypanthial pubescence, more definite calyx lobes, and toral hair tufts within; L. brunnescens (Standl.) Gleason, still known only by two fruiting collections from Panama, is perhaps synonymous with L. mespiloides. The Guayana collections of L. collatata have longer cauline and petiolar hairs and somewhat smaller fruits than Andean materials. The relative geographic distribution of L. subandina, L. collatata, and L. spruceana is not in the neat pattern that a neotropical taxonomist would prefer. Cogniaux' generic description of Loreya indicated 1-pored anthers, but 7 species actually have biporose anthers, and L. spruceana (Prance et al 4699), L. collatata, and L. mespiloides are the only ones with 1-pored anthers (the pores unknown at present in L. mucronata Gleason and L. brunnescens).

- - - - - - - - - - - - - - - -

## ADDITIONAL NOTES ON THE ERIOCAULACEAE. XIX

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional & emended bibliography: Pluk., Phytogr. 3: pl. 221, fig. 7. 1692; Petiv., Mus. 796. 1695; Pluk., Almag. 3: 336. 1696; Rheede, Hort. Malab. 12: 129, pl. 68. 1703; Petiv. Gazoph. 1: pl. 33, fig. 10. 1706; H. Herm., Mus. Zeyl., ed. 1, 7 (1717) and ed. 2, 17. 1726; J. Burm., Thes. Zeyl. 108. 1737; Lightf., Fl. Scot., ed. 1, 2: 568—570 (1777) and ed. 2, pr. 1, 2: 568—570. 1789; Lour., Fl. Cochinch., ed. 1, 60. 1790; Lam., Tabl. Encycl. 1: 212—214, pl. 50. 1791; Lightf., Fl. Scot., ed. 2, pr. 2, 2: 568—570. 1792; H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: [200]-203, pl. 69, fig. 2, & pl. 70 (1816) and ed. quarto, 1: [251]—254, pl. 69, fig. 2, & pl. 70. 1816; Lam., Tabl. Encycl. 3: 506. 1823; Mart. in Wall., Plant. As. Rar. 3: 25—29, pl. 248 & 249. 1832; Roxb., Fl. Ind. 3: 612. 1832; Mart., Flora 24, Beih. 2: 60. 1841; Dalz. in Hook., Kew Journ. 3: 280—282. 1851; Körn., Linnaea 27: [561]—692 & 797—799. 1856; C. Muell. in Walp., Ann. 6: 1170—1171. 1861; Thwaites & Hook. f., Enum. Pl. Zeyl., pr. 1, 341. 1864; Van Heurck, Obs. Bot. 101. 1870; Böck., Flora 56: 90. 1873; Benth., Fl. Austral. 7: 189—198 & 792. 1878; Morong, Bull. Torr. Bot. Club 18: [351]—362. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 552, 750, 804, 829, 877—880, & 1195. 1893; Hook. f., Fl. Brit. Ind. 6: 571—585 (1893) and 6: 769. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 19, 35, 71, 84, 214, 295, 401—402, & 497 (1894) and 2: 681, 960, 1021, 1088, & 1283. 1895; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145 (1901) and 158. 1902; Barnhart, Bull. Torr. Bot. Club 29: 585—598. 1902; J. K. Small, Fl. Southeast. U. S., ed. 1, 234—236, 1328, 1353, 1358, 1361, & 1368. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 235 & 310. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 64, 70, 131, 180, & 203. 1904; J. Matsumura, Ind.

Pl. Jap. 2 (1): 175—177. 1905; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 483. 1906; Prain, Ind. Kew. Suppl. 3: 26, 99, 101, 126—127, & 175. 1908; H. Lecomte, Bull. Soc. Bot. France 45: 645. 1909; H. Lecomte, Not. Syst. 2: 214—216 (1912) and 2: 380 & 393. 1913; J. K. Small, Fl. Miami 36—38, 202, & 203. 1913; J. K. Small, Fl. Fla. Keys 28—29 & 158. 1913; J. K. Small, Fl. Southeast. U. S., ed. 2, 234—236, 1382, 1385, 1388, & 1392. 1913; Prain, Ind. Kew. Suppl. 4, pr. 1, 82, 138, 153, 170, & 230—231. 1913; H. Hallier, Beih. Bot. Centralbl. 34 (2): 45—46. 1916; Prain, Ind. Kew. Suppl. 5, pr. 1, 97 & 183. 1921; E. D. Merr., Bibl. Enum. Born. Pl. 110—111. 1921; A. W. Hill, Ind. Kew. Suppl. 6: 72, 78—79, & 127. 1926; Alv. Silv., Fl. Mont. 1: [1]—426, [I]—IX, & pl. 1—254. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 79, 88—89, 133, 135, & 174. 1929; J. K. Small, Man. Southeast. Fl. 255—258, 1525, 1532, 1537, & 1549. 1933; A. W. Hill, Ind. Kew. Suppl. 8: 87, 133, 169, & 231. 1933; Satake, Bot. Mag. Tokyo 51: 285—291 [Shib. Comm. Art. 17: 103—109], fig. 1—3. 1937; A. W. Hill, Ind. Kew. Suppl. 9: 37, 105, 156, 199—200, 238, & 271—272. 1938; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145, 158, 235, 310, & 483. 1941; H. Pittier, La Mesa Guanip. 22. 1942; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: [66]—104, pl. 14—21. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 552, 750, 804, 829, 877—880, & 1195 (1946) and 2: 19, 35, 71, 84, 214, 295, 401—402, 497, 681, 960, 1021, 1088, & 1283. 1946; Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: [311]—341, pl. 1 & 2. 1946; E. H. Walker, Contrib. U. S. Nat. Herb. 30: 380. 1947; Hill & Salisb., Ind. Kew. Suppl. 10: 80, 86, 126, 158, & 224. 1947; Suesseng. & Heine, Mitteil. Staatssamm. München 2: 57—58. 1950; Rambo, Anais Bot. 2: 128. 1950; Heine in Fedde, Repert. Sp. Nov. 54: 223—224. 1951; Moldenke in Maguire & Phelps, Bol. Soc. Venez. Cienc. Nat. 14: 10. 1952; Moldenke, Mutisia 6: 1—3. 1952; Meikle & Baldwin, Am. Journ. Bot. 39: 44—51. 1952; Moldenke in Maguire, Mem. N. Y. Bot. Gard. 8: 97. 1953; E. J. Salisb., Ind. Kew. Suppl. 11: 88, 133, 157, 175—176, & 244. 1953; Niering, Ecol. Monog. 23: 132. 1953; J. S. Beard, Ecol. Monog. 23: 170 & 177. 1953; Suesseng. & Heine, Mitteil. Staatssamm. München 6: 220 & 227. 1953; Koyama, Philip. Journ. Sci. 84: [365] & 367—378, pl. 2—6. 1956; Moldenke in Maguire & Wurdack, Mem. N. Y. Bot. Gard. 9: 278—283. 1957; Moldenke in Maguire, Steyermark, & Wurdack, Mem. N. Y. Bot. Gard. 9: 408—414. 1957; Prain, Ind. Kew. Suppl. 4, pr. 2, 82, 138, 153, 170, & 230—231. 1958; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145, 158, 235, 310, & 483. 1959; G. Taylor, Ind. Kew. Suppl. 12: 55, 79, 90, 101, 122, & 138. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 552, 750, 804, 829, 877—880, & 1195 (1960) and 2: 19, 35, 71, 84, 214, 295, 401—402, 497, 681, 960, 1021, 1088, & 1283. 1960; Prain, Ind. Kew. Suppl. 5, pr. 2, 97 & 183. 1960; Tamayo, Bol. Soc. Venez. Cienc. Nat. 22: 40, 46, 87—88, & 170. 1961; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 175—185 & 429—430, pl. 48, fig. 303—311. 1964; Thwaites & Hook. f., Enum. Pl. Zeyl., pr. 2, 341. 1964; G. Taylor, Ind. Kew. Suppl. 13: 52, 78, 98, & 132. 1966; Hocking, Excerpt. Bot. A.13: 505—506. 1968; Moldenke, Phytolo-

gia 18: 72—112. 1969.

The Humboldt, Bonpland, & Kunth references given in the bibliography above are sometimes dated "1815" or "1817", and, indeed, the title-page of the folio edition is dated "1815", but according to Barnhart (1902) both editions were issued (insofar as the pages and plates involved here are concerned) in 1816.

It is of interest to note that page 393 of the Lecomte reference cited in the same bibliography above is in the index section of the volume and is dated "31 décembre 1893"; an obvious typographic error, since the journal did not begin until 1909 and the volume involved was issued during 1911, 1912, and 1913. Perhaps the fact that it was probably New Year's Eve, 1913, when those index pages were actually printed, had something to do with the mistake.

BLASTOCAULON Ruhl.

Additional bibliography: Alv. Silv., Fl. Mont. 1: [397]. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 37. 1938; Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: [311], 313, & 315. 1946; Moldenke, Phytologia 18: 74—75. 1969.

BLASTOCAULON PROSTRATUM (Körn.) Ruhl.

Additional bibliography: Alv. Silv., Fl. Mont. 1: [397]. 1928; Moldenke, Phytologia 18: 74. 1969.

Silveira (1928) cites A. Silveira 706 from Minas Gerais.

BLASTOCAULON RUPESTRE (Gardn.) Ruhl.

Additional bibliography: Alv. Silv., Fl. Mont. 1: [397]. 1928; Moldenke, Phytologia 18: 74—75. 1969.

Silveira (1928) cites A. Silveira 208 from Minas Gerais.

BLASTOCAULON SPELEICOLA Alv. Silv.

Additional & emended bibliography: Alv. Silv., Fl. Mont. 1: 274 & [397], pl. 182. 1928; Moldenke, Phytologia 18: 75. 1969.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 182. 1928.

Silveira (1928) cites A. Silveira 707 from Minas Gerais.

ERIOCAULON Gron.

Additional & emended synonymy: Eriocavlon Crantz, Inst. 1: 360. 1766. Eriocavlon L. ex Willd. in L., Sp. Pl., ed. 4, 1: 485. 1797. Eriocaulon L. ex H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: [200] (1816) and ed. quarto, 1: [251]. 1816.

Additional & emended bibliography: Pluk., Phytogr. 3: pl. 221, fig. 7. 1692; Petiv., Mus. 796. 1695; Pluk., Almag. 3: 336. 1696; Rheede, Hort. Malab. 12: 129, pl. 68. 1703; Petiv., Gazoph. 1: pl. 33, fig. 10. 1706; H. Herm., Mus. Zeyl., ed. 1, 7 (1717) and ed. 2, 17. 1726; J. Burm., Thes. Zeyl. 108. 1737; Lightf., Fl. Scot., ed. 1, 2: 568—570 (1777) and ed. 2, pr. 1, 2: 568—570. 1789; Lour., Fl. Cochinch., ed. 1, 60. 1790; Lam., Tabl. Encycl. 1: 212-214, pl. 50. 1791; Lightf., Fl. Scot., ed. 2, pr. 2, 2: 568—570. 1792; H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: [200]—203, pl. 69, fig. 2, & pl. 70 (1816) and ed. quarto, 1: [251]—254, pl. 69,

fig. 2, & pl. 70. 1816; Lam., Tabl. Encycl. 3: 506. 1823; Mart. in Wall., Plant. As. Rar. 3: 25—29, pl. 248 & 249. 1832; Mart., Flora 24, Beih. 2: 60. 1841; Dalz. in Hook., Kew Journ. 3: 280—282. 1851; C. Muell. in Walp., Ann. 1170—1171. 1861; Thwaites & Hook. f., Enum. Pl. Zeyl., pr. 1, 341. 1864; Van Heurck, Obs. Bot. 101. 1870; Benth., Fl. Austral. 7: 190—198 & 792. 1878; Morong, Bull. Torr. Bot. Club 18: 352—359. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 750, 829, & 877—880. 1893; Hook. f., Fl. Brit. Ind. 6: 571—585 (1893) and 6: 769. 1894; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 35, 71, & 295 (1894) and 2: 681, 960, 1021, & 1283. 1895; Barnhart, Bull. Torr. Bot. Club 29: 585—598. 1902; J. K. Small, Fl. Southeast. U. S., ed. 1, 234—236, 1328, & 1353. 1903; J. Matsumura, Ind. Pl. Jap. 2 (1): 175—177. 1905; Prain, Ind. Kew. Suppl. 3: 26, 69—70, & 126. 1908; H. Lecomte, Bull. Soc. Bot. France 45: 645. 1909; H. Lecomte, Not. Syst. 2: 214—216 (1912) and 2: 380 & 393. 1913; J. K. Small, Fl. Miami 37—38 & 202. 1913; J. K. Small, Fl. Southeast. U. S., ed. 2, 234—236 & 1382. 1913; H. Hallier, Beih. Bot. Centralbl. 34 (2): 45—46. 1916; E. D. Merr., Bibl. Enum. Born. Pl. 110—111. 1921; Molfino, Physis 6: 361—362. 1923; Alv. Silv., Fl. Mont. 1: [7], [11]—20, [397]—398, [421]—422, & [I], pl. 1—6 ["IV"]. 1928; J. K. Small, Man. Southeast. Fl. 255, 257—258, & 1525. 1933; Satake, Bot. Mag. Tokyo 51: 285—291 [Shib. Comm. Art. 17: 103—109], fig. 1—3. 1937; H. Pittier, La Mesa Guanip. 22. 1942; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: [69]—91, [99], & [101]—104, pl. 14—21. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 750, 829, & 877—880 (1946) and 2: 35, 71, 295, 681, 960, 1021, & 1283. 1946; Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: [311]—319, 321—332, 339, & 340, fig. 1—6, pl. 1 & 2. 1946; Jacques-Félix, Bull. Soc. Bot. France 94: 143—151. 1947; E. H. Walker, Contrib. U. S. Nat. Herb. 30: 380. 1947; Suesseng. & Heine, Mitteil. Staatssamm. München 2: 57—58. 1950; Rambo, Anais Bot. 2: 128. 1950; Heine in Fedde, Repert. Sp. Nov. 54: 223—224. 1951; Moldenke in Maguire & Phelps, Bol. Soc. Venez. Cienc. Nat. 14: 10. 1952; Moldenke in Maguire, Mem. N. Y. Bot. Gard. 8: 97. 1953; E. J. Salisb., Ind. Kew. Suppl. 11: 88 & 157. 1953; Niering, Ecol. Monog. 23: 132. 1953; Suesseng. & Heine, Mitteil. Staatssamm. München 6: 220 & 227. 1953; Koyama, Philip. Journ. Sci. 84: 367—378, pl. 2—6. 1956; Moldenke in Maguire & Wurdack, Mem. N. Y. Bot. Gard. 9: 278. 1957; Cuatrecasas, Revist. Acad. Colomb. Cienc. 10: 254. 1958; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 750, 829, & 877—880 (1960) and 2: 35, 71, 295, 681, 960, 1021, & 1283. 1960; Tamayo, Bol. Soc. Venez. Cienc. Nat. 22: 40, 46, 87—88, & 170. 1961; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 175—185 & 429—430, pl. 48, fig. 303—311. 1964; Thwaites & Hook. f., Enum. Pl. Zeyl., pr. 2, 341. 1964; Hocking, Excerpt. Bot. A.13: 506. 1968; Moldenke, Phytologia 18: 74—112. 1969.

While the variant classical orthography with a "v" instead of a "u" in this generic name, used by Willdenow (1797), is not

definitely accredited to Linnaeus by him, the credit is certainly implied since he cites Linnaeus' Genera Plantarum, ed. 4, immediately after the name.

The Humboldt, Bonpland, & Kunth references in the bibliography given above are sometimes dated "1815" or "1817", and, indeed, the title-page of the folio edition is dated "1815", but according to Barnhart (1902) the pages and plates which concern us here were first published in 1816.

The members of this genus are usually called "pipeworts", "button-rods", or "hat-pins" in the United States and "joncinelle" in French-speaking lands.

ERIOCAULON ACHITON Körn.

Additional bibliography: Benth., Fl. Austral. 7: 194. 1878; Hook. f., Fl. Brit. Ind. 6: 584. 1893; Fyson, Journ. Indian Bot. 3: 18. 1922; Moldenke, Phytologia 18: 59 (1968) and 18: 104 (1969) and 17: 477. 1969.

Bentham (1878) reduces E. achiton to synonymy under E. nigricans R. Br., which, in turn, is now reduced to synonymy under E. pygmaeum Soland.

ERIOCAULON AFRICANUM Hochst.

Additional bibliography: Moldenke, Phytologia 17: 478. 1969.

It should be noted that the homonym, E. africanum Sonder, 1960, is a synonym of E. matopense Rendle.

ERIOCAULON AFZELIANUM Wikstr.

Additional bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 164. 1867; Moldenke, Phytologia 18: 77. 1969.

ERIOCAULON ALPESTRE Hook. f. & Thoms.

Additional & emended bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 163. 1867; Hook. f., Fl. Brit. Ind. 6: 578. 1893; Fyson, Journ. Indian Bot. 3: 12, pl. 42. 1922; Koyama, Philip. Journ. Sci. 84: 367--368. 1956; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 429. 1964; Moldenke, Phytologia 18: 77. 1969.

Illustrations: Fyson, Journ. Indian Bot. 3: pl. 42. 1922.

Hooker (1893) regarded E. kiusianum Maxim. as a synonym of E. alpestre.

ERIOCAULON ANGUSTIFOLIUM Körn.

Additional bibliography: Alv. Silv., Fl. Mont. 1: [397]. 1928; Moldenke, Phytologia 17: 479. 1969.

Silveira (1928) cites A. Silveira 344 from Minas Gerais.

ERIOCAULON ANNAMENSE H. Lecomte

Additional & emended bibliography: H. Lecomte, Not. Syst. 2: 215 (1912) and 2: 393. 1913; Moldenke, Phytologia 17: 480. 1969.

ERIOCAULON ARECHAVALETAE Herter

Additional synonymy: Eriocaulon arechavaleta Herter apud Abbi-

atti, Rev. Mus. La Plata Bot., new ser., 6: 326, sphalm. 1946.

Additional & emended bibliography: Herter, Rev. Sudam. Bot. 2: 125. 1935; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 72, 75, 80—83, & [103], pl. 14 & 15. 1945; Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: 326. 1946; Moldenke, Phytologia 17: 480. 1969.

Illustrations: Castell. in Descole, Gen. & Sp. Pl. Argent. 3: pl. 14 & 15. 1945.

ERIOCAULON ATRATUM Körn.

Additional & emended bibliography: Hook. f., Fl. Brit. Ind. 6: 572—574 & 585. 1893; Fyson, Journ. Indian Bot. 3: 18. 1922; Moldenke, Phytologia 18: 77. 1969.

Fyson (1921), in his discussion of E. ceylanicum Körn., notes that "This species is very closely allied to E. atratum, and if the involucral bracts of the latter vary, as stated by Hooker in Fl. Ceylon from black to yellowish, all these forms should be included under one species. The only other real distinction given by Hooker is that the lower floral bracts of E. atratum are very shortly cuspidate, the upper being acute (as in E. ceylanicum)."

ERIOCAULON ATRATUM var. MAJOR Thwaites

Additional synonymy: Eriocaulon atratum β major Thwaites apud Hook. f., Fl. Brit. Ind. 6: 573, in syn. 1893. Eriocaulon atratum var. minor Mart. ex Moldenke, Phytologia 4: 340, in syn. 1953.

Additional bibliography: Hook. f., Fl. Brit. Ind. 6: 572—573. 1893; Fyson, Journ. Indian Bot. 3: 18. 1922; Moldenke, Phytologia 18: 77—78. 1969.

ERIOCAULON ATRUM Nakai

Additional & emended bibliography: Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 53, 57, & 60—61, pl. 12, fig. 24. 1940; Moldenke, Phytologia 18: 78, 107, & 108. 1969.

ERIOCAULON AUSTRALASICUM (F. Muell.) Körn.

Additional & emended bibliography: Benth., Fl. Austral. 7: 191, 195, & 792. 1878; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 829, 877, & 878 (1893), pr. 2, 1: 829, 877, & 878 (1946), and pr. 3, 1: 829, 877, & 878. 1960; Moldenke, Phytologia 18: 79. 1969.

ERIOCAULON AUSTRALE R. Br.

Additional & emended bibliography: Benth., Fl. Austral. 7: 190, 192, & 792. 1878; Koyama, Philip. Journ. Sci. 84: 368 & 378, pl. 6, fig. D. 1956; Moldenke, Phytologia 18: 79. 1969.

Illustrations: Koyama, Philip. Journ. Sci. 84: pl. 6, fig. D. 1956.

ERIOCAULON BANANI H. Lecomte

This entry is to be deleted because it has been shown that Lecomte's name is conspecific with and a synonymy of E. latifolium J. Sm.

ERIOCAULON BENTHAMI Kunth

Additional & emended bibliography: Morong, Bull. Torr. Bot. Club 18: 357—358. 1891; Moldenke, Carnegie Inst. Wash. Publ. 522: 141. 1940; Moldenke, Phytologia 18: 61 (1968) and 17: 483. 1969.

The Kinloch 213, distributed as E. benthami, is actually the tyoe collection of E. kinlochii Moldenke, while Perrottet 1166 is E. leucomelas Steud.

ERIOCAULON BIFISTULOSUM Van Heurck & Muell.-Arg.

Additional synonymy: Eriocaulon bifistulosum Van Heurck apud Hook. f., Fl. Brit. Ind. 6: 572. 1893. Eriocaulon setaceum Benth. apud Hook. f., Fl. Brit. Ind. 6: 572, in syn. 1893 [not E. setaceum Auct., 1903, nor Crantz, 1766, nor Heyne, 1832, nor L., 1753, nor Lour., 1790, nor Rottl., 1960, nor Wall., 1893, nor Wight, 1832, nor Willd., 1959].

Additional bibliography: Benth., Fl. Austral. 7: 191. 1878; Hook. f., Fl. Brit. Ind. 6: 572. 1893; Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: [311]. 1946; Moldenke, Phytologia 18: 79. 1969.

Eriocaulon setaceum L. is a valid species, with the homonyms accredited to Crantz and to Wallich as synonyms, but the E. setaceum credited to "Auct." is a synonym of E. intermedium Körn., while the homonym accredited to Heyne is E. sexangulare L., that credited to Loureiro is Fimbristylis setacea Benth. in the Cyperaceae, that credited to Rottler and to Willdenow is E. cinereum R. Br., and that credited to Wight is E. quinquangulare L.

Additional citations: CONGO LEOPOLDVILLE: Malaisse 5110 (Ac, Rf).

ERIOCAULON BILOBATUM Morong

Additional & emended bibliography: H. B. Davis, Life & Works Pringle 94, 123, & 141. 1936; Moldenke, Phytologia 17: 483. 1969.

ERIOCAULON BLUMEI Körn.

Additional bibliography: Moldenke, Phytologia 17: 483—484. 1969.

Van Steenis has recently given his opinion that E. macrophyllum Ruhl. should be reduced to synonymy under E. blumei.

ERIOCAULON BOMBAYANUM Ruhl.

Additional bibliography: Fyson, Journ. Indian Bot. 3: 17. 1922; Moldenke, Phytologia 17: 484. 1969.

ERIOCAULON BREVIPEDUNCULATUM Merr.

Additional bibliography: E. D. Merr., Bibl. Enum. Born. Pl. 110.

1921; Moldenke, Phytologia 18: 80. 1969.
Merrill (1921) cites Clemens 10611 and Haslam s.n. from British North Borneo (Sabah).

ERIOCAULON BREVISCAPUM Körn.
Emended synonymy: Eriocaulon breviscapon Körn. apud Fyson, Journ. Indian Bot. 3: 13 & 14, pl. 45. 1922.
Additional bibliography: Hook. f., Fl. Brit. Ind. 6: 575--576. 1893; Fyson, Journ. Indian Bot. 3: 13 & 14. 1922; Moldenke, Phytologia 17: 485. 1969.
Illustrations: Fyson, Journ. Indian Bot. 3: pl. 45. 1922.

ERIOCAULON BROMELIOIDEUM H. Lecomte
Additional bibliography: H. Lecomte, Not. Syst. 2: 215 (1912) and 2: 393. 1913; Moldenke, Phytologia 18: 80. 1969.

ERIOCAULON BROMELIOIDEUM var. LATIFOLIUM H. Lecomte
Synonymy: Eriocaulon bromelioideum var. latifolia H. Lecomte, Not. Syst. 2: 215, hyponym. 1912.
Bibliography: H. Lecomte, Not. Syst. 2: 215 (1912) and 2: 393. 1913.
Lecomte (1912) gives no description for this taxon, but cites as the type Lecomte & Finet 1555bis from Dalat, Annam, Indochina. It is curious to note that the index to this volume is dated "31 décembre 1893" -- surely an error since this journal did not start until 1909 and volume 2 was issued in parts during 1911, 1912, and 1913. It seems obvious that the index was issued at the same time as the last text pages, namely, on December 31, 1913.

ERIOCAULON BROWNIANUM Mart.
Emended synonymy: Eriocaulon brownianum Wall., Numer. List 207. 1832 [not E. brownianum Hook. f., 1903].
Additional & emended bibliography: Mart. in Wall., Plant. As. Rar. 3: 25--26 & 28, pl. 248. 1832; Hook. f., Fl. Brit. Ind. 6: 576. 1893; Fyson, Journ. Indian Bot. 2: 262--264, pl. 17. 1921; Moldenke, Phytologia 18: 80. 1969.
Illustrations: Mart. in Wall., Plant. As. Rar. 3: pl. 248. 1832; Fyson, Journ. Indian Bot. 2: pl. 17. 1921.
Martius (1832) based this species on an unnumbered collection made by Silva in Silhet. Hooker (1893) regarded E. nilagirense Steud. as a synonym of E. brownianum, and this fact forms the basis for the homonym, E. brownianum Hook. f., cited by Ruhland (1903) as a synonym of E. nilagirense.
It is worth noting here that Fyson (1921) divided E. brownianum into three varieties: (a) var. typica, with the "leaves and involucre often (but not always) glabrous, Assam; Silhet (type), Khasia; Burma; Manipur"; (b) var. nilagirense, with the "Whole plant hairy and more robust than the type. Leaves usually shorter and broader, but sometimes narrow. Scapes stout and

hairy. Heads 1 inch flat or hemispheric. Involucre black, hairy. Female flower: — Sepals less deeply boatshaped. Petals a little broader; otherwise as in the type. See Fig. p. 263. S. India and Ceylon at high elevations. Very common in semi-dry or marshy land at about 7000 ft., forming usually dense tufts a foot or more across. The flowers smell strongly of honey and are visited by small butterflies. The name suggests that this is a variety confined to these regions but in Herb. Calcutta are sheets from Khazia hardly if at all different. Hooker was the first I think to reduce Steudel's species to E. brownianum Mart. Koernicke considered it closest to E. Wightianum. Var. b. was founded by Steudel as a distinct species, but reduced by Hooker to E. brownianum. It was restored to specific rank by Ruhland and because the type has glabrous involucre is separated in his clavis by 24 species"; and (c) var. macrophyllum, with no diagnostic characters given, but with the comments "Ruhl. lc. No. 95. Malay Peninsula....Ruhland described (lc. p. 77) the Malay Peninsula form (var. c) as a distinct species E. macrophyllum (Ruhl. No. 95) but if the sheet so named in Herb. Calc. is identified correctly it is in my opinion the same species. In Herb. Calc. is a sheet from China which might equally well be separated as a distinct species."

ERIOCAULON BRUNONIS Britten

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and 2: 681 (1895), pr. 2, 1: 879 (1946) and 2: 681 (1946), and pr. 3, 1: 879 (1960) and 2: 681. 1960; Moldenke, Phytologia 18: 80. 1969.

ERIOCAULON BUCHANANII Ruhl.

Additional bibliography: Moldenke, Phytologia 17: 485—486 (1969) and 18: 97. 1969.

The Raynal & Raynal 6879, distributed as E. buchananii, is actually E. inundatum Moldenke.

ERIOCAULON BUERGERIANUM Körn.

Additional & emended bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 163—164. 1867; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 108, 132—135, 140, 204, & 205. 1949; Koyama, Philip. Journ. Sci. 84: 368. 1956; Moldenke, Phytologia 18: 80. 1969.

The vernacular name, "tôyen-imunohige", is recorded for this species.

ERIOCAULON CABRALENSE Alv. Silv.

Additional & emended bibliography: Alv. Silv., Fl. Mont. 1: 17—19 & [397], pl. 5 & 5a. 1928; Moldenke, Phytologia 17: 486. 1969.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 5 & 5a. 1928.

Silveira (1928) cites A. Silveira 595 from Minas Gerais.

ERIOCAULON CAESIUM Griseb.

Additional bibliography: Alv. Silv., Fl. Mont. 1: 13. 1928; Moldenke, Phytologia 17: 486. 1969.

ERIOCAULON CARSONI F. Muell.

Additional & emended bibliography: Moldenke, Known Geogr. Distrib. Erioc. 27, 33, 40, 41, & 61. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 153 & 206. 1949; Moldenke, Phytologia 18: 81. 1969.

ERIOCAULON CEYLANICUM Körn.

Additional & emended synonymy: Eriocaulon ceylanicum var. subcaulescens Hook. f. ex Fyson, Journ. Indian Bot. 2: 310. 1921. Eriocaulon subacaulescens Hook. f. ex Moldenke, Known Geogr. Distrib. Erioc. 32, sphalm. 1946. Eriocaulon ceylanicum var. subcaulescens (Hook. f.) Fyson ex Moldenke, Phytologia 17: 458, in syn. 1968.

Additional & emended bibliography: Hook. f., Fl. Brit. Ind. 6: 573 & 585. 1893; Fyson, Journ. Indian Bot. 2: 310 & 312, pl. 27 & 28. 1921; Moldenke, Known Geogr. Distrib. Erioc. 24, 32, 33, 40, & 42. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 130, 204, & 206. 1949; Moldenke, Résumé Suppl. 1: 11, 16, 18, & 25. 1959; Moldenke, Phytologia 18: 81. 1969.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 27 & 28. 1921.

It should be noted here that Fyson (1921) considers Hooker's E. subcaulescens as a distinct variety of E. ceylanicum. He describes his E. ceylanicum var. typica as "Stems 0, leaves linear, 2—6 ins. by 1/10 ins., from a broader base. Ceylon, Eliya Lake". On the other hand, he describes E. ceylanicum var. subcaulescens as "Stem to 2 ins. Leaves narrow 2—4 ins. by 1/6 ins., slightly broader at the base. Scapes stouter, but heads exactly as in the type species of which this appears to be more developed or a form of drier positions. Plate 28. Ceylon; Horton Plain. This species is very closely allied to E. atratum, and if the involucral bracts of the latter vary, as stated by Hooker in Fl. Ceylon from black to yellowish, all these forms should be included under one species. The only other real distinction given by Hooker is that the lower floral bracts of E. atratum are very shortly cuspidate, the upper being acute (as in E. ceylanicum). Ruhland makes three species of these forms."

Hooker (1900) considered E. atratum Thwaites as a synonym of E. ceylanicum, but this name is now placed under E. subglaucum Ruhl. He also dates Körnicke's original description as "1854", but the page involved actually was not issued until 1856.

ERIOCAULON CINEREUM R. Br.

Emended synonymy: Eriocaulon sexangulare Mart. apud Hook. f., Fl. Brit. Ind. 6: 577, in syn. 1893 [not E. sexangulare Fyson, 1959, nor Heyne, 1832, nor L., 1753, nor Willd., 1841]. Eriocaulon hexangulare Kunth apud Hook. f., Fl. Brit. Ind. 6: 577, in syn.

1893 [not E. hexangulare L., 1959, nor Royle, 1839]. Eriocaulon hexangulare Wall. ex Moldenke, Bull. Jard. Bot. Brux. 27: 137, in syn. 1937. Eriocaulon siebolotianum Sieb. & Zucc. apud Koyama, Philip. Journ. Sci. 84: 373, sphalm. 1956. Eriocaulon setaceum Willd. ex Moldenke, Résumé 292, in syn. 1959 [not E. setaceum Auct., 1903, nor Benth., 1893, nor Crantz, 1766, nor Heyne, 1832, nor L., 1753, nor Lour., 1790, nor Wall., 1893, nor Wight, 1832].

Additional & emended bibliography: Benth., Fl. Austral. 7: 191, 193--194, & 792. 1878; Hook. f., Fl. Brit. Ind. 6: 577--578 & 585. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877--879 (1893) and 2: 71. 1894; Fyson, Journ. Indian Bot. 3: 13 & 15, pl. 50 & 51. 1922; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877--879 (1946) and 2: 71. 1946; Koyama, Philip. Journ. Sci. 84: 373. 1956; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877--879 (1960) and 2: 71. 1960; Moldenke, Phytologia 18: 81--82 & 105. 1969.

Additional illustrations: Fyson, Journ. Indian Bot. 3: pl. 50 & 51. 1922.

The E. setaceum, referred to in the synonymy above, is a valid species with the homonym accredited to Crantz and to Wallich as synonyms, while the homonym accredited to Bentham is E. bifistulosum Van Heurck & Muell.-Arg., that credited to Heyne is E. sexangulare L., that credited to Loureiro is Fimbristylis setacea Benth. in the Cyperaceae, and that credited to Wight is E. quinquangulare L. Hooker (1893) regarded E. setaceum Heyne as a synonym of what we now call E. cinereum R. Br., rather than E. sexangulare L.

ERIOCAULON CIPOENSE Alv. Silv.

Additional & emended bibliography: Alv. Silv., Fl. Mont. 1: [11]--12, 20, & [397], pl. 1. 1928; Moldenke, Phytologia 17: 488. 1969.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 1. 1928.

Silveira (1928) cites A. Silveira 343 from Minas Gerais.

ERIOCAULON COLLETTII Hook. f.

Additional & emended bibliography: Hook. f., Fl. Brit. Ind. 6: 575. 1893; Moldenke, Phytologia 17: 488. 1969.

ERIOCAULON COLLINUM Hook. f.

Additional & emended bibliography: Hook. f., Fl. Brit. Ind. 6: 584. 1893; Fyson, Journ. Indian Bot. 3: 14 & 18. 1922; Moldenke, Phytologia 18: 82 & 108. 1969.

The Benbauer 30, distributed as E. collinum, is actually E. leucomelas Steud. mixed with something non-eriocaulaceous.

ERIOCAULON COMPRESSUM Lam.

Additional & emended bibliography: Lam., Tabl. Encycl. 1: 213. 1791; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 & 878 (1893) and 2: 960. 1895; J. K. Small, Fl. Miami 37. 1913; J. K.

Small, Man. Southeast. Fl. 257 & 258. 1933; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 & 878 (1946) and 2: 960 (1946) and pr. 3, 1: 877 & 878 (1960) and 2: 960. 1960; Moldenke, Phytologia 18: 80 & 82—83. 1969.

The French vernacular name for this plant is "joncinelle comprimée".

ERIOCAULON CONCRETUM F. Muell.

Additional bibliography: Benth., Fl. Austral. 7: 191, 195, & 792. 1878; Moldenke, Phytologia 17: 497. 1969.

ERIOCAULON CRASSISCAPUM Bong.

Additional & emended bibliography: Alv. Silv., Fl. Mont. 1: [397]. 1928; Molfino, Physis 6: 361—362. 1923; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 70, 73, 81, 87, 88, & [103], pl. 17 & 21. 1945; Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: [311]—313, 318, 319, 321, 327, 329—332, 339, & 340, fig. 4 (D) & 6, pl. 2 (1). 1946; Moldenke, Phytologia 17: 494—495. 1969.

Emended illustrations: Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: 327 & 330, fig. 4 (D) & 6, pl. 2 (1). 1946.

Silveira (1928) cites A. Silveira 201 from Minas Gerais.

ERIOCAULON CRISTATUM Mart.

Additional & emended bibliography: Körn., Linnaea 27: 609. 1856; Wall., Numer. List 208 ["207"]. 1832; Kunth, Enum. Pl. 3: 559—560 & 568. 1841; Hook. f., Fl. Brit. Ind. 6: 573 & 574. 1893; Moldenke, Phytologia 18: 78, 81, & 83. 1969.

It is worth noting that Wallich (1832), Kunth (1841), and Hooker (1893) all regarded E. quinquangulare Heyne as a synonym of what they called E. melaleucum Mart., now known as E. leucomelas Steud., rather than as a synonym of E. cristatum.

Martius (1832) based E. cristatum on an unnumbered collection of Bruce and one of Silva from Silhet.

The Meebold 9735, distributed as E. cristatum, is actually E. leucomelas Steud.

ERIOCAULON CUSPIDATUM Dalz.

Additional & emended bibliography: Hook. f., Fl. Brit. Ind. 6: 581. 1893; Moldenke, Phytologia 18: 83. 1969.

ERIOCAULON DALZELLII Körn.

Additional synonymy: Eriocaulon dalzeli Fyson, Journ. Indian Bot. 3: 14, in syn. 1922.

Additional & emended bibliography: Hook. f., Fl. Brit. Ind. 6: 580—581 & 585. 1893; H. Lecomte, Not. Syst. 2: 215 & 216 (1912) and 2: 393. 1913; Fyson, Journ. Indian Bot. 3: 13 & 14, pl. 46. 1922; Moldenke, Phytologia 18: 83—84. 1969.

Illustrations: Fyson, Journ. Indian Bot. 3: pl. 46. 1922.

ERIOCAULON DECANGULARE L.

Additional synonymy: Eriocavlon statices Crantz, Inst. 1: 360. 1766. Eriocaulon statices Crantz apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879, in syn. 1893. Eriocaulon decemangulare L. ex Moldenke, Résumé 287, in syn. 1959 [not E. decemangulare H.B.K., 1815, nor Körn., 1959].

Additional & emended bibliography: Lightf., Fl. Scot., ed. 1, 2: 569--570 (1777) and ed. 2, pr. 1, 2: 569--570. 1789; Lam., Tabl. Encycl. 1: 213. 1791; Lightf., Fl. Scot., ed. 2, pr. 2, 2: 569--570. 1792; H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: 202 (1816) and ed. quarto, 1: 254. 1816; Mart. in Wall., Plant. As. Rar. 3: 28. 1832; Morong, Bull. Torr. Bot. Club 18: 354--355. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 681 & 1021. 1895; J. K. Small, Fl. Miami 37. 1913; J. K. Small, Man. Southeast. Fl. 257 & 258. 1933; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: [79] & [103]. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 681 & 1021 (1946) and pr. 3, 1: 878 (1960) and 2: 681 & 1021. 1960; Hocking, Excerpt. Bot. A.13: 506. 1968; Moldenke, Phytologia 18: 83 & 84. 1969.

The E. decangulare Lightf. is a synonym of the Old World E. septangulare With., not of E. pellucidum Michx. ( a New World species) as erroneously stated by me in a previous publication before I knew where its type was collected. The E. decemangulare H.B.K. and its homonym accredited to Körnicke are both synonyms of E. humboldtii Kunth. Humboldt, Bonpland, & Kunth (1816) actually propose their E. decemangulare as a new orthography, and therefore a new name, for E. decangulare L., but it is usually placed in the synonymy of E. humboldtii because it is accompanied by a new diagnosis, does not have Linnaeus' surname immediately following, and it based entirely on South American plant specimens.

The French vernacular name for E. decangulare is "joncinelle decangulaire".

ERIOCAULON DECANGULARE var. MINOR Moldenke

Additional bibliography: Moldenke, Phytologia 18: 45--46. 1968; Hocking, Excerpt. Bot. A.13: 506. 1968.

ERIOCAULON DEPRESSUM R. Br.

Additional bibliography: Benth., Fl. Austral. 7: 191, 197--198, & 792. 1878; Moldenke, Phytologia 18: 85 & 112. 1969.

Bentham (1878) regarded E. heterogynum F. Muell. as conspecific with and a synonym of this taxon, but Ruhland (1903) keeps them apart.

ERIOCAULON DICTYOPHYLLUM Körn.

Additional bibliography: Alv. Silv., Fl. Mont. 1: [397]. 1928; Moldenke, Phytologia 18: 85 & 91. 1969.

Silveira (1928) cites A. Silveira 467 from Minas Gerais.

ERIOCAULON DREGEI Hochst.

Additional bibliography: Meikle, Kew Bull. 22: 141. 1968; Mol-

denke, Phytologia 18: 56--57. 1968.

Meikle (1968) asserts that E. mamfeense Meikle is related to E. dregei, "sed scapis numerosioribus, gracilioribus, capitulis minoribus, bracteis floralibus et floribus stramineis nec fuscidulis, sepalis floris foeminei haud alato-carinatis inter alia recedit".

ERIOCAULON DUTHIEI Hook. f.

Additional & emended bibliography: Hook. f., Fl. Brit. Ind. 6: 578. 1893; Moldenke, Phytologia 18: 85. 1969.

ERIOCAULON EBERHARDTII H. Lecomte

Additional & emended bibliography: H. Lecomte, Not. Syst. 2: 215 (1912) and 2: 393. 1913: Moldenke, Phytologia 18: 57--58. 1968.

ERIOCAULON ECHINULATUM Mart.

Additional & emended bibliography: Hook. f., Fl. Brit. Ind. 6: 579. 1893; H. Lecomte, Not. Syst. 2: 215 (1912) and 2: 393. 1913; Koyama, Philip. Journ. Sci. 84: 368--369. 1956; Moldenke, Phytologia 18: 85 & 103. 1969.

Martius (1832) based this species on an unnumbered W. Gomez collection from Tavoy.

ERIOCAULON EHRENBERGIANUM Klotzsch

Additional synonymy: Eriocaulon sessaei Moldenke, Résumé Suppl. 17: 1 & 9, hyponym. 1968.

Additional & emended bibliography: Sessé & Moc., Fl. Mex., ed. 1, 17 [La Naturaleza, ser. 2, 2: App. 2] (1893) and ed. 2, 16. 1894; Alv. Silv., Fl. Mont. 1: 20. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 88. 1929; Moldenke, Résumé Suppl. 17: [1], 9, & 10. 1968; Moldenke, Phytologia 18: 85. 1969.

The original description of E. anceps by Sessé & Mocino (1893), on which E. sessaei Moldenke was based, is as follows: "Eriocaulon culmo ancipiti, foliis ensiformibus capitulo ouato. Folia radicalia, ensiformia, integerrima, exsuccosa, asperiuscula. Culmus anceps, erectus, glaber. Capitulum terminale, ouatum, multiflorum. Glumae ouatae, concauae, coriaceae, sessiles, fuscae. Flores lutei, insipidi, inodorique. Petala basi barbata. Antherae didymae. Semina plurima minutissima. Habitat in Ahualulci apricis. Floret Septembri. ♃."

There has been considerable discussion about the exact location of the Ahualulco of Sessé & Mociño. The United States Board of Geographic Names' Gazeteer of Mexico lists three localities with this name: (1) in Jalisco, 40 miles north of Guadalajara, and also known as Ahualulco del Mercados, (2) in San Luis Potosí, 20 miles northwest of the city of that name, and (3) a small village in Guanajuato. The Lippincott Gazeteer states that the first of these has a population of 6000, the second of 1000, and the third is not listed at all. Sprague in 1926 [Kew Bull. Misc. Inf. 9: 417--425] concluded that the Jalisco location is the one

visited by Sessé & Mociño because it is the largest and is on a railroad. I am indebted to Mrs. Ida K Langman, in a letter to me dated December 23, 1968, for this valuable information.

Dr. Rogers McVaugh, however, in a recent communication to me states that there is still another place by that name, in Tabasco, and that, based on the evidence of Sessé & Mociño's collections themselves and the types of ecological habitat available at this site as compared to the others, it is obvious to him that the Tabasco locality is actually the one visited by Sessé & Mociño and is the one referred to by them in their published works.

ERIOCAULON ELICHRYSOIDES Bong.

Additional bibliography: Moldenke, Phytologia 18: 86--87 & 100. 1969.

The Sellow B.1290 C.263, distributed as E. elichrysoides, seems actually to be the type collection of E. kunthii Körn.

Additional citations: PARAGUAY: Hassler 11348 (Ca--929858).

ERIOCAULON EURYPEPLON Körn.

Additional bibliography: Hook. f., Fl. Brit. Ind. 6: 585. 1893; Fyson, Journ. Indian Bot. 3: 17. 1922; Moldenke, Phytologia 18: 88. 1969.

ERIOCAULON FISTULOSUM R. Br.

Additional bibliography: Benth., Fl. Austral. 7: 191, 197, & 792. 1878; Moldenke, Phytologia 18: 90. 1969.

ERIOCAULON FLUVIATILE Trimen

Additional bibliography: Hook. f., Fl. Brit. Ind. 6: 585. 1893; Fyson, Journ. Indian Bot. 3: 13 & 15, pl. 49. 1922; Moldenke, Phytologia 18: 90--91. 1969.

Illustrations: Fyson, Journ. Indian Bot. 3: pl. 49. 1922.

ERIOCAULON GIBBOSUM Körn.

Additional bibliography: Moldenke, Phytologia 18: 88 & 93--94. 1969.

Silveira (1928) cites A. Silveira 620 from Minas Gerais.

ERIOCAULON GILGIANUM Ruhl.

Additional bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 750 (1893), pr. 2, 1: 750 (1946), and pr. 3, 1: 750. 1960; Moldenke, Phytologia 18: 94--98. 1969.

ERIOCAULON GLABRIFLORUM Ridl.

Additional bibliography: Koyama, Philip. Journ. Sci. 84: 374. 1956; Moldenke, Phytologia 18: 98. 1969.

ERIOCAULON GLAUCUM Griff.

Additional bibliography: Fyson, Journ. Indian Bot. 3: 17. 1922; Moldenke, Phytologia 18: 99. 1969.

ERIOCAULON GLAZIOVII Ruhl.

Additional bibliography: Castell. in Descole, Gen. & Sp. Fl. Argent. 3: 75 & [103]. 1945; Moldenke, Phytologia 18: 99. 1969.

Silveira (1928) cites A. Silveira 621 from Minas Gerais.

ERIOCAULON GRACILE Mart.

Emended synonymy: Eriocaulon sericans Hook. f., Fl. Brit. Ind. 6: 577. 1893 [not E. sericans Heyne, 1832, nor Mart., 1893].

Additional & emended bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 164. 1867; Hook. f., Fl. Brit. Ind. 6: 577. 1893; Moldenke, Phytologia 18: 100—103. 1969.

Hooker (1893) reduces E. gracile to synonymy under what he called E. sericans Mart., as he also does E. infirmum Steud. Martius (1832) seems to have based his E. gracile on Wallich 1827.

ERIOCAULON HAMILTONIANUM Mart.

Additional synonymy: Eriocaulon oryzetorum Hook. f. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 107, in syn. 1903 [not E. oryzetorum Mart., 1832]. Eriocaulon orizetorum Hook. f. apud H. Lecomte, Not. Syst. 2: 214, in syn. 1912.

Additional & emended bibliography: Hook. f., Fl. Brit. Ind. 6: 579. 1893; H. Lecomte, Not. Syst. 2: 214 (1912) and 2: 393. 1913; Fyson, Journ. Indian Bot. 2: 313 & 316, pl. 33. 1921; Moldenke, Phytologia 18: 105—107. 1969.

Hooker (1893) reduces E. hamiltonianum to the synonymy of E. oryzetorum Mart., which is a valid species. It is to be noted that Ruhland (1903) dates the Hooker reference as "1894", but the page involved here was actually issued in 1893.

ERIOCAULON HAMILTONIANUM var. MINOR Fyson

Additional & emended bibliography: Fyson, Journ. Indian Bot. 2: 313 & 316. 1921; Moldenke, Phytologia 18: 107. 1969.

ERIOCAULON HAYATANUM Koyama

Additional & emended bibliography: Koyama, Philip. Journ. Sci. 84: 369—370, 377, & 378, pl. 2, fig. 3, & pl. 5, fig. B 1—6, 11, & 12. 1956; Moldenke, Phytologia 18: 108. 1969.

Emended illustrations: Koyama, Philip. Journ. Sci. 84: pl. 2, fig. 3, & pl. 5, fig. B 1—6, 11, & 12. 1956.

ERIOCAULON HETEROCHITON Körn.

Additional bibliography: Moldenke, Phytologia 18: 110—112. 1969.

The Eriocaulon heterochiton "sensu Lecomte" is a synonym of E. irregulare Meikle.

ERIOCAULON HETEROGYNUM F. Muell.

Additional & emended bibliography: Benth., Fl. Austral. 7: 197. 1878; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878

(1893) and 2: 681 (1895), pr. 2, 1: 878 (1946) and 2: 681 (1946), and pr. 3, 1: 878 (1960) and 2: 681. 1960; Moldenke, Phytologia 18: 112. 1969.

Bentham (1878) regarded this taxon as a synonym of E. depressum R. Br., but Ruhland (1903) maintains them as distinct.

ERIOCAULON HETEROLEPIS Steud.

Synonymy: Eriocaulon heterolepis Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 162. 1867.

Additional bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 162. 1867; Hook. f., Fl. Brit. Ind. 6: 585. 1893; Fyson, Journ. Indian Bot. 2: 316 (1921) and 3: 16. 1922; Moldenke, Phytologia 18: 112. 1969.

It is well worth noting here that Fyson (1921), in his discussion of E. margaretae Fyson, says "This may be E. heterolepis: Steud, but I have not seen any sheet so named. Ruhland lc. s. described that species as having broader leaves and with the inner involucral bracts obtuse and lacerate".

Additional citations: INDIA: Mysore: S. N. Ramaswamy 13 (Z). Surgaja: Koelz 19208 (Mi).

ERIOCAULON HETEROLEPIS var. NIGRICANS Körn.

Bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 239. 1867; Ruhl. in Engl., Pflanzenreich 13 (4-30): 74 & 286. 1903; Moldenke, Known Geogr. Distrib. Erioc. 27 & 35. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 144 & 204. 1949; Moldenke, Résumé 190 & 481. 1959.

The type of this variety was collected by Willem Hendrik de Vriese in Java. According to Ruhland (1903) it "Differt a typo capitulis nigrescentibus albido-pubescentibus, sepalis saturatius vel obscure olivaceo-viridibus".

Citations: INDONESIA: GREATER SUNDA ISLANDS: Java: Boschproefst. 6690 (Bi).

ERIOCAULON HETEROMALLUM Bong.

Bibliography: Bong., Mém. Acad. Sci. St. Pétersb., ser. 6, 1: 626, pl. 39. 1831; Kunth, Enum. Pl. 3: 574. 1841; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893), pr. 2, 1: 878 (1946), and pr. 3, 1: 878. 1960.

Nothing is known to me about this taxon except what is given about it in the bibliography above. It was apparently overlooked by Ruhland when he prepared his monograph, as also by Martius and Körnicke. The description, as given by Kunth (1841) is as follows: "Acaule; foliis caespitosis, linearibus, obtusiusculis, piloso-incanis, subhomomallis; pedunculo solitario, incano; vagina apice barbata. — In glareosis Serra da Lapa." Kunth tells us also that the Bongard plate, referred to above, was never actually published.

ERIOCAULON HETEROPEPLON Alv. Silv.

Bibliography: Alv. Silv., Fl. Serr. Min. 34. 1908; Alv. Silv.,

Fl. Mont. 1: 12—13 & [397], pl. 2 (1). 1928; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 76 & 204. 1949; Moldenke, Résumé 89 & 481. 1959; Moldenke, Phytologia 17: 383. 1968.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 2 (1). 1928.

Citations: BRAZIL: Minas Gerais: A. Silveira 345 (B—isotype, Z—isotype).

ERIOCAULON HETEROPETALUM Ruhl.

Bibliography: Ruhl. in Fedde, Repert. Sp. Nov. 22: 33. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Moldenke, N. Am. Fl. 19 (1): 19 & 30—31. 1937; Moldenke, Phytologia 1: 318. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 35. 1946; León, Fl. Cuba 1: 281. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 43 & 204. 1949; Moldenke, Résumé 51 & 481. 1959.

Additional citations: CUBA: Pinar del Río: Ekman 17253 (S—type).

ERIOCAULON HEUDELOTII N. E. Br.

Synonymy: Eriocaulon hendeloti N. E. Br. apud Nakai & Honda, Nov. Fl. Jap. 6: 20 & 87, sphalm. 1940.

Bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 258. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 113 & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Nakai & Honda, Nov. Fl. Jap. 6: 20 & 87. 1940; Moldenke, Known Geogr. Distrib. Erioc. 20 & 35. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 109, 111, & 204. 1949; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 174—176, pl. 9, fig. 4. 1955; Moldenke, Résumé 133, 135, 147, 288, & 481. 1959; Moldenke, Résumé Suppl. 3: 15. 1962; Berhaut, Fl. Sénégal, ed. 2, 312. 1967; Moldenke, Phytologia 17: 395. 1968.

Illustrations: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: pl. 9, fig. 4. 1955.

Hess (1955) says that Baum in 1903 reported Baum 111 as being E. sexangulare L., whereas actually it is a mixture of E. amboense Schinz and E. heudelotii N. E. Br. He also comments that "Aus dem Herbarium Kew konnte ich das Original-Material von Eriocaulon Heudelotii untersuchen. Es wurde von Heudelot ohne nähere Fundortsangabe 1838 in Senegambien gesammelt (Nr. 677). Das Material von Baum (Nr. 111) stimmt gut mit dem Original-Material überein. An den Pflanzen aus Angola sind die Brakteen auf dem Rücken oft etwas behaart; dies konnte ich am Material aus Senegambien nicht feststellen. Weiter sind die Blätter an Nr. 111 fein bespitzt. Nr. 677 von Heudelot hat allmählich in eine feine Spitze ausgezogene Blätter; doch sind an diesem Material nur wenige gut erhaltene Blätter vorhanden, so dass der Unterschied nicht gesichert ist. Es besteht kein Zweifel, dass das Material aus Angola zu Eriocaulon Heudelotii gehört." He says, further, that "Eriocaulon Heudelotii steht E. cinereum R. Br.....nahe. Diese Art hat jedoch drei Sepalen in den ♀ Blüten, stimmt sonst aber weitgehend mit E. Heudelotii

überein." He cites only Baum 111 from Huila, Angola. Berhaut (1967) cites Berhaut 1259 from Sénégal.

The Couey 1, distributed as E. heudelotii, is actually E. bifistulosum Van Heurck & Muell.-Arg.

Additional citations: MALI: Soudan: Jaeger 5581 (Z). SÉNÉGAL: J. G. Adam 18255 (Z); Jaeger 5581a (An).

ERIOCAULON HILDEBRANDTII Körn.

Bibliography: Ruhl. in Engl., Bot. Jahrb. 27: 73. 1899; Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 13, 103, 108—109, & 286, fig. 14 A—N. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; H. Lecomte, Bull. Soc. Bot. France 55: 571. 1908; Moldenke, Known Geogr. Distrib. Erioc. 22 & 35. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 123 & 204. 1949; Moldenke, Phytologia 3: 327. 1950; Moldenke in Humbert, Fl. Madag. 36: 6, [7], & 9, fig. 1 (13—21). 1955; Moldenke, Résumé 156 & 481. 1959.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 108, fig. 14 A—N. 1903; Moldenke in Humbert, Fl. Madag. 36: [7], fig. 1 (13—21). 1955.

Additional citations: MADAGASCAR: Hildebrandt 3598 (B—type, B—isotype, P—isotype).

ERIOCAULON HIRSUTULUM Moldenke

Bibliography: Moldenke, Résumé Suppl. 4: 6. 1962; Moldenke, Phytologia 8: 387. 1962; Moldenke, Biol. Abstr. 42: 1517. 1963; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1962: 29. 1963; Hocking, Excerpt. Bot. A.6: 455. 1963; Berhaut, Fl. Sénégal, ed. 2, 311. 1967.

Citations: SÉNÉGAL: J. G. Adam 18370 (Z—type).

ERIOCAULON HOMOTEPALUM Koyama

Bibliography: Koyama, Philip. Journ. Sci. 84: 370—371, 377, & 378, pl. 2, fig. 2, & pl. 5, fig. C. 1956; Moldenke, Résumé 176 & 481. 1959; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

Illustrations: Koyama, Philip. Journ. Sci. 84: 377 & 378, pl. 2, fig. 2, & pl. 5, fig. C. 1956.

The species is based on a collection made by Bunzô Hayata (no. 997) at Krong Pha, Annam, on June 23, 1921. Koyama comments that "This species more or less resembles Japanese E. atrum and its allies in its external appearance of vegetative parts, there has been no suggestion, however, that the two species are otherwise akin."

ERIOCAULON HONDOENSE Satake

Synonymy: Eriocaulon sikokianum Miyabe & Kudo apud Nakai & Honda, Nov. Fl. Jap. 6: 49 & 87, in syn. 1940 [not E. sikokianum Maxim., 1892]. Eriocaulon miquelianum Auct. Jap. ex Nakai & Honda, Nov. Fl. Jap. 6: 49 & 87, in syn. 1940 [not E. miquelianum Körn., 1867, nor Koeck., 1940, nor Mori, 1940]. Eriocaulon miquelianum Miyabe & Kudo apud Nakai & Honda, Nov. Fl. Jap. 6: 49 &

87, in syn. 1940. Eriocaulon miquelianum Miyabe & Tatew. apud Nakai & Honda, Nov. Fl. Jap. 6: 49 & 87, in syn. 1940. Eriocaulon hondoënse Satake apud Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947. Eriocaulon hondoensis x robustius Koyama ex Moldenke, Résumé Suppl. 3: 32, in syn. 1962.

Bibliography: Miyabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. 27 [Fl. Hokk. & Saghal. 3]: 287. 1932; Satake, Bot. Mag. Tokyo 51: 288--291 [Shib. Comm. Art. 17: 106--109], fig. 3. 1937; Miyabe & Tatew., Trans. Sapporo Nat. Hist. Soc. 15: 47. 1937; Honda, Nom. Pl. Jap. 462. 1939; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 37--40, fig. 13. 1940; Nakai & Honda, Nov. Fl. Jap. 6: 6, 7, 13, 26, 45, 49, 50, 57--59, 77, 80, & 87, fig. 1 (I), 2 (I), & 22. 1940; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 133, 134, & 204. 1949; Moldenke, Phytologia 3: 327. 1950; Moldenke, Résumé 171, 173, 289, 290, 292, & 481. 1959; Moldenke, Résumé Suppl. 3: 18, 19, 21, & 32. 1962; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 180--181 & 429, fig. 123 (1), & pl. 48, fig. 306. 1964; Moldenke, Résumé Suppl. 12: 9 & 10. 1965.

Illustrations: Satake, Bot. Mag. Tokyo 51: 288 [Shib. Comm. Art. 17: 106], fig. 3. 1937; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] fig. 13. 1940; Nakai & Honda, Nov. Fl. Jap. 6: 6, 7, & 50, fig. 1 (I), 2 (I), & 22. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 180, fig. 123 (1) & pl. 48, fig. 306 [in color]. 1964.

This species has been collected in ricefields, flowering and fruiting from July to November. Koyama tells us that Koyama 13103 was growing in shallow clear water at the edge of a large swamp; Ohwi & Koyama 13102 was "quite common" in a "densely vegetated marsh", with its "flowers and receptacle entirely glabrous"; Koyama & Itô s.n. [7 October 1953] was "abundant in marshy place around a pond" and is "well characterized by entirely glabrous floral parts except the inner surface of pistillate petals where pilose". Vernacular names for the plant are "inonohige", "inuno-hige", "nippon-inunohige", and "nippon-inuno-hige". The type was collected by T. Nakazima at Sinzyô-mura, in the province of Kii, Hunshu, in September, 1924.

The E. miquelianum Körn., referred to in the synonymy above, is a valid species, of which E. miquelianum Koeck. is a synonym; the E. miquelianum of Mori is E. tenuissimum Nakai. Eriocaulon sikokianum Maxim., also referred to above, is also a valid species.

Material of E. hondoense has been abundantly misidentified and distributed in herbaria under the names E. miquelianum Körn. and E. shikokianum Maxim. Furuse s.n. [16 Oct. 1956] was identified by Koyama as "E. hondoensis x robustius ?", while Furuse s.n. [Hirataki-numa, 19 Sept. 1955] is apparently a mixture with E. robustius (Maxim.) Mak.

Satake (1940) gives us a very detailed description of this species and comments that it "Resembles Eriocaulon Miquelianum, but this plant is more rigid, the leaves are broader and thicker and somewhat nitidous on the upper surface, the heads larger, and the floral bracts almost glabrous". He cites the following collections: KOREAN COASTAL ISLANDS: Saisyu-to: Faurie 1839. JAPAN: Hokkaido: Faurie 1429 & 5238; Hara s.n. [Syoya, Sept. 1933]; Yamamoto 7904, 7905, & s.n. [Sept. 1932]; Yokoyama 4564. Honshu: Akita 37351; Andô 33 & 34; Collector undetermined 3592 & 32721; Faurie 1244, 1245, 1866, 1870, 6252, & s.n. [Aomori, Oct. 1904]; Inoue 55899; Itô s.n. [Ryû-senzi, Aug. 1890], s.n. [inter Simotu et Hamasima, Oct. 1893], & s.n. [Tasiro-mura, Oct. 1893]; Iwabuti 5438, 5445, 5446, 5456, & 5458; Kinasi 361 & s.n. [Sept. 1908]; Kinouti 51288; Koidzumi 34102, 34105, & s.n. [Higasiyama, Oct. 1920]; Maekawa 10028 & 10033; Makino s.n. [Hutakawa-mura, Oct. 1894]; Murau 146; Nakazima s.n. [Sinzyô-mura, Sept. 1924]; Nikai 799 & 49453; Nisizima 41858; Okuyama 25; Sakaguti 20; Satake s.n. [Tataranuma, Oct. 1936]; Sekimoto s.n. [Siro-yama-mura, Sept. 1931]; Simizu 332; Siota s.n. [Kamiho-mura, Nov. 1927]; Sono 17147; Tasiro 38234 & s.n. [Ooi-mura, Oct. 1930]; Watanabi s.n. [Arai-mura, Oct. 1893]; Yamazaki 88543; Yosikawa 57460. Kyushu: Ide 52704; Kôzuma 23128; Matsumura s.n. [Katuo-mura, Oct. 1880]; Mayebara 358; Nakasima 50 & 51; Sugino 19 & s.n. [Miyake-mura, 1927]; Tasiro 43764, 43766, 60089, & s.n. [Yamasita-ike, Sept. 1922]. Miyakejima: Hayasi 55898. Shikoku: Faurie 11855; Oti 1, 4, & 8; Watanabe s.n. [Sakawa, Sept. 1894]; Yamasita s.n. [Omaki-mura].

Additional citations: WESTERN PACIFIC ISLANDS: JAPAN: Hokkaido: Faurie s.n. [Hakodate, 29.9.1902] (S); Maximowicz s.n. [Hakodate, 1861] (C, N). Honshu: Collector undetermined s.n. [Mt. Mizaki, 12-7-1905] (N); Furuse 19849 (S), s.n. [Matsuzaka-tooga, 3 Oct. 1952] (S, S), s.n. [Makino, 29 Sept. 1953] (S), s.n. [Shiriya, 17 Sept. 1954] (S, S), s.n. [Fukkoshi, 18 Sept. 1954] (S), s.n. [Hirataki-numa, 19 Sept. 1955] (S), s.n. [Gyoonin-bara, 27 Sept. 1955] (S, S), s.n. [Shimidzu-numa, 6 Oct. 1955] (S, S), s.n. [Tochikubo, 2 July 1956] (S), s.n. [16 Oct. 1956] (S, S), s.n. [22 Sept. 1957] (S, Z), s.n. [23 Sept. 1957] (S), s.n. [Echigo Hondo] (Mg, Ss); C. Hashimoto 399 (B, Ca--955768, Go, Kg, Mg, Mi, N, S, Vi); Koyama 13103 (Ss); Koyama & Itô s.n. [7 October 1953] (Ss); Y. Matsumura 6676 (N); Ohwi 164 (Go), 166 (Go), s.n. [Mizoro, 26.X.1930] (N, N); Ohwi & Koyama 1124 (Ca--24591, Go, Mg, S), 13102 (Z); Togasi 722 (B, Bi, Go, N), 914 (Ca--21963, Go, N), 1101 (Ca--36939, Go); Yishiba s.n. [Sendai, 15 Sep. 1929] (Go). Kyushu: Hayakawa s.n. [Nagasaki] (S); Koyama 7010 (Mg), 7040 (Mg); Taguti s.n. [Sept. 5, 1912] (Kg); Yamada s.n. [Oct. 5, 1920] (Kg).

RYUKYU ISLAND ARCHIPELAGO: SATSUNAN ISLANDS: Tanegashima: Hatusima s.n. [Jan. 11, 1952] (Kg).

ERIOCAULON HONDOENSE var. GRACILE Satake

Bibliography: Moldenke, Résumé 173 & 481. 1959.

This plant has been collected in flower and fruit in Shinano province, on Mt. Kirigamine, on September 16, 1950, and was so determined by T. Koyama.

Citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Furuse 17494 (Z).

ERIOCAULON HONDOENSE var. PILOSUM Satake

Synonymy: Eriocaulon parvum var. pilosum Satake ex Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 181 & 430, in syn. 1964. Eriocaulon hondoense f. pilosum (Satake) Murata ex Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 181 & 429. 1964.

Bibliography: Satake, Bot. Mag. Tokyo 51: 290 [Shib. Comm. Art. 17: 108]. 1937; Honda, Nom. Pl. Jap. 462. 1939; Setake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 51, & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 40. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 204. 1946; Moldenke, Résumé 173 & 481. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 181, 429, & 430. 1964; Moldenke, Résumé Suppl. 12: 9 & 10. 1965.

This variety differs from the typical form of the species in having its receptacles long- or short-pilose.

The type of the variety was collected by S. Sakaguti (no. 19) on Mt. Sinodayama, in Izumi province, Honshu, Japan, in November of 1927. A vernacular name for the plant is "ke-inunohige". The plant is said to be endemic to the islands of Honshu and Kyushu, flowering and fruiting from September to November. Satake (1940) cites the following collections: Honshu: Hasimoto 57468; Hosomi 52040; Nikai 799; Sakaguti 19; Takami s.n. [Sendai, Sept. 1914]. Kyushu: Collector undetermined 33345; Nakano 14; Nakasima 18882.

ERIOCAULON HONDOENSE var. STELLATUM Satake

Synonymy: Eriocaulon parvum var. stellatum Satake ex Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 181 & 430, in syn. 1964. Eriocaulon hondoense f. stellatum (Satake) Murata ex Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 181. 1964.

Bibliography: Satake, Bot. Mag. Tokyo 51: 290—291 [Shib. Comm. Art. 17: 108--109]. 1937; Honda, Nom. Pl. Jap. 462. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 51, & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 40. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 204. 1949; Moldenke, Résumé 173 & 481. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 181, 429, & 430. 1964; Moldenke, Résumé Suppl. 12: 9. 1965.

This variety differs from the typical form of the species in

having the involucral bracts subulate-lanceolate and almost three timea as long as the disk.

The type of the variety was collected by N. Ui (no. 22) at Toyonaka-mati, in Settu province, Honshu, Japan, in September of 1934. A vernacular name is "hosizaki-inunohige". The plant has been collected in flower and fruit in September and October. Satake (1940) cites the following collections: Honshu: Ui 22 & 73. Kyushu: Mayebara 355 & 3660; Tasiro 28775, in part, 29999, in part, & s.n. [Yunohira]. Shikoku: Kusumoto 43765.

ERIOCAULON HONDOENSE var. STENOPETALON Koyama

Bibliography: Koyama, Journ. Jap. Bot. 31: 9. 1956; Moldenke, Résumé 173 & 481. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 181 & 429. 1964.

This variety differs from the typical form of the species in having the involucral bracts broadly ovate-deltoid, 3 mm. long, 1.7—2 mm. wide, thin-membranous, broadly hyaline-margined, pale-green at the center, obtuse at the apex, and the petals of the pistillate florets narrowly linear. Koyama (1956) adds "cetero-quin paene sicut typus speciei".

The type of the variety was collected by M. Huruse around the swamp known as Imôto-numa at Higashitôri-mura, in Mutsu province, Honshu, Japan, on September 16, 1954, and is deposited in the herbarium of Tokyo University. It should be noted that on the collector's labels his surname is written "Furuse".

Citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Furuse s.n. [16 Sept. 1954] (S—isotype, Z—isotype).

ERIOCAULON HOOKERIANUM Stapf

Synonymy: Eriocaulon beccarii Suesseng. & Heine, Mitteil. Staatssamm. München 2: 57—58. 1950. Eriocaulon beccarii Suesseng. ex Moldenke, Résumé 286, in syn. 1959. Eriocaulon beccarii Ruhl. ex Moldenke, Résumé Suppl. 1: 16, in syn. 1959.

Bibliography: Stapf, Trans. Linn. Soc. Lond. Bot., ser. 2, 4: 243. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 63, 83, 84, & 286. 1903; H. Lecomte, Journ. de Bot. 21: [101]. 1908; E. D. Merr., Bibl. Enum. Born. Pl. 110. 1921; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Moldenke, Known Geogr. Distrib. Erioc. 27 & 35. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 143, 145, 146, & 204. 1949; Suesseng. & Heine, Mitteil. Staatssamm. München 2: 57—58. 1950; Heine in Fedde, Repert. Sp. Nov. 54: 223—224. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Suesseng. & Heine, Mitteil. Staatssamm. München 6: 220 & 227. 1953; Moldenke, Résumé 176, 188, 192, 193, 286, & 481. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158. 1959; Moldenke, Résumé Suppl. 1: 13, 16, & 25 (1959) and 3: 20. 1962.

Eriocaulon beccarii was based on O. Beccari 2420 from Borneo and J. & M. S. Clemens 27813 from Upper Kinabalu, Kamburanga, alt. 8000 feet, January 8, 1932, and 32629 from Mt. Kinabalu, Marai Parai, alt. 5000 feet, April 7, 1933, British North Borneo (Sabah),

all deposited in the herbarium of the Botanische Staatssammlung at Munich. Since it was named in honor of Beccari, it would be logical to assume that the Beccari collection cited above should be selected as the lectotype. M. S. Clemens 10874 is said to be a topotype collection. Suessenguth & Heine (1953)cite a Clemens & Clemens 27814, not as yet seen by me. In their original description (1950) these authors describe the plant as follows: "Caulis perbrevis; folia rosulata, 3,5—7,5 cm longa, linearia, 2—3 mm lata, saepe subinvoluta, basi latiore, nervis compluribus instructa, glabra, apice obtusiusculo. Pedunculi solitarii (in 1 specimine 3),striati, aliquando torti, (5—)20 cm longi, glabri. Capitula 7 mm lata, ad 6 mm alta, subglobosa; bracteae involucrales dorso partim pilis albis subcrassis indutae. Flos mascul.: Bracteolae nigrescentes, sepala 3, ad medium connata, nigrescentia; petala 3, minuta, tubo longo insidentia, glanduligera, in fasciculos pilorum alborum exuentia; antherae 6, nigrae. Flos femin.: Bracteolae nigrae, antice ciliolatae, liberae, leviter carinatae, spathulatae; sepala 3 libera, nigrescentia, exalata; petala 3 libera, lineari-oblanceolata, longe pilosa, glanduligera (glande nigra)."

They state that if the species is carried through Ruhland's key it arrives at a place where there is no species corresponding to it -- "Hier ist indes keine Art aufgeführt, die mit der unsrigen übereinstimmte; auch in der uns zugänglichen neueren Literatur lässt sich keine solche nachweisen".

The species has been found growing at altitudes of 2400 to 9000 feet, flowering and fruiting in March, May, September, November, and December. The Clemenses found it in wet places and describe the inflorescence as gray. Synge found it "growing in holes in sandy rock by rapids of river in sand forest" and describes the flower-heads as white, the peduncles ribbed, and the leaves bright-green.

Material has been misidentified and distributed in herbaria under the names E. thwaitesii Körn., E. trilobum Hamilt., and E. trilobus Buch.-Ham. On the other hand, the H. H. Bartlett 7457, distributed as E. hookerianum, is actually E. merrillii Ruhl.

Merrill (1921) cites Burbidge s.n., Clemens 10542, 10874, & 10992, Haslam s.n., Haviland 1153 & 1204, Low s.n., and Topping 1650, 1885, & 1887 from British North Borneo (Sabah) and Beccari 2420 from Sarawak.

Citations: THAILAND: Hansen, Seidenfaden, & Smitinand 10966 (Cp, Z); Hosseus 102 (V—6361). INDOCHINA: Annam: Souchère 6 (N), 7 (N), 26 (N), 28 (N). Tonkin: Pételot 8076 (N). MALAYA: Pahang: Holttum 20728 (Ca—374160). INDONESIA: GREATER SUNDA ISLANDS: Borneo: Beccari 2420 (B, S). British North Borneo: M. S. Clemens 10874 (Ca—214440); Clemens & Clemens 27813 (B, Ca—556938, N, Ur), 32629 (B, Ca—559806, N), 34090 (Ca—556902, N), 50643 (Ca—557562); Topping 1887 (N). Java: Kjellberg s.n. [Papandajan] (S); Kuntze 5686 (N); Van Steenis 4298 (B, Ut—2087a).

Sarawak: Clemens & Clemens 20094 [field no. 7286 bis] (Bi, E--987800, N); Mjoberg 182 (Ca--234173, N); Synge 492 (N). Sumatra: H. H. Bartlett 7883 (Mi, N); Hagerup s.n. (Cp); E. Nielsen 1154 (Cp).

ERIOCAULON HUIANUM Ruhl.

Bibliography: Ruhl., Notizbl. Bot. Gart. Berlin 10: [1040] & 1060. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Moldenke, Known Geogr. Distrib. Erioc. 25 & 35. 1946; Moldenke, Résumé 169 & 481. 1959.

Material of this species has been misidentified and distributed in herbaria as E. sexangulare L.

Citations: CHINA: Kiangsi: S. K. Lau 4229 (S, Z).

ERIOCAULON HUMBOLDTII Kunth

Synonymy: Eriocaulon decemangulare H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: 254. 1816 [not E. decemangulare L., 1959]. Eriocaulon decangulare Willd. ex Kunth, Enum. Pl. 3: 544, in syn. 1841 [not E. decangulare Hill, 1959, nor Hope, 1770, nor Huds., 1959, nor L., 1753, nor Lightf., 1777, nor Michx., 1959]. Eriocaulon gujanense D. Dietr., Syn. Pl. 5: 263. 1852. Eriocaulon folboldii Pittier, La Mesa Guanip. 22, sphalm. 1942. Eriocaulon decemangulare Körn. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959.

Bibliography: H.B.K., Nov. Gen. & Sp. Pl., ed. folio, 1: 202 (1816) and ed. quarto, 1: 254. 1816; Kunth, Enum. Pl. 3: 544--545. 1841; Schlecht., Linnaea 18: 434. 1844; D. Dietr., Syn. Pl. 5: 263. 1852; Walp., Ann. 5: 931 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 476, 497, & 498. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Barnhart, Bull. Torrey Bot. Club 29: 585--598. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 42, 51, 285, & 286. 1903; H. Pittier, La Mesa Guanip. 22. 1942; Moldenke, Known Geogr. Distrib. Erioc. 5, 6, 8, 33, & 36. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 327. 1950; Moldenke in Maguire & Phelps, Bol. Soc. Venez. Cienc. Nat. 14: 10. 1952; Moldenke in Maguire, Mem. N. Y. Bot. Gard. 8: 97. 1953; Cuatrec., Revist. Acad. Colomb. Cienc. 10: 254. 1958; Moldenke, Résumé 66, 71, 75, 89, 287, 289, & 481. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Tamayo, Bol. Soc. Venez. Cienc. Nat. 22: 46, 87--88, & 170. 1961; Moldenke, Résumé Suppl. 4: 5 (1962), 12: 3 (1965), 16: 5 (1968), and 17: 10. 1968; Moldenke, Phytologia 17: 394 (1968), 17: 500 (1969), and 18: 175. 1969.

Gleason, in his unpublished flora of British Guiana, describes this species as follows: "Leaves cespitose, erect or suberect, rigid, 2--4 dm. long, 3--6 mm. wide; peduncles few, erect, 4--8 dm. high, glabrous, costate, not twisted, their basal sheaths about 2 dm. long and loose; heads subglobose, cinereous, 7--10 mm. in diameter; bracts obovate, obtuse, glabrous; subtending bracts

oblanceolate, acuminate, pubescent toward the apex." He records it only from the Roraima district, citing Appun 1200, ImThurn 34, Schomburgk s.n., and Tate 267 & 329, regarding it as endemic. Recent collectors describe it as having the leaves erect, rich-green, convex below, concave above, the inflorescence to 35 cm. tall, the heads white or chalky-white, and the flowers white. They have found it at altitudes of 100 to 1730 meters, flowering and fruiting from October to May. Rather than being endemic to the Roraima part of British Guiana, the species is actually found from Colombia and Venezuela through British Guiana to northern Brazil. The initial letter of the specific epithet is very often uppercased.

The species has been found growing in small swamps, wet sandy slopes, marshy areas, moist savannas, moist sandy banks, morichals, along small streams in savannas, and in the water or along the marshy edges of ponds and slow-moving streams. Wurdack & Monachino describe it as "locally abundant in morichals"; Maguire and his associates refer to it as an "occasional herb in the wet borders of savannas", "common in marshy savannas", and "annual herb with white flowers, frequent in marshy areas". Tamayo (1961) describes it as "Planta acaule; flores en cabezuelas color blanco lechoso. Habita en al herbazal más espeso de un morichal, terrenos pantanosos."

It should be noted here that the E. decangulare L., referred to in the synonymy above, is a valid species of North America, with the homonym accredited to Michaux as a synonym, while the homonyms credited to Hill, Hope, Hudson, and Lightfoot are all synonyms of the Old World E. septangulare With.

The Humboldt, Bonpland, & Kunth name, also referred to in the synonymy above, is only a new name (actually, merely a new orthography) for E. decangulare L., for which the South American plant was apparently mistaken. However, since it is accompanied by a new diagnosis and Linnaeus' surname does not actually appear after it, it is usually listed as a new species publication, but under the present International Rules of Botanical Nomenclature cannot be regarded as taking priority over the binomial proposed by Kunth in 1841. The folio edition of the H.B.K. work is dated "1815" on its title-page and the quarto edition is sometimes dated "1817" by authors, but according to Barnhart (1902) both were actually issued, at least insofar as the pages that bear on our plant are concerned, in 1816.

Material has been misidentified and distributed in herbaria as E. tenuifolium Klotzsch. On the other hand, the Collector undesignated s.n. [Chapultepec, August 31, 1872], distributed as E. humboldtii, is actually E. benthami Kunth, while Kuntze s.n. [Ost-Velasco, VII.82] is E. linearifolium Körn.

Additional citations: COLOMBIA: Méta: Sandeman 5854 (K, N). Vaupés: Schultes & Cabrera 20016 (Ss). VENEZUELA: Amazonas: Maguire, Cowan, & Wurdack 30464 (F, K, N, Ve, W); Maguire & Maguire 35473 (N); Maguire, Phelps, Hitchcock, & Budowski 31784 (Gl, N,

Ve, W). Bolívar: Agostini 372 (Lw); Aristeguieta 2245 (N, Ve--36755); Killip 37682 (Ve, W--1855129); Koyama & Agostini 7230 (N, N); B. Maguire 33232 (N); Maguire & Wurdack 33997 (N), 35754 (N); J. A. Steyermark 75243 (Z), 75272 (Ss), 88796 (N); Steyermark & Wurdack 24 (N); Tamayo 2906 (Ve, Ve); Vareschi & Maegdefrau 6917 (Ve--42505); Wurdack & Monachino 39962 (N, S), 41173 (N). Delta Amacuro: Humboldt s.n. [Alto Orinoco; Macbride photos 10560] (B--type, N--photo of type, W--photo of type). Guaricó: Aristeguieta 6222 (Ac); Blydenstein 384 (Bi), s.n. [1961] (N). Roraima: Irwin 438 (W--2197660). GUYANA: C. D. K. Cook 180 (S); Jenman 34 (W--303489); Schomburgk 216 (Ut--419); G. H. H. Tate 267 (N), 329 (N). BRAZIL: Amapá: Murça Pires & Cavalcante 52037 (N). Amazonas: G. H. H. Tate 3 (N). Goiás: Héringer 11264 (Ac); Irwin, Maxwell, & Wasshausen 21355 (Rf). Mattogrosso: Maguire, Murça Pires, Maguire, & Silva 56270 (N). Rio Branco: W. Rodrigues 187 [Herb. Inst. Nac. Pesq. Amaz. 675] (Bs); Ule 7629 [Herb. Mus. Goeldi 12745] (Gl), 8089 (Bs). MOUNTED LITERATURE: Ruhl. in Engl., Pflanzenreich 13 (4-30): 51 (B).

ERIOCAULON HUMILE Moldenke

Bibliography: Moldenke, Phytologia 3: 162--163 & 327--328. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 162 & 481. 1959; Moldenke, Résumé Suppl. 1: 11. 1959; Razi, Rec. Bot. Surv. India 18: 19. 1959; G. L. Shah, Bull. Bot. Surv. India 4: 237. 1962; Moldenke, Résumé Suppl. 11: 5. 1964.

Material of this taxon has been misidentified and distributed in herbaria as E. truncatum Hamilt.

Additional citations: INDIA: Bombay: Patel 3 (Z); Santapau 2926 (N, Xa), 2927 (N, Xa). Madras: Kuriakose s.n. [16-1-33] (N). Mysore: S. N. Ramaswamy 16 (Rf), 27 (Ac); Shantha 68 (Bn--3238).

ERIOCAULON HYDROPHILUM Markötter

Bibliography: Markötter, Ann. Univ. Stellenb. 8A (1): 10. 1930; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Moldenke, Résumé Suppl. 17: 4. 1968.

Nothing is known to me about this taxon except that it is supposed to grow in and presumably is endemic to the Orange Free State portion of South Africa.

ERIOCAULON INFAUSTUM N. E. Br.

Bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 253. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 62, 78, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Moldenke, Known Geogr. Distrib. Erioc. 22 & 36. 1946; Moldenke, Résumé 150 & 481. 1959.

ERIOCAULON INSULARE Ruhl.

Bibliography: Ruhl. in Fedde, Repert. Spec. Nov. 22: 32. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929.

# BOOK REVIEWS

Alma L. Moldenke

"RECENT ADVANCES IN PHYTOCHEMISTRY - Volume I" edited by T. J. Mabry, xii & 437 pp., illus., Appleton-Century-Crofts, Inc., New York, N. Y. 10016. 1968.

The book is the first of an annual series of promising and promised volumes by the Phytochemical Society of North America and the proceedings of its sixth annual symposium held in Austin, Texas in the spring of 1966. The five previous symposia were under the direction of the Plant Phenolics Group which recently was metamorphosed into the society mentioned above.

Part I consists of two papers on the role of chemistry in modern biology - as the frontier of biological sciences (Dr. Whaley) and as the principles in chemosystematics (Dr. Erdtman). The authors' stress on the "great responsibility [that] will always rest on the authors of chemical papers — to define accurately the plant material that they have been investigating" will certainly make all taxonomic workers affected happy.

Part II consists of three papers on the nitrogen and sulfur compounds. Dr. Ettlinger and Dr. Kjaer discuss the latter in plants with an excellent table of the sulfur compounds related to polyacetylene in the Compositae and a table on the familial distribution of grouped glucosinolates. The editor and Dr. Deutring discuss the betalains, introducing this term to cover both the red and violet betacyanins and yellow betaxanthins found in ten families of the Centrospermae as to their chromophores, natural occurrence, biogenesis and phylogenetic significance. Dr. Stermitz describes alkaloid chemistry as it affects the systematics of Papaver and Argemone. "The morphologically distinct sections of the genus Papaver also have distinct alkaloid chemistry. In instances where the morphological demarcations are not strong, the alkaloid content is also less distinctive." The occurrence of unique pavine alkaloids in Papaver section Scapiflora (the ice age relicts) and also in Eschscholtzia and Argemone (occurring south of the ice age limits in America) helps validate the geographical and ecological assumption that the species of the Papaveraceae with the closest link to those of early northern origin would be species which had already reached southern regions prior to the advent of the ice age and the Scapiflora.

Part III deals with acetate and mevalonate-derived compounds. Dr. Sørensen finds acetylenic compounds in such widespread plants as the Umbelliferae, Araliaceae, Agaricaceae and Polypodiaceae and concludes that more refined spectrophotometry is needed for differentiations. Dr. Herz suggests that the relatively limited distribution of pseudoguaianolides in the Heliantheae and in the

Heleniae of the Compositae when coupled with morphological and cytological evidences become useful taxonomic tools. Drs. Ponsinet, Ourisson and Oehlschlager discuss the many di- and tri-terpenes found in so many dicot plants and conclude that the former are generated in nature from excess geranylgeranoil and the latter from the waste products of steroid biosynthesis. The more distant these are from simple chemical pathways the less likelihood there is of evolutionary convergence in widely separated botanical groups.

Part IV deals with flavonoids. The recently deceased Dr. Alston, to whose memory this book is dedicated, discusses the C-glycosyl flavones for their distribution among plants, their chemical structure, biosynthesis and relation to other flavonoids. Dr. Ollis discusses new structural variants among iso- and neo-flavonoid classes. Dr. Grisebach describes recent investigations on flavonoid biosynthesis.

Each paper ends with detailed bibliographies. There is not only a subject index but also a systematic one making the book usable also to the classical taxonomist. On p. x two separate book titles appear as one and the final phrase is repeated uselessly. Three misspellings were detected in the index -- Saponaria officinalis, Daedalea and Aspalathus; in the text they all were correct.

"ADVANCES IN ECOLOGICAL RESEARCH 5" edited by J. B. Cragg, xi & 283 pp., illus., Academic Press, London W.1, and New York, N. Y. 10003. 1968. 80 sh.

The four papers given here are of comparable excellence to those in the previous volumes. This series should certainly serve as an effective means of keeping abreast of the major advances in this challenging and growing field.

Dr. Gates in "Toward Understanding Ecosystems" defines one as the "total sum of the organisms, the environment, and the processes of interaction between and within all parts of the system" and stresses its complexity. He develops a basic methodology and pleads for the development of a new theoretical basis lest as an empirical science it become hopelessly bogged down by its own complexity. "Ecology must have a strong theoretical and analytical basis before it can advance significantly".

Dr. Main discusses the ecology, systematics and evolution of Australian frogs (only anurans known there) that fill all ecological places available including the semi-arid and desert interior which composes 70 percent of the continent. Some species of Crinia and of Neobatrachus have their eggs laid out of water and their larvae developed out of water. The cryptozoic subterranean termitophile Myobatrachus is a termitophage right in their galleries. His unit of study has been in each case the population which is reproductively isolated from other populations and corresponds with the systematic species.

Dr. Waloff relates his "Studies on the Insect Fauna on Scotch Broom, Sarothamnus scoparius (L.) Wimmer" and concludes that a prolonged life history of a population is adaptive and allows a

species to sample a full range of weather of a temperate summer, and to have only part of a population at any one time exposed to the full force of predation and parasitism.

Dr. Daubenmire in "Ecology of Fire in Grasslands" shows how forest fires generate higher temperatures with greater damage to life in and under the tree canopy even to the subsoil organisms as bacteria, seeds, fruits, perennial roots or stolons, nemertine worms, etc., and have been always considered by man as destructive because of timber and game loss. But grassland fires have often been intentionally man-started as an agricultural technique and as a means of driving game to nets. The temperature gradient in rapid grassland conflagrations is often so steep that there is little alteration of the soil structure or chemistry. If enough legumes are burned the nitrogen content is raised, making herbage more nutritious. The majority of perennial herbs usually send up new shoots if their growing tips have not been destroyed.

The book is provided with excellent bibliographies, good indexing, and an author list of all volumes mentioned.

"RECENT ASPECTS OF NITROGEN METABOLISM IN PLANTS" edited by E. J. Hewitt & C. V. Cutting, xvi & 280 pp., illus., Academic Press, Inc., London W.1 and New York, N. Y. 10003. 1968. 80 sh. or $11.50.

The included papers consist of the proceedings of a first symposium held at Long Ashton Research Station of the University of Bristol in April 1967 and of oldest standing as a fruit research station.

Section 1 with six presentations on the transformations in inorganic nitrogen metabolism and fixation begins with Drs. Chatt and Leigh who discuss the well-known inactivity of $N_2$ and its activation by either a concerted electron donor or acceptor. It continues with Dr. Bond's analysis of nitrogen-fixation in symbiosis in legume-type, Alnus-type, and cycad-type nodulations, in Azolla-Anabaena, liverwort-bluegreen, and lichen-bluegreen algal associations, in rubiac and myrsinac leaf-bacteria associations, and in podocarp-mycorrhizal nodulation. Then follows Dr. Cox' manometric experiment report on $N_2$-fixation in the bluegreen Anabaena cylindrica in light copiously and in dark weakly when $N_2$ starved, using so-generated reducing power or ATP with pyruvate as a stimulant. Drs. Hewitt, Hucklesby and Betts discuss hyponitrite and hydroxylamine as intermediates in nitrite reduction in fungi and higher plants. Dr. Miflin's experiments show nitrate reductase in barley roots. Drs. Sims, Folkes, and Bussey, using the simple heterotrophic food yeast Candida utilis and the spermatophytic duckweed Lemna minor, show that the former with its fuller integrated nitrosome regulated nitrite metabolism more efficiently.

Section 2, dealing with intermediate metabolism of amino acids, begins with Dr. Davies' experiments with $^{14}C$ showing two obvious points of control of amino acid metabolism -- (1) fixation of $CO_2$

and entry into the Krebs cycle and (2) entry of an ammonia into organic combination. Dr. Smith shows that putrescine in barley leaves is derived from arginine with the intermediate formation of agmatine and N-carbamylputrescine possibly in response to increasing internal acidity representing a new aspect of homeostasis. Among the properties of the copper-containing plant enzyme diamine oxidase Drs. Hill and Mann support its role in auxin formation. Drs. Fowden, Smith and Dunhill give their observations on the specificity of amino acid biosynthesis and conclude that as of the present specificity may be due to this chemical itself or to the enzyme holding it.

Section 3 deals with the interaction of $N_2$ metabolism with external factors and is introduced by Dr. Luckwill's paper on the reciprocal relations between plant growth regulators (endogenous hormones) and $N_2$ metabolism. Both auxins and cytokinins are themselves $N_2$-containing compounds that have strong mobilization effects leading to their being called "chemical policemen" rather than "chemical regulators" because of their directing the flow of nutrients to sites where they are required for protein synthesis. Dr. Markham, considering the deviations of $N_2$ metabolism associated with viruses, mentions the better known one that the new proteins formed within the host cells are only viral replication products and the less known one that their self-polymerizing potentialities of other structures like empty shells, long helical tubes, etc. Dr. Pate reports his studies of the assimilation, transport and utilization of $N_2$ in the roots, stems and leaves of Pisum arvense L. The last technical paper consists of Dr. Hill-Cottingham's report on the effect of climate and time of application of fertilizers on the development and crop performance of fruit trees.

After each section the pertinent questions and answers are given. After the last paper a concluding statement is given by the chairman. The book is well indexed.

"PLANT PATHOLOGIST'S POCKETBOOK" edited by G. C. Ainsworth, 267 pp., Commonwealth Mycological Institute, Kew, Surrey, England. 1968.

This is a little gem that, true to character, will surely shine with use. It was issued upon the occasion of the First International Congress of Plant Pathology in London.

It covers diseases (fungal, bacterial, viral, non-parasitic, quarantine, regional listings, glossary, bibliography), plant-parasite nematodes, insect pests, weeds, fungicides, mycotoxicoses, techniques (herbarium, isolation, seed testing, spore trapping, culturing, and almost everything else imaginable), formulae (for culture media, stains, mounting), presentation techniques of study results, and addresses for culture collections and research stations. It is amazing to see how much valuable, modern, accurate information is crammed within these small book covers.

"FLORA ANALÍTICA DO PARANÁ- Vol. 7" by João Angely, 728 pp., Instituto Paranaense de Botânica, Caixa Postal 30786, São Paulo, Brazil. 1965.

This valuable catalogue of 5287 bryophytes, pteridophytes and spermatophytes native, naturalized or cultivated in this botanically rich and interesting state of Paraná in Brazil has proven to be and will continue to be easily usable and useful for many more than just the taxonomic botanists.

This work is far freer from printing errors than most South American publications. Petrea (p. 578) and Hayek (p. 573) are the correct spellings.

In reference to the treatment of the Verbenaceae -- Verbena isabellei is now considered a synonym of V. montevidensis, and the binomial V. peruviana should be accredited to "(L.) Britton" since Britton made this transfer much earlier than Druce. Aloysia lycioides var. revoluta is treated as a synonym on p. 576 and also as a valid name on p. 577 -- it is, of course, a synonym. Similarly Aloysia gratissima var. paraguariensis is listed on p. 576 as a valid name, with the name-bringing synonym Lippia ligustrina var. paraguariensis. On p. 577 Aloysia lycioides var. paraguariensis is listed as a valid name instead of as another synonym for A. gratissima var. paraguariensis. In the related Avicenniaceae the species which he lists as Avicennia nitida is now known as A. germinans.

For all scientific names the authors, dates and titles of publication are given, making this work that much more valuable than it would be if it were just a bare listing of names.

"PHYLOGENETIC SYSTEMATICS" by Willi Hennig, revised and translated from the German by D. Dwight Davis & Rainer Zangerl, 263 pp., illus., University of Illinois Press, Urbana, Illinois. 1966. $12.50.

Originally appearing in 1950 as "Grundzüge einer Theorie der phylogenetischen Systematik", this valuable survey by an European leader in this field is only somewhat updated and is herein available for the English-reading public.

Part I describes the position of systematics among the biological sciences. Modern writers advocate 2 ways of describing phylogenetic history: in one the chronology of the species cleavage processes is set forth as the only supra-individual or supra-population consideration (true phylogeny) and in the other these same cleavage processes are drawn up according to their epochal significance (different typological systems).

Part II deals with taxonomic tasks and methods both in the lower categories using comparative holomorphology as an auxiliary science and in the higher group categories.

Part III develops the problems, tasks and methods of phylogenetics and discusses evolution, monophyly, polyphyly, explosive radiation, dichotomy and typogenesis without a single reference to any molecular or other really modern work.

# NEW TREE SPECIES FROM ESMERALDAS, ECUADOR

ELBERT L. LITTLE, JR.

Some undescribed tree species were collected in 1965-1966 by the forest survey in the wet tropical (rain) forests of the Province of Esmeraldas along the Pacific coast in northwestern Ecuador. Five new species are published here in the following genera (and families): Coussapoa (Moraceae), Magnolia (Magnoliaceae), Matisia (Bombacaceae), Rudgea (Rubiaceae), and Sickingia (Rubiaceae). Each description is accompanied by a line drawing prepared for a book on the common trees of Esmeraldas now awaiting publication. Descriptions of the new species will be continued in later numbers of Phytologia.

In March-July 1943 I made a collection of tree specimens in western Ecuador as dendrologist with the forest survey by the Latin American Forest Resources Project, of the Forest Service, United States Department of Agriculture. This was a World War II project in cooperation with the Office of the Coordinator of Inter-American Affairs. Further information about the important trees is contained in the published report: Holdridge, L. R., et al. The forests of western and central Ecuador. 134 pp., illus. Forest Service, U. S. Dept. Agr. 1947.

Various new tree species were named from that collection. I published 19, including 12 from Esmeraldas (New species of trees from western Ecuador. Wash. Acad. Sci. Jour. 38: 87-105, illus. 1948), also a list of the identifications with notes (A collection of tree specimens from western Ecuador. Caribbean Forester 9: 215-298. 1948).

A 5-year forestry project, including an inventory and entitled Desarrollo Forestal de Noroccidente (DEFORNO), was begun in Esmeraldas in 1964. This was United Nations Special Fund Project No. 127, administered by the Food and Agriculture Organization (FAO) of the United Nations and the Government of Ecuador. I served as consultant on this project, making a brief trip to Ecuador in February 1965 and another for two months field work in Esmeraldas in September-October 1965. Robert G. Dixon, silviculturist on the project, and I collected about 250 numbers of herbarium specimens of trees, many with wood samples for testing. About 100 additional numbers were collected by others. After my return to Washington, D. C., I identified the specimens at the U. S. National Herbarium, United States National Museum, with the assistance of specialists. Also, I prepared botanical descriptions for the forthcoming book. This work was financed by the project through Special Service Agreements.

A set of the herbarium specimens including holotypes of the new species described here is being deposited in the U. S. National Museum (US). A duplicate set is being retained by the forestry project in Quito, Ecuador. Isotypes will be deposited in the herbarium of the New York Botanical Garden (NY). Wood samples are being placed in the Wood Collection, U. S. Forest Products Laboratory, Madison, Wisconsin (MADw).

The assistance of Elbert S. Reid, director, Robert G. Dixon, silviculturist, and others of the project in many ways is gratefully acknowledged. Credit is due several artists for the full-page line drawings of the new species prepared for the book and reproduced here first. Most drawings of the new species are by Anita Ortiz, Jaime F. Cárdenas, and Antonio Dueñas V. Two are by Carol Ann Kanter.

**COUSSAPOA ROTUNDA** Little, sp. nov. "Matapalo." Fig. 1.

Arbor epiphytica vel scandens ad 15 m. alta, trunco 15 cm. diametro. Cortex griseus laevis vel parum fissuratus. Ramuli crassi pubescentes, cicatricibus obliquis stipularum notati. Stipulae 1-3 cm. longae, acuminatae puberulae gemmam anguste oblongam formantes, caducae. Foliorum alternorum petioli 1-2.5 cm. longi, crassi pubescentes, longitudinaliter sulcati. Laminae rotundae, 6-15 cm. longae et latae, apice rotundatae, basi cordatae vel rotundatae, margine leviter undulatae, coriaceae, supra glabrae virides, subtus flavo-virides, venatione palmata nervis principalibus 9 vel 7, supra valde impressis, subtus puberulis, venulis numerosis parallelis.

Inflorescentiae masculinae pedunculis 1-2.5 cm. longis pubescentibus, 2-4—plo dichotome ramosae, capitula numerosa globosa 3-4 mm. diametro pedicellis puberulis 1-3 mm. longis ferentes. Flores masculini numerosi sessiles sepalis 3 pubescentibus 0.5 mm. longis stamine unico 1 mm. longo. Flores feminei fructique non visi.

Epiphytic tree or vine to 15 m. high, with trunk 15 cm. in diameter. Bark gray, smooth or slightly fissured. Twigs stout, pubescent, with oblique stipule scars. Stipules 1-3 cm. long, acuminate, puberulent, forming narrowly oblong bud, caducous. Petioles of the alternate leaves 1-2.5 cm. long, stout, pubescent, longitudinally grooved. Blades round, 6-15 cm. long and broad, rounded at apex, cordate or rounded at base, with margin slightly wavy, coriaceous, above glabrous and green, beneath yellow green, palmately veined with 9 or 7 principal veins very impressed and puberulent beneath, and with numerous parallel veinlets.

Male inflorescences with pubescent peduncles 1-2.5 cm. long, 2-4 times dichotomous, bearing numerous globose heads 3-4 mm. in diameter on puberulent pedicels 1-3 mm. long. Male flowers numerous, sessile, with 3 pubescent sepals 0.5 mm. long and 1 stamen 1 mm. long. Female flowers and fruits not seen.


Fig. 1. Coussapoa rotunda Little, sp. nov. "Matapalo."

ECUADOR, ESMERALDAS: Junction of Río Hoja Blanca and Río Hualpi, 50 km. S. of Borbón, alt. 75 m., wet tropical forest, Sept. 14, 1965, E. L. Little, Jr., and R. G. Dixon 21056 (HOLOTYPE, US; isotype, NY).

This species is readily distinguished by its rounded leaves with 9 or 7 principal veins. The commonest species of this genus of "matapalos" in Esmeraldas and other wet areas of western Ecuador is Coussapoa eggersii Standl., which becomes a large tree 35 m. tall with fluted trunk to 2 m. in diameter. Specimens of a third species were referred to C. oligoneura Mildbr, of Colombia.

**MAGNOLIA STRIATIFOLIA** Little, sp. nov. "Cucharillo." Fig. 2.

Arbor magna ad 32 m. alta, trunco 64 cm. diametro, anteridibus humilibus angustis. Cortex asper squamosus fulvescens lenticellis. Ramuli juventute pubescentes nodis annulatis atque internodis brevibus. Stipula larga pubescens gemmam obducens, libera, caduca. Foliorum alternorum petioli 2 cm. longi pubescentes, longitudinaliter sulcati. Laminae ellipticae, 15-20 cm. longae, 8-10 cm. latae, chartaceae, apice et basi acutae, margine integra, leviter striatae linea tenui vel plica unica utroque costae latere, nervis lateralibus utroque latere 12-15 fere rectis, virides nitidae, praeter costam pubescentem subtus glabrae.

Flores terminales solitarii flavescentes fragrantes, pedunculo crasso fere 1 cm. longo apice pubescenti. Alabastrum ovoideum bractea spathacea glabrata obtectum. Sepala 3, elliptica, 43 mm. longa, 24 mm. lata, plus minusve crassa concava apice rotundata. Petala (in alabastro) obovata, plus minusve crassa concava apice obtusa, petala exteriora 3, 38 mm. longa, 20-25 mm. lata, petala interiora 3, 32 mm. longa, 16 mm. lata. Stamina numerosa filamentis 0.5 mm. longis, thecis linearibus 6 mm. longis, connectivo apice acuto 1-1.5 mm. longo. Gynoecium ovoidem, 18 mm. longum, 15 mm. latum, glabrum, carpellis c. 30, stylis 5 mm. longis. Fructus non visus.

Large tree to 32 m. high, with trunk 64 cm. in diameter, with low narrow buttresses. Bark rough, scaly, yellowish brown, with lenticels. Twigs pubescent when young, with ringed nodes and short internodes. Stipule long, pubescent, covering bud, free, caducous. Petioles of the alternate leaves 2 cm. long, pubescent, longitudinally grooved. Blades elliptic, 15-20 cm. long, 8-10 cm. wide, chartaceous, acute at apex and base, with entire margin, faintly striate with 1 thin line or fold on each side of midrib, with 12-15 nearly straight lateral veins on each side, shiny green, glabrous except for the midrib pubescent beneath.


Fig. 2. Magnolia striatifolia Little, sp. nov. "Cucharillo."

Flowers terminal, solitary, yellowish, fragrant, with stout peduncle nearly 1 cm. long pubescent at apex. Flower bud ovoid, covered by a glabrate spathaceous bract. Sepals 3, elliptic, 43 mm. long, 24 mm. wide, slightly thick, concave, rounded at apex. Petals (in flower bud) obovate, slightly thick, concave, obtuse at apex, outer petals 3, 38 mm. long, 20-25 mm. wide, inner petals 3, 32 mm. long, 16 mm. wide. Stamens numerous with filaments 0.5 mm. long, linear pollen sacs 6 mm. long, and connective with acute apex 1-1.5 mm. long. Gynoecium ovoid, 18 mm. long, 15 mm. wide, glabrous, with about 30 carpels, with styles 5 mm. long. Fruit not seen.

The wood is moderately hard, with whitish sapwood. The heartwood has the attractive yellowish or olive green color found in some other species of Magnolia.

ECUADOR, ESMERALDAS: Tobar Donoso, junction of Río San Juan and Río Camumbi, alt. 260 m., wet tropical forest, uncommon, July 27, 1966, Carlos Játiva 331 (1139) (HOLOTYPE, US; isotypes, LA, NY; wood sample, MADw).

The thin dried leaves of this specimen have a faint line or stria on each side of the midrib and nearly parallel with it. This character, to which the specific epithet refers, apparently indicates a fold of the developing leaf in the bud. The collection contains flower buds but no fully open flowers.

Figure 2 shows a leafy twig with flower bud covered by the spathaceous bract. At lower right is an opening bud with bract shed, the 3 spreading sepals, and the petals still closely pressed together.

This collection from about 1° N. lat. is the southernmost record of the genus Magnolia in the New World. A few species have been found in Venezuela. I collected another new species in southern Colombia. A new species of Talauma, also in the family Magnoliaceae, was found in Esmeraldas and will be described.

**MATISIA LONGIPES** Little, sp. nov. "Suare." Fig. 3.

Arbor mediocris at 15 m. alta, trunco 18 cm. diametro, ramis horizontalibus verticillatis. Cortex griseus laevis. Ramuli graciles, petioli, laminae et pedunculi stellato-pilosi et lepidoti. Stipulae 3-5 mm. longae ovatae pubescentes gemmam formantes, caducae. Folia alterna pauca, petiolo 2-3 cm. longo fulvescenti ambabus extremitatibus dilatato. Laminae ellipticae vel obovatae, 11-25 cm. longae, 4.5-12 cm. latae, chartaceae, asymmetricae nervis principalibus 3-5, apice acutae vel acuminatae, basi rotundatae et inaequilaterae, margine integrae, supra virides impolitae, subtus flavovirentes nervis prominentibus flavidis, venulis sub angulo fere 90° abeuntibus.

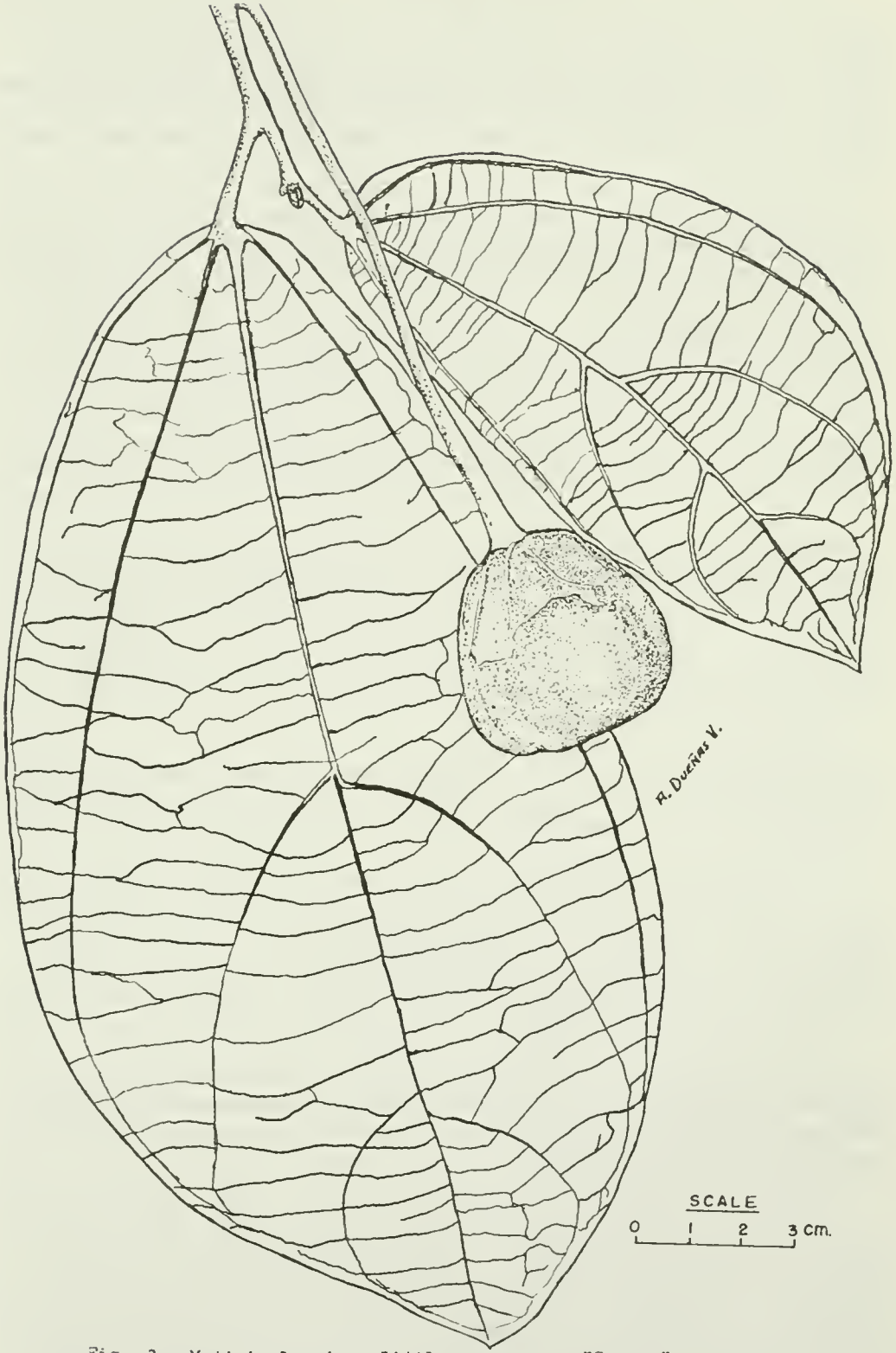



Fig. 3. Matisia longipes Little, sp. nov. "Suare."

Baccae solitariae pendulae pedunculo gracili 9-12 cm. longo apice dilatato laterales vel foliis oppositae, ellipsoideae vel globulosae, 3-3.5 cm. longae, 2-3 cm. latae, mucronatae, brunneolae, stellato-pilosae, 5-loculares, seminibus 5, ellipsoideis 17 mm. longis; calyx persistens cyathiformis flavidus leviter 10-alatus et 10-dentatus, fere dimidium basale baccae obducens. Flores non visi.

Medium-sized tree to 15 m. high, with trunk 18 cm. in diameter, with branches horizontal and whorled. Bark gray, smooth. The slender twigs, petioles, blades, and peduncles with stellate hairs and small scales. Stipules 3-5 mm. long, ovate, pubescent, forming bud, caducous. Leaves alternate, few, with yellowish brown petiole 2-3 cm. long, enlarged at both ends. Blades elliptic or obovate, 11-25 cm. long, 4.5-12 cm. wide, chartaceous, asymmetrical with 3-5 principal veins, acute or acuminate at apex, rounded and unequal at base, with entire margin, above dull green, beneath yellow green with prominent yellowish veins, the veinlets departing at nearly 90° angle.

Berries solitary, drooping from slender peduncle 9-12 cm. long enlarged at apex, lateral or opposite the leaves, ellipsoid or globular, 3-3.5 cm. long, 2-3 cm. broad, mucronate, brownish, with stellate hairs, 5-celled, with 5 ellipsoid seeds 17 mm. long; calyx persistent, cup-shaped, yellow, slightly 10—winged and 10-toothed, nearly covering the basal half of berry. Flowers not seen.

ECUADOR, ESMERALDAS: Alto Tambo, alt. 650 m., lower montane forest, Sept. 23, 1965, E. L. Little, Jr., and R. G. Dixon 21125 (HOLOTYPE, US; isotype, NY).

This species is characterized by the very long drooping peduncles of the fruit. The fruiting specimen is placed in Matisia Humb. & Bonpl., rather than Quararibea Aubl., partly because of its 5 cells. However, the regular branching with whorls of horizontal branches is suggestive of the latter. Matisia has been treated as a synonym by some authors.

Figure 3 by Antonio Dueñas V. from a fresh specimen shows the fleshy berry and stout peduncle before shrinkage in drying. This artist accompanied the forest survey for a month to make drawings for the tree book.

A number of species have been described in this genus from northwestern South America in recent years. Some of these seem to be of local distribution. Matisia coloradorum R. Benoist was described from Santo Domingo de los Colorados, in the adjacent Province of Pichincha. M. alata Little and M. grandifolia Little were based on the author's specimens of 1943. The 1965 collection contains incomplete material of 1 or 2 additional unnamed species.

**RUDGEA JATIVAE** Little, sp. nov. Fig. 4.

Arbor mediocris at 19 m. alta, trunco 30 cm. diametro. Cortex asper fulvescens. Ramuli juventute puberuli, demum glabri, nodis annulatis saepe incrassatis. Folia opposita, stipulis truncatis 3 mm. longis puberulis, setiferis, petiolis 1-2 cm. longis, glabris, longitudinaliter sulcatis. Laminae ellipticae vel ovatae, 10-15 cm. longae, 4-7 cm. latae, glabrae, coriaceae, apice acuminatae, basi acutae, supra virides nitidae nervis lateralibus utroque latere 7-11 curvis atque valde impressis ante marginem conjunctis, subtus pallidae impolitae nerviis laterales elevatis.

Inflorescentia terminalis paniculata 4-5 cm. longa, pedunculo brevi 1-2 cm. longo, multos flores sessiles aggregatos in capitula ramis oppositis puberulis ferens. Flores in alabastro 7 mm. longi; hypanthium 2 mm. longum et latum, puberulum; calyx 1 mm. longus, minute 5-dentatus margine ciliatus; corolla infundibuliformis extus puberula, tubo 4 mm. longo, 3 mm. lato, ad faucem dense albo-barbato, lobis 5 anguste oblongis 4-5 mm. longis patentibus; stamina 5, paulo exserta, ad apicem tubi corolla inserta, filamentis fere 1 mm. longis, antheris anguste oblongis 1.5 mm. longis; stylus 5-6 mm. longus puberulus exsertus stigmatibus 1 mm. longis. Fructus deest.

Medium-sized tree to 19 m. high, with trunk 30 cm. in diameter. Bark rough, yellow brown. Twigs puberulent when young, becoming glabrous, with ringed nodes often thickened. Leaves opposite, with truncate puberulous stipules bearing setae, with glabrous petioles 1-2 cm. long longitudinally grooved. Blades elliptic or ovate, 10-15 cm. long, 4-7 cm. wide, glabrous, coriaceous, acuminate at apex, acute at base, above shiny green with 7-11 lateral veins on each side, curved and deeply impressed, joined before margin, beneath pale and dull with lateral veins raised.

Inflorescence terminal, paniculate, 4-5 cm. long, with short peduncle 1-2 cm. long, bearing many sessile flowers clustered in heads on opposite puberulent branches. Flowers in bud 7 mm. long; hypanthium 2 mm. long and broad, puberulent; calyx 1 mm. long, minutely 5-toothed, ciliate on margin; corolla funnel-shaped, puberulent on outside, with tube 4 mm. long, 3 mm. broad, densely white-bearded in throat, with 5 narrowly oblong spreading lobes 4-5 mm.; stamens 5, slightly exserted, inserted at apex of corolla tube, with filaments nearly 1 mm. long and narowly oblong anthers 1.5 mm. long; style 5-6 mm. long, puberulent, exserted, with stigmas 1 mm. long. Fruit lacking.

The sapwood is whitish.

ECUADOR, ESMERALDAS: Tobar Donoso Cerro, junction of Río San Juan and Río Camumbi, alt. 260 m., wet tropical forest, common, July 26, 1966, Carlos Játiva 328 (HOLOTYPE, US; isotypes, LA, NY). COLOMBIA: El Chocó, S. of Río Condoto, between Quebrada Guarapo and Mandinga, alt. 120-180 m., dense forest, Apr. 22-28, 1939, E. P. Killip 35426 (US).

This medium-sized tree from Esmeraldas has short-petioled elliptic or ovate glabrous shiny leaves with 7-11 curved and very impressed lateral veins on each side and numerous sessile flowers crowded in paniculate heads. Killip 35426 is referred to this new species. That small unicate specimen from a tall tree consists of a fallen twig with 2 leaves, also 2 detached leaves apparently different, and a detached globose glabrous white fruit 1.5 cm. in diameter.

Carlos Játiva, Ecuadoran botanist, collected tree specimens for this project in Esmeraldas in 1966, including this type.

Rudgea Salisb. is a tropical American genus of more than 150 species. Earlier, Paul C. Standley (The Rubiaceae of Ecuador. Field Mus. Nat. Hist. Bot. Ser. 7: 179-251. 1931) recorded from Ecuador only 1 species, R. fimbriata (Benth.) Standl., a shrub of wide distribution from Central America to Brazil.

**SICKINGIA STANDLEYI** Little, sp. nov. "Manglillo," "colorado." Fig. 5.

Arbor ad 25 m. alta, trunco 30 cm. diametro. Cortex interior succo rubro. Ramuli crassi, leviter quadrangulares nodis annulatis atque cicatricibus foliaribus magnis elongatis. Folia opposita stipulis caducis non visis, petiolo crasso 3-4 cm. longo, leviter puberulo. Laminae suborbiculares vel late ellipticae, 20-28 cm. longae, 21 cm. latae, subcoriaceae, apice rotundatae et mucronatae, basi subcordatae, nervis lateralibus utroque latere c. 15 sub angulo fere 90° abeuntibus prope marginem conjunctis, supra glabrae et leviter nitidae, subtus pallidae nervis puberulis.

Inflorescentiae terminales paniculatae c. 6-9 cm. longae ramulis puberulis. Flores multi 7 mm. longi sessiles, bracteis late triangularibus ciliatis; hypanthium clavatum 3-4 mm. longum puberulum; calyx breve tubulosus, 1 mm. longus, puberulus ciliatus 5-dentatus; corolla in alabastro cylindrica tubo breve et lobis 5 versus apicem puberulis; stamina 5 prope basin tubi corollae inserta, filamentis 0.5 mm. longis, anteris oblongis 2 mm. longis; ovarium 2-loculare, ovulis numerosis in quoque loculo, stylus 2 mm. longus 2-partitus. Capsula globosa 1.5 cm. diametro, 2-loculare seminibus numerosis applanatis.


Fig. 4. Rudgea jativae Little, sp. nov.

Tree to 25 m. high, with trunk 30 cm. in diameter. Inner bark with beet-red sap. Twigs stout, slightly 4-angled, with ringed nodes and large elongate leaf scars. Leaves opposite with caducous stipules not seen, with stout, slightly puberulent petiole 3-4 cm. long. Blades suborbicular or broadly elliptic, 20-28 cm. long, 21 cm. wide, subcoriaceous, rounded and mucronate at apex, subcordate at base, with about 15 lateral veins on each side departing at angle almost 90° and joined near margin, above glabrous and slightly shiny, beneath pale with puberulent veins.

Inflorescences terminal, paniculate, about 6-9 cm. long, with puberulent branches. Flowers many, 7 mm. long, sessile, with broadly triangular ciliate bracts; hypanthium clavate, 3-4 mm. long, puberulent; calyx short tubular, 1 mm. long, puberulent, ciliate, 5-toothed; corolla in bud cylindric with short tube and 5 lobes puberulent toward apex; stamens 5 inserted near base of corolla tube, with filaments 0.5 mm. long and oblong anthers 2 mm. long; ovary 2-celled, with numerous ovules in each cell, style 2 mm. long, 2-parted. Capsule globose, 1.5 cm. in diameter, 2-celled, with numerous flattened seeds.

As in other species of the genus, the cut wood is reddish tinged. The following description by J. Edson Myer in 1943 is based on a wood sample from the type tree:

"Heartwood uniformly rose-red, the surface becoming yellowish to dark brown upon exposure, lustre rather dull; sapwood not sharply defined. Heartwood odorless and tasteless; moderately hard and heavy, with a specific gravity (oven-dry) of 0.70 (about 44 pounds per cubic foot); grain straight to roey; texture fine and uniform; easy to work, takes a good polish; strong but rather brittle; and not durable when exposed to the weather. Makes high-grade flooring. Used also for panelling and trim."
—Holdridge, L. R., et al. The forests of western and central Ecuador, p. 63. Forest Service, U. S. Dept. Agr. 1947.

ECUADOR, ESMERALDAS: Quinindé, alt. 60 m., cutover wet tropical forest, Apr. 13, 1943, E. L. Little, Jr. 6248 (HOLOTYPE, US 1844947; isotypes, F, Q; wood sample, MADw).

This species is distinguished by its large rounded leaves and may be related to Sickingia cordifolia Hook. f. of the Santa Marta region of northern Colombia. Herbarium specimens with wood samples were collected in 1943 by the Latin American Forest Resources Project. However, this species is not represented among the collections of 1965-1966. Instead, Sickingia tinctoria (H.B.K.) K. Schum., known also as "manglillo," was found in Esmeraldas.

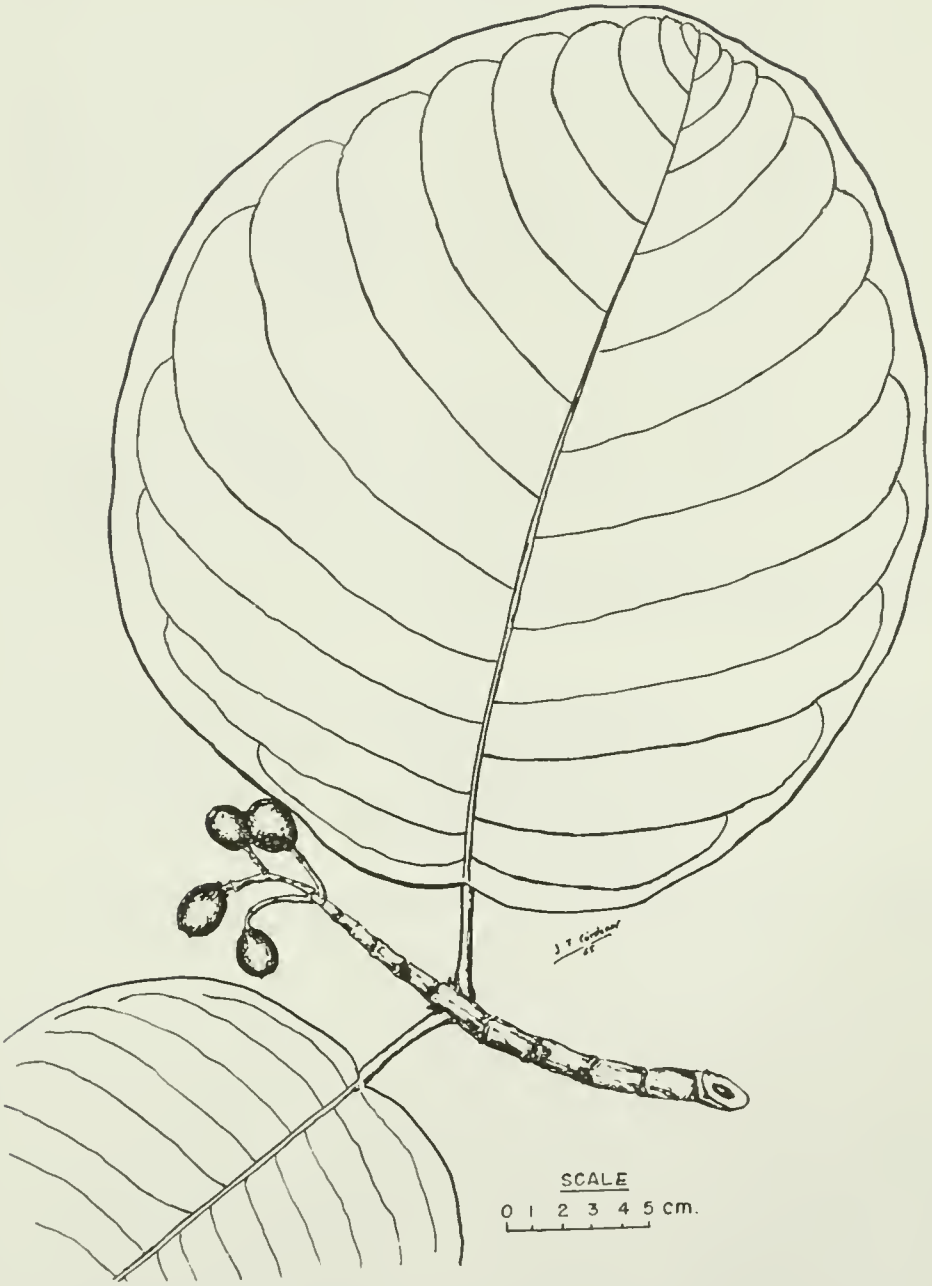



Fig. 5. Sickingia standleyi Little, sp. nov. "Manglillo."

This tree was cited as Sickingia sp. nov. "Manglillo" in my published list of the 1943 collection (A collection of tree specimens from western Ecuador. Caribbean Forester 9: 215-298. 1948; pp. 275, 281).

It is a pleasure to associate this species with Paul Carpenter Standley (1884-1964), outstanding authority on New World plants, author of numerous useful floras, and specialist on the family Rubiaceae. Some specimens of my 1943 Ecuador collection including this family were sent to him for naming. He recognized this as undescribed and planned to name it. His herbarium name was noted to be a later homonym and was replaced by another for the collector. He explained that he was holding it for a treatment of all the Ecuador Rubiaceae based on the abundant recent collections (during World War II; letter of June 14, 1946). Unfortunately, no revision was published of his earlier treatment (The Rubiaceae of Ecuador. Field Mus. Nat. Hist. Bot. Ser. 7: 179-251. 1931). That publication did not record the genus Sickingia Willd. from Ecuador.

When identifying these specimens, Standley called to my attention the close relationship between the floras of Costa Rica and northwestern Ecuador. Many tree species range from the wet tropical forests of Costa Rica southward across Panama and along the Pacific coast of western Colombia from El Chocó to Esmeraldas or slightly beyond. More tree species are common to Esmeraldas and Costa Rica than to Esmeraldas and the Amazonian forests of eastern Ecuador, southeastern Colombia, and Peru.

The 5 new tree species from Esmeraldas, Ecuador, described and illustrated above are: Coussapoa rotunda (fig. 1), Magnolia striatifolia (fig. 2), Matisia longipes (fig. 3), Rudgea jativae (fig. 4), and Sickingia standleyi (fig. 5).

(To be continued.)

Forest Service, United States Department of Agriculture, Washington, D. C. 20250.

# PHYTOLOGIA

*Designed to expedite botanical publication*

Vol. 18 April, 1969 No. 4

CONTENTS





Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, $1; per volume, $6.75 in advance, or $7 at close of volume

# SIX ADDITIONAL VERBENACEOUS NOVELTIES

Harold N. Moldenke

AEGIPHILA MEDITERRANEA var. BREVILOBATA Moldenke, var. nov.

Haec varietas a forma typica speciei calyce sub anthesi brevissime 5-dentato recedit.

This variety differs from the typical form of the species in having the rim of the calyx during anthesis merely very shortly 5-dentate rather than caudate-awned.

The type of the variety was collected by Antonio Krapovickas (no. 13364) at the Cataratas do Iguaçú, Paraná, Brazil, on September 27, 1967, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector describes the plant as a tree 4 m. tall.

CITHAREXYLUM LEMSII Moldenke, sp. nov.

Frutex, ramulis ramulisque numerosis graciliusculis griseis glaberrimis; sarmentis nitidis minutissime puberulis tetragonis, angulis costatis; internodiis abbreviatis; foliis oppositis deciduis, cicatricibus valde robustis suberosis ciliatis; petiolis graciliusculis dense puberulis; laminis firme chartaceis ellipticis usque ad late ellipticis vel subrotundatis acutis vel subacuminatis integerrimis, ad basin longiuscule acuminatis, supra glabris, subtus dense molliterque pubescentibus, pilis brevissimis subvelutinis.

Shrub, apparently much branched and twiggy, the branches and branchlets rather slender, gray, completely smooth, the younger parts and twigs shiny, microscopically puberulous, decidedly tetragonal with rounded-costate angles; principal internodes abbreviated, 1.5—4 cm. long; leaves decussate-opposite, deciduous; nodes not plainly ampliate but the leaf-scars much enlarged, corky, ascending-prominent, with the upper margin ciliate-fringed; petioles rather slender, 1—1.5 cm. long, densely puberulent but the puberulence visible only under a handlens; leaf-blades thick- and firmly chartaceous, dark-green and somewhat brunnescent in drying above, lighter beneath, elliptic to broadly elliptic or even subrotund, 7.5—11 cm. long, 4—6.5 cm. wide, acute or subacuminate at the apex, entire, rather long-acuminate at the base and prolonged downward into the petiole, glabrous above, densely soft-pubescent with dark and very short hairs beneath, almost velvety to touch, not glanduliferous; midrib slender, flat above, prominent beneath; secondaries very slender, 2—4 per side, arcuate-ascending, not anastomosing, flat or very obscurely prominulous above, decidedly prominulent beneath; veinlet reticulation abundant, slightly prominulous above, decidedly prominulent beneath; inflorescence much abbreviated, few, axillary and terminal on the youngest twigs, apparently often only one per node, 1—2 cm. long in fruit and then usually mutant, with apparently 3—14 sessile fruits subtended by ovate scale-like prophylla which are ciliate-fringed and triangular-acute or -acuminate; flowers not seen; immature fruiting-calyx cylindric, about 5 mm.

long and 2.5 mm. wide, nigrescent in drying, decidedly 5-costate, microscopically scattered-strigillose or glabrescent, the rim minutely 5-toothed.

The type of this unusual species was collected by the ill-starred and much-lamented K. Lems — in whose honor it is named — in quadrat 64090302a on the hills west of the resort at Playas El Coco, Guanacaste, Costa Rica, on September 3, 1964, and is deposited in the Britton Herbarium at the New York Botanical Garden.

GMELINA PHILIPPENSIS f. TRANSITORIA Moldenke, f. nov.

Haec forma a forma typica speciei laminis foliorum subtus perspicue brunneo-pilosis, pilis rectis vel subrectis differt.

This form differs from the typical form of the species in having the lower surface of its leaf-blades conspicuously brownish-pilose, the hairs straight or almost so, not twisted nor tomentose-matted, the hairs found all over the surface of the lamina as well as on the venation.

The type of this form was collected by M. D. Sulit [Philippine National Herbarium 11741] on Guimaras Island, Philippine Islands, in February or March, 1950, and is deposited in the United States National Herbarium at Washington. It was originally determined and distributed by E. D. Merrill as G. philippensis Cham. which has the under surface of its leaf-blades glabrous, subglabrous, or with hairs only on the largest veins. The present form has definitely pubescent twigs and conspicuously armed branches. It seems in many ways to be intermediate between G. philippensis Cham. and G. elliptica J. E. Sm.

LANTANA ACHYRANTHIFOLIA f. GRANDIFOLIA Moldenke, f. nov.

Haec forma a forma typica speciei foliis maturis usque ad 12 cm. longis et 6 cm. latis recedit.

This form differs from the typical form of the species in having at least most of its mature leaves attaining a size of up to 12 cm. in length and 6 cm. in width.

The type of the form was collected by J. Flores Crespo (no. 11) in a deciduous tropical woods at the base of a canyon, Cañón de Lobos, 20 km. east-southeast of Cuernavaca, on the road to Chautla, Morelos, Mexico, on August 6, 1967, at an altitude of 1320 m., and is deposited in the herbarium of the Escuela Nacional de Ciencias Biologicas at the Instituto Politecnico Nacional in Mexico City.

LIPPIA MICROMERA var. TONSILIS Moldenke, var. nov.

Haec varietas a forma typica speciei differt foliis perspicue apiculatis, bracteis magnis foliaceisque lanceolatis ad apicem longe attenuatis plerumque recurvatis, et calicibus brevissime puberulis.

This variety differs from the typical form of the species and from var. paludicola Moldenke in having the leaf-blades definitely and rather uniformly apiculate at the apex, the bracts conspicuous, lanceolate, elongate, more or less hiding the flowers, long-attenuate and mostly somewhat reflexed at the apex, and the split

calyx merely very shortly puberulous, not at all hirsutulous.

The type of the variety was collected by J. S. Sobrinho (no. 247) two km. south of Rio de Contas, Alto da Raposa, Serra dos Gerais, Bahia, Brazil, on April 5, 1966, is no. 2050 in the Herbário Sérgio Tavares of the Instituto Tecnológico do Estado de Pernambuco, and is deposited in the United States National Herbarium at Washington. The collector notes the vernacular name "alecrim verdadeiro" and comments "Arbusto formando moitas com fôlhas pequenas. Quando trituradas tem odor agradável servindo de defumador. Flôres pequenissimas côr lilás estames amarelos. Medicinal."

VERBENA SEDULA var. FOURNIERI Moldenke, var. nov.

Haec varietas a forma speciei recedit caulibus ramulisque pedunculisque rhachidibusque petiolisque irregulariter breviterque pilosis et laminis foliorum subtus densiuscule breviterque pilosis.

This variety differs from the typical form of the species in having its stems, branches, branchlets, peduncles, rachids, and petioles irregularly and rather sparsely short-pilose with hairs not plainly visible without a handlens, and the lower leaf-surface rather densely short-pilose.

The type of the variety was collected by Luis A. Fournier (no. 269) beside a small pond on Chatham Island, Galápagos Islands, at an altitude of 500 meters, on February 23, 1964, and is deposited in my personal herbarium at Plainfield, New Jersey.

- - - - - - - - - - - - - - - -

## NECROLOGY

### Otto & Isa Degener

Mrs. Mary Clemens, indefatigable collector in the Orient and widow of Chaplain Joseph Clemens, retired last Good Friday night and died in her sleep. Her interesting botanical letters to us always included quotations and clippings from the Scriptures. She had been living at The Garden Settlement for Aged People, Chermside, Queensland, Australia. Her tired, outworn body was turned over to the medical authorities as she thought it might be of some use to them. According to her philosophy, "There is a natural body and a spiritual body, and I will be clothed with a new body."

# Qataria Reed, nom. nov. for Polygonella Elliott

Clyde F. Reed *

Polygonella Elliott (1957, Rhodophyceae, Upper Jurassic) is antedated by Polygonella Michx. (1803, Polygonaceae) and needs a new name. The type horizon for the genotype of the fossil alga is Duklan, Qatar in Oman on the Persian Gulf. Therefore, I am renaming this genus Qataria.

Elliott described his genus as a calcareous alga composed of a thin encrusting-spread consisting of single layer of proportionally large cells of polygonal-prismatic shape, in a honeycomb fashion. He placed the genus in 'Alga Incertae sedis'.

However, Imaizumi (1965, p. 53), when describing the second species in the genus, gave a more formal treatment: Rhodophyta Papenfuss, 1946; Rhodophyceae Ruprecht, 1851; Cryptonemiales Schmitz in Engler, 1892; Solenoporaceae Pia, 1927. (Phodophyta and Phodophyceae are misspellings).

Qataria Reed, nom. nov. Based on Polygonella Elliott, Micropaleontology, 3: 230, pl. 1, f. 11-12. 1957. Upper Jurassic: Arabia, Syria, Switzerland, Austria, Japan; Lower Cretaceous: N. Iraq.

Qataria incrustata (Elliott) Reed, comb. nov. Basionym: Polygonella incrustata Elliott, Micropaleontology, 3: 230, pl. 1, f. 11-12. 1957. Upper Jurassic: Arabia, Fahud, Oman, Dukhan, Qatar, Persian Gulf); Terbol, Syria; Switzerland; Austria; Lower Cretaceous (Aptian): Najmah, N. Iraq.

Qataria shikokuensis (Imaizumi) Reed, comb. nov. Basionym: Polygonella shikokuensis Imaizumi, Sci. Rep. Tohoku Univ., 2nd. Ser. Geol., 37(1): 53, pl. 9, f. 3-6. Sendai. 1965. Upper Jurassic: Torinosu, Sakawa-machi, Takaoka-gun Kochi Pref., Shikoku, Japan.

Elliott, Graham F. New Calcareous Algae from the Arabian Peninsula. Micropaleontology, 3: 227-230, pl. 1, f. 11-12. 1957.

Imaizumi, Rikizo Late Jurassic Algae from Honshu and Shikoku, Japan. Sci. Rep. Tohoku Univ., 2nd Ser. Geol., 37(1): 49-62, 6 pl., 5 tables. Sendai. 1965.

Michaux, Andre Flora Borealis Americana, 2: 240. 1803.

* Reed Herbarium, 10105 Harford Road, Baltimore, Maryland; Collaborator in Department of Botany, Smithsonian Institution, Washington.

# NOTES ON NEOTROPICAL EUPHORBIACEAE

## 4. Monograph of the genus *Actinostemon*

E. Jablonski
New York Botanical Garden

### ACTINOSTEMON Klotzsch

in Wiegemann, Arch. Naturg. 7: 184. 1841; Benth. in Benth. et Hooker f. Gen. 3: 338. 1880; Pax et K. Hoffm. in Pflanzenr. Heft 52: 57. 1912.
*Dactylostemon* Klotzsch, Arch. Naturg. 7: 181. 1841
*Gussonia* Spreng., Neue Entdeckungen 2: 119. 1821 ex parte

TYPE SPECIES: *Actinostemon concolor* (Spreng.) Müll. Arg.

Arbores vel frutices glaberrimi vel glabrescentes foliis margine semper integerrimis in apice ramulorum spurie verticillatis vel sparsis.

Racemi e gemmis strobiliforme imbricatis dein deciduis orientes, squamis glumaceis coriaceis dorso costatis, brunneo-purpureis margine ciliatis.

Inflorescenciae spicae cymuliferae basi flores ♀ 1-3 dein cymulas ♂ numerosas gerentes.

Flores ♂ sepalis valde reductis vel nullis. Stamina indefinita, filamenta libera apice saepe in phalanges 3-8 staminiferas divisa ex uno centro oriente divergentia. Pedicelli filamentis simillimi in floribus nudis ab eis vix distincti nil nisi rudimentis sepalis 1-2 vel eis absentis divisio inter pedicellum et filamentum geniculo tantum notata. Flores in cymulo intermedio staminas plus quam in cymulos laterales praebens.

Flores ♀ basi spicae solitarii vel pauci saepe longius pedicellati. Sepala basi ovarii adpressi vel nulli. Styli liberi vel in columnam connati. Ovarium fusiforme, subglobosum vel late discoideum, laeve vel tuberculatum.

Capsula in coccos 2-valves dissiliens dorso carpidiorum armata vel laevis, columella trialata persistens.

Semina subglobosa carunculata, embryo in albumine horizontalis vel verticalis.

Plate I

Geographic Distribution of *Actinostemon*

The geographic distribution of *Actinostemon* is distinctly neotropical. Nowhere does it cross the tropic of Cancer and only the tropic of Capricorn is crossed slightly south of São Paolo by *A. concolor* and *A. concepcionis*. The area of main distribution lies along the eastern margin of South America between Pernambuco and Paraguay (with 9 species). Four endemic species have four very isolated occurrences: one in Acre and Upper Amazonas (12), one in the Roraima area (7), one in western Cuba (3), and one in the Antilles and northern Venezuela (2).

Plate I


Distribution of Actinostemon
4 unciformis
5 angustifolius
8 klotzschii
9 lundianus
10 appendiculatus
11 verticillatus
13 echinatus
3 brachypodus
2
2 caribaeus
7
7 schomburgkii
9
8
12 amazonicus
12
1
1
10
13
4
8
1 concolor
10
9
6 concepcionis
5
10
10
6
6
9
13
11
8
MILES
0
1000
2000
Drawn by C. C. Clare

NOTE: The strobilaceous tegmentum enclosing the undeveloped inflorescence is very conspicuous and a good character of the genus. When later the inflorescence develops, the tegmentum falls off and the genus is less easily identifiable. Because of the conspicuous character of the young tegmentum most collectors collect the specimen at this stage. A great number of collections, therefore, are unsuitable for specific identification.

This genus first appeared in the literature in 1821 under the name Gussonia Sprengel. This name, however, had to be dropped because it became confused by the fact that Sprengel included into it right from the start Sebastiania, a very different genus, and worst of all Sprengel's diagnosis does not cover Actinostemon correctly. As Pax puts it (l.c. 79): "descripcio Sprengeliana cum diagnosi generis haud quadrat."

In 1841 Klotsch introduced two names simultaneously: Dactylostemon and Actinostemon to cover this genus. Klotsch claimed that Dactylostemon has a good developed ? calyx and capsules with protuberances, whereas Actinostemon is lacking these. Müller Arg. in 1866 has added to these characters a further distinction claiming the embryo in Dactylostemon is horizontal and in Actinostemon vertical.

In 1912 Pax concluded that these distinctions cannot be maintained. He selected Actinostemon for the name of the genus and relegated Dactylostemon to synonymy.

After 1841 the number of species slowly increased through the work of Didricksen, Grisebach (1857) and Klotzsch (1862) and then rapidly through Müller of Argau (1863, 1866, 1874). Müller was the creater of many new binomials (18) and a flood of tri- and quadrinomials (52) based on very weak evidence, on poor material and often on one single specimen.

O. Kuntze in 1891 (Rev. Gen. 2: 606) following rigid priority revived the name Gussonia and retransferred 21 Actinostemon binomials to Gussonia. Only four of these binomials remain today in the genus; the rest are synonyms of these or do not belong to Actinostemon at all.

Pax in the Pflanzenreich 1912 has reduced many of Müller's bi-, tri- and quadrinomials but was too much of a follower of Müller and was far too little critical in his revision. He has recognized 29 species plus 4 dubia. Seven more binomials were added since 1912, increasing the total to 40.

In the present revision I have accepted of these only 11, but added two new species, bringing the total to 13.

Two distinct evolutionary trends can be discerned within the Hippomaneae. One goes from Sapium through Sebastiania to Stillingia culminating in the development of a gynobase. The other starts with Senefeldera, goes through Gymnanthes and culminates in Actinostemon. In this evolution the calyx becomes reduced step by step to nil, and this loss is compensated by the development of a peculiar protection in the form of a strobiliform tegmentum which encloses the young inflorescence completely.

Another characteristic feature in these two parallel trends (Sebastiania and Actinostemon) is the evolution of appendices and protuberances on the ovary and horns and thorns on the capsules. This development, however, often reverses itself, and the protuberances so conspicuous on the young ovary become reduced and often disappear entirely on the ripe capsule.

## CLAVIS SPECIERUM ACTINOSTEMONIS

1. Carpidia inermia vel geminatim bituberculata
   2. Folia in ramulis subaequaliter sparsa
      3. Ovarium inerme glabrum
         4. Ovarium fusiforme calice destitutum apice in columnam ovario leviter tenuiorem abeunte. Columna stylaris 1 cm longa, capsula pedunculo 2-3 cm longo elevata
            5. Flos intermedius cymuli ♂ 5-11 andrus. Brasilia austro-orientalis, Paraguay, Misiones.....1. concolor
            5. Flos intermedius cymuli ♂ 4-andrus
               6. Folia oblonga 10 cm longa. Antilles, Venezuela.....2. caribaeus
               6. Folia elliptica, basi rotundata 3-5 cm longa. Cuba occidentalis 3. brachypodus
         4. Ovarium subglobosum, styli liberi elongati circum ovarium uncinato-deflexi, pedicelli ♀ breviusculi 6-8 mm longi, calyx ♀ evolutus. Bahia 4. unciformis
      3. Ovarium armatum 6-gibbosum vel cristato-appendiculatum
         7. Flos intermedius cymuli ♂ 8-15-andrus, ovarium 6-gibbosum
            8. Ovarium glabrum, folia lanceolata 10-12 cm longa 1-4 cm lata. Rio de Janeiro 5. angustifolium

8. Ovarium vestitum, folia ovata parva 3.5-7.0 cm longa infra medium latissima. Paraguay, S. Paulo...6. concepcionis

7. Flos intermedius cymuli ♂ 4-8 andrus

9. Ovarium leviter 6-gibbosum, folia minora 3-5 cm longa 1.5-2 cm lata. Guayana.....7. schomburgkii

9. Ovarium grosse cristato-appendiculatum, folia magnitudine variabilia 3-12 cm longa 1.5-4 cm lata. Rio de Janeiro, Maranhão.....8. klotzschii

2. Folia apice ramulorum congesta

10. Styli in columnam connati

11. Ovarium inerme vel leviter tantum 6-tuberculatum. Bahia, Minas Geraes, Rio de Janeiro.....9. lundianus

11. Ovarium grosse cristato-appendiculatum, flos intermedius cymuli ♂ 10-15 andrus pedicello 2-3 mm longo elevatus, androeceum capituliforme. Pernambuco, Espiritu Santo, Bahia.....10. appendiculatus

10. Styli liberi vel imo basi tantum connati, ovarium lurido-hirsutum

12. Carpidia inermia vel obscure 2-tuberculata, flos intermedius cymuli ♂ 3-8-andrus. Bahia, Minas Geraes, Rio de Janeiro 11. verticillatus

12. Carpidia distincte 2-tuberculata, flos intermedius cymuli ♂ 8-12-andrus. Acre, Amazonia Brasiliensis 12. amazonicus

1. Carpidia muricata nec bituberculata. Rio de Janeiro, Pernambuco.....13. echinatus

1. ACTINOSTEMON CONCOLOR (Spreng.) Müll. Arg. in DC. Prodr. 15, 2: 1193. 1866

Gussonia concolor Spreng., Neue Entdeck. 120. 1821

Excoecaria concolor Spreng., Syst. 3: 24. 1826

Actinostemon sessilifolius Kl. in Linnaea 25: 297. 1852

Actinostemon multiflorus Müll. Arg. in Linnaea 32: 111. 1863

Actinostemon oligandrus (Müll. Arg.) Baill. Adansonia 5: 335. 1863

Actinostemon polymorphus Müll. Arg. in Linnaea 32: 108. 1863

Actinostemon macrocarpus Müll. Arg. in Mart. Fl. Bras. 11, 2: 597. 1874

Actinostemon sparsifolius (Müll. Arg. Pax in Pflzr. Heft 52: 72. 1912
Actinostemon cantagallensis Glaz. Bull. Soc. Bot. Fr. 59: 634. 1913 (nomen)
Actinostemon tortuosus Glaz. l.c. 1913 (nomen)
Dactylostemon oligandrus Müll. Arg. in Linnaea 32: 115. 1863
Dactylostemon sparsifolius Müll. Arg. in Mart. Fl. Bras. 12, 2: 610. 1874
Gymnanthes concolor Müll. Arg. in Linnaea 32: 103. 1863
Stillingia concolor Baill. Adansonia 5: 327. 1865

TYPE COLLECTION: None.

DISTRIBUTION: On the eastern margin of South America, between Pernambuco and Paraguay.

SPECIMENS EXAMINED:
Pernambuco: Nazare da Mata, Jayme Coelho de Moraes 1099 (US)
Ceara: Serra do Bezouro, Guedes 471 (NY)
Bahia: Prope Bahiam (Tulasne sen.) Blanchet 9788 (NY)
Forest of Rio Grungogy Basin, Curran 246 (US)
Minas Geraes: (Tulasne) Claussen 742 (A, A, NY)--Type of A. oligandrus
Photo Delessert, Claussen s.n. (GH)
Teixeira Soares, A. Sampaio 825 (US)
Gardner 5175 (US, NY, V).--Type of var. gardneri
Lagoa Santa, Warming 1601 (GH) Photo Copenhagen (C).--Type of A. sparsifolius
Rio de Janeiro: mostly without exact locality
Duarte 5186 (US)
Gardner 172 (V); 5620 (GH); 5822 (V, V, V, US)
Glaziou 1465 (US, F); 3106 (US); 9578 (US); 9580 (F) (nomen).--Type of A. tortuosus; 16347 (F); 16354 (F).--Type of A. cantagallensis (nomen); 18470 (US)
Hoehne-Kuhlman 25070 (NY)
Langsdorf s.n. (US)
Lund (hb. Warming) (NY)
Pabst 5409 (US)
Pereira 110 (US); 4080 (7006) (US); 7100 (US)
Pohl 1717 (GH, NY, MO).--Type of A. multiflorus
Riedel s.n. (GH, GH, GH, GH, NY, NY, NY, MO)
Riedel s.n. photo of Type of A. macrocarpus (V, V, V, V, US, US, US)
Saint Hilaire 976 (NY)
Schott 4202 (V, V); 4654 (V, V); 4655 (V, V); 1717$^{d}$ (GH, F)
Sello s.n. (V, V, V)
Vauth (herb. Endl.) (V)
Wilkes s.n.
Collector ? (herb. Warming) (GH)

São Paulo:
Sao Luiz do Parahytinga, Löfgren & Edwall 1859 (A)
Bosque da Saude, Hoehne 4354 (NY)
J. Weir 303 (F)
Iguape, Pirassununga, Löfgren & Edwall s.n. (A)
Parque de Estado, O. Handro 28.131 (A, A)
Parana:
Maringo, Orto Forestal, Hatschbach 12.936 (US)
Pinheirinho (Antonina), Hatschbach 14.751 (US)
Guaratuba, Pedra Branca de Araraguara, Hatschbach 14.525 (US)
Serra do Mar, Porto de Cima, Jonsson 954[a] (A, F)
Villa Velha, in campo rupestri 875 m, Jonsson 1151a
Ponta Grossa, in sylvula, Dusen 10.304 (NY, US, GH, F, MO)
Jaguarinhyva, 740 m, Dusen 13.091 (G, H)
Villa Velha, in sylvula, Dusen 15.697 (A, MO)
Santa Catarina:
Klein 55 (US, US, US); 149 (NY); 597 (US); Klein 805 (US, NY, F); 1582 (US, NY); 1612 (US); 1635 (US, NY); 2281 (US, NY); 3006 (NY)
Reitz 1852 (US, NY); 2807 (F, NY); 3080 (US)
Reitz & Klein 3830 (NY); 4687 (US); 6927 (F); 7018 (US); 7030 (US, US, NY, GH); 7045 (US); 9039 (US); 9118 (F); 9318 (NY); 16236 (US); 16261 (US)
Smith-Klein-Gieweski 7606 (US, NY)
Smith-Reitz 12905 (GH, MO); 12513 (F); 12932 (NY)
Ule 939 (US)
Luederwald 13843 (A)
Rio Grande do Sul:
Estacão Linha Bonita, Rambo 40.019 (F, V)
Estacão Azevedo, Rambo 43.302 (F, V)
Capesberg prope Caxias, Rambo 43.387 (F, V)
Portão prope S. Leopoldo, Rambo 43.534 (MO, V)
Morro do Sabia, prope Porto Alegre, Rambo 43.739
Neu Wurtenberg, Bornmuller 536 (V, GH)
Canoas prope Porto Alegre, Malme 290 (US, GH); 1472 (US, GH)
Mo da Gloria--Porto Alegre, Rambo & Andinata 117 (US)
Uruguay:
Tacuari, Dept. Treinta y Tres, Herter 1806 (V, F, GH, MO, NY, US)
Argentina, Misiones:
Salto Iguazu, Rodriguez (388) 3548 (GH); 10976 (GH
Iguazu Eldorado, Schwindt 2106 (V)
Cercanias del Piray-Guazu, Schwindt 2010 (MO)
Acaragua, Dept. San Javier, Bertoni 2892 (MO, F)
Candelaria, Coreto, Montes 148 (V)
Paraguay:
Sierra de Amambay, Pedro Juan Caballero, Rojas 6407 (A)
Cerro Torin, Rojas 3897 (A)
Sierra de Amambay, Hassler 11278 (A, NY, V)

Paraguay (continued):
Ibytimi, Paretti & Rojas 9703 (A)
Vista Alegre, Rojas 3885 (A, A, US)
Lacus Ypacaray, prope Sapucay, Hassler 11834 (US, A, GH, F, F, NY, MO)
Villa Rica, Hassler 8866 (V, F, NY, A)
Villa Rica, Jorgensen 3981 (GH)
Colonia Independencia, Rojas 4856 (NY, A, A, US); 14,569 (V)
Alto Parana, Fiebrig 6143 (US, GH)
Puerto Bertoni, Alto Parana, Rojas 8202 (A)
Tacuru Pucu, Alto Parana, Fiebrig 6681 (A)
Iturbe del Guaira, Montes 15.817 (V)

NOTE: Actinostemon concolor has been split by Müller to a great number of trinomials of doubtful value. He admitted himself that these were "formae varietatum nominis haud dignae." In the following I am trying to reconstruct the nomenclatural circus created by the avalanche of these tri- and quadrinomials:

In 1863 Müll. Arg. (in Linnaea 32: 108-110) listed 11 trinomials and 9 quadrinomials under Actinostemon polymorphus.

In 1866 (DC. Prodr. 15, 2: 1193-5) he transferred all these to A. concolor (Spreng.) Müll. Arg., increasing their number to 12 by adding one by reducing A. caribaeus Griseb. to a trinomial status. He further complicated the picture by changing var. angustatus to var. angustifolius, var. gardneri to var. genuinus, var. acutissimus to var. acuminatus. He also changed one quadrinomial: f. minor to f. sessilifolius (Kl.) Müll. Arg., and dropped 7 quadrinomials, retaining unchanged only one: f. platyphyllos

In 1874 (Mart. Fl. Bras. 12, 2: 593-597) he further increased the number of trinomials from 12 to 17 by adding a new one (var. riedelii), by reviving and elevating 5 quadrinomials to 4 varieties (f. microphyllus to var. microphyllus, f. latifolius to var. gardneri, f. bicolor to var. bicolor, f. angustifolius lumped with f. biattenuatus to var. genuinus). At the same time he dropped without trace: f. concolor and f. cuspidatus.

In 1912 Pax (Pflzr. Heft 52 Hippomaneae: 75-79) made an attempt to save 10 of Müller's 17 trinomials but let the two last quadrinomials (f. platyphyllos and f. sessifolius) die their natural death.

2. ACTINOSTEMON CARIBAEUS Griseb. in Abh. Ges. Wiss. Göttingen 7: 168. 1857
Actinostemon concolor var. caribaeus Müll. Arg. in DC. Prodr. 15, 2: 1193. 1868

Actinostemon sessilifolius Kl. in Linnaea 25: 297. 1852 ex parte
Excoecaria caribaea Griseb. Fl. Brit. Westind Isl. 51. 1864

TYPE COLLECTION: Antigua, Wullsohl (V)

DISTRIBUTION: Lesser Antilles, Northern Venezuela

SPECIMENS EXAMINED:
St. Martin: Boldingh 3143 (NY)
Antigua : Wullschlagel 514 (V)
Rose-Fitch-Russell 3477 (NY)
Harold E. Box 1106 (NY, MO)
Guadeloupe: Duss 2465 (NY, NY, US, F, GH, MO)
Griseb. ded. 1857 (MO)
H. Stehle 81 (US); 5646 (US)
Dominica : Hodge & Hodge 2684 (GH)
Martinique: Duss 891 (NY)
Barbados : Gooding 423 (NY)
Eggers 7149 (US)
Trinidad : Sieber s.n. (V)
Venezuela :
Estado Falcon: Peninsula Paraguara, Cerro Santa Ana, Steyermark & Brown 94631; Tamaga 699 (Ven); Breteler 4294 (Ven); Lasser & Aristeguita 3411 (Ven)
Estado Yaracuy: Near Tania, Steyermark 56858 (NY, NY, F)
Estado Carabobo: Guaremales, road from El Palito to San Felipe, Pittier 8847 (NY, GH, Ven, US)

3. ACTINOSTEMON BRACHYPODUS (Griseb.) Urban in Fedde, Rep. Spec. Nov. 28: 231. 1930; Bro. Alain, Fl. de Cuba 3: 120. 1953
Excoecaria brachypoda Griseb. in Nachrichten Gesellsch. Wiss. Göttingen 178. 1865
Excoecaria brachyandra Müll. Arg. in DC. Prodr. 15, 2: 1224. 1866
Gymnanthes brachypoda (Griseb.) Pax & Hoffm. Pflzr. Heft 52: 1912

TYPE COLLECTION: C. Wright 2005, Prov. Pinar del Rio prope Vinales in sylva humili Sierra de Vinales ad Ensenado de la Bandera, Cuba occidentalis. "Obs. Jam cl. Müller Arg. hanc speciam recte ad Actinostemon traduxerat sed infauste cum specie ex Antillis minoribus conjunxit, que foliis oblanceolatis vel ellipticis inferne longe cuncatis angustatis facile distinguenda est" (Urban).

DISTRIBUTION: Endemic in western Cuba.

SPECIMENS EXAMINED:
Pinar del Rio, Cuba occidentalis
In woods Rebiro, Wright 2005 (NY, GH, US, MO)
Guabinacho, El Rangel, slope of Loma, Fr. Leon 14048 (NY, NY, GH)
Sierra de Linares, Fr. Leon 5120 (NY, GH)
Vinales in low forest at the ascent of Sierra Vinales called Ensenada de la Bandera, Ekman 16562 (US)
Sierra del Sitio Santo Tomas in limestone in Ensenada de Vega Cuchilla, about 500 m, Ekman 16672 (NY)
Bahia Honda, Roig & Acuna 14239 (NY)
San Diego de los Banos, Britton, Earle, Gager 6783 (NY, F, GH)
Habana: Sierra del Grillo, Madruga, Fr. Leon 6341 (NY, GH)

NOTE: Only one specimen (Wright 2005) carried male inflorescences; all others carried only female flowers or had the integuments not yet open.

4. ACTINOSTEMON UNCIFORMIS Jabl. sp. nov.

Arbor 6 metralis, foliis parvis in ramulis sparsis 4-5 cm longis 1.5 cm latis ellipticis apice subrotundatis. Spicae 3-4 cm longae basi flores ♀ 2-3 dein cymulas ♂ numerosas gerentes. Flores ♂ 3-4 andri sepalis solitarius lato suffulti. Flores ♀ calyce suffulti. Calyx 3-5 lobatus. Ovarium subglobosum inerme glabrum, styli liberi ovario duplo longiores circum ovarium uncinato-deflexi. Pedicelli breviusculi 6-8 mm longi. Fructus nondum maturi.

TYPE COLLECTION: Belem & Magalhães 614. Centro de Pesquisas do Cacau, Ceplac, Cepec, Ilheus, Bahia (NY)

DISTRIBUTION: Known only from the type collection.

5. ACTINOSTEMON ANGUSTIFOLIUS (Müll. Arg.) Pax in Pflzr. Heft 52 (Hippomaneae): 64. 1912
Actinostemon glabrescens Pax et K. Hoffm. in Pflzr. Heft 52 (Hippomaneae): 64. 1912
var. macrophyllus Pax et K. Hoffm. l.c. 65
var. acuminatus (Müll. Arg.) Pax l.c. 65
var. tenuifolius (Müll. Arg.) Pax l.c. 65
var. angustifolius (Müll. Arg.) Pax l.c. 65
Dactylostemon angustifolius Müll. Arg. in Mart. Fl. Bras. 2: 604. 1874
Dactylostemon klotzschii var. acuminatus Müll. Arg. in Mart. Fl. Bras. 11, 2: 606. 1874

Dactylostemon klotzschii var. tenuifolius Müll. Arg. in Mart. Fl. Bras. 11, 2: 607. 1874
Dactylostemon klotzschii var. angustifolius Müll. Arg. in Mart. Fl. Bras. 11, 2: 607. 1874
Dactylostemon communis var. angustifolius Müll. Arg. in Linnaea 32: 713. 1863

TYPE COLLECTION: Riedel s.n., Mandioca near Rio de Janeiro (V), Photo of Delessert herb. (MO)

SPECIMENS EXAMINED:
Rio de Janeiro:
Sello s.n. (V)
Sello 1345 (F) fragment
Glaziou 13493 Photo of Berlin type (MO, GH, NY)
Riedel s.n. (GH, NY)
Hoehne s.n. Morroda Babilonia (A)

6. ACTINOSTEMON CONCEPCIONIS (Chod. et Hassler) Hochreitinger in Bull. N.Y. Bot. Gdn. 6: 278. 1910; Pax et K. Hoffm. in Pflzr. Heft 52 (Hippomaneae): 67. 1912
Dactylostemon klotzschii var. obtusatus, heterophyllus, concepcionis Chod. et Hassler in Bull. Herb. Boiss. 2 ser. 5: 678. 1905

TYPE COLLECTION: Hassler 7431, Concepcion

SPECIMENS EXAMINED:
Paraguay:
Prope Concepción, Hassler 7431, 7308 (NY, A, MO)
Zwischen Río Apa und Río Aquidaban, Fiebrig 5050 (GH)
Sierra de Amambay, Hassler 10598 (NY, F, MO)
Sierra de Amambay, Rojas 4105 (A)
Río Tapiracuai, Dep. San Pedro: Prima vera, Alto Paraguay, Woolston 866 (US, NY)
Corros Tobati: Cerro Penitente, Fiebrig 764 (A, F)
Cordillera de Altos, Hassler 681, 701 (NY, NY, NY, NY)
Cordillera de Altos, Fiebrig 131 (F, A, GH)
Silva Atira, Hassler 1480 (NY), 3143 (F) dupl. ex. Conserv. Genevensi, Photo Berlin Hb (MO, NY, NY, NY, GH)
In regione lacus Ypacaray, Hassler 12272 (NY, MO, A, A, GH)
Cordillerita-Ibatymi, Rojas 6145 (A)
Cerro de Acabay, Rojas 3257 (A)
Parque del Jardin Botanico, Rojas 9107 (A, A, A)
São Paulo:
Alto Araras: Faz Campo, Pacifico 23651 (NY)
Botucatum, Cerradao, Edwell 4294 (A)
Itapetininga, Löfgren 218 (A)

7. ACTINOSTEMON SCHOMBURGKII (Kl.) Hochr. in Bull. N. Y. Bot. Gdn.: 298. 1910; Pax in Pflzr. Heft 52 (Hippomaneae): 68. 1912

Dactylostemon schomburgkii Klotzsch in Hook. London Jour. Bot. 2: 45. 1843

Actinostemon depauperatus Pax et K. Hoffm. in Pflzr. Heft 68. Addit. 6: 58. 1919

Actinostemon parvifolius Pittier in Bol. Soc. Venez. Cie. Nat. 5: 306. 1938-9

TYPE COLLECTION: Schomburgk 716 Br. Guiana (Holotype BM) non vidi; Schomburgk 716 (Isotype MO, F); Schomburgk s.n. Photo hb. Delassert (MO)

DISTRIBUTION: Roraima area

SPECIMENS EXAMINED:

Br. Guiana: Schomburgk 714 (F); 716 photo (MO); s.n. (MO); 939 Roraima (NY); 1273 fragment (F)

Kanuku Mt., drainage of Moku-moku, A. C. Smith 3378 (A, US, MO, F, NY)

Brazil: Rio branco, Surumu Ule 7947 (US) Isotype of A. depauperatus, im Walde der Serra Mairary 900 m.

Photo of Berlin type of Ule 7947 (NY, GH, MO)

Territorio do Roraima, Senuha, Rio Mucajai, Summit of small serra, Prance, Forero, Pena, Ramos 4214 (NY)

Venezuela: Estado Bolívar: Wooded summit of Cerro between Las Nieves on base of slopes southeast of Cerro Pichacha N of Las Nieves 45 kms N of Tumeremo, Altiplanicie de Nuria. El. 100-300 m, Steyermark 89291 (NY, NY, VEN, VEN)

Estado Bolivar: El Paraiso, 38 km al NE del caserio Los Rosas el cual esta en la carretera Upata San Felix a 17 km de Upata, L. Marcanto Berti 770 (NY)

Estado Bolívar: En los sotos de la silvas veraneras del Callao, E. Delgado 211. Holotype of A. parvifolius Pittier (VEN). Isotype (US)

NOTE: A. parvifolius is based on a specimen on which the ♀ flowers are too young, but even so the appendices are distinctly shown, that the specimen can not belong to the "section Laeves" which misled the author to distinguish it from A. schomburgkii.

8. ACTINOSTEMON KLOTZSCHII (Didr.) Pax in Pflzr. Heft 52 (Hippomaneae): 69. 1912

Dactylostemon klotzschii Didricksen in Videnskahl. Meddel. Kjobenh. 127. 1857; Müll. Arg. in DC. Prodr. 15, 2: 1197. 1866; in Mart. Fl. Bras. 11, 2: 604. 1874

Actinostemon communis Pax in Pflzr. Heft 52: 65. 1912
var. grandifolius Pax l.c. 66
var. spathulatus Pax l.c. 66
var. cordatus Pax l.c. 66
var. obovatus Pax l.c. 66
var. obtusatus Pax l.c. 66
var. weddellianus Pax l.c.
var. intermedius Pax l.c.
var. heterophyllus Pax l.c.
Actinostemon cuneatus (Müll. Arg.) Baill. Adansonia 5: 535. 1865
?Actinostemon leptopus (Müll. Arg.) Pax in Pflzr. Heft 52: 69. 1912
?Actinostemon australis (Müll. Arg.) Pax l.c. 69
?Actinostemon glaziowii Pax et K. Hoffm. l.c. 75
Actinostemon desertorum (Müll. Arg.) Pax in Pflzr. Heft 52: 70. 1912
Actinostemon sprengelii Baill. Adansonia 5: 333. 1865
Dactylostemon communis Müll. Arg. in Linnaea 32: 112. 1863
var. obtusatus Müll. Arg. l.c. 113
f. glabratus Müll. Arg. l.c.
var. weddelianus Müll. Arg. l.c.
var. hagendorfii Müll. Arg. l.c.
var. cordatus Müll. Arg. l.c.
var. petiolaris Müll. Arg. l.c.
f. obovatus Müll. Arg. l.c.
f. spathulatus Müll. Arg. l.c.
var. angustifolius Müll. Arg. l.c.
Dactylostemon cuneatus Kl in sched. ex Müll. Arg. in Linnaea 32: 114. 1863
var. latifolius Müll. Arg. l.c. 114
var. angustifolius Müll. Arg. l.c. 114
Dactylostemon klotzsch Müll. Arg. in DC. Prodr. 15, 2: 1197. 1866
var. obtusatus Müll. Arg. l.c.
var. weddellianus Müll. Arg. l.c.
var. genuinus Müll. Arg. l.c.
var. cordatus Müll. Arg. l.c.
var. petiolaris Müll. Arg. l.c. 1198
var. angustifolius Müll. Arg. l.c.
Dactylostemon klotzschii Müll. Arg. in Mart. Fl. Bras. 12, 2: 604. 1874
var. grandifolius Müll. Arg. l.c. 604
var. heterophyllus Müll. Arg. l.c. 605
var. intermedius Müll. Arg. l.c. 605
var. obovatus Müll. Arg. l.c. 606
var. spathulatus Müll. Arg. l.c. 606
var. tenuifolius Müll. Arg. l.c. 607
?Dactylostemon leptopus Müll. Arg. in Mart. Fl. Bras. 11, 2, 607. 1874

?Dactylostemon australis Müll. Arg. l.c. 608
Dactylostemon desertorum Müll. Arg. l.c. 608

TYPE COLLECTION: Brazilia, Merkel Hb. Horn (C)

DISTRIBUTION: Known with certainty only from the States of Rio de Janeiro, Bahia and Maranhão.

SPECIMENS EXAMINED:
Rio de Janeiro:
Riedel s.n. Berlin photo (NY, MO, GH), 377, 3806 as var. grandifolia
Gaudichaud 1153 (NY)
Glaziou 3649, hb. Warming (F) as var. weddelianus
F. C. Hoehne 25048, Morro de S. Joao (NY) fragment (A)
Ule 734, Stranch auf dem Morro de Nova Cintra (US)
Capt. Wilkes (GH, GH, GH)
Miers s.n. (US)
Pereira 4023, Jacarepagua: Estado Boiuma (US)
Minas Geraes: Sello s.n. fide Pax, photo Berlin Sello 1343 as Actinostemon cuneatus (NY, MO, GH)
Bahia:
"Desertum Bahiense" Martius s.n. Photo München, Type of Actinostemon desertorum
Maranhão:
Island of Sao Luiz. Froes 11593 (US, F, MO, A, NY)
St. Paul:
Burchell 5238, 4966 Photo Delessert. (MO) Type of Actinostemon australis
Brasilia without closer locality, but probably mostly from Rio de Janeiro:
Hagendorf 1347. Photo Berlin as "Actinostemon klotzschii" (GH, F, NY, MO)
Schueck s.n. Photo Vienna (MO) as Actinostemon leptopus (V)
Glaziou 16347. Photo Berlin as Actinostemon glaziovii (MO, GH, NY)
Burchell 1086 (K)
Riedel s.n. as var. grandifolius (US), as var. spathulatus (NY, US)

NOTE: Didricksen defined this species as "Ovarium...infra apicem cornubus 6 per paria dispositis e latere compressis curvulato-erectis obtusis preditum."

This character could not be verified with certainty in the following synonyms: A. australis, cuneatus, desertorum and leptopus. Pax who had opportunity to examine the pistils on the types of these synonyms describes them as "minute sed districte 6-tuberculatum," or "obtuse tuberculato-6-gibbosum" or simply as "6-gibbosum," or "dorso carpidiorum infra medium minuta et obtusa 2 tuberculatum."

9. ACTINOSTEMON LUNDIANUS (Didr.) Pax in Pflzr. Heft 52 (Hippomaneae): 70. 1912
Dactylostemon lundianus Didricksen in Vid. Medd. Nat. for Kjobenh. 126. 1857
Dactylostemon lasiocarpoides Müll. Arg. in Linnaea 32: 114. 1863
Dactylostemon lasiocarpus Müll. Arg. l.c. 111. 1863
Actinostemon estrellensis (Müll. Arg.) Pax Pflzr. Heft 52: 71. 1912
Actinostemon gardneri (Müll. Arg.) Pax Pflzr. Heft 52: 63. 1912
Actinostemon grandifolius (Müll. Arg.) Pax l.c. 61. 1912
Actinostemon lagoensis (Müll. Arg.) Pax l.c. 62. 1912
Actinostemon lanceolatus Saldanha in Adansonia 8: 263. 1867-8
Actinostemon lasiocarpoides Baill. Adansonia 5: 334. 1865
Actinostemon lasiocarpus (Müll. Arg.) Baill. Adansonia 5: 334. 1865
Actinostemon mandiocanus (Müll. Arg.) Pax Pflzr. Heft 52 (Hippomaneae): 61. 1912

TYPE COLLECTION: W. Lund s.n. hb. Horn (C) non vidi. However Didricksen's description leaves no doubt about the identity of this species. "A genere diversa in primis cornuum defectu."

DISTRIBUTION: Bahia, Minas Geraes and Rio de Janeiro. Recently discovered in the Territorio Amapa.

SPECIMENS EXAMINED:
Bahia:
Inter Bahiam et Vittoriam. Sello s.n. in hb. Berol. non vidi. Type of Actinostemon lasiocarpus Müll. Arg. in Linnaea 32: 111. 1863
Prope Nazare. Sello 1349 photo of Berlin type of A. grandifolius (MO, NY, GH)
Minas Geraes:
Lagoa Santa, Warming 1061 photo of Copenhagen type of A. lagoensis (F, GH)
Vicosa, El. 700 m, road to Sao Miguel, Ynes Mexia 5198 (MO, MO, F, NY, A, GH, US, US)
Distr. Iltien, Fazenda da Tabunha El. 300, Ynes Mexia 4987 (MO, F, NY, GH, A)
Rio de Janeiro:
Parahyba do Sul dans la foret du Macao. Saldanha (285) 5490 photo of Berlin type of A. lanceolatus (NY, MO, GH)
Fazenda do Sobrol, inflor. not yet open, Glaziou 13179 (F, NY, NY, MO, GH, US)
Mandioca, photo of Delessert type of A. mandiocanus Riedel et Lansdorff 556 (MO)

Rio de Janeiro (continued):
Without exact locality Schott 4653. Pohl 1714 (F)
Prope Rio de Janeiro, Typus of A. gardneri. Gardner 166 (V, NY) Photo of Vienna Typus (MO, GH) Photo of Geneva Typus (NY, MO)
Corcovado, Riedel 378, photo of Types of Dactylostemon lasiocarpoides (GH, MO, NY) without detail, Riedel s.n. (GH, GH, US, NY)
Aldeida de S. Pedro, Glaziou 13177 (NY, GH)
Entre Lago de Deixo et la Rio Bonita, Typus of Actinostemon extrellensis, Glaziou 13178 (F, US)
Terr. Amapa:
Rio Araguari, 5 hours above Rio Muruni, 1°24' N--51°57' W, Pires, Rodrigues, Irvine 50447 (NY). Fruits only. Unicate.
Rio Araguari, vicinity of Camp 12, 1°11' N--52°8' W. Pires Rodrigues, Irvine 51437 (NY, NY, NY, NY)
Male part of inflorescence slipping out, ♀ not yet out.

10. ACTINOSTEMON APPENDICULATUS Jabl. sp. nov.
Arbor heterophyllus foliis nitidis brevissime petiolatis ternatim quinatimque verticillatis, oblanceolatis basin versus cuneato angustatis ima basi saepe brevissime subcordatis 9-13 cm longis 2-4.5 cm latis superiore parte latissimis.

Squamae involucrantes more generis brunneae striatae margine ciliatae florendi tempore caducissimae, spicae 2-3 cm longae basi flores ♀ 1-3 dein cymulas ♂ numerosas gerentes, cymulae basales hinc inde juxta florem ♀ utrinque flores ♂ gerentes.

Stamina floris ♂ intermedii 9-15, reliquorum 7-12 basi glandulosa, pedicelli graciles 2-3 mm longi, calyx ♂ omnis deficiens, anthereae fere sessiles capitulum formantes.

Pedicelli ♀ breves fere crassi, 2-3 mm longi, sepala exigua lanceolata glabra vel sparse hirsuta, ovarium glabrum vel sparse hirsutum duplo latius quam altum grosse cristato-6-appendiculatum, appendices sub anthesin divaricati dein apicem versus vel introrsum falcati, styli sub anthesin in columnam brevem post antherin longiorem 2-5 mm longam connati, stigmata longa circinatim involuta.

Capsula glabra 7 mm alta 9 mm diametiens appendicibus subalatis 6-cornuta.

TYPE COLLECTION: Jayme Coelho de Moraes 1091 Nazare da Mata, Pernambuco (US)

DISTRIBUTION: Northeastern Brazil between Pernambuco and Espiritu Santo and possibly Rio de Janeiro.

SPECIMENS EXAMINED:
Pernambuco:
In woods Tapera. Pickel 3467 (GH, NY, F) 3530 (GH, NY, F)
Bahia:
Forest Grungogy. Curran 163 (US)
Espiritu Santo:
Itabapoana. Sampaio 946 (US)
Rio de Janeiro:
Schott 4652 (F)

11. ACTINOSTEMON VERTICILLATUS (Kl.) Baill. in Adansonia 5: 334. 1865
Dactylostemon verticillatus Klotzsch in Linnaea 25: 298. 1852
Actinostemon verticillatus Baill. f. genuinus Müll. Arg. in Mart. Fl. Bras. 11, 2: 603 tab 83 f. 1. 1874
Actinostemon verticillatus f. subinermis Müll. Arg. l.c. 603. 1874

TYPE COLLECTION: None. "Frutex brasiliensis ramosissimus" (Klotzsch described a plant grown in Berlin Bot. Gdn.)

DISTRIBUTION: Bahia, Minas Geraes, Rio de Janeiro.

SPECIMENS EXAMINED:
Bahia:
Forest of Grungogy, Curran 24 (GH, US); 198 (US); 246 (GH) ♀ flowers not yet unfolded.
Minas Geraes:
Lagoa Santa, Warming s.n. (GH)
Rio de Janeiro:
Morro do Babilonia. Hoehne s.n. (A)
Gaudichaud 1146 (NY, A, F) non nisi capsula
Glaziou 3815 (F)
Riedel 381 (US, GH, NY)(Typus of f. subinervis)
Aug. St. Hilaire 297 (F) Capsula glabra laevis

12. ACTINOSTEMON AMAZONICUS Pax et K. Hoffm. in Pflzr. Heft 52 (Hippomaneae): 63. 1912

TYPE COLLECTION: Ule 5586 Jurua Miry. Acre, Brazil (V). Photo of Berlin type (MO, NY, GH)

DISTRIBUTION: Very limited to Acre and the southwestern edge of Amazonas bordering to Acre.

SPECIMENS EXAMINED:
Acre:
Rio Purus: Rio Yaco, R. Macauhan, Krukoff 5551 (NY, A)
Amazonas:
Jurua, Embira (Rio Tarauca) 7°30' 70°15' Krukoff 4751 (MO, NY, A)

NOTE: In all specimens seen the involucrant scales enclose the inflorescence to such an extent that nothing is shown from the flowers. According to Pax and Hoffmann's description Actinostemon amazonicus is closely related to Actinostemon verticillatus and differs from it only in the number of stamens which is 8-12 in the intermediate flower of the cymule of A. amazonicus, and only 3-8 of A. verticillatus.

13. ACTINOSTEMON ECHINATUS Müll. Arg. in Linnaea 32: 107. 1863
Actinostemon echinatus var. major Müll. Arg. l.c. 108.
Actinostemon echinatus var. minor Müll. Arg. l.c. 108.
Actinostemon echinatus var. spathulatus Müll. Arg. l.c. 108.
Actinostemon echinatus var. obovatus Müll. Arg. in Mart. Fl. Bras. 12, 2: 592. 1874
Actinostemon trachycarpus Müll. Arg. in Mart. Fl. Bras. 12, 2: 591. 1874

TYPE COLLECTION: Gaudichaud 1145, prope Rio de Janeiro Photo ex Delessert Hb. (MO), fragment of type (F)

DISTRIBUTION: Besides the type locality of Rio de Janeiro collected in Pernambuco

SPECIMENS EXAMINED:
Rio de Janeiro:
Gaudichaud 1145 fragment (F) photo (MO)
Pernambuco:
Schorbaum s.n. Photo ex hb. Delessert (MO)

NOTE: Poorly known species. The echinate capsule distinguishes it from all other Actinostemon. The flowers are known only from Müller's and Pax et K. Hoffm. description.

Plate II

*Actinostemon brachypodus* Urb.

A. Fruiting branchlet x 1 (Ekman 16.672)

B. Branchlet with ♀ flower x 1 (Leon 14.048)

C. Branchlet with ♂ spike x 1 (Wright 2.005)

Plate II

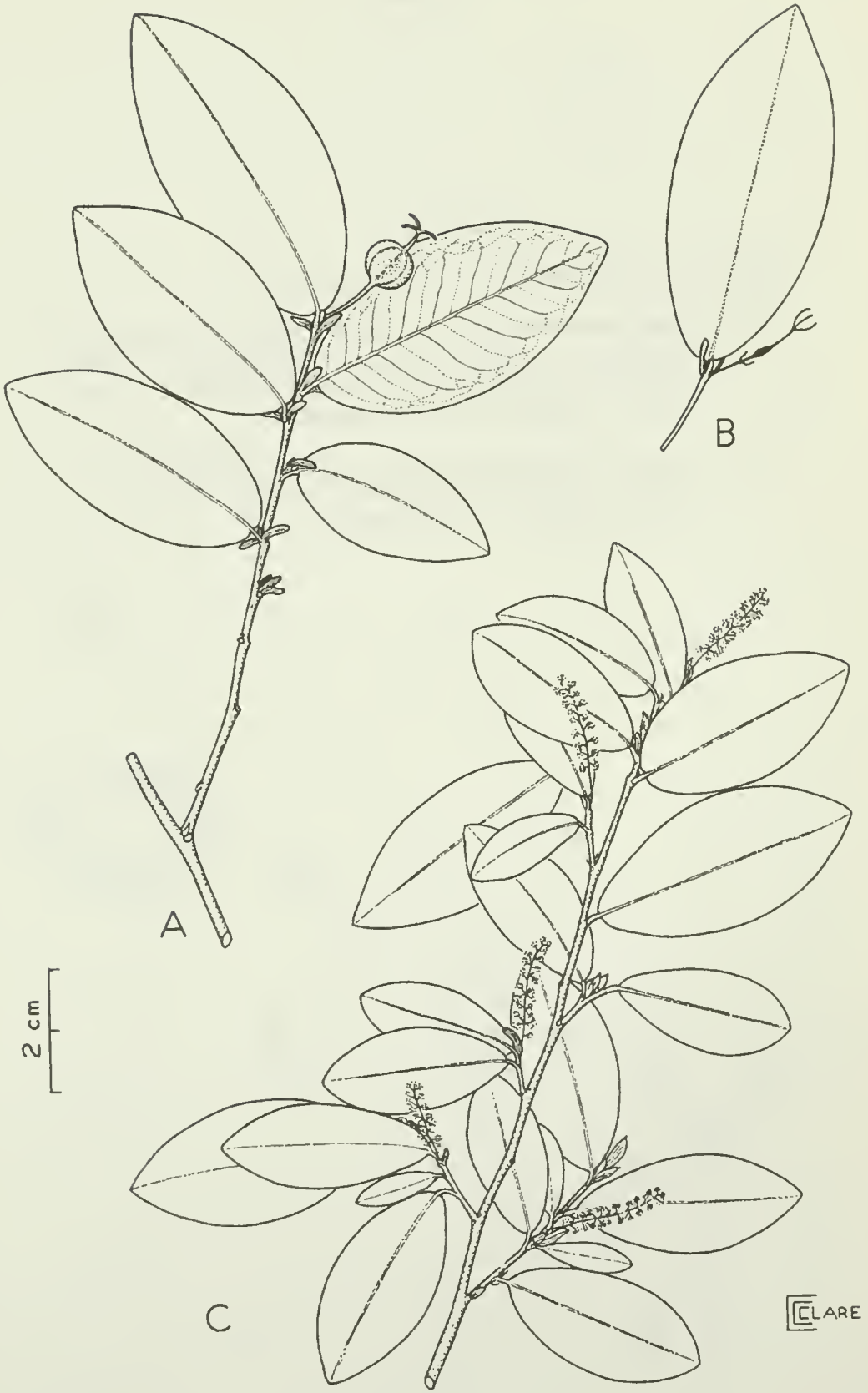


Plate III

Actinostemon lundianus (Didrichs.) Pax

A. Spike emerging from the strobiliform tegmentum, exposing the rich ♂ part of inflorescence. The ♀ flowers usually at the base of the spike have not yet emerged from the tegmentum.

B. Branchlet showing verticillate arrangement of 3 leaves and the inflorescence in an advanced fruiting stage of development.

Plate III

INDEX ALPHABETICUS

| | |
|---|---|
| cuneatus (Müll. Arg.) Baill. (1863) 1865 | (8) |
| var. angustifolius (Müll. Arg.) 1863 | (8) |
| var. latifolius Müll. Arg. 1863 | (8) |
| depauperatus Pax & K. Hoffm. 1919 | (7) |
| desertorum (Müll. Arg.) Pax (1874) 1912 | (8) |
| echinatus Müll. Arg. 1863 | (13) |
| var. major Müll. Arg. 1863 | (13) |
| var. minor Müll. Arg. 1863 | (13) |
| var. obovatus Müll. Arg. 1874 | (13) |
| var. spathulatus Müll. Arg. 1863 | (13) |
| estrellensis (Müll. Arg.) Pax (1874) 1912 | (9) |
| var. genuinus Pax 1912 | (9) |
| var. latifolius Pax 1912 | (9) |
| gardneri (Müll. Arg.) Pax (1874) 1912 | (9) |
| glabrescens Pax & K. Hoffm. 1912 | (5) |
| var. acuminatus (Müll. Arg.) Pax (1874) 1912 | (5) |
| var. angustifolius (Müll. Arg.) Pax (1863) 1912 | (5) |
| var. macrophyllus Pax & K. Hoffm. 1912 | (5) |
| var. tenuifolius (Müll. Arg.) Pax (1874) 1912 | (5) |
| glaziovii Pax & K. Hoffm. 1912 | (8) |
| grandifolius (Müll. Arg.) Pax (1863) 1912 | (9) |
| guyanensis Pax 1912 | Sandwithia |
| imbricatus Müll. Arg. 1863 | Gymnanthes |
| jamaicensis Britton 1913 | Sebastiania |
| klotzschii (Didrichs.) Pax (1857) 1912 | (8) |
| lagoensis (Müll. Arg.) Pax (1874) 1912 | (9) |
| lanceolatus Sald. 1867-8 | (9) |
| lasiocarpoides Baill. 1865 | (9) |
| lasiocarpus (Müll. Arg.) Baill. (1863) 1865 | (9) |
| leptopus (Didr.) Pax (1857) 1912 | (9) |
| luquense Morong 1892 | Sebastiania |
| macrocarpus Müll. Arg. 1874 | (1) |
| mandiocanus (Müll. Arg.) Pax (1874) 1912 | (9) |
| multiflorus Müll. Arg. 1863 | (1) |
| oligandrus (Müll. Arg.) Baill. (1863) 1865 | (1) |
| parvifolius Pittier 1938-9 | (7) |
| polymorphus Müll. Arg. Linnaea 32: 108. 1863 | (1) |
| var. acutissimus Müll. Arg. 1863 | (1) |
| f. bicolor Müll. Arg. 1863 | (1) |
| f. concolor Müll. Arg. 1863 | (1) |
| f. cuspidatus Müll. Arg. 1863 | (1) |
| var. angustatus Müll. Arg. 1863 | (1) |
| var. ellipticus Müll. Arg. 1863 | (1) |
| var. gardneri Müll. Arg. 1863 | (1) |
| f. angustifolius Müll. Arg. 1863 | (1) |
| f. biattenuatus Müll. Arg. 1863 | (1) |
| f. latifolius Müll. Arg. 1863 | (1) |
| f. microphyllus Müll. Arg. 1863 | (1) |
| var. grandifolius Müll. Arg. 1863 | (1) |
| var. intermedius Müll. Arg. 1863 | (1) |

polymorphus (continued)
var. longifolius Müll. Arg. 1863 (1)
var. mucronatus Müll. Arg. 1863 (1)
var. obovatus Müll. Arg. 1863 (1)
f. minor Müll. Arg. 1863 (1)
f. platyphyllus Müll. Arg. 1863 (1)
var. sellowii Müll. Arg. 1863 (1)
var. variifolius Müll. Arg. 1863 (1)
schomburgkii (Kl.) Hochr. (1841) 1910 (7)
sessilifolius Kl. 1852 (1)
sparsifolius (Müll.) Arg.) Pax (1874) 1912 (1)
sprengelii Baill. 1865 (8)
tortuosus Glaz. 1913 (nomen) (1)
trachycarpus Müll. Arg. 1874 (13)
unciformis Jabl. sp. nov.1969 (4)
verrucosus Glaz. 1913 Celastraceae?
verticillatus (Kl.) Baill. (1862) 1865 (11)
var. genuinus Müll. Arg. 1874 (11)
var. subinermis Müll. Arg. 1874 (11)

ACTINOSTEMON (NOMINA NUDA)

acuminatus Kl. in Baill. 1858 (1)
angustifolius Kl. in Baill. 1858 (1)
furcatus Kl. in Baill. 1858 (2)
grandifolius Kl. in Baill. 1858 (1)
marginatus Kl. in Baill. 1858 (1)

DACTYLOSTEMON Kl. 1841

angustifolius Kl. 1841 (nomen)
angustifolius Müll. Arg. 1874 (5)
anisandrus Griseb. 1879 Sebastiania brasiliensis
australis Müll. Arg. 1874 (8)
brasiliensis Müll. Arg. 1863 Sebastiania brasiliensis
communis Müll. Arg. 1863 (8)
var. angustifolius Müll. Arg. 1863 (5)
var. hagendorfii Müll. Arg. 1863 (8)
var. petiolaris Müll. Arg. 1863 (8)
cuneatus Müll. Arg. 1863 (8)
desertorum Müll. Arg. 1874 (8)
estrellensis Müll. Arg. 1874 (9)
gardneri Müll. Arg. 1874 (9)
glabrescens Kl. 1841 (nomen)
grandifolius Kl. 1841 (nomen)
guyanensis Kl. 1848 (nomen) Sandwithia guyanensis Lanj. 1932
hagendorfii Kl. 1841 (nomen)

| | |
|---|---|
| klotzschii Didr. 1857 | (8) |
| var. acuminatus Müll. Arg. 1874 | (5) |
| var. angustifolius Müll. Arg. 1874 | (5) |
| var. concepcionis Chod. et Hassler 1905 | (6) |
| var. cordatus Müll. Arg. 1866 | (8) |
| var. genuinus Müll. Arg. 1866 | (8) |
| var. heterophyllus Chod. et Hassler 1905 | (6) |
| var. obtusatus Müll. Arg. 1866 | (8) |
| var. obtusatus Chod. et Hassler 1905 | (6) |
| var. petiolaris Müll. Arg. 1863 | (8) |
| var. weddellianus Müll. Arg. 1866 | (8) |
| lagoensis Müll. Arg. 1874 | (9) |
| lasiocarpoides Müll. Arg. 1863 | (9) |
| lasiocarpus Kl. 1841 (nomen) | (9) |
| lasiorhachis Kl. in sched | (5) |
| leptopus Müll. Arg. 1874 | (8) |
| lundianus Didr. 1857 | (9) |
| mandiocanus Müll. Arg. 1874 | (9) |
| obtusatus Kl. 1841 (nomen) | (8) |
| oligandrus Chod. et Hassler 1901 | (6) |
| oligandrus Müll. Arg. 1863 | (1) |
| polyandrus Griseb. 1865 | Forestiera (Oleacea) |
| schomburgkii Kl. 1841 | (7) |
| sparsifolius Müll. Arg. 1874 | (1) |
| verticillatus Kl. 1852 | |
| var. genuinus Müll. Arg. 1874 | |
| var. subincanus Müll. Arg. 1874 | |

GUSSONIA Spreng. 1821

| | |
|---|---|
| concolor Spreng. | (1) |
| discolor Spreng. | Sebastiania discolor (Spreng.) Müll. Arg. |
| serrulata Mig. 1847 Linnaea 19 | Sebastiania gaudichaudii Müll. Arg. |

Gussonia O. Ktze.
Rev. gen. 2: 604-606. 1891.

O. Kuntze summarily transferred all Actinostemon on grounds of strict priority disregarding the fact that the name Gussonia was untenable on other grounds.

ACKNOWLEDGMENTS

It is my pleasant duty to express my thanks to:

Rupert Barneby for his help, for the steady encouragement he gave during my work, and for the time he spent in reading and improving my manuscript.

C. C. Clare for preparing the illustrations and for the many practical suggestions he was able to give me because of his long experience.

# ADDITIONAL NOTES ON THE ERIOCAULACEAE. XX

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional & emended synonymy: Eriocauleae L. C. Rich. apud H.B.K., Nov. Gen. & Sp. Pl., ed. quarto, 1: [251]. 1816. Eriocauleae Mart., Nov. Act. Nat. Cur. 17 (1): 3 & 71. 1835. Eriocauloneae L. C. Rich. apud Lindl., Veg. Kingd., ed. 1, 122, in syn. 1846.

Additional & emended bibliography: Breyn., Exot. Min. Cog. Pl. Cent. 1: 108--109, pl. 50. 1678; Moris., Pl. Hist. Univ. 3: 259--260, sect. 8, pl. 16, fig. 17. 1699; L., Sp. Pl., ed. 1, pr. 1, 1: 87 & 129 (1753) and 2: [1203]. 1753; J. A. Murr. in L., Syst. Veg., ed. 12, 109 & 834. 1774; Reich. in L., Syst. Pl. 1: 243--244 (1779) and 4: [668]. 1780; J. A. Murr. in L., Syst. Veg., ed. 13, 1: 108--109 (1783) and 2: 855 (1783) and ed. 14, 127--128 & [1004]. 1784; Palau & Verdera, Part. Pract. Bot. 1: 530--532. 1784; Jacq., Ind. Pl. 63. 1785; Lippert, Pflanzensyst. 1: 187--188 (1786) and 2: [2036]. 1786; Palau & Verdera, Part. Pract. Bot. 8: 214. 1788; Pers. in L., Syst. Veg., ed. 15, 132 & [1033]. 1797; J. A. Murr. in L., Syst. Veg., ed. 15 nov., 106--107 & 812. 1798; Jolyclerc, Syst. Sex. Vég., ed. 1, pr. 1, 92 & 781 (1798) and pr. 2, 92 & 781. 1803; Mouton-Fontenille in L., Syst. Pl. 1: 147--148 (1804) and 5: tab. 2: vii & tab. 12: xvii. 1805; Jolyclerc, Syst. Sex. Vég., ed. 2, 1: 101 (1810) and 2: 474. 1810; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 56--57, 61, 861--870, & 938. 1817; Roem. & Schult., Mant. 2: 468--470 & 499. 1824; Spreng. in L., Syst. Veg., ed. 16, 1: 188 & 980 (1825) and 3: 774--776. 1826; Roem. & Schult., Mant. 3: 527, 671, & 687. 1827; Spreng. in L., Syst. Veg., ed. 16, 5: 267--268. 1828; Bong., Ess. Monog. Erioc. Brés. 1--12. 1831; Cham. & Schlecht., Linnaea 6: 43. 1831; Lindl., Veg. Kingd., ed. 1, 122, 797, 802, 818, & 830, fig. 82 (1846) and ed. 2, 122, 797, 802, 818, & 830, fig. 82. 1847; Walp., Ann. 5: 919--947, 954, 957, 958, 960, & 964 (1858) and 6: 1170--1171 & 1245. 1861; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): [21]--27, fig. 11--13. 1888; Niederlein, Bol. Mus. Prod. Argent. 3 (31): 336. 1890; Komarov, Fl. Mansh. 1: 418--419. 1901; Prain, Bengal Pl., pr. 1, 121 & 1125--1127. 1903; Schlecht. in Engl., Bot. Jahrb. 40, Beibl. 92: 20. 1908; Guillaum., Ann. Mus. Colon. Marseille, sér. 2, 9: 256. 1911; Fedch., Rastit. Turk. 811. 1915; Hayata, Icon. Pl. Formos. 10: 49--56, fig. 27--31. 1921; Rendle, Journ. Linn. Soc. Lond. Bot. 45: 259--260. 1921; Gleason, Bull. Torr. Bot. Club 52: 195. 1925; Mak., Nippon Shokubutsu 725. 1926; Sasaki, List Pl. Formos. 99. 1928; Sasaki, Cat. Govern. Herb. 118--119. 1930; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1607--1620. 1931; Komarov & Alis., Opred. Rast. Dal'nevost. Kr. 1: 340. 1931; Däniker, Vierteljahrsschr. Naturf. Gesell. Zürich 77, Beibl. 19: 91. 1932; L., Sp. Pl., ed. 1, pr. 2, 1: 87 & 129 (1934) and 2: [1203]. 1934; Fl. U. S. S. R. 3:

494—498 & 748, pl. 27, fig. 1—5. 1935; Masamune, Short Fl. Formos. 262—263. 1936; Mak., Illustr. Fl. Jap. 8, 771, & E.26, fig. 2311—2316. 1940; Guillaum., Fl. Analyt. & Synop. Nouv-Calléd. 49—50 & 361. 1948; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1119—1128 & 1333. 1956; Bourdu, Bull. Soc. Bot. France 104: 156—158, fig. A—F. 1957; Straka, Erdkunde 14: 61 & 63. 1960; Van Royen, Blumea 11: 224—225, fig. 1. 1961; Fl. U. S. S. R., Engl. transl., 3: 392—395 & 512. 1964; Moldenke in Guillaum., Mém. Mus. Hist. Nat. Paris, new ser. B, 15: 6. 1964; Anon., Ind. Bibliogr. Bot. Trop. 1 (1): 25 & 32. 1964; R. Good, Geogr. Flow. Pl. 227, 440, & 495. 1964; Hambler, Journ. Ecol. [Brit.] 52: 581. 1964; Guillaum., Thorne, & Virot, Univ. Iowa Stud. Nat. Hist. 20 (7): 26. 1965; Angely, Fl. Anal. Paran., ed. 1, 198—202. 1965; Faden, Idrobo, Jiminez, & Tomlinson, Common Dist. Int. Pl. Cerro Muerte 2. 1966; Thornberry, U. S. Dept. Agr. Agric. Handb. 165: 137. 1966; Ogden, Quatern. Paleoecology 7: 175—183. 1967; Satake, Nat. Sci. & Mus. 34: 161—162. 1967; Begum, Proc. Indian Acad. Sci. B.67 (4): 148—156. 1968; Winner, Biol. Abstr. 49: 11782. 1968; Ogden, Biol. Abstr. 49: 9863. 1968; Moldenke, Phytologia 18: 163—186. 1969; Anon., Biol. Abstr. 49 (24): S.61 (1969) and 50 (3): S.63. 1969; Moldenke, Biol. Abstr. 50: 1490. 1969.

Lindley (1846) is in error when he states that Humboldt, Bonpland, and Kunth spelled the family name "Eriocauloneae". The spelling which they adopted was Eriocauleae. He also dates their work on this subject as "1815", whereas it should be 1816. These three authors refer the name to L. C. Richard in "Ann. Mus. Hist. Nat. 17: 52" (1811) — a reference that has been widely copied — but the name does not occur on that page, nor anywhere else in that volume, as far as I can see, nor is it in Mém. Mus. Hist. Nat. Paris, volume 17.

The Niederlein (1890) reference given in the bibliography above is sometimes quoted as "31: 68. 1890", apparently an alternate citation.

The Gonzalez Quintero 560, distributed as "Eriocaulaceae", is actually a species of Eleocharis in the Cyperaceae.

BLASTOCAULON PROSTRATUM (Körn.) Ruhl.

Synonymy: Paepalanthus prostratus Körn. in Mart., Fl. Bras. 3 (1): 350. 1863 [not P. prostratus Mart., 1959]. Philodice prostrata (Körn.) Benth. apud Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888. Dupatya prostrata Kuntze, Rev. Gen. Pl. 2: 746. 1891. Philodice prostrata Benth. & Hook. apud Ruhl. in Engl., Pflanzenreich 13 (4, 30): 224 & 292, in syn. 1903.

Additional bibliography: Benth. & Hook. f., Gen. Pl. 3: 1024. 1883; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Moldenke, Phytologia 18: 165. 1969.

The Paepalanthus prostratus Mart., referred to above, is a synonym of P. bongardii Kunth. Ruhland (1903) cites the name, Philo-

dice prostrata, to Benth. & Hook. f., Gen. Pl. 3: 1024 (1883), but it does not occur there, nor is it listed in the Index Kewensis.

ERIOCAULON INSULARE Ruhl.

Additional bibliography: Moldenke, N. Am. Fl. 19 (1): 19 & 28. 1937; Moldenke, Phytologia 1: 318. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 36. 1946; León, Fl. Cuba 1: 281. 1946; Moldenke, Phytologia 3: 328. 1950; Moldenke, Résumé 51, 53, & 481. 1959; Moldenke, Phytologia 18: 189. 1969.

Killip found this plant growing along roadsides, mixed with E. sclerocephalum Ruhl., Syngonanthus lagopodioides (Griseb.) Ruhl., and various members of the Lentibulariaceae, and his no. 45170 is a mixture of these elements.

Additional citations: CUBA: Pinar del Río: Ekman 17808 (S—type). ISLA DE PINOS: Killip 45170, in part (Z).

ERIOCAULON INTERMEDIUM Körn.

Synonymy: Eriocaulon setaceum Kunth apud Walp., Ann. 5: 931, in syn. 1858 [not E. setaceum Benth., 1893, nor Crantz, 1893, nor Heyne, 1832, nor L., 1753, nor Lour., 1790, nor Rottl., 1960, nor Wall., 1893, nor Wight, 1832, nor Willd., 1959]. Eriocaulon setaceum Auct. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 90 & 287, in syn. 1903. Eriocaulon glabrifolium Vesterdal, in herb.

Bibliography: Körn., Linnaea 27: 601. 1854; Walp., Ann. 5: 931 (1858) and 6: 1171. 1861; Thwaites & Hook. f., Enum. Pl. Zeyl., pr. 1, 341. 1864; Körn. in Mart., Fl. Bras. 3 (1): 476. 1863; Benth., Fl. Austral. 7: 192. 1878; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 27. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Hook. f., Fl. Brit. Ind. 6: 572. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 18, 64, 90, 286, & 287. 1903; Fyson, Journ. Indian Bot. 2: 193, pl. 2. 1921; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1618. 1931; Moldenke, Known Geogr. Distrib. Erioc. 23, 24, 26, 36, & 40. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Phytologia 3: 328. 1950; Moldenke, Résumé 162, 167, 176, 178, 292, & 481. 1959; Moldenke, Résumé Suppl. 1: 13. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Thwaites & Hook. f., Enum. Pl. Zeyl., pr. 2, 341. 1964; Moldenke, Phytologia 18: 169. 1969.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 2. 1921.

Hooker (1893), Fischer (1931), Thwaites & Hooker (1964), and Thanikaimoni (1965) all reduce this taxon to synonymy under E. setaceum L., but Ruhland (1903) and Fyson (1921), both specialists on this genus and careful workers whose conclusions should not be taken lightly, keep it separate. The Flora of British India, in fact, goes so far as to suggest that E. bifistulosum Van Heurck & Muell.-Arg., E. intermedium Körn., and E. setaceum L. are all conspecific. I wonder why E. melanocephalum Kunth was not also included! And why not also E. schippii Standl.? These

five species, inhabiting precisely the same type of habitat, but in different parts of the world, all do look very similar in general habital aspect, which is to be expected from their similar submerged aquatic habitat. Fyson, however, points out that E. intermedium is "Similar in habit to E. setaceum L., but the floral bracts glabrous, making the heads black. Flowers as in E. setaceum, but female petals unequal." He records it from "[?] Assam: Khasia: Peninsular India; Malabar: Ceylon."

It should be noted here that the E. setaceum L., referred to above and in the synonymy, is a valid species, with E. setaceum Crantz and E. setaceum Wall. as synonyms, while the homonym of Loureiro is actually Fimbristylis setacea Benth. in the Cyperaceae, that of Rottler and of Willdenow is E. cinereum R. Br., that credited to Wight is E. quinquangulare L., that credited to Heyne is E. sexangulare L., and that of Bentham is E. bifistulosum Van Heurck & Muell.-Arg. Walpers (1858, 1861) implies a homonyn accredited to Steudel, but does not actually write it.

Smitinand & Abbe found E. intermedium growing in stagnant water, while the former of these collectors describes it as an "aquatic herb submerged in stream, sending up flower stalk above the surface, flowers greenish" in Thailand. The Clemenses found it growing with Chara in a paddy outlet by a pasture in Annam. It has been collected at altitudes of 100 to 1300 meters, flowering and fruiting in August, September, and November.

The cheironymous name, E. glabrifolium, seems to be based on Vesterdal 8f from Thailand, deposited in the Copenhagen herbarium. Material of E. intermedium has been, as is to be expected, widely misidentified and distributed in herbaria as E. setaceum L.

Additional citations: INDIA: Travancore: Wight 2369 (Ac, B), s.n. [Quilon, 1835] (V—159840). CEYLON: Thwaites C.V.791 (B, B). THAILAND: Floto 7350 (Cp); Smitinand 1908 [Herb. Roy. Forest Dept. 11527] (Z); Smitinand & Abbe 6155 [Herb. Roy. Forest Dept. 24385] (Gg); Sørensen, Larsen, & Hansen 5780 (S); Vesterdal 8f (Cp). INDOCHINA: Annam: Clemens & Clemens 4214 (Ca—339334). INDONESIA: GREATER SUNDA ISLANDS: Sumatra: E. von Martens 8 (B), s.n. [April 1862] (B). LOCALITY OF COLLECTION UNDETERMINED: Thunberg s.n. (S). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON INTRUSUM Meikle

Synonymy: Eriocaulon lacteum "sensu Hutch. & Dalz." ex Meikle, Kew Bull. 22: 141, in syn. 1968 [not E. lacteum Rendle, 1899].

Bibliography: Meikle, Kew Bull. 22: 141. 1968; Winner, Biol. Abstr. 49: 11782. 1968; Moldenke, Résumé Suppl. 17: 4 & 10. 1968.

The type of this species was collected by Hugh Vandervaes Lely (no. 283) at Naraguta, in the Plateau province, Nigeria, on June 20. 1921, and is deposited in the herbarium of the Royal Botanic

Gardens at Kew. The E. lacteum Rendle, referred to in the synonymy above, is itself a synonym of E. teusczii Engl. & Ruhl.

ERIOCAULON INUNDATUM Moldenke

Bibliography: Moldenke, Phytologia 3: 413--414. 1951; G. Taylor, Ind. Kew. Suppl. 12: 55. 1959; Moldenke, Résumé 135 & 481. 1959; Moldenke, Phytologia 18: 171. 1969.

This plant has been collected in anthesis and fruit in October and December. Material has been misidentified and distributed in herbaria as E. buchananii Ruhl.

Citations: SENEGAL: Monod s.n. [28 octobre 1943] (An--type, N--isotype, N--photo of type, Z--photo of type); Raynal & Raynal 6879 (Mi), 6988 (Z), 6996 (Mi).

ERIOCAULON INYANGENSE Arwidsson

Bibliography: Arwidsson, Bot. Notiser 1934: 83. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Moldenke, Phytologia 3: 328. 1950; Moldenke, Résumé 149 & 481. 1959; Moldenke, Phytologia 17: 387. 1968.

This plant has been found growing in wet sandy soil along rivulets, at altitudes of 1550 to 1650 meters, flowering and fruiting in October and November. The Brain 4470 & 9010, Govt. Herb. Salisbury 13417 & 15100, Hornby H.2388, and H. Wild 1162, distributed as E. inyangense and some of which were so cited by me in my 1950 work, are actually E. amboense Schinz.

Additional citations: RHODESIA: Freid, Norlindh, & Weimarck 2478 (S--isotype, Z--isotype), 3225 (S); Haptröm 163 (S).

ERIOCAULON IRREGULARE Meikle

Synonymy: Eriocaulon heterochiton "sensu Lecomte" ex Meikle, Kew Bull. 22: 143, in syn. 1968 [not E. hetsrochiton Körn., 1867, nor A. Chev., 1959].

Bibliography: Meikle, Kew Bull. 22: 143--144. 1968; Winner, Biol. Abstr. 49: 11782. 1968; Moldenke, Résumé Suppl. 17: 4 & 10. 1968; Moldenke, Phytologia 18: 178. 1969.

It should be noted here that the E. heterochiton Körn. referred to in the synonymy above is a valid species, while the homonym attributed to Chevalier is a synonym of E. plumale N. E. Br.

The type of E. irregulare was collected by P. Adames (no. 353) on the Plaine de la Fetoré, near Koubi, Guinea, on September 12, 1962, and is deposited in the herbarium of the Royal Botanic Gardens at Kew. Meikle (1968) cites also Chevalier 18488 and Schnell 7379 from Guinea and Jaeger 184 from Sierra Leone. Concerning the last-mentioned collection, however, he notes that "The specimen from Sierra Leone, with regularly 2-merous flowers, is untypical; though it agrees so closely with typical Guinean specimens in details of floral structure that it would be unwise, at least for the present, to regard it as distinct, especially as the material is overripe and unsatisfactory."

ERIOCAULON JAPONICUM Körn.

Synonymy: Eriocaulon iaponicum Körn. in Miq., Bot. Lugd. 3: 162. 1867.

Bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 162—163. 1867; Franch. & Savat., Enum. Pl. Jap. 2: 99. 1879; Maxim., Diagn. Pl. Nov. Asiat. 8: 24. 1892; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Mak., Bot. Mag. Tokyo 8: 506. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 4, 65, 95, 117, & 286. 1903; Matsumura, Ind. Pl. Jap. 2 (1): 176. 1905; Mak & Nemoto, Fl. Jap., ed. 1, 1305 (1925) and ed. 2, 1511. 1931; Nemoto, Suppl. Fl. Jap. 1038. 1936; Honda, Nom. Pl. Jap. 462. 1939; Satake, Journ. Jap. Bot. 15: 628—629. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 1, 13, 45, 79, & 87, fig. 19. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 32—33. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 36. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Résumé 173, 289, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 184 & 429. 1964; Moldenke, Phytologia 17: 386. 1968.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 45, fig. 19. 1940.

A common name recorded for this species is "yamato-hosikusa". Satake (1940) comments that "Not having met with any plant quite corresponding to the original description, the writer doubted the existence of this species, but recently in examining the specimens in the Herbaria of the Hokkaido Imperial University and of the Tokyo Science Museum, he found two specimens which he accurately determined as E. japonicum Koernicke, thus confirming the existence of this plant." He cites Miura s.n. [Mobara, Jul. 1911] and Togasi s.n. [Yatumi, Sept. 1937] from Honshu, where he says the species is apparently endemic. The Warburg s.n. [Yulupo], distributed as E. japonicum, is actually E. alpestre Hook. f. & Thoms.

Citations:MOUNTED LITERATURE: Ruhl. in Engl., Pflanzenreich 13 (4-30): 95. 1903 (B).

ERIOCAULON JAUENSE Moldenke

Bibliography: Moldenke, Résumé Suppl. 17: 2. 1968.

This species is based on a collection made by Julian Alfred Steyermark (no. 98179) in a wet savanna bordering woods just below the second fall at "Meseta de Jáua, Cerro Jáua: Cumbre de la porción Central-Occidental de la Meseta, 4°45' Lat. No., 64°26' Long. Oest, 36 millas nauticas o 60 Kms. noroeste de la misión de Campamento Sanidad del Río Kanarakuni", Bolívar, Venezuela, between March 22 and 27, 1967, deposited in my personal herbarium at Plainfield, New Jersey. The collector notes that the plants formed large spongy mats, the leaves being subcoriaceous, rich-green on both surfaces, ascending to subspreading, the heads white with black. A formal description is in manuscript, to be published soon in the Memoirs of the New York Botanical Garden.

ERIOCAULON JOHNSTONII Ruhl.

Bibliography: Ruhl. in Engl., Bot. Jahrb. 27: 82. 1899; Ruhl. in Engl., Pflanzenreich 13 (4-30): 63, 82, & 286. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; H. Lecomte, Bull. Soc. Bot. France 55: 571. 1908; Moldenke, Known Geogr. Distrib. Erioc. 22 & 36. 1946; Moldenke, Résumé 157 & 481. 1959; Punt, Reg. Veg. 36: 9. 1964.

The type of this species was collected by Sir Harry Hamilton Johnston -- in whose honor it is named — along a forest stream, at an altitude of 1920 feet, on Mauritius, on September 28, 1888, and is deposited in the herbarium of the Botanisches Museum at Berlin. The collector describes the leaves as recurved-patent, the heads greenish-brown, and the flowers trimerous. Material has been misidentified and distributed in herbaria as E. repens Lam.

Citations: MASCARENE ISLANDS: Mauritius: Bouton 1829 (P); H. H. Johnston s.n. [28th September 1888] (B--type, Z--isotype); Petit-Thouars s.n. (N, N--photo, P, Z--photo).

ERIOCAULON JORDANI (Moldenke) Meikle

Synonymy: Syngonanthus jordani Moldenke, Phytologia 5: 91. 1954. Eriocaulon jordanii (Moldenke) Meikle, Kew Bull. 22: 143. 1968.

Bibliography: Moldenke, Phytologia 5: 91--92. 1954; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1954: 34. 1955; Anon., Trav. Lab. Bot. Syst. Brux. 16: 32. 1955; Moldenke, Résumé 137, 352, & 492. 1959; G. Taylor, Ind. Kew. Suppl. 12: 138. 1959; Meikle, Kew Bull. 22: 143. 1968; Winner, Biol. Abstr. 49: 11782. 1968; Moldenke, Résumé Suppl. 17: 4, 10, & 12. 1968.

It should perhaps be recorded here again that I do not approve of the recommendation of the American Joint Committee on Horticultural Nomenclature as published in "Standardized Plant Names" (1924) that all subgeneric epithets terminating in "i" or "ii" when originally proposed be written always with a single "i", nor the opposing recommendation of the International Rules of Botanical Nomenclature, now so widely followed, which asks that many, though not all, names originally proposed with a single "i" always be corrected to a double "i". I still feel that the original orthography of the original author of a name be followed unless it can be shown that an error in gender was made [e.g., "schulzii" when the person being honored by the epithet actually was a woman and the name should have been written "schulzae"]. I therefore do not adopt Meikle's new orthography of the specific epithet which I originally gave to this taxon.

Citations: SIERRA LEONE: H. D. Jordan 721 (Z--type).

ERIOCAULON KAINANTENSE Masamune

Synonymy: Eriocaulon kainantensis Masamune, Trans. Nat. Hist. Soc. Taiwan 33: 13. 1943.

Bibliography: Masamune, Trans. Nat. Hist. Soc. Taiwan 33: 13. 1943; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Ré-

sumé Suppl. 17: 5 & 13. 1968.

The type of this endemic Hainan species was collected by Genkei Masamune at Sana, Hainan, on November 30, 1940, and is deposited in the herbarium of the University of Tokyo. Masamune's original (1943) use of the incorrect gender for the specific epithet used by him for this taxon was corrected by Salisbury (1953). Masamune records the vernacular name "kainan-hosikusa", and cites also Masamune & Fukuyama 86 & 845 from Hainan island, deposited in the herbarium of the University of Tokyo. His description of the species is as follows: "(sect. Heterochiton) Annua. Folia caespitosa, lineari-lanceolata, basi dilatata, utrimque tomentella multinervia rigida 17—25 cm longa, medio ca. 4 mm lata. Pedunculi plures, glabri 6 costati plus minusve torte 30—40 cm alti. Vaginae oblique fissae, laxiusculae tomentellae, 7—10 cm longae. Capitula semiglobosa, glabriuscula 3—5 mm longa, 5—10 mm lata, 5—10 mm in diametro. Bracteae involucrates late obovatae, obtusae, glabrae stramineae, disco breviores. Bracteae flores cuneato-obovatae, plus minusve cuspidato-acuminatae, summo dorso saepe dense albotomentosae quam flores vix longiores. Flos ♂: sepala 2 a medium in spatham antice fissam connata, oblongo-spathulata, obtusa saepe minute incisa glabriuscula concava hyalina. Antherae 6 nigrae. Flos ♀: sepala 2 angusto-linearia glabra hyalina apice truncata dorso alata. Petala 3 linearia glabra, illis ca aequilonga. Stigmata 3."

ERIOCAULON KATOI Onuma

Bibliography: Moldenke, Résumé 173 & 481. 1959.

It would appear that this species is based on two collections made by S. Kato — in whose honor the taxon is named — at Kukurimura, Mino, Honshu, on September 14, 1914, and another also from Honshu on September 28, 1918. The former collection has "nov. sp." written after the binomial on the Stockholm specimen. I have not as yet been able to ascertain where the taxon was officially described.

Citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Kato s.n. [Kukuri-mura, 13/9/14] (S—cotype), s.n. [Sept. 28, 1918] (Kg—cotype, Z—cotype).

ERIOCAULON KENGII Ruhl.

Bibliography: Ruhl., Notizbl. Bot. Gart. Berlin 10: 1042—1043 & 1060. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Moldenke, Known Geogr. Distrib. Erioc. 25 & 36. 1946; Moldenke, Résumé 169 & 481. 1959.

ERIOCAULON KINABALUENSE Van Royen

Bibliography: Van Royen, Blumea 10: 133. 1960; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966; Moldenke, Résumé Suppl. 17: 6. 1968.

Nothing is known to me about this species except that it is supposed to grow in and presumably be endemic to Sabah.

ERIOCAULON KINLOCHII Moldenke

Bibliography: Moldenke, N. Am. Fl. 19 (1): 23—24. 1937; Molden-

ke, Phytologia 1: 318. 1939; Moldenke, Carnegie Inst. Wash. Publ. 522: 140--141. 1940; Moldenke, Known Geogr. Distrib. Erioc. 4 & 36. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Résumé 43 & 481. 1959; Moldenke, Phytologia 18: 169. 1969.

This species has been confused with and material distributed to herbaria as E. benthami Kunth of Mexico and Guatemala, from which it differs in many respects, notably in its dimerous florets, long-attenuate and filiform-tipped leaves, 3-costate peduncles, and many floral characters.

Emended citations: BRITISH HONDURAS: Kinloch 213 (F--675903--type).

ERIOCAULON KIUSIANUM Maxim.

Bibliography: Maxim., Bull. Acad. Sci. Pétersb. [Dec. Pl. Asiat.] 8: 7 & 22. 1893; Hook. f., Fl. Brit. Ind. 6: 578. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158 & 501. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 65, 95, & 286. 1903; Satake in Nakai & Honda, Nov. Pl. Jap. 6: 1, 77, & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 64. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158 & 501. 1941; Moldenke, Known Geogr. Distrib. Erioc. 25 & 36. 1946; Moldenke, Résumé 172, 173, & 481. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158 & 501. 1959; Moldenke, Résumé Suppl. 3: 19. 1962; Moldenke, Phytologia 18: 167. 1969.

This binomial was published in the synonymy of E. alpestre Hook. f. & Thoms. by Hooker (1893), as reported in the Index Kewensis Supplement 1: 158 (1902). On a later page, p. 501, of the same Supplement, however, it is credited to "Maxim. Dec. Pl. Asiat. 8: 7" (1893), apparently as a correction of the previous entry. Satake (1940) gives "1892" as the date of publication of Maximowicz's original description, but it would seem that 1893 is correct.

Durand & Jackson (1902) reduce this species to synonymy under E. alpestre Hook. f. & Thoms. It has been collected in anthesis in May. Material has been misidentified and distributed in herbaria under the names E. cinereum R. Br. and E. formosanum Hayata.

Citations: CHINESE COASTAL ISLANDS: Hainan: S. K. Lau 3883 (Bi, S); Liang 66137, in part (Go). WESTERN PACIFIC ISLANDS: JAPAN: Kiushu: Maximowicz s.n. [Prov. Simabara, 1863] (B--isotype, Br--isotype, N--isotype, N--photo of isotype, Z--photo of isotype). FORMOSA: Masamune & Suzuki 23 (W--2062441, W--2062456, Z); Tanaka & Shimada 13574 (B, Ca--517642, Go, Mi, N, S).

ERIOCAULON KLOTZSCHII Moldenke

Synonymy: Eriocaulon brevifolium Klotzsch in Schomb., Faun. & Fl. Brit. Guian. 1116, nom. nud. 1848 [not E. brevifolium Mart., 1863, nor Raf., 1840].

Additional bibliography: Klotzsch in Schomb., Faun. & Fl. Brit. Guian. 1116. 1848; Walp., Ann. 5: 931 (1858) and 6: 1170. 1861; Körn. in Mart., Fl. Bras. 3 (1): 496--497. 1863; Moldenke, Phytologia 17: 9, 451--452, & 484--485 (1968) and 18: 79--80. 1969.

The bibliographic references given above are in addition to those previously noted by me under E. brevifolium before I realized that this binomial is invalid. The Klotzsch binomial, published invalidly in 1848, was validated by Körnicke in 1863, but is still a later homonym of Rafinesque's name. The ten herbarium specimen citations enumerated by me previously under E. brevifolium should now, of course, be transferred to E. klotzschii.

The Eriocaulon brevifolium of Martius, referred to in the synonymy above, is a synonym of E. sellowianum Kunth, while that of Rafinesque is E. pellucidum Michx.

ERIOCAULON KLOTZSCHII var. PROLIFERUM (Moldenke) Moldenke

Synonymy: Eriocaulon brevifolium var. proliferum Moldenke in Maguire & Wurdack, Mem. N. Y. Bot. Gard. 9: 278. 1957.

Emended & additional bibliography: Moldenke in Maguire & Wurdack, Mem. N. Y. Bot. Gard. 9: 278. 1957; Moldenke, Bull. Jard. Bot. Brux. 27: 130. 1957; Moldenke, Résumé 71 & 480. 1959; Moldenke, Phytologia 17: 9, 452, & 484. 1968.

ERIOCAULON KOERNICKEI Britten

Synonymy: Eriocaulon pygmaeum Körn. in Mart., Fl. Bras. 3 (1): 477—478. 1863 [not E. pygmaeum Dalz., 1851, nor Mart., 1841, nor Soland., 1809]. Eriocaulon vauthieri Ruhl. in Engl., Pflanzenreich 13 (4-30): 37. 1903.

Bibliography: Walp., Ann. 5: 927 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 475, 477—478, & 500, pl. 40, fig. 2. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23 & 25, fig. 12 L—R. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Britten, Journ. Bot. 1900: 481 & 482. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 37, & 286—288. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 203. 1904; Prain, Ind. Kew. Suppl. 3: 69 & 70. 1908; H. Lecomte, Bull. Soc. Bot. France 55: 644. 1909; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 8, 36, 39, & 41. 1946; Moldenke, Résumé 89, 291, 293, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 40, fig. 2. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23, fig. 12 L—R. 1888.

It should be noted here that the Eriocaulon pygmaeum Soland., referred to above, is a valid species, while the homonym of Dalziel is a synonym of E. xeranthemum Mart. and that of Martius is Paepalanthus bifidus (Schrad.) Kunth. The Vauthier collection cited below as the type of E. koernickei, seems also to be the type collection of E. vauthieri Ruhl., as well, of course, as of E. pygmaeum Körn.

Citations: BRAZIL: State undetermined: Vauthier s.n. (B—type, B—isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B, B).

ERIOCAULON KÖRNICKIANUM Van Heurck & Muell.-Arg.

Synonymy: Eriocaulon koernickianum Van Heurck & Muell.-Arg. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893. Eriocaulon kornickianum Van Heurck & Muell.-Arg. apud Kral, Sida 2: [298] & 299. 1966.

Bibliography: Van Heurck, Obs. Bot. 101. 1870; Morong, Bull. Torr. Bot. Club 18: 356. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Coult., Contrib. U. S. Nat. Herb. 2: 459. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 35, & 286. 1903; J. K. Small, Fl. Southeast. U. S., ed. 1, 236 (1903) and ed. 2, 236. 1913; Cory, Texas Agr. Exp. Sta. Bull. 550: 29. 1937; Moldenke, N. Am. Fl. 19 (1): 19 & 30. 1937; Moldenke, Phytologia 1: 318. 1939; Moldenke in Lundell, Fl. Texas 3 (1): 7—8. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 3 & 36. 1946; Moldenke, Phytologia 3: 153 (1948) and 3: 328. 1950; Moldenke, Résumé 22, 25, 27, 289, 414, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Kral, Sida 2: [298], 299, & 330. 1966; Shinners, Sida 2: 441. 1966.

Illustrations: Kral, Sida 2: [298]. 1966.

Because of the rarity of this species it may be worthwhile to repeat here the statements about it by several botanists. Morong (1891) says "I have not seen a specimen of this Texan plant, but the authors of the species describe it as having pellucid leaves which are five to seven-nerved, plane, smooth, 8 to 11 lines long and a little over 1 line wide at the base. Scapes numerous, 4 to 5 inches high, setaceous, smooth, compressed, two to three-angled, with lax sheaths which are as long as the leaves. Heads ovoid-globose, about 1 1/2 inch long, a little longer than broad. Involucral scales fuliginous, broadly obovate, irregularly denticulate and white-woolly above, at length slightly recurved. Receptacle smooth. Bracts not quite 1 line high, surpassing the flowers. Sterile flowers about 1/2 line high; outer perianth segments smooth and black-glandular at the apex; inner obovate and pilose at the apex. Stamens four. Inner perianth segments of the fertile flower white-woolly on the margins. Style two-parted plainly destitute of appendages. Seeds ellipsoidal, rough papillose. East Texas. Coll. Charles Wright, in herb. DC et Van Heurck."

In my 1937 work the distribution of this species is given as "Springy places and swamps on the Coastal Plain, Arkansas, Oklahoma, and eastern Texas." In my 1942 work the Texan distribution is given as "In springy places on prairies and wet sandy ground, Timber Belt area of eastern Texas" and the comment is made that "No Texan material of this species has been seen by the writer, but the type is said to have been collected in 'East Texas' [=Tyler Co.] by Charles Wright. Coulter records it from eastern Texas, and Cory from the Timber Belt area. Small lists it for the state. It is definitely known from Arkansas and Oklahoma, so its occurrence in Texas is very probable."

The Little specimen cited below has a label originally inscri-

bed "Utah" as the locality of collection, but Dr. Elbert L. Little, Jr., the collector, in a letter to me dated March 29, 1958, says "there is an error somewhere. If the specimen was collected by me in 1929, then it is the specimen from the top of Porum Mountain, about 2 miles west of Porum, Muskogee County, Oklahoma. I have changed the label accordingly. Your identification Eriocaulon kŏrnickianum Van Heurck & Muell.-Arg. agrees, as you listed this species from Oklahoma in your monograph. The locality where I collected Eriocaulon in Oklahoma is not on the Coastal Plain but is about 100 miles northward."

The Moore specimen cited below was gathered in Magazine Mountain in Logan County, Arkansas, where Kral also collected it (apparently after the writing of the quotation from him given below), and where he describes the locality as follows: "alt. 2650 ft., top of Magazine Mtn., on moist fine sand of bed and bank of intermittent stream through boggy swale in scrub oak. This is the only Eriocaulon known from the Interior Highlands province, although more populations of it have been found in Oklahoma & Texas, it is also reported from the lower Coastal Plain of Texas."

Kral (1966) gives a thorough description of this plant: "Solitary or in small tufts, reproducing vegetatively by short lateral offshoots. Leaf pale green, very thin, linear-attenuate, 1—5 cm. long, tapering evenly from a thin, pale, aerenchymatous base, the margin slightly incrassate. Sheath of the scape about the length of most of the leaves (ca. 2—3 cm.) loose, somewhat inflated and scarious above, bifid. Mature scape filiform, 5—8 cm. long, about 0.5 mm. broad, twisted, 3—4 ridged. Mature head subglobose or short-oblong, 0-0—4.0 mm. broad, dark gray or gray-green save for pale 'rims' of the white-ciliate perianth parts and bracts and the pale, scarious, outer bracts. Outer involucral bracts broadly oblong to suborbicular, reflexed at maturity, 1.0—1.25 mm. long, smooth, very thin, stramineous, translucent, the apex rounded. Receptacular bractlet oblong to cuneate, ca. 1.5 mm. long, gray or gray-green, acute to obtusely angled, translucent, acute to obtusely angled, concave and unequilaterally keeled, smooth save for a scattering of white, clavate, trichomes along the somewhat erose upper margin. Surface of the receptacle of the head smooth. Male flower: sepals linear-curvate, concave, ca. 1 mm. long, grayish-translucent, with a few white, clavate trichomes on the backs apically. Corolla members subequal, yellowish, primarily consisting of a narrowly obpyramidal androphore which terminates in two low, glanduliferous, tooth-like lobes whose apices have a few white-clavate trichomes. Female flower: sepals linear-curvate, ca. 1 mm. long, gray-translucent save for the pale, clawed bases, smooth or with a scattering of hairs on the backs apically; petals spatulate, curvate, the blades broadly rhombic and opaque, the bases clawed, ca. 1 mm. long or slightly longer, yellowish-white, the inner surface and upper margin with white-clavate trichomes. Seeds broadly ovoid, ca. 0.5 mm. long, deep reddish brown, the surfaces papillate or rugose. Upland seepage areas and bogs, from the Interior Highlands (Magazine Mt.,

Arkansas) south and west to Oklahoma and Texas. I have never seen living examples of this apparently rare, diminutive, Eriocaulon. Superficially it is closest to E. ravenelii of the eastern Coastal Plain, differing from it primarily in its smaller stature, its trichomiferous bractlets and perianth parts, and its smaller, rugose rather than alveolate, seeds." In his distribution map he indicates two Arkansas, one Oklahoma, and three Texas localities, but the county names are illegible.

The only common name recorded for the plant is "pipewort". It has been collected and flower and fruit in July. Material has been misidentified and distributed in herbaria under the name E. articulatum (Huds.) Morong. On the other hand, the Cory 52778, distributed as E. körnickianum, is actually Lachnocaulon anceps (Walt.) Morong.

Additional citations: ARKANSAS: Logan Co.: Kral 24579 (N); D. M. Moore 4333 (Ws). OKLAHOMA: Muskogee Co.: E. L. Little Jr. s.n. [Jul. 14, 1929] (Ok—2123). TEXAS: Tyler Co.: C. Wright s.n. (B—isotype).

ERIOCAULON KUNTHII Körn.

Synonymy: Eriocaulon elichrysoides Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 482—483, in syn. 1863 [not E. elichrysoides Bong., 1831]. Eriocaulon kunthii var. α Körn. in Mart., Fl. Bras. 3 (1): 482—483. 1863. Eriocaulon kunthii var. β Körn. in Mart., Fl. Bras. 3 (1): 482—483. 1863. Eriocaulon kunthii var. γ Körn. in Mart., Fl. Bras. 3 (1): 482—483. 1863. Eriocaulon kunthii var. j Körn. ex Alv. Silv., Fl. Mont. 1: [397] & 398. 1928. Eriocaulon callocephalum Alv. Silv. ex Moldenke, Résumé Suppl. 1: 16, in syn. 1959.

Bibliography: Vell., Fl. Flum. 36 (1825) and Icon. 1: pl. 86. 1827; Bong., Mém. Acad. Sci. Pétersb., sér. 6, 1: 631 (1831) and 3: 559, pl. 27. 1840; Kunth, Enum. Pl. 3: 525, 546, & 575. 1841; Körn., Linnaea 27: 599. 1856; Walp., Ann. 5: 930 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 482—483. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 41, 44, 45, 285, & 286. 1903; Alv. Silv., Fl. Mont. 1: [397] & 398. 1928; L. B. Sm., Contrib. Gray Herb., new ser., 124: 5. 1939; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 82 & [103]. 1945; Moldenke, Known Geogr. Distrib. Erioc. 8, 34, & 36. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Résumé 89, 218, 287, 289, & 481. 1959; Moldenke, Résumé Suppl. 1: 16 & 17 (1959) and 2: 5. 1960; Rennó, Levant. Herb. Inst. Agron. 68. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Angely, Fl. Paran. 17: 24. 1961; Hocking, Excerpt. Bot. A.4: 592. 1962; Angely, Fl. Anal. Paran., ed. 1, 199. 1965; Moldenke, Phytologia 18: 87 & 177. 1969.

The type of this species seems to be a specimen collected by Friedrich Sellow in Minas Gerais, Brazil, deposited in the herbarium of the Botanisches Museum at Berlin and labeled as no. B.1290

C.263. The type of E. callocephalum appears to be A. Silveira 2939 in the same herbarium; Stephan s.n. [Congonhas do Campo, 1843] is the type collection of E. kunthii var. β, while L. Riedel 2388 is the type collection of E. kunthii var. γ. Silveira (1928) cites his no. 203 for E. kunthii and his no. 204 for what he calls E. kunthii var. j. The E. elichrysoides Bong., referred to above, is a valid species.

Kunth (1841) regards Dupatya ligulata Vell. as a synonym of E. elichrysoides Bong., while Körnicke (1863) regards it as a synonym of E. kunthii. L. B. Smith (1939) also feels that Dupatya ligulata and Eriocaulon kunthii are conspecific, and reduces them both to E. ligulatum (Vell.) L. B. Sm. Ruhland (1903), however, considered Velloso's name probably to belong in the synonymy of Eriocaulon vaginatum Körn. Following this disposition by the last previous monographer of the group, I consider Dupatya ligulata and Eriocaulon vaginatum conspecific and reduce them both [rather than E. kunthii] to synonymy under E. ligulatum (Vell.) L. B. Sm. If this disposition of the names is followed, then, according to Ruhland, the two taxa may be distinguished as follows:

E. kunthii has the receptacle pilose, the sepals of the staminate florets free, subacute at the apex, and the sepals of the pistillate florets subovate, two subacute and the third obtuse at the apex. E. ligulatum has the receptacle glabrous, the sepals of the staminate florets connate at the base, obtuse at the apex, and the sepals of the pistillate florets oblong-spatulate, all obtuse at the apex.

Eriocaulon kunthii has been found growing at altitudes of 1500 to 2200 meters, flowering and fruiting in November. The initial letter of the specific epithet is often uppercased. Material has been misidentified and distributed in herbaria as E. magnificum Ruhl., E. vaginatum Körn., and Paepalanthus calvus Körn. On the other hand, the Mexia 5833, widely distributed in herbaria as E. kunthii, is actually the type collection of Paepalanthus mexiae Moldenke, while A. Silveira 2914 is a cotype collection of Eriocaulon majusculum Ruhl.

Additional citations: BRAZIL: Minas Gerais: Black 51-11001 (Z); A. Castellanos 24179 [Herb. Cent. Pesq. Florest. 2951] (An, Rf); Dusén 2045 (S, S); Glaziou 6742 [Macbride photos 22275] (N--photo, W--photo); R. S. Santos s.n. [12.9.63] (Bd--28326); Santos & Castellanos 24179 [Herb. Bradeanum 28327] (N); Sellow B.1290 (Br), B.1290 C.263 (B--type, B--isotype, B--isotype); A. Silveira 2939 (B); Stephan s.n. [Congonhas do Campo, 1843] (Br, N); Ule s.n. [Herb. Mus. Nac. Rio Jan. 28] (S). Paraná: Braga s.n. [28/8/59; Herb. Inst. Hist. Nat. 5271] (Mm); Dombrowski & Saito 350/159 (Ac); Hatschbach 7303 (Ca). Rio Grande do Sul: Friedrichs 30570 (S), 30670 (N); Gaudichaud 262 (P); Rambo 36785 (S), 52183 (S);

Saint-Hilaire $C^2$.1805 (P, P, P). Santa Catarina: Reitz & Klein 7351 (N, Z), 8242 (Ok, S). São Paulo: L. Riedel 2388 (B); Segadas-Vianna 3123 (Sm). CULTIVATED: Brazil: Hemmendorff 468 (N, S). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON KUSIROENSE Miyabe & Kudo

Synonymy: Eriocaulon kushirense Kudo, Jap. Journ. Bot. 2: 248, nom. nud. 1925. Eriocaulon atrum Miyabe & Kudo apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 62 & [86], in syn. 1940 [not E. atrum Masamune, 1940, nor Nakai, 1911]. Eriocaulon kushiroense Miyabe & Kudo apud Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 52. 1940. Eriocaulon kusiroënse Miyabe & Kudo apud Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947.

Bibliography: Kudo, Jap. Journ. Bot. 2: 248. 1925; Satake, Journ. Jap. Bot. 15: 629—630. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 7, 13, 62—63, 81, [86], & 87, fig. 1 (C), 2 (E), & 29. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 52—53, fig. 16. 1940; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Résumé 173, 286, & 481. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185 & 429. 1964; Moldenke, Phytologia 18: 78, 107, & 108. 1969.

Illustrations: Satake in Nakai & Honda, Nov. Pl. Jap. 6: 6, 7, & 63, fig. 1 (C), 2 (E), & 29. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] fig. 16. 1940.

The type of this species was collected by M. Nakamura (no. 52) at Syakubetu, in the province of Kusiro, Hokkaido, Japan, in August, 1886, and is deposited in the herbarium of the Imperial University of Hokkaido.

Satake refers to this species as endemic to the provinces of Hidaka, Iburi, Kusiro, Nemuro, and Tokachi, on the island of Hokkaido [which he calls "Yezo"], and comments that it "Closely resembles Eriocaulon sachalinense, but the sepals of the flowers are slightly 2—3-lobed, and the caput has many flowers. This species may lie between E. atrum and E. sachalinense."

The E. atrum Nakai, referred to above, is a valid species, while the homonym ascribed to Masamune is a synonym of E. hananoegoense Masamune.

ERIOCAULON KWANTUNGENSE Ruhl.

Synonymy: Eriocaulon kwangtungense Ruhl. apud A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933.

Bibliography: Ruhl., Notizbl. Bot. Gart. Berlin 10: 1042 & 1060. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Moldenke, Known Geogr. Distrib. Erioc. 25 & 36. 1946; Moldenke, Résumé 170 & 481. 1959; Moldenke, Résumé Suppl. 1: 17. 1959.

I see no justification for Hill's "correction" of the spelling of the specific epithet of this taxon. The "accepted" spelling of geographic names often varies with the nationality of the writer and often with the current political situation, witness, e.g., "Pensylvania" vs. "Pennsylvania", "Porto Rico" vs. "Puerto

Rico", "Honshu" vs. "Honshiu", "Liukiu" vs. "Ryukyo", "Geneva" vs. "Genf", "Bruxelles" vs. "Brussels", "Belge" vs. "Belgique", etc.

ERIOCAULON LACUSTRE Ruhl.

Bibliography: Ruhl. in Fedde, Repert. Spec. Nov. 22: 33. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Moldenke, N. Am. Fl. 19 (1): 19 & 34. 1937; Moldenke, Phytologia 1: 318. 1939; León, Fl. Cuba 1: 281. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4 & 36. 1946; Moldenke, Phytologia 3: 328—329. 1950; Moldenke, Résumé 51 & 481. 1959.

Additional citations: CUBA: Pinar del Río: Ekman 17877 (N—photo of type, S—type, Z—photo of type); León 17002 (Um—9316).

ERIOCAULON LANATUM H. Hess

Bibliography: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 137—139, pl. 8, fig. 1, 2, & 4. 1955; G. Taylor, Ind. Kew. Suppl. 12: 55. 1959; Moldenke, Résumé 147 & 481. 1959.

Illustrations: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: pl. 8, fig. 1, 2, & 4. 1955.

This species is based on H. Hess 52/2108 from Baixo Cubango, at an altitude of 1230 meters, 5 km. east of Rio Cuebe and 30 km. north of Caiundo in the region of Mission Capico on the Rio Ceuvi, Bié, Angola, collected on February 5, 1952. The species is sometimes infested by the fungus, Tolyposporium hessii E. Müller.

Hess (1955) comments that "Eriocaulon lanatum wächst auf sandig-moorigen Boden, der während der Regenzeit überschwemmt ist. So fanden wir die Art an Altläufen des Rio Quiriri und am kleinen Bach Cuevi. Als Begleiter wurden gesammelt: Mesanthemum radicans Körn., Syngonanthus angolensis H. Hess, verschiedene Utricularien, eine Genlisea und Buchnera-Arten.....Das ganze Material ist einheitlich. Unterschiede in der Höhe der Halme und in der Länge der Blätter sind standortsbedingt." For its distribution he says "Provinz Bié: an den Seitenflüssen des Rio Cubango, im unteren Teil dieses Stromgebietes. Die Fundstellen am Rio Cuevi und am Rio Quiriri sind in der Luftlinie gemassen etwa 150 km voneinander entfernt."

He also says "Eriocaulon lanatum stehl E. pictum Fritsch nahe; E. lanatum ist jedoch an den behaarten Halmen sofort von E. pictum zu unterscheiden. Nach unserem 7 Bogen umfassenden Material zu schlieszen, sind die roten Blätter eine weitere Eigentümlichkeit von E. lanatum. Auch fehlt bei E. lanatum das Rhizom. Die Blütenköpfe sind bei der neuen Art durchwegs kleiner als bei E. pictum. Die einzelnen Blütenteile von E. lanatum sind nur etwa halb so grosz wie jene von E. pictum; die Petalen der ♀ Blüten sind auszerseits kahl, bei E. pictum hingegen sind sie beiderseits behaart. Sonst finden sich in den Blüten keine sicheren Unterscheidungsmerkmale. Mit Eriocaulon Teusczii Engl. et Ruhl. und E. matopense Rendle braucht die neue Art trotz habitueller Ähnlichkeiten nicht verglichen zu werden, da jene Arten freie Sepalen

haben."

ERIOCAULON LANCEOLATUM Miq.

Synonymy: Eriocaulon metzianum Miq. ex C. Muell. in Walp., Ann. 6: 1171. 1861. Eriocaulon metzianum C. Muell. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878, in syn. 1893. Eriocaulon metzianum O. Muell. ex Moldenke, Résumé 290, sphalm. in syn. 1959.

Bibliography: Walp., Ann. 5: 942 (1858) and 6: 1171. 1861; Steud., Syn. Pl. Glum. 2 (Cyp.): 271. 1855; Hook. f., Fl. Brit. Ind. 6: 577. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 62, 78, & 286. 1903; Fyson, Journ. Indian Bot. 2: 266, pl. 23. 1921; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1610 & 1619. 1931; Moldenke, Known Geogr. Distrib. Erioc. 23, 36, & 37. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 205. 1949; Moldenke, Phytologia 3: 329. 1950; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1122, 1127, & 1333. 1956; Moldenke, Résumé 162, 290, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 3: 17. 1962.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 23. 1921.

Both E. lanceolatum and the synonymous E. metzianum seem to be based on a Metz collection [probably Pl. Metz. Exsicc. 131] from Mangalore, Canara, in what is now called the state of Kerala, India, although most of the specimens of this collection are accompanied by a label which is generally interpreted as and cited as Hohenacker 131 from Mangalore.

Fyson (1921) describes the plant as follows: "Scapes slender 5—6 in. hairy. Leaves 2 1/2 cm. by 1/4 in. at the widest, acute, nearly or quite glabrous. Heads 1/4 in., white. Floral bracts short, darkish, obcuneate, but overtopped by the female sepals which are longer and visible beyond them. Female petals shorter or longer than the sepals, oblanceolate, often or always unequal in length. Seeds dark brown, oval....Western Peninsular on the Malabar Coast. Remarkable for the glabrous conspicuous sepals." It is said by Hohenacker to flower in the rainy season The initial letter of the specific epithet of the three synonymous names is, of course, often uppercased.

Additional citations: INDIA: Kerala: Hohenacker 131 [Pl. Metz. Exsicc. 131] (Mi—cotype, S—cotype, S—cotype, Ut—309-cotype); Metz s.n. [Mangalore] (B—cotype, B—cotype, Z—cotype); Stocks, Law, etc. s.n. [Malabar, Concan] (S).

ERIOCAULON LANCEOLATUM var. PILOSUM Moldenke

Bibliography: Moldenke, Phytologia 3: 164 (1949) and 3: 329. 1950; Moldenke, Résumé 162 & 481. 1959.

ERIOCAULON LANIGERUM H. Lecomte

Bibliography: H. Lecomte, Journ. de Bot. 21: 109. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and pr. 2, 82. 1938; Moldenke, Known Geogr. Distrib. Erioc. 26 & 36. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136 & 205. 1949; Moldenke, Résumé 176 & 481. 1959.

ERIOCAULON LAOSENSE Moldenke

Bibliography: Moldenke, Phytologia 3: 309 & 329. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 176 & 481. 1959.

Material of this species has been misidentified and distributed in herbaria as E. quinquangulare L.

Additional citations: INDOCHINA: Laos: D. I. Jeffrey 5096 (Ca--343655).

ERIOCAULON LASIOLEPIS Ruhl.

Synonymy: Lasiolepis brevifolia Boeck., Flora 56: 90. 1873. Lasiolepis brevicola Boeck. ex Moldenke, Résumé 309, in syn. 1959.

Bibliography: Boeck., Flora 56: 90. 1873; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 35. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 64, 86, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 35. 1946; Moldenke, Known Geogr. Distrib. Erioc. 26, 36, & 42. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 139 & 205. 1949; Moldenke, Résumé 180, 309, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 35. 1960.

The initial letter of the specific epithet of this taxon is often uppercased.

ERIOCAULON LATIFOLIUM J. Sm.

Synonymy: Eriocaulon rivulare G. Don ex Benth. in Hook., Niger Fl. 547. 1849 [not E. rivulare Dalz., 1851]. Eriocaulon banani H. Lecomte, Bull. Soc. Bot. France 45: 645. 1909. Mesanthemum radicans Stapf ex Moldenke, Résumé 320, in syn. 1959 [not M. radicans (Benth.) Körn., 1856]. Mesanthemum latifolium J. Sm. ex Moldenke, Résumé Suppl. 7: 8, in syn. 1963.

Bibliography: J. E. Sm., Cycl. 13. 1809; Benth. in Hook., Niger Fl. 547. 1849; Dalz. in Hook., Kew Journ. 3: 280. 1851; Walp., Ann. 5: 940 (1858) and 6: 1171. 1861; Britten, Journ. Bot. 38: 482. 1900; Thiselt.-Dyer, Fl. Trop. Afr. 8: 243. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 62, 78, 286, & 287. 1903; H. Lecomte, Bull. Soc. Bot. France 45: 645. 1909; A. Chev., Sudania 1: 11. 1911; H. Lecomte, Not. Syst. 2: 215, 216, & 393. 1913; Fyson, Journ. Indian Bot. 3: 14. 1922; Hutchinson & Dalz., Fl. W. Trop. Afr. 2: 326. 1936; Dinklage in Fedde, Repert. Spec. Nov. 41: 243. 1937; Moldenke, Known Geogr. Distrib. Erioc. 20, 21, 32, 36, 39, 41, 44, & 62. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 109, 111, 112, & 205. 1949; Moldenke, Phytologia 3: 329.

1950; Meikle & Baldwin, Am. Journ. Bot. 39: 45. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 133, 136, 137, 286, 291, 320, & 481. 1959; Moldenke, Résumé Suppl. 4: 6 (1962), 7: 8 (1963), and 17: 4. 1968; Moldenke, Phytologia 17: 387 (1968), 17: 482, 497, & 498 (1969), and 18: 79 & 169. 1969.

This plant has been found growing in acid water, rather rapid current, with only the inflorescences above water, in streams, on submerged prairies, and in swift streams, flowering and fruiting from November to January. Meikle & Baldwin (1952) assert that it is "Widespread along the West Coast [of Africa] from Senegal to Angola", citing Baldwin 10091, 10382, & 10946 and Whyte s.n. [April 1904] from Liberia. The common name "orro" is recorded for the plant.

The E. rivulare Dalz., referred to in the synonymy above, is a synonym of E. dalzellii Körn.; E. latifolium Arech. is now more correctly known as E. arechavaletae Herter, while E. latifolium Bong. is a synonym of Paepalanthus serralapensis Moldenke.

Eriocaulon vittifolium H. Lecomte is sometimes regarded as conspecific with E. latifolium, but is probably distinct. Chevalier (1911) cites A. Chevalier 524.

Additional citations: MALI: Soudan: Raynal & Raynal 5449 (Z, Z—drawing). REPUBLIC OF GUINEA: Landale-Brown 2638 (S); Pitot s.n. [8.V.1949] (An). LIBERIA: J. T. Baldwin Jr. 10382 (N), 10946 (N). CONGO LEOPOLDVILLE: Malaisse 6017 (Ac, Rf).

ERIOCAULON LATIFOLIUM f. PROLIFERUM Moldenke

Bibliography: Moldenke, Résumé Suppl. 4: 6. 1962; Moldenke, Phytologia 8: 387—388. 1962; Moldenke, Biol. Abstr. 42: 1517. 1963; Hocking, Excerpt. Bot. A.6: 455. 1963; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1962: 29. 1963.

Material of this taxon has been misidentified and distributed in herbaria under the name E. zambeziense Ruhl.

Citations: SÉNÉGAL: Herb. Inst. Fr. Afr. Noire 10358 (An—type).

ERIOCAULON LAXIFOLIUM Körn.

Synonymy: Paepalanthus laxifolius Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 494, in syn. 1863.

Bibliography: Körn., Linnaea 27: 60. 1854; Walp., Ann. 5: 931 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 494. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 57, & 286. 1903; Alv. Silv., Fl. Mont. 1: 20 & 398. 1928; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 8 & 36. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89 & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 12: 9 (1965) and 17: 11. 1968.

Silveira (1928) cites A. Silveira 710 as representing this taxon, but as yet I have not seen material of this collection.

Citations: BRAZIL: Minas Gerais: Martius 1499 [Macbride photos 18687] (N--photo of type, W--photo of type). State undetermined: Glaziou 22308 (Br, N). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B); drawings & clipping from Pflanzenreich (B).

ERIOCAULON LEPIDUM Koyama

Bibliography: Koyama, Philip. Journ. Sci. 84: 371--372 & 377, pl. 3. 1956; Moldenke, Résumé 178 & 481. 1959; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

Illustrations: Koyama, Philip. Journ. Sci. 84: 377, pl. 3. 1956.

The type of this species was collected by Bunzô Hayata at Doi Step, Thailand, on October 3, 1921, and is deposited in the herbarium of Tokyo University. The original publication is dated "1955", but the pages in question were not actually issued until 1956.

ERIOCAULON LEPTOPHYLLUM Kunth

Synonymy: Eriocaulon argentinum Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 81, 83, 84, & [103], pl. 18, fig. B. 1945. Eriocaulon lepthophyllum Kunth ex Angely, Fl. Paran. 10: 14, sphalm. 1957. Paepalanthus sp. Niederlein apud Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 83, in syn. 1945. Syngonanthus gracilis Molfino apud Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 83, in syn. 1945 [not S. gracilis (Bong.) Ruhl., 1965, nor Körn., 1965, nor (Körn.) Ruhl., 1903, nor (Kunth) Ruhl., 1959, nor Ruhl., 1908].

Additional & emended bibliography: Walp., Ann. 5: 931 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 476 & 494. 1863; Niederlein, Bol. Mus. Prod. Argent. 3 (31): 336. 1890; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 57, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 175. 1908; Molfino, Physis 6: 363. 1923; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 81, 83, 84, & [103], pl. 18, fig. B. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 8 & 36. 1946; Abbiati, Rev. Mus. La Plata Bot., new ser., 6: 312, 314, 318, 319, 321, 326--329, 339, & 340, fig. 4 (A--C) & 5, & pl. 2 (2). 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77, 103, & 205. 1949; Moldenke, Phytologia 3: 329. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Herter, Rev. Sudam. Bot. 9: 188. 1954; Angely, Fl. Paran. 10: 14. 1957; Moldenke, Résumé 89, 119, 123, 285, 329, 428, & 481. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Angely, Fl. Paran. 16: 51 (1960) and 17: 24. 1961; Moldenke, Résumé Suppl. 3: 32. 1962; Angely, Fl. Anal. Paran., ed. 1, 199. 1965.

Illustrations: Castell. in Descole, Gen. & Sp. Pl. Argent. 3: pl. 18, fig. B. 1945; Abbiati, Rev. Mus. La Plata Bot., new ser., 6: 327 & 328, fig. 4 (A--C) & 5, & pl. 2 (2). 1946.

The original description of this species by Kunth (1841) is as

follows: "Acaule; foliis angustissime linearibus, superne subulato-angustatis, fenestrato-5-nerviis, pellucidis, pedunculis vaginisque glabris; his folio brevioribus; illis sulcatis; bracteis involucrantibus obtusis, flores stipantibus acuminatis; floribus dioecis?; femineis trigynis: sepalis apice pilosis. -- Brasilia meridionalis. (Sellow.) -- Folia 2--3 1/4 pollicaris, dimidiam lineam lata. Pedunculi subquinquepollicares. Vaginae laxae, membranaceae, acutae, apice fissae, 1 1/4 -- 1 1/2 -pollicares. Capitula subglobosa, magnitudine grani piperis minores; suppetentia mere feminea. Bracteae involucrantes subellipticae, obtusae, pallide fuscescentes, glabrae, capitulo multo breviores; bracteae flores stipantes cuneato-spathulatae, acuminatae, pallide fuscescentes, ciliatae. Flores feminei pedicellati: Sepala 3 exteriora obovata, obtusiuscula, navicularia, subgrisea, apice pilosa, subaequalia; 3 interiora ab exterioribus valde remota, ideo ea parum superantia, subspathulata, obtusa, albida, apice ciliata, interne sub apice glandula minuta nigra notata, parum inaequalia. Ovarium brevissime stipitatum, ellipticum, tricoccum. Stylus longiusculus. Stigmate 3, filiformia, simplicia. Pili bractearum et calycum crassiusculi, obtusiusculi, opaci, nivei."

The type of the species appears to be Sellow 2513, labeled "Brasilia meridionali" and deposited in the herbarium of the Botanisches Museum at Berlin, cited by Ruhland (1903) as having been collected in Rio Grande do Sul. A second sheet of the same number, however, in the same herbarium, is labeled "Montevideo".

Herter (1954) says for the species: "Patria: Sudamérica cálida. Uruguay: A buscar." The initial letter of the specific epithet is sometimes uppercased for no valid reason. Abbiati (1946) cites and illustrates Niederlein 2257, which is the type collection of E. argentinum Castell., from Corrientes, Argentina. The Niederlein (1890) reference given in the bibliography above is sometimes cited as "31: 68. 1890". The Syngonanthus gracilis homonyms referred to above are all various mis-accreditions for the valid species, S. gracilis (Körn.) Ruhl. The Pedersen 3653, distributed as E. leptophyllum, is actually E. modestum Kunth.

Additional citations: BRAZIL: Paraná: Reitz & Klein 17618 (Z). Rio Grande do Sul: Sellow 2513 (B--type, B--isotype). URUGUAY: Sellow s.n. [Montevideo] (Br, N--photo, N--photo). ARGENTINA: Corrientes: Pedersen 1192 (N, Ut--25715, W--2122707). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B); Descole, Gen. & Sp. Pl. Argent. 3: pl. 18, fig. B (N, Z).

ERIOCAULON LEUCOGENES Ridl.

Bibliography: H. N. Ridl., Trans. Linn. Soc. Lond. Bot., ser. 2, 9: 240. 1916; Rendle in Gibbs, Contrib. Phytogeogr. & Fl. Arfak Mts. 100. 1917; A. W. Hill, Ind. Kew. Suppl. 6: 78. 1926; Moldenke, Known Geogr. Distrib. Erioc. 27 & 36. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 149 & 205. 1949; Moldenke, Résumé 201 & 481. 1959; Moldenke, Résumé Suppl. 3: 24. 1962.

Ridley's original description (1916) of this plant states that its scapes are "11 mm." long. Meikle, in a letter to me dated December 22, 1951, has confirmed my suspicion that this statement should read "11 cm." This is another example of the unfortunate situations that can so easily arise when the metric system of measurement is used. Meikle also states that the ovaries of the type collection's florets are 3-celled, not 2-celled as stated by Ridley.

The plant has been found growing in wet open places, in damp meadows, in peaty swamps, and in seepage areas along small creeks, at altitudes of 1600 to 2830 meters, flowering and fruiting in April. June, August, and December. Hoogland & Pullen found it "in very wet muddy patch on gentle mountain slope" and "fairly common in open patches on wet peat". Common name recorded for it are "abundink", "jampi", "masul", "mimmeh", "poio", and "yogos". Gibbs (1917) avers that it is "common on marsh by ♀ lake [whatever that means!], where open and sandy" in the Arfak Mountains. She also says "Flower heads mauve" and "The plants show a great range in size from 6 cm. to 20 cm., the heads varying in diameter from .5 to 1 cm." She cites Gibbs 5567. Rendle comments in this connection that "A species of Eriocaulon was also collected by Miss Gibbs on Mt. Kinabalu at 12,000' (no. 4209) by Kadamaian torrent, on the granite core near the summit of the mountain; it was mixed with Centrolepis kinabaluensis Gibbs (no. 4209).....It is a caespitose plant, forming small cushions 2.5 cm. high, with glabrous leaves 2—2.5 cm. long, ±1 mm. wide in the middle, linear-tapering from a broad membranous base. The specimens are all sterile. No Eriocaulon has hitherto been recorded from the granite core of the mountain." It seems possible to me that the plant here being referred to is E. brevipedunculatum var. angustifolium Moldenke, with which it should certainly be compared.

Citations: INDONESIA: GREATER SUNDA ISLANDS: Celebes: Kjellberg 1580 (S), 2174 (S). MELANESIA: NEW GUINEA: Dutch New Guinea: D. Bergman 586 (S); Hoogland & Schodde 6765 (W—2393176), 6804 (W—2393189), 7474 (W—2393780). Northeastern New Guinea: M. S. Clemens 5299 (B, N), 6321 (N), 9379 (B, N); Hoogland & Pullen 5397 (W—2314903), 6009 (W—2315182).

ERIOCAULON LEUCOMELAS Steud.

Synonymy: Eriocaulon melaleucum Mart. in Wall., Plant. As. Rar. 3: 29. 1832 [not E. melaleucum Bong., 1831]. Eriocaulon nigrescens D. Dietr., Syn. Pl. 5: 265. 1852. Eriocaulon geoffreyi Fyson, Kew Bull. Misc. Inf. 1914: 330. 1914. Eriocaulon horsley-kundae var. megalocephala Fyson, Journ. Indian Bot. 3: 14, pl. 44. 1922. Eriocaulon horsleykondae var. megalocephala Fyson apud C. E. C. Fischer, Kew Bull. Misc. Inf. 1931: 261. 1931. Eriocaulon horsley-kondae var. megalocephala Fyson apud C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1121—1122, 1127, & 1333. 1956. Eriocaulon horsleykonsae var. megaloceph-

ala Fyson ex Moldenke, Résumé Suppl. 14: 8, in syn. 1966.

Bibliography: Mart. in Wall., Plant. As. Rar. 3: 29. 1832; Wall., Numer. List 208 ["207"]. 1832; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 568. 1841; D. Dietr., Syn. Pl. 5: 265. 1852; Körn., Linnaea 27: 647—649 & 797. 1856; Walp., Ann. 5: 940 (1858) and 6: 1171. 1891; Hook. f., Fl. Brit. Ind. 6: 574—575. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 61, 72, & 286. 1903; Fyson, Kew Bull. Misc. Inf. 1914: 330. 1914; Prain, Ind. Kew. Suppl. 5, pr. 1, 97. 1921; Fyson, Journ. Indian Bot. 2: 196 (1921) and 3: 14, 17, & 18, pl. 44. 1922; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1608—1609 & 1619. 1931; C. E. C. Fischer, Kew Bull. Misc. Inf. 1931: 261. 1931; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23, 24, & 35—37. 1946; Razi, Journ. Mysore Univ. 7 (4): 77. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126, 129, & 205. 1949; Razi, Journ. Mysore Univ. 11 (1): 6 & 16. 1950; Moldenke, Phytologia 3: 329. 1950; Razi, Journ. Mysore Univ. B.14 (10): 460. 1955; Razi, Contrib. Bot. 40: 92. 1955; Razi, Proc. Nat. Inst. Sci. India 21 B (2): 84. 1955; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1121—1122, 1127, & 1333. 1956; Moldenke, Résumé 162, 165, 288—290, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879. 1960; Prain, Ind. Kew. Suppl. 5, pr. 2, 97. 1960; Panigrahi, Chowdhury, Raju, & Deka, Bull. Bot. Surv. India 6: 260. 1964; Thanikaimoni, Pollen & Spores 7: 184—185. 1965; Moldenke, Résumé Suppl. 14: 8 (1966), 15: 8 (1967), and 16: 9. 1968; Moldenke, Phytologia 18: 169, 173, & 174. 1969.

Illustrations: Fyson, Journ. Indian Bot. 3: pl. 44. 1922.

Because of the various interpretations that have been given this taxon by botanists in the past, it may be worthwhile to repeat Kunth's description (1841) here: "E. Melaleucum *) [*) Eriocaulon melaleucum Bong. est Paepalanthi species.] Mart. in Wall. Plant. rar. 3. 29. Rhizomate annuo; scapo (3—4-pollicari) striato, folia angusto-linearia acuta fenestrata vaginasque transverse truncatas duplo superante; capitulis globosis; bracteis oblongis, nigricantibus; perianthiis nigricantibus, superne pilis eburneis barbatis. Mart. E. quinquangulare Heyne herb. — Coromandelia. — Huic affine E. septangulare, quod foliis latioribus et scapis longioribus praesertim distinguitur. (Mart.) Folia radicalia rosulata, pollicem longa, vix lineam lata, tenera, subtiliter fenestrata. Vagina teres, ore nonnihil ampliato et scarioso-membranaceo truncata, foliis paulo brevior. Scapus e quavis rosula foliorum solitarius, 3—5-pollicaris, ut tota planta, exceptis calycibus, glaber. Bracteae oblongae, linea paulo longiores, nigricantes, margine passim inciso-lacerae, tenerae, ut calyces nigricantes. Mas: Calyx exterior: Sepala oblonga, acuta; interior angusto-tubaeformis: laciniis triangularibus. Cilia eburnea, opaca, nitentia. Stamina 6: longiora laciniis opposita. Antherae subglobosae, flavescentes, tandem nigricantes. Femina: Calyx exterior ut in mare; interior: Sepala oblanceolata, albida, ciliata. Ovarium ob-

longum. Stylus tripartitus. Semina elliptica, nitida, lutescenti-fuscidula, pilis seriatis. (Ex Mart.)"

Fyson (1921) describes his E. geoffreyi as follows: "Stem 0. Leaves 1/2 — 2 in., flat tapering to the acute apex. Scapes solitary, in the type, or several, three or four times as long as the leaves. Heads gray; involucre black. Receptacle glabrous. Flowers regular, 3-merous. Petals unusually broad, the female spathulate with large glands. Fig. opp. Peninsular India; on the Pulneys at 7000 ft. The type plant was collected at 7500 feet on the Pulneys and is remarkable for the solitary scape rising from a rosette of stiff short leaves. It occurs all over the downs, not in particularly damp spots, and flowers in the autumn. What appears to be a dimerous variety of this species is on a sheet in Herb. Calc., dated July 5th, 1865 collected at 'North Hastings'."

It should be noted here that the E. melaleucum Bong., referred to in the synonymy above, is a synonym of Paepalanthus melaleucus (Bong.) Kunth. Martius (1832), Wallich (1832), Kunth (1841), Körnicke (1856), and Hooker (1893) all regard E. quinquangulare Heyne as a synonym of E. leucomelas, but I have placed it in the synonymy of E. cristatum Mart.

As an example of how various botanical workers have differed in their interpretation of taxa in this group, Meebold 9735 was originally distributed as E. cristatum Mart.; then Fyson redetermined it as E. horsley-kundae Fyson; then it was re-determined as E. ritchieanum Ruhl.; and finally it was placed in E. leucomelas Steud.

The species has been found growing at altitudes of 4769 to 7500 feet, flowering in February, April to June, and November. Panigrahi and his associates (1964) record it as "occasional in sandy rocky beds of rivers" in Orissa; this is the first record of the species from Bihar & Orissa.

Material has been misidentified and distributed in herbaria under the names E. benthami Kunth, E. collinum Hook. f., E. mariae Fyson, E. modestum Kunth, E. nepalense Prescott, E. oliveri Fyson, E. ritchieanum Ruhl., E. smithii R. Br., E. sollyanum Royle, and E. trilobum Ham. The B. Schmid 827, cited below, is a mixture with E. sollyanum Royle, while Bembower 30 is a mixture with something non-eriocaulaceous.

In a letter to me from Dr. A. R. Kulkarni, dated December 24, 1968, he says "During my recent excursions in Western Ghats I have collected a species of Eriocaulon with tuberiferous habit. The stem in this species is condensed into a short disc bearing rosette of leaves and a few scapes above and numerous septate roots below. Tuber primordia originate as axillary buds. Each primordium grows vertically up to 5 mms to form a small stout axillary branch. Its tip then branches dichotomously into 2—4 branches, which turn down, pierce through the subtending or adjacent leaf base and enter into the soil where their tips swell to from tubers. Mature

tubers have an average size of 4 x 2.5 mms. Their surface is covered with dense growth of unicellular hairs. One or two sprouting eyes are often found on the tuber. Tubers are full of simple circular starch grains. The species has anesopetalous male flowers. Anthers are white when young but become blackish at maturity. Heads and involucral bracts are glabrous. Floral bracts are densely tufted with white hairs. Refering to the Indian floras, Fyson's and Ruhland's work, I have placed it tentatively in E. melaleucum Mart., though tuberiferous habit has not been recorded for E. melaleucum."

Additional citations: INDIA: Madras: Bembower 28 (Mi), 29 (Mi), 30, in part (Mi), 31 (Mi), 32 (Mi), 36 (N), 431 (Z), 432 (Ca—495798); Perrottet 1166 (B); Saulière 71 (Ca—262279, N); B. Schmid 823 (B), 825 (B), 826 (B), 827, in part (B). Mysore: Begum 5 (Mf); Meebold 9735 (Z); Nusrath 39 (Bn—3251). State undetermined: Wight 2856 (B). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON LIGULATUM (Vell.) L. B. Sm.

Synonymy: Dupatya ligulata Vell., Fl. Flum. 36 (1825) and Icon. 1: pl. 86. 1827. Eriocaulon vaginatum Körn., Linnaea 27: 599, nom. nud. (1856); Mart., Fl. Bras. 3 (1): 482—484. 1863.

Bibliography: Vell., Fl. Flum. 36 (1825) and Icon. 1: pl. 86. 1827; Körn., Linnaea 27: 599. 1856; Walp., Ann. 5: 930 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 482—484. 1863; Vell., Arch. Mus. Nac. Rio Jan. 5: 37. 1881; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 804 & 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 41, 45, 46, & 288. 1903; L. B. Sm., Contrib. Gray Herb., new ser., 124: 5. 1939; Moldenke, Known Geogr. Distrib. Erioc. 8, 30, & 41. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 804 & 879. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 206. 1949; Moldenke, Phytologia 3: 470. 1951; Rambo, Sellowia 7: 283. 1956; Angely, Fl. Paran. 10: 14. 1957; Moldenke, Résumé 89, 281, & 483. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 804 & 879. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Angely, Fl. Paran. 17: 24. 1961; Angely, Fl. Anal. Paran., ed. 1, 199. 1965; Moldenke, Résumé Suppl. 17: 3, 9, & 11. 1968; Moldenke, Phytologia 18: 87. 1969.

Illustrations: Vell., Fl. Flum. Icon. 1: pl. 86. 1827.

There is considerable doubt as to the status of this taxon and as to its synonymy. Körnicke (1863), Jackson (1893), and Smith (1939) all consider Dupatya ligulata Vell. to be conspecific with Eriocaulon kunthii Körn. Kunth (1841) and Ruhland (1903), however, consider it to be conspecific (with a question) with E. vaginatum Körn. The only differences which Ruhland gives to separate these two species are as follows: in E. kunthii the receptacle is pilose, the sepals of the staminate florets are free and subacute, and the sepals of the pistillate florets are sub-

ovate, two subacute at the apex and the third obtuse. In E. vaginatum the receptacle is glabrous, the sepals of the staminate florets are connate at the base and obtuse at the apex, and the sepals of the pistillate florets are oblong-spatulate, all obtuse at the apex. As Dr. Smith points out, in a letter to me dated January 9, 1969, the female sepals in Velloso's illustration seem "nearer ovate than oblong-spatulate", but, of course, Velloso's drawings are notoriously poor. It may well be that the material cited by me under E. kunthii and here under E. ligulatum is all conspecific. E. kunthii seems to be based on Sellow B.1290 C.263 (probably a combination of two collections) from Minas Gerais, while E. vaginatum is based on Regnell II.291 & III.291, also from Minas Gerais, and Sellow 99, whose locality of collection has not been accurately determined as yet. All this historic material should be re-examined very carefully to note the critical differences, if any, and all cited material under both taxa should then also be re-examined.

The so-called E. ligulatum Bong. is merely a misspelling of the name, E. lingulatum Bong., and belongs in the synonymy of Paepalanthus lingulatus (Bong.) Kunth.

Material of E. ligulatum has been found growing in swamps, at 900 meters altitude, flowering and fruiting in September and October. Material has been misidentified and distributed in herbaria as E. magnificum Ruhl. On the other hand, the Fridrichs s.n. [Rambo 30670], distributed as E. vaginatum and so cited by me in my 1951 work, is actually now cited by me under E. kunthii Körn.

Additional citations: BRAZIL: Minas Gerais: Mello Barreto 2530 [Herb. Jard. Bot. Belo Horiz. 8277; Herb. U. S. Nat. Arb. 236392] (W—2109991); Mosén 767 (S, S, S); Regnell II.291 [10/1846] (Ut—334), II.291 [2/9/1861; Macbride photos 10567] (B, Br, N, N, N—photo, S, S, W—photo), III.291 [10/1846] (W—200755); Widgren I.2 (S), s.n. [1845] (S, S, S, S, S, W—937195). Paraná: Dombrowski & Saito 351/157 (Ac), 352/158 (Ac), 416/235 (Ac); H. M. Filho 38 [Herb. Mus. Paran. 5324; Herb. Curso Farmac. 671] (S); Hatschbach 2868 (N), 8093 (Ca), 8311 (Ca); Jönsson 933a (N, S, W—1470451); Moure s.n. [R-19, No. 1; 24-9-52] (Z). Rio Grande do Sul: O. Camargo 62435 (S); Sehnem 2941 (B). São Paulo: Burchell 4916 (Br); Campos Novaes 1150 (W—389981); Hemmendorff 145 (S). State undetermined: Sellow 99 (B). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON LINEARE Small

Synonymy: Eriocaulon linerae Sm. ex Moldenke, Résumé Suppl. 4: 11, in syn. 1962.

Additional bibliography: J. K. Small, Fl. Southeast. U. S., ed. 1, 236 & 1328. 1903; R. M. Harper, Ann. N. Y. Acad. Sci. 17: 267. 1906; Prain, Ind. Kew. Suppl. 3: 69. 1908; J. K. Small, Fl. South-

east. U. S., ed. 2, 236. 1913; J. K. Small, Man. Southeast. Fl. 257 & 258. 1933; Moldenke, N. Am. Fl. 19 (1): 18 & 23. 1937; Moldenke, Phytologia 1: 318—319. 1939; Moldenke, Known Geogr. Distrib. Erioc. 2, 3, & 36. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 7—9, 11, & 205. 1949; Moldenke, Phytologia 3: 329—330. 1950; Moldenke, Résumé 10—12, 14, & 481. 1959; Moldenke, Résumé Suppl. 2: 2 (1960), 3: 3 (1962), and 4: 11. 1962; Radford, Ahles, & Bell, Guide Vasc. Fl. Carol. 106 & 107. 1964; Kral, Sida 2: 301, 302, 306, 307, 309, & 330. 1966; Moldenke, Résumé Suppl. 15: [1] (1967), 16: [1] (1968), and 17: [1]. 1968; Moldenke, Phytologia 17: 490. 1969.

Illustrations: J. K. Small, Man. Southeast. Fl. 258. 1933; Kral, Sida 2: 306. 1966.

This species has been collected in moist pinebarrens, Sarracenia sledgei bogs, in shallow water and wet margins of small sandy ponds, in somewhat wet soil with pitcherplants, in moist damp bog areas with orchids, mints, and milkweeds, and in boggy areas with orchids, pitcherplants, and sensitive-briers. Collectors sometimes report the plant bases submerged or they report the "plants practically or wholly submerged on lake shores". Harper found it growing "on Eocene overlaid by Lafayette formation in moist pinebarrens" in Georgia. Kral, collecting in Florida, found it abundant on sandy fluctuating shores of lakes, on wet sandy peat at the margins of sinkhole ponds in pinewoods, in sandy peat-muck or wet slash pine - saw palmetto flatwoods ditches, and abundant in wet sandy peat of lake edges. On Kral 17748 he notes "the tall specimens submersed save for upper portion of stem, short specimens on moist sandy shores, with perfect gradation of habitat between, the submersed ones tend to be stoloniferous." His reference to the upper portion of the "stem" here must certainly refer to the scapes instead. The heads are described as "white" and the only common name specifically recorded for the species is "hatpin". It has been collected in flower from April to September and in fruit from July to September.

Radford, Ahles, & Bell (1964) record it as growing "in bogs, savannas, pools, very rare, Henderson Co., N. C. April—July". Harper (1906) records it from Berrien, Bulloch, Coffee, Irwin, Montgomery, Sumter, Tattnall, and Wilcox Counties, Georgia.

Kral (1966), in his discussion of E. compressum Lam., notes "It is the closest in appearance to a shorter plant, E. lineare, which also has soft, white, usually hemisphaerical heads, but differs from that species in having larger, often unisexual (rather than bisexual) heads, the receptacular surfaces of which have at least sparse hairs (those of E. lineare are smooth). Also the surface of the seed of E. compressum is smoothish while that of the seed of E. lineare is indistinctly cancellate, sometimes papillate."

The same author, after giving a splendid and very detailed description of E. lineare, comments as follows: "Sandy or peaty lakeshores, margins of pineland ponds, ditches, and savannas, coastal plain, Florida north to North Carolina, west to Alabama.

Type. Eocene geologic formation overlain by Lafayette and Columbia, Bullock County, Georgia, R. M. Harper 830. At NY. This species is locally abundant, being commonest in the limesink country of northern Florida, where in midsummer its white 'buttons' ring the sandy sinkhole lakes and ponds. Length and breadth of leaf and scape vary drastically within the species, this directly related to degree or extent of submersion. Thus, a perfect continuum of habit may be found if one would run a cross contour line through a population. Those furthest from the shore would be the shortest leaved and have the shortest, narrowest scapes, while submersed forms have extremely elongated, spongy, leaves and scapes. Difficulties in identification of E. lineare stem from partial samples from such populations, the larger specimens having some resemblance to E. compressum. Curiously, E. lineare most closely resembles E. septangulare, whose range it may contact to the north and northwest, and E. texense, whose range it does contact to the west. A detailed examination of the Eriocaulons comprising this complex may well result in a far more conservative treatment of them than now exists. E. lineare is the only one of the three to have a perfectly smooth receptacular surface and flavescent outer bracts. On the other hand, E. septangulare has some populations in which the surface of the receptacle has trichomes, others in which it does not."

Small (1933) comments that "E. septangulare as admitted into our range, seems to have been, for the most part, based on small specimens of E. lineare." Thorne 5022 bears a notation "E. septangulare With., incl. E. lineare Small", indicating that collector's belief that both taxa are conspecific. Personally, I prefer to follow Small, Harper, Ahles, Bell, Radford, and Kral in keeping them separate.

Material has been misidentified and distributed in herbaria under such names as E. anceps (Walt.) Morong, E. compressum Lam., E. compressus Lam., E. gnaphalodes Michx., E. septangulare With., and Lachnocaulon anceps (Walt.) Morong. On the other hand, the R. M. Harper 2146 (at least in part) & 2219, distributed as E. lineare and the former so cited by me in my 1939 work, appear to be E. compressum Lam., while Wherry s.n. [1 m. s. of Flat Rock Sta., 5-30-1927] from Henderson County, North Carolina, and so cited by me in a previous work, seems to be E. pellucidum Michx.

Additional citations: NORTH CAROLINA: Henderson Co.: Murley 982 (Ok). GEORGIA: Baker Co.: R. F. Thorne 1581 (Ca--906392), 4370 (Mi, N). Bulloch Co.: C. Owens 154 (Hi--197942); W. Palmer 87 (Hi--197941); S. Taylor 127 (Hi--198300). Decatur Co.: R. F. Thorne 6551 (We). Dougherty Co.: R. F. Thorne 5022 (Mv). Montgomery Co.: R. M. Harper 2146, in part (B). Sumter Co.: R. M. Harper 1395 (Ms--15475). FLORIDA: Bay Co.: Kral 15671 (N). Calhoun Co.: W. M. Canby s.n. [Magnolia, April 1858] (Ws). Leon Co.: R. K. Godfrey 53684 (Hi--157556, N); Kral & Godfrey 15575 (N), 15585 (N).

Wakulla Co.: Kral 23024 (N). Walton Co.: Kral 17748 (N). ALABAMA: Baldwin Co.: W. Wolf s.n. [Summerdale, July 30, '26] (Ca--841809). County undetermined: A. Ruth s.n. [De Soto Falls, July 1898] (S). MISSISSIPPI: George Co.: Ahles & Bell 7695 (Ur).

ERIOCAULON LINEARIFOLIUM Körn.

Bibliography: Körn., Linnaea 27: 601. 1854; Walp., Ann. 5: 931 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 498. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 42, 47, 48, 58, & 286. 1903; Moldenke, Known Geogr. Distrib. Erioc. 8 & 36. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Phytologia 3: 330. 1950; Moldenke, Résumé 89, 113, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 11: 4. 1964; Moldenke, Phytologia 18: 188. 1969.

Material has been misidentified and distributed in herbaria as E. humboldtii Kunth.

Additional citations: BRAZIL: Goiás: Andrade 479 [Emmerich 471] (Bd--15506). Piauhy: G. Gardner 2954 [Macbride photos 10561] (B--type, W--photo of type, Z--photo of type). BOLIVIA: Santa Cruz: Kuntze s.n. [Ost-Velasco, VII.92] (N). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON LIVIDUM F. Muell.

Bibliography: F. Muell., Fragm. 1: 92. 1859; Benth., Fl. Austr. 7: 191, 195, & 792. 1878; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 65, 98, & 286. 1903; Moldenke, Known Geogr. Distrib. Erioc. 28 & 36. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Résumé 209 & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; J. S. Beard, Descrip. Cat. W. Austr. Pl. 9. 1965; Moldenke, Résumé Suppl. 15: 14. 1967.

ERIOCAULON LONGICUSPE Hook. f.

Synonymy: Eriocaulon longicuspis Hook. f., Fl. Brit. Ind. 6: 573. 1893. Eriocaulon longicuspis var. typica Fyson, Journ. Indian Bot. 2: 308. 1921.

Bibliography: Hook. f., Fl. Brit. Ind. 6: 573. 1893; Hook. f. in Trimen, Handb. Fl. Ceylon 5: [1], 4, & 412. 1900; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 115, 116, & 286. 1903; H. Lecomte, Journ. de Bot. 21: 109. 1908; Fyson, Journ. Indian Bot. 2: 308, 309, & 312, pl. 25. 1921; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Moldenke, Known Geogr. Distrib. Erioc. 24 & 36. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 130 & 205. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158. 1959; Moldenke, Résumé 167, 289, 418, & 481. 1959.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 25. 1921.

Practically all previous authors spell the specific epithet of this taxon "longicuspis", as Hooker originally proposed it. The generic name, Eriocaulon, however, is neuter and the adjectival specific epithet must take on a neuter ending.

Fyson (1921) describes the species "Stem disciform, leaves usually 3 (2—8) in. Bracts acuminate, fringed with white hairs, and more or less hidden by the projecting male petals the lowest of which form a conspicuous fringe round the head. Flowers regular and normal." He describes his var. typica as having the scapes solitary, and states that it is endemic to Ceylon.

Hooker (1893) regarded "E. cristatum var. Thw. Enum. 341" as a synonym of E. longicuspe, but I place it in the synonymy of E. ceylanicum Körn. The E. longicuspis var. polycephala Fyson is regarded by me as E. polycephalum Hook. f.

ERIOCAULON LONGIPEDUNCULATUM H. Lecomte

Synonymy: Eriocaulon longepedunculatum H. Lecomte apud Moldenke, Known Geogr. Distrib. Erioc. 27, 36, & 62, sphalm. 1946 [not E. longepedunculatum Alv. Silv., 1928].

Bibliography: H. Lecomte, Not. Syst. 2: 380 & 393. 1913; Prain, Ind. Kew. Suppl. 5, pr. 1, 97. 1921; Moldenke, Known Geogr. Distrib. Erioc. 27, 36, & 62. 1946; E. H. Walker, Contrib. U. S. Nat. Herb. 30: 380. 1947; Guillaum., Fl. Analyt. & Synopt. Nouv.-Caléd. 49—50. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 151 & 205. 1949; Moldenke, Phytologia 3: 330. 1950; Moldenke, Résumé 205, 298, & 481. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 97. 1960.

The E. longepedunculatum Alv. Silv., referred to in the synonymy above, is now placed in the synonymy of E. silveirae Moldenke.

Guillaumin (1948) keys this species from the other species of New Caledonia known to him as follows:

1. Plants stout (robust); leaves 20—35 cm. long; heads globose; scape 6-angled, 20—30 cm. long.....E. pancheri H. Lecomte.

1a. Plants very dwarf; leaves 13 cm. long or longer.

2. Heads globose.

3. Scapes plainly ribbed.

4. Scapes with 6 ribs, 14—16 cm. long; leaves 5—13 cm. long; pistillate sepals obtuse.....E. comptonii Rendle.

4a. Scapes with 5 ribs, 8—20 cm. long; leaves 3—7 cm. long; pistillate sepals acute.....E. scariosum J. Sm.

3a. Scapes almost cylindric, 5—8 cm. long; leaves 5—7 cm. long.....E. neo-caledonicum Schlecht.

2a. Heads turbinate, very small; scape 7-ribbed, 40—100 cm. long.....E. longipedunculatum H. Lecomte.

Citations: MELANESIA: New Caledonia: McKee 3373 (Go).

ERIOCAULON LONGIPETALUM Rendle

Bibliography: Rendle, Cat. Welw. Afr. Pl. 2: 96. 1899; Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1105. 1901; Ruhl. in Engl., Pflan-

zenreich 13 (4-30): 33, 40, 99, & 286, fig. 13 B & C. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; H. Lecomte, Bull. Soc. Bot. France 55: 644. 1909; Moldenke, Known Geogr. Distrib. Erioc. 22 & 36. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 118 & 205. 1949; Moldenke, Résumé 147 & 481. 1959.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 99, fig. 13 B & C. 1903.

It should be noted here that Ruhland (1903) claims that the type collection, Welwitsch 2446, is from Morro do Lopolla in Benguela, Angola -- not from Huila as cited herein below. The type locality is 1000--1500 meters in altitude.

Citations: ANGOLA: Huila: Welwitsch 2446 (B--isotype, Z--isotype). MOUNTED ILLUSTRATIONS: Ruhland in Engl., Pflanzenreich 13 (4-30): fig. 13 B & C (B).

ERIOCAULON LONGIROSTRUM Alv. Silv. & Ruhl.

Synonymy: Eriocaulon longirostrum Alv. Silv., Fl. Mont. 1: 398, sphalm. 1928. Paepalanthus longirostrum Alv. Silv. ex Moldenke, Résumé 326, in syn. 1959; Rennó, Levant. Herb. Inst. Agron. 70. 1960.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 21, 113, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Alv. Silv., Fl. Mont. 1: 398. 1928; Moldenke, Known Geogr. Distrib. Erioc. 8 & 36. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89, 289, 326, & 481. 1959; Rennó, Levant. Herb. Inst. Agron. 70. 1960.

Silveira (1928) cites A. Silveira 188 for this species as though it were the type collection, but the actual type specimen in the Berlin herbarium bears the number "1268", which seems to be a herbarium number.

Citations: BRAZIL: Minas Gerais: Alveiro de Silveira 188 [Herb. Com. Geogr. & Geol. M. Gerais 1268; Herb. Jard. Bot. Belo Horiz. 26676] (B--type, N--isotype).

ERIOCAULON LUTCHUENSE Koidz.

Synonymy: Eriocaulon lutschuense Koidz. ex Moldenke, Known Geogr. Distrib. Erioc. 26 & 36, sphalm. 1946. Eriocaulon sikokianum var. lutschuense (Koidz.) Satake ex Moldenke, Résumé 292, in syn. 1959. Eriocaulon sikokianum var. lutchuense Satake apud Hatusima, Mem. South. Indust. Sci. Inst. Kagoshima Univ. 3 (2): 123. 1962.

Bibliography: Koidz., Bot. Mag. Tokyo 28: 171. 1914; Prain, Ind. Kew. Suppl. 5, pr. 1, 97. 1921; Mak. & Nemoto, Fl. Jap., ed. 1, 1305 (1925) and ed. 2, 1511. 1931; Nemoto, Suppl. Fl. Jap. 1038. 1936; Honda, Nom. Pl. Jap. 462. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 48, 79, & 87, fig. 21. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 36--37, pl. 6, fig. 12. 1940; Moldenke, Known Geogr. Distrib. Erioc. 26 & 36. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 140 & 205. 1949; Moldenke, Résumé 181, 292, & 481. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 97. 1960; Hatusima, Mem. South. Indust. Sci. Inst. Kagoshima Univ. 3

(2): 123. 1962.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 48, fig. 21. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 6, fig. 12. 1940.

The common names, "okinawa-hoshikusa" and "okinawa-hosikusa", are recorded for this species. Satake (1940) cites Kanasiro 137, Miyagi 298, and Tomoyori s.n. [Aug. 1923] from Okinawa island, where the species is apparently endemic. The type of the species is T. Miyagi 298, collected at Kogatsi, Okinawa, in May, 1912, and is deposited in the herbarium of the University of Tokyo; the other two cited collections are deposited in the herbarium of the Royal Botanic Gardens at Kew.

ERIOCAULON LUZULAEFOLIUM Mart.

Synonymy: Eriocaulon luzulifolium Mart. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 64, 88, & 286. 1903 [not E. luzulifolium Thwaites, 1968].

Bibliography: Wall., Numer. List 207. 1832; Mart. in Wall., Plant. As. Rar. 3: 28. 1832; Royle, Illustr. Bot. Himal. 409. 1840; Kunth, Enum. Pl. 3: 553--555. 1841; Walp., Ann. 5: 937 (1858) and 6: 1171. 1861; Thwaites & Hook. f., Enum. Pl. Zeyl. 341. 1864; Hook. f., Fl. Brit. Ind. 6: 582. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 7, & 412. 1900; Prain, Bengal Pl., pr. 1, 1127. 1903; Ruhl. in Engl., Pflanzenreich 13 (4-30): 64, 88, & 286. 1903; Matsum. & Hayata, Enum. Pl. Formos. 468. 1906; H. Lecomte, Journ. de Bot. 21: 108. 1908; Kawakami, List Fl. Formos. 130. 1910; Fyson, Journ. Indian Bot. 2: 200, pl. 8. 1921; Sasaki, List Pl. Formos. 99. 1928; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23, 24, & 36. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 125, 126, 129, 130, & 205. 1949; Moldenke, Phytologia 3: 331. 1950; Moldenke, Résumé 159, 162, 165, 167, 176, 290, & 481. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Panigrahi & Naik, Bull. Bot. Surv. India 3: 365 & 383. 1961; Moldenke, Résumé Suppl. 4: 7 (1962) and 6: 8. 1963; Prain, Beng. Pl., pr. 2, 2: 848 & 849. 1963; Thanikaimoni, Pollen & Spores 7: 183 & 185, tab. 1. 1965; Malick, Bull. Bot. Surv. India 8: 47 & 58. 1966; Moldenke, Phytologia 17: 386 (1968) and 17: 463. 1969.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 8. 1921; Thanikaimoni, Pollen & Spores 7: 183, tab. 1. 1965.

Because of considerable difference in opinion concerning the characters of this species, it may be worth repeating the description given by Kunth (1841) here: "Rhizomate [caulis perennis, simplex, radiculosus, apice folii- et florifer. Mart.] perpendiculati, brevi, simplici, apice folioso; foliis subensiformi-linearibus, angustato-acutatis, fenestrato-9--11-nerviis, pellucidis glabris, vaginas superantibus; pedunculis umbellato-congestis, quinquesulcatis, glabris; capitulis albido-villosulis; bracteis involucrantibus obovatis, apice rotundatis; flores sti-

pantibus spathulatis, acutis; floribus masculis hexandris; femineis trigynis; calyce masculo interiore limbo irregulariter tridentato?: dentibus glabris, glanduliferis; sepalis masculis exterioribus postice cohaerentibus; femineis interioribus superne ciliatis, eglandulosis. — Silhet. (India orientalis.) 4 — Folia 16—18 lineas longa, 1 — 1 1/4 linea lata, laete viridia, plana. Vaginae laxae, membranaceae, glabrae, 1 1/4 — 1 1/2 pollicares, apice integrae vel bifidae. Pedunculi in apice caulis per 10—20 umbellato-congesti, 5—8-pollicares. Capitula hemisphaerica, magnitudine grani minoris piperis nigri. Bracteae involucrantes obovatae, apice rotundatae, convexae, arido-membranaceae, stramineo-pallidae, nitidulae, glabrae, capitulo parum breviores; bracteae flores stipantes spathulatae, acutae, griseae, apice pilosae. Receptaculum pilosum. Flores masculi longe pedicellati: Sepala 3 exteriora olivacea, pilosa, postice cohaerentia, apice libera: lateralia latiora, carinata, interdum distincta; sepala interiora in tubulum glabrum, apice 3?-dentatum connata; dentibus glabris, glanduliferis. Stamina 6, summo tubo inserta, inaequalia. Antherae didymo-reniformes, olivaceo-nigrae. Pistillorum rudimenta 3, nigra. Flores feminei brevissime pedicellati: Sepala 6, lineari-spathulata, obtusa, eglandulosa, apicem versus piloso-ciliata; 3 exteriora paulo majora, grisea; 3 interiora hyalino-albida, ab exterioribus parum remota. Ovarium sessile, subrotundo-ovatum, tricoccum. Stylus longitudine ovarii. Stigmate 3, elongata, simplicia. Pili bractearum et calycum crassiusculi, opaci, nivei."

Fyson (1921) describes the species as follows: "Leaves 2—4 in. narrowed from the 1/6 in. base, flat, many-nerved. Sheaths about as long. Scapes many, 2 to 4 times as high, slender. Heads 1/4 in., truncate, clasped below by the light? brown obtuse saucer shaped involucre. Floral bracts dark with white hairs, making the heads gray. Receptacle hairy. Sepals and petals three, narrow. Plate 8. Central Himalayas, Nepal, Assam; Silhet (type sheet!); Lr Bengal; and the Shan States. Hooker in F. B. I. has a much wider distribution extending over all India, Ruhland merely repeats this. But the sheets seen by me from Madras, Kanara and other parts are not the species of the above quoted type. The Ceylon plant C.P.796, so named, has none of the characteristic truncate appearance of the head on a saucer-shaped involucre and is E. collinum. Wallich's plant quoted above [Wall. Cat. 6071 in Herb. Calc.] does not in fact resemble E. quinquangulare as stated by Hooker."

In this connection I may point out that two sheets of Thwaites C.V.796 [doubtless the collection referred to by Fyson] in the Berlin herbarium seem to match perfectly the Bruce s.n. [Wallich 6071] sheet from Silhet in the same herbarium and apparently an isotype of the species, while the two other sheets at Berlin, also labeled as Thwaites C.V.796, seem to be E. collinum Hook. f. and one of them was actually so annotated by Ruhland. It is possible, therefore, that the Thwaites number is a mixture of the two species. Koelz 19398, cited below, is actually a mixture of E. luzu-

laefolium Mart., E. cinereum R. Br., E. oryzetorum Mart., and E. sollyanum Royle! The E. luzulifolium Thwaites, referred to in the synonymy above, is a synonym of E. collinum Hook. f.

Kunth (1841) says of E. truncatum Hamilt. "E. luzulaefolio simillimum, bracteis sat distinctum." Prain (1963) says for E. luzulaefolium: "Female flowers distinctly pedicelled.....Involucral bracts erect or spreading, never reflexed; head hemispheric, grey; leaves pale grey-green, opaque....in all the provinces [of Bengal]. A herb of rice-fields and wet places." Malick (1966) cites Malick 155 and reports the species common near rice-fields and in marshes in West Bengal. Panigrahi & Naik (1961) cite Bot. Surv. India 19843. The initial letter of the specific epithet is sometimes uppercased. Vernacular names recorded for the species are "shima-inuhige" and "taiwan-inunohige".

Material has been misidentified and distributed in herbaria as E. collinum Hook. f. and as E. sexangulare L. On the other hand, the Jenkins s.n. [Assam, h.r.m. 310], distributed as E. luzulaefolium, is actually E. alpestre Hook. f. & Thoms., while Hooker & Thomson s.n. [Mont. Khasia] is E. nepalense Prescott. The Mrs. D. J. Collins 1887 specimen, cited below, is very immature, and is placed here only tentatively.

Additional citations: INDIA: Assam: Bruce 14 (Br--isotype), s. n. [Wallich 6071] (B--isotype). Surguja: Koelz 19398, in part (Mi). CEYLON: G. Gardner 936 (Br); Thwaites C.V.796, in part (B, B). THAILAND: Mrs. D. J. Collins 1887 (W--1701537); Hosseus 102 (Cp); A. F. G. Kerr 1635 (Cp). INDOCHINA: Annam: Schmid 1414 (N); Souchère 4 (N).

ERIOCAULON MACROBOLAX Mart.

Synonymy: Eriocaulon macrobolax Körn. ex Walp., Ann. 5: 930. 1858. Paepalanthus macrobolax Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 485, in syn. 1863.

Bibliography: Körn., Linnaea 27: 599. 1854; Walp., Ann. 5: 930 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 484--485. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 41, 44, 45, & 286. 1903; Alv. Silv., Fl. Mont. 1: 398. 1928; Moldenke, Known Geogr. Distrib. Erioc. 8 & 36. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89 & 481. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 17: 11. 1968.

The Macbride photograph cited below is of the type specimen deposited in the herbarium of the Botanische Staatssammlung at Munich.

Citations: BRAZIL: Minas Gerais: Macedo 2589 (N, S, S), 2620 (N); Martius s.n. [Macbride photos 18688] (B--isotype, N--photo

of type, N--photo of type, W--photo of type). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON MACROPHYLLUM Ruhl.

Synonymy: Eriocaulon brownianum var. macrophyllum Ruhl. ex Fyson, Journ. Indian Bot. 2: 262 & 264. 1921.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 62, 77, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Fyson, Journ. Indian Bot. 2: 262 & 264. 1921; Moldenke, Known Geogr. Distrib. Erioc. 27 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 144 & 205. 1949; Moldenke, Résumé 190, 286, & 481. 1959; Moldenke, Phytologia 18: 169 & 171. 1969.

Fyson (1921) reduced this taxon to varietal status under E. brownianum Mart. He distinguished three varieties: (a) var. typica, with the "leaves and involucre often (but not always) glabrous, Assam; Silhet (type), Khasia; Burma; Manipur"; (b) var. nilagirense, with the "Whole plant hairy and more robust than the type. Leaves usually shorter and broader, but sometimes narrow. Scapes stout and hairy. Heads 1 inch flat or hemispheric. Involucre black, hairy. Female flower: Sepals less deeply boatshaped. Petals a little broader; otherwise as in the type"; and (c) var. macrophyllum, with no diagnostic separation given, but with the comment "Ruhland described (lc. p. 77) the Malay Peninsula form (var. c) as a distinct species E. macrophyllum (Ruhl. No. 95) but if the sheet so named in Herb. Calc. is identified correctly it is in my opinion the same species. In Herb. Calc. is a sheet from China which might equally well be separated as a distinct species." Unfortunately, he does not cite the collector or number of the Calcutta sheet on which he bases this opinion.

Van Steenis recently has given the opinion that E. macrophyllum is a synonym of E. blumei Körn.

ERIOCAULON MACULATUM Schinz

Bibliography: Schinz, Bull. Herb. Boiss., sér. 2, 6: 709. 1906; Prain, Ind. Kew. Suppl. 4, pr. 1, 82. 1913; Moldenke, Résumé Suppl. 1: 10 & 25. 1959; Prain, Ind. Kew. Suppl. 4, pr. 2, 82. 1938.

This taxon is known to me only from the type collection, which was gathered at an altitude of 960 meters, flowering in March.

Citations: SOUTH AFRICA: Transvaal: F. R. R. Schlechter 4651 (B--isotype, Z--isotype).

ERIOCAULON MADAGASCARIENSE Moldenke

Bibliography: Moldenke, Phytologia 3: 414. 1951; Moldenke in Humbert, Fl. Madag. 36: [7]--9, fig. 1 (9--12). 1955; G. Taylor, Ind. Kew. Suppl. 12: 55. 1959; Moldenke, Résumé 156 & 481. 1959.

Illustrations: Moldenke in Humbert, Fl. Madag. 36: [7], fig. 1 (9--12). 1955.

Citations: MADAGASCAR: Perrier de la Bâthie 17905 (N--photo of type, P--type, Z--photo of type).

ERIOCAULON MAGNIFICUM Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 42, 48, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 82. 1945; Moldenke, Known Geogr. Distrib. Erioc. 8 & 37. 1946; Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: [311], 312, & 326. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Rambo, Anais Bot. 2: 128. 1950; Moldenke, Phytologia 3: 331. 1950; Rambo, Sellowia 6: 130 & 156. 1954; Reitz, Sellowia 7: 124. 1956; Angely, Fl. Paran. 10: 14. 1957; Moldenke, Résumé 89 & 481. 1959; Angely, Fl. Paran. 16: 51 (1960) and 17: 24. 1961; Reitz, Sellowia 13: 52, 53, 72, & 90. 1961; Angely, Fl. Anal. Paran., ed. 1, 199. 1965.

The type of this species is Ule 1689 from Santa Catarina, Brazil, deposited in the herbarium of the Botanisches Garten und Museum at Berlin. The plant has been collected at 8 m. altitude, flowering in September. It very closely resembles E. kunthii Körn., but Körnicke's species has the sheaths truncate at their apex, while in E. magnificum they are very plainly oblique. Both these taxa are also uncomfortably close to E. ligulatum (Vell.) L. B. Sm. and E. megapotamicum Malme. Rambo (1950) says "Eriocaulon magnificum Ruhl. — Até o momento aó o conheço de Sombrio; sua constatação ao sul de Torres é questão de ulteriores pesquisas. Seja dito de passagem, que após comparação minuciosa do material com E. megapotamicum, não estou convencido duma verdadeira diferença entre as duas especies."

The Hemmendorff 468, cited by me as E. magnificum by me in my 1950 work, is apparently E. kunthii Körn. instead. Similarly, the Hatschbach 2868, distributed as E. magnificum, is actually E. ligulatum (Vell.) L. B. Sm.

Additional citations: BRAZIL: Rio Grande do Sul: Canisio 135 (S), 2036 (N, S). Santa Catarina: Rambo 31465 (Gg—354365, S); Reitz 1911 (S), C.1207 (N); Smith & Reitz 5876 (W—2120179); Ule 1689 [Macbride photos 10562] (B—type, N—photo of type, N—photo of type, W—photo of type).

ERIOCAULON MAGNUM Abbiatti

Synonymy: Eriocaulon arechavaletae Castell. ex Moldenke, Résumé 285, in syn. 1959 [not E. arechavaletae Herter, 1935, nor Moldenke, 1946].

Additional & emended bibliography: Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: 312, 313, 316, 318, 319, 321, 323—326, 339, & 340, fig. 2 & 3, pl. 1. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 98, 103, & 205. 1949; Moldenke, Phytologia 3: 331. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 116, 123, 285, & 481. 1959; Cabrera, Pl. Acuat. 64. 1964; Moldenke, Résumé Suppl. 12: 5. 1965; Moldenke, Phytologia 17: 389 (1968) and 18: 87. 1969.

Illustrations: Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: 324 & 325, fig. 2 & 3, pl. 1. 1946.

The type of this species was collected by Augusto Gustavo

Schulz (no. 6337) at Colonia Benítez, Chaco, Argentina, in October, 1945, and is deposited in the herbarium of the Universidad Nacional de la Plata as sheet number 56990. The species has been collected at 50 meters altitude, flowering and fruiting in September and October. Pedersen reports that it grows "in swamps and quaking bogs, not rare, but rarely accessible". Material has been misidentified and distributed in herbaria as E. arechavaletae Herter and as Paepalanthus planifolius Körn. On the other hand, the Hassler 11348, distributed as E. magnum, is actually E. elichrysoides Bong.

Additional citations: PARAGUAY: Hassler 9428 (S, V--7009); Krapovickas & Cristóbal 13474 (Z). ARGENTINA: Chaco: T. Meyer s. n. [Herb. Herter 98017] (S). Corrientes: Burkart 19441 (W--2196266), 19598 (W--2196322); Pedersen 812 (W--2122569), 1891 (S, W--2432876).

ERIOCAULON MAJUSCULUM Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 41, 44, 45, & 286, fig. 6. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Luetzelb., Estud. Bot. Nordéste 3: 147 & 150. 1923; Alv. Silv., Fl. Mont. 1: 398. 1928; Moldenke, Known Geogr. Distrib. Erioc. 8 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Phytologia 3: 331. 1950; Moldenke, Résumé 89 & 481. 1959; Rennó, Levant. Herb. Inst. Agron. 68. 1960.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 45, fig. 6. 1903.

Collectors have found this plant growing at 2100 meters altitude, in flower and fruit in February, March, and December. Silveira (1928) cites A. Silveira 105 from Minas Gerais. Material has been misidentified and distributed in herbaria as E. kunthii Körn.

Additional citations: BRAZIL: Minas Gerais: Santos & Castellanos 24179 [Herb. Brad. 28327] (Lw); A. Silveira 2914 (B--cotype); Ule 3770 (B--cotype). Rio de Janeiro: Luetzelburg 6338 (N); Segadas-Vianna, Dau, Ormond, & Machline 1426 (Z).

ERIOCAULON MAMFEËNSE Meikle

Bibliography: Meikle, Kew Bull. 22: 141--142. 1968; Winner, Biol. Abstr. 49: 11782. 1968; Moldenke, Résumé Suppl. 17: 4. 1968; Moldenke, Phytologia 18: 176. 1969.

This species is based on a specimen collected by S. Tamajong (F. H. I. 22107) at Basu, near Mamfe, Cameroons, on November 7, 1947, and is deposited in the herbarium of the Royal Botanic Gardens at Kew. Meikle (1968) cites also from the same country F. Migeod 276, J. K. Morton K.676, and P. W. Richards 5245. The species has been found growing at 120 meters altitude, flowering in November, December, and March, and is said to be related to E. dregei Hochst. "sed scapis numerosioribus, gracilioribus, capitulis minoribus, bracteis floralibus et floribus stramineis nec

fuscidulis, sepalis floris foeminei haud alato-carinatis inter alia recedit."

ERIOCAULON MANNII N. E. Br.

Bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 241. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 61, 68, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Moldenke, Known Geogr. Distrib. Erioc. 21 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 114 & 205. 1949; Moldenke, Résumé 140 & 481. 1959; Moldenke, Résumé Suppl. 1: 9 (1959) and 2: 6. 1960.

The Mann collection, cited below, sometimes bears labels which are inscribed "Gabun", but appears actually to have come from Corisco island.

Citations: CORISCO: G. Mann 1689 (B--isotype, S--isotype, Ut--326--isotype, Z--isotype). ANGOLA: Lunda: Gossweiler 14093 (B).

ERIOCAULON MARGARETAE Fyson

Bibliography: Fyson, Journ. Indian Bot. 1: 50 (1919) and 2: 316 & 317. 1921; A. W. Hill, Ind. Kew. Suppl. 6: 78 (1926) and 7: 89. 1927; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1612 & 1619. 1931; Razi, Journ. Mysore Univ. 7: 77. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 205. 1949; Razi, Journ. Mysore Univ. 11: 6. 1950; Moldenke, Phytologia 3: 331. 1950; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1123, 1127, & 1333. 1956; Razi, Rec. Bot. Surv. India 18: 19. 1959; Moldenke, Résumé 162 & 481. 1959; Thanikaimoni, Pollen & Spores 7: 183 & 185, tab. 1. 1965; Moldenke, Phytologia 18: 86 & 179. 1969.

Illustrations: Thanikaimoni, Pollen & Spores 7: 183, tab. 1. 1965.

Because of the unavailability in many libraries of the journal in which the original publication of this species appeared, the description is repeated here: "E. Margaretae Fyson, sp. nov. (Fyson 3839! Sedgwick 2979!) Caulis perbrevis. Folia angusto-linearia aut setacea, 3—5 cm., longa, glabra. Pedunculi 5—10 cm., tenuia. Capitula 1.5 mm, lata, demum conica, alba, glabra. Bractae involucrantes glabrae, straminea. Bractea flores superantes similes, glabrae aut sub-pubescentes, acutae. Flores trimeres. Flos ♀ sepala aequalia, apice acuta, medio naviculari-carinata, carina spongiosa: petala oblanceolate, ciliate. Flos ♂ antherae nigrae; petala et sepala 3. Bombay and Mysore on the Western Ghats, Rudrasiri, Bidi (Belgaum District). The peduncles are very slender, and the pale glabrous conical heads are very similar to those of E. Hamiltonianum var. minor (sp. No. 35). The three female sepals are all equal, winged and acute above the wing, otherwise the plants are very like the next species [E. elenorae Fyson]. This may be E. heterolepis Steud, but I have not seen any sheet so named. Ruhland lc. s. described that species as having broader leaves and with the inner involucral bracts obtuse and lacerate. See also note in Appendix I." He likewise states that E. elenorae Fyson is very close to E. margaretae, but that the lat-

ter is less robust and has the female sepals equal. Razi (1950) states that two "type sheets" are deposited in the Mysore University herbarium from Mysore, India.

ERIOCAULON MATOPENSE Rendle

Synonymy: Eriocaulon africanum Sonder ex Moldenke, Résumé Suppl. 2: 9, in syn. 1960 [not E. africanum Hochst., 1845].

Bibliography: Rendle, Journ. Linn. Soc. Lond. Bot. 37: 475. 1906; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and pr. 2, 82. 1938; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 119 & 205. 1949; Moldenke, Phytologia 3: 331—332. 1950; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 139. 1955; Moldenke, Résumé 149 & 481. 1959; Moldenke, Résumé Suppl. 2: 9. 1960; Moldenke, Phytologia 18: 167. 1969.

Fisher & Schweickerdt tell us that this plant is "locally frequent on rocks near river banks, submerged", flowering in July. Other collectors have found it in swamps at 2000 meters altitude.

Additional citations: RHODESIA: Bodong s.n. [10 August 1901] (S); Fisher & Schweickerdt 293 (Rh—22825); Fries, Norlindh, & Weimarck 3446 (S), 3547 (S); Wild 3581 [Govt. Herb. Salisbury 30400] (N).

ERIOCAULON MEGAPOTAMICUM Malme

Additional bibliography: Malme, Arkiv Bot. Stockh. 26 A (9): 8. 1935; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Moldenke, Known Geogr. Distrib. Erioc. 8 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Rambo, Anais Bot. 2: 128. 1950; Moldenke, Phytologia 3: 332. 1950; Rambo, Sellowia 6: 130 & 156. 1954; Moldenke, Résumé 89 & 481. 1959; Reitz, Sellowia 83: 53. 1961.

Rambo has found this plant growing in swamps, flowering in October. He notes (1950) "O lugar típico desta espécie é Povo Novo perto de Pelotas; èntretanto, é o Eriocaulon predominante dos arredores de Osório, onde cresce de mistura com e Syngonanthus acima mencionado."

Citations: BRAZIL: Rio Grande do Sul: Malme 406 (N—photo of type, S—type, S—isotype, Z—photo of type); Rambo 61454 (S).

ERIOCAULON MEIKLEI Moldenke

Bibliography: Moldenke, Phytologia 3: 164—165 (1949) and 3: 332. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Monod, Bull. Inst. Fr. Afr. Noir 16: 316. 1954; Moldenke, Résumé 135 & 481. 1959; Berhaut, Fl. Sénégal, ed. 2, 312. 1967.

Berhaut (1967) cites Berhaut 1635, 6691, & 6983 from Sénégal.

ERIOCAULON MELANOCEPHALUM Kunth

Synonymy: Eriocaulon aquaticum Sagot ex Körn. in Mart., Fl. Bras. 3 (1): 498, in syn. 1863. Lasiolepis aquatica Böck., Flora 56: 91. 1873. Paepalanthus melanocephalos Kunth ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959.

Bibliography: Kunth, Enum. Pl. 3: 549. 1841; Walp., Ann. 5: 931 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 476 & 498—500, pl. 43. 1863; Böck., Flora 56: 91. 1873; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 27. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 & 878 (1893) and 2: 35. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 18, 22, 64, 89, 284, & 286. 1903; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 284. 1908; Alv. Silv., Fl. Mont. 1: 398. 1928; Moldenke, N. Am. Fl. 19 (1): 19 & 33. 1937; Moldenke, Phytologia 1: 319. 1939; León, Fl. Cuba 1: 281. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4, 5, 7, 8, 32, 33, 37, 41, & 42. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 & 878 (1946) and 2: 35. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 43, 60, 63, 68, 77, & 205. 1949; Moldenke, Phytologia 3: 332. 1950; Moldenke in J. A. Steyerm., Fieldiana 28: 825. 1957; H. Hess, Bericht. Schweiz. Bot. Gesell. 67: 87—88. 1957; Alain, Revist. Soc. Cub. Bot. 15: 56. 1958; Moldenke, Résumé 51, 66, 71, 78, 89, 285, 309, & 481. 1959; Moldenke, Résumé Suppl. 1: 19 & 21 (1959) and 2: 5. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 & 878 (1960) and 2: 35. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Résumé Suppl. 6: 5. 1963; J. A. Steyerm., Act. Bot. Venez. 1: 195. 1966; Moldenke, Phytologia 17: 394 & 395 (1968) and 17: 483. 1969.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 43. 1863.

The type of this species was collected by Friedrich Sellow (no. 5850) in São Paulo, Brazil, and is deposited in the herbarium of the Botanisches Museum at Berlin. The original description by Kunth (1841) actually says "Brasilia meridionalis. (A St. Paulo ad meridiem, Sellow.)" The synonym, E. aquaticum Sagot, is based on Sagot 1330 from French Guiana, while Lasiolepis aquatica is based on Jelski s.n. from Cayenne in French Guiana, and is also deposited in the Berlin herbarium.

Kunth (1841) gives a very detailed description of this taxon, which should be of great value in checking the supposed conspecificity of certain similar-appearing taxa like E. bifistulosum Van Heurck & Muell.-Arg., E. intermedium Körn., E. schippii Standl., and E. setaceum L., all of which are similar submerged aquatics. Hess (1957) actually reduces E. bifistulosum to synonymy under E. melanocephalum, claiming that the differences enumerated by me do not hold. He therefore records the species from Angola.

Collectors have found E. melanocephalum growing at altitudes of 100 to 1065 meters, flowering in April, May, July, October, and December. Wurdack & Monachino describe it as "flower heads black, filaments white; locally frequent in morichal rivulets". Harrison notes "leaves pale yellowish-green, flowers gray, anthers white, stems very brittle, rooted in mud at base". Silveira (1928) cites A. Silveira 207 from Minas Gerais, Brazil. The Collector undesignated 177, cited below, is a mixture with Paepalanthus lamarckii Kunth. The Milne-Redhead & Taylor 9929, distributed as E. melanocephalum, appears to be E. bifistulosum Van Heurck & Muell.-Arg.

# PHYTOLOGIA

*Designed to expedite botanical publication*

Vol. 18 June, 1969 No. 5

CONTENTS





Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, $1; per volume, $6.75 in advance,
or $7 at close of volume

FLORA

OF THE PRAIRIE PROVINCES

Bernard Boivin

Part II
(continued)

## ADDITIONS AND CORRECTIONS

The following came to our attention too late or could not be confirmed until the corresponding text had been given its final form for printing.

Page 19 -- Aconitum delphiniifolium DC. var. Chamissonianum (Rchb.) stat. n., A. Chamissonianum Rchb., Mon. gen. Acon. 80. 1820. The spelling Chamissonis was a lapsus calami.

Page 21 -- Anemone virginiana L. -- There has been much variation in the treatments of this species by the various authors dealing with our area. Rydberg 1917 and 1932 distinguished A. virginiana and A. riparia Fern. and reported both as occurring throughout our area. So did Scoggan 1957. But Breitung 1957 did not accept A. riparia as a distinct segregate. Gleason 1952 accepts the distinctiveness of the two entities, but he does not extend the range of either as far as our area and our specimens are apparently to be placed under A. cylindrica. Fernald 1950 would refer all our material to A. riparia and his treatment was accepted by Russell 1954, Moss 1959 and ourselves 1966 except that, dissatisfied with the quality of the morphological discontinuity, we reduced A. riparia to varietal rank. But having noticed that the large sepals typical of var. riparia are always lacking in our area, we have recently shifted to the treatment of page 21 above in which A. virginiana is recognized as the type occurring in our area while var. riparia is restricted to regions east of us.

None of these treatments is fully satisfactory.

It is true that our plants have the smaller anthers and narrower head of achenes of var. riparia. But it is also true that with about 100 collections at hand, our plants obviously lack the large white tepals of A. riparia. They are best placed in the following variety of their own.

A. virginiana L. var. cylindroidea var. n. Ad var. ripariam vergens antheris brevioribus et capite acheniorum angustiore, ± cylindrico. Sed floribus minoribus, sepalis ± 1 cm long et viridescentibus. Type: Boivin, Russell & Breitung 6733, Pike Lake, Sask., July 31, 1949 (DAO).

Ranges in Canada from southern Quebec west to northern British Columbia. Grades eastward into var. riparia and var. virginiana. Supposed differences in leaf shape have not proved worth retaining.

The name var. riparia (Fern.) Boivin 1966 for the larger flowered eastern plant should be replaced by the earlier and correct var. alba Wood 1861.

Page 29 -- Ranunculus cardiophyllus Hooker -- In 1968 there was at WTU no justifying specimen corresponding to a range extension to N.W.T. by Hitchcock 1964.

Page 30 -- Ranunculus pedatifidus Sm. var. leiocarpus (Trautv.) Fern.; R. affinis Br. -- The range has been extended to the Cypress Hills of Alberta. See De Vries 1968. The many Saskatchewan reports by Russell 1954, Benson 1954, Breitung 1957, etc. were based on collections since revised to R. cardiophyllus or its f. apetalus.

Page 31 -- Line 8 from the bottom. The petal size should read: 2.0-5.0 mm long.

Page 36 -- Add the following after T. venulosum:

Some of the reports of Thalictrum confine Fern. from Manitoba were apparently based on T. venulosum var. Turneri (MT; DAO, photo); while others (DAO), including those from Gillam, have been revised to T. venulosum var. venulosum. Our own report in Rhodora 46: 442, from Moose Factory was a lapsus calami as the said locality is in northern Ontario.

The Bourgeau sheet which we have referred to var. Lunellii has been variously treated in the past as T. dioicum, T. confine and T. occidentale.

For var. confine substitute var. monoicum (DC.) stat. n., T. purpurascens L. var. monoicum DC., Syst. 1: 174. 1817; T. confine Fern., Rhodora 2: 232. 1900; T. venulosum Trel. var. confine (Fern) Boivin, Nat. Can. 93: 646. 1966.

Page 38 -- Nuphar polysepalum Eng. was also reported for Alberta by Hitchcock 1964, but no justifying sheet could be located at WTU in 1969.

Page 57 -- Insert the following after Brassica hirta.

1a. B. NIGRA (L.) Koch -- Black Mustard (Moutarde noire) -- Siliques at first ± divergent, soon becoming appressed in the manner of Sisymbrium officinale, but the style longer and the branches diverging mostly at ± 45°. Resembling B. Kaber and similarly ± hispid, but the flowers smaller, the pod shorter with fewer nerves, and the beak shorter. Petals mostly 6-8 mm long (9-12 in B. Kaber). Silique glabrous, 1.0-2.5 cm long, ± quadrangular from 4 prominent ribs, these being the 2 sutures and the two midnerves. Other nerves of the valves obscure and reticulate. Beak 1.5-3.0 mm long, seedless, thin and ± quadrangular. From mid summer on. A rare weed of cultivated soils: Saskatoon--NF-SPM, NS-(PEI)-NB-O, S, US, Eur.

In our area we know only of a single collection at Saskatoon by C. Frankton in 1950 (DAO). Its inclusion by Moss 1959 in the Flora of Alberta was speculative. Reports by Groh 1948, 1950 and Frankton 1955 from Baldur, Man. and Revelstoke,,B.C. were based on specimens (DAO) since revised to B. Kaber.

Page 57 -- To Brassica Kaber add the synonym: Sinapis arvensis L.

Page 58 -- Raphanus Raphanistrum L. -- The lone voucher for the Manitoba report by Scoggan 1957, repeated by Boivin 1966, was G.E. Swailes, Old Kildonan, Aug. 12, 1944 (WIN; DAO, photo). It has now been revised to Brassica Kaber, a species with smaller sepals and much shorter pedicels, only 3-6 mm long.

Page 63 -- Add the following genus and species:

18A. LUNARIA L.
Silicle very large and long stipitate.

1. L. ANNUA L. -- Honesty, Moonwort (Satinée, Monnaie du Pape) -- Fruit very flat and largest, mostly ±4 cm long and ±2 cm wide, borne on a stipe ±1 cm long. Leaves scabrous, cordate, dentate, the lower opposite. Flowers fairly large and showy, the sepals more deeply tinted than the petals. Fruit very showy after shedding its seeds, the septum persistent and becoming silvery. (Late spring to early summer). Rarely reseeding itself in loose soils around flower gardens: Benito. -- Q-Man, BC, US, (Eur).

We must admit having been suspicious all along of the single report of this species as subspontaneous once in our area. We have recently had occasion to borrow the voucher specimen and we are now satisfied that at least the said specimen was correctly identified. It consists in two small pieces of inflorescence and the label reads: J. Bowles, Benito, garden escape, 1926 (WIN).

Page 65 -- Camelina Parodii Ibarra & La Porte -- For "cribbings" substitute "screenings".

Pages 66 and 69 -- D. exalta was reported for the Rockies in 1959, but we have not yet seen the justifying specimens. A Banff collection (DAO) identified D. ventosa was recently checked and proved to be correctly identified. The species may then be intercalated as follows. On page 66 change lines 33 and 34 to read:

ff. Pubescence of back of leaves entirely or primarily of much smaller stellate hairs.
x. Only 2-4 cm high; pod ovate, 3.5-5.0 mm wide ..... 5a. D. ventosa
xx. Usually taller, mostly ±1 dm high; pods narrower ..... 7 D. incerta

Insert the following on page 69.

5a. D. ventosa Gray var. ventosa -- Densely and finely stellate-pubescent throughout, including the pods. Low, 2-4(8) cm high and rather large-fruited. Forming small mats, the new rosettes borne at the end of short creeping shoots. Leaves obovate to oblanceolate, loosely marcescent. Pods few. Mid

summer. High alpine on gravel ridges: Banff -- swAlta, wUS -- Var. ruaxes (Payson & St. John) C.L. Hitchc. (D. exaltata Ekman) -- Pubescence mixed: largely of stellate hairs on the rosettes, largely of simple or forked hairs on the stem, inflorescence and pod. -- (Mack, Aka, swAlta-BC, US).

Because collected only rarely it is difficult at this stage to decide if var. ruaxes is a commonplace phenotype of no significance or a geographically restricted race.

Page 69 -- Draba aurea Vahl var. leiocarpa (Payson & St. John) C.L. Hitchc. -- The herbarium basis for the original Alberta report by Moss 1959 could not be retraced at ALTA or elsewhere, but we now know of a more recent (1963) collection from the Marmot Creek Basin (DAO) in the Kananaskis area.

Page 69 -- Draba oligosperma Hooker -- Exceptional specimens may be stellate-puberulent throughout, including the stem and silicles. This rare phenotype is known from our area but is apparently of sporadic distributions. In our key such plants would come out to D. stenopetala, but the latter bears coarser cilia and hairs, the latter being branched rather than stellate. In a more generalized key these hairier D. oligosperma would come out to the more eastern D. Peasei Fern. We have yet to study material of the latter and cannot pronounce on its distinctiveness.

Page 70 -- Draba cinerea Adams -- Typically the stem is unifoliate but the more northern specimens may be somewhat smaller and often leafless except for the rosette. Such specimens have been distinguished mainly as D. groenlandica E. Ekman on the basis of said characters and also of pubescence. The resulting classification is not very convincing and the two taxa are largely sympatric as can be gathered by the distribution maps of Porsild 1957. Accordingly the segregate was recognized neither by Polunin 1940 nor Boivin 1966.

Dr. G.A. Mulligan has recently brought to our attention that if the morphological emphasis is shifted almost entirely to the type of pubescence, a new picture emerges, which is far more convincing both morphologically and geographically. Var. cinerea as defined above on page 70 is found throughout the Arctic Islands southward to our regions where it is rather highly localized. We have checked specimens from Lake Athabaska and from the Athabaska Glacier. The more northern plants are often superficially quite similar to var. arctogena and herbarium sheets from the high arctic will often carry a mixture. Var. arctogena as defined below is restricted to the more northern parts of the Arctic Archipelago. Dr. Mulligan informs us that all the specimens he has examined from the more southern parts proved to belong to var. cinerea.

Var. arctogena (E. Ekman) stat. n, D. arctogena E. Ekman, Svensk Bot. Tidskr. 23: 489. 1930 -- Rosette leaves densely covered with mixed pubescence on both faces, partly of simple and somewhat longer hairs, partly of stellate hairs. The latter are simply stellate and 0.5-0.8 mm across -- (G)-nF.

The stellate hairs of var. cinerea are generally only half as large as those of var. arctogena.

Page 74 -- Arabis Holboëllii Horn. -- Rather frequently reported from Canada and the U.S.A., but we have yet to see a convincing specimen from outside Greenland. Many herbaria have been examined and their Canadian contents is usually a mixture of species, with A. retrofracta predominating. The most common other component is A. divaricarpa, especially its var. dacotica, such as in Thompson & Thompson 87, Marble Mts., B.C., 1938 (WTU). The smallish A. pendulocarpa Nelson is also involved at times.

A. Holboëllii is a Greenland endemic with a strongly secund inflorescence of rather broad, descending, and recurved-falcate siliques, 2.0-2.5 mm broad, that is as broad or broader than the broadest of A. divaricarpa. The herbage of A. Holboëllii is stellate-puberulent throughout, right up to the pedicels, in the manner of the narrow-fruited A. retrofracta var. retrofracta. And the pedicels are strongly reflexed at base as in A. Holboëllii, but like the pods they are descendent rather than pendent. The petals are white or nearly so.

Page 78 -- Braya glabella Rich.; B. humilis (C.A. Meyer) Rob. var. glabella (Rich.) Boivin -- There has been some confusion about the correct application of this name. We have recently examined an excellent series of recently collected Braya from the District of Mackenzie where B. glabella was originally collected and we are now satisfied that the latter belongs with B. purpurascens and not with B. humilis.

Hence the common northern phase of B. humilis from Greenland to Mackenzie, which we have termed var. glabella in 1966 and on page 78 above, should be properly designated as:

Braya humilis (C.A. Meyer) Rob. var. arctica (Böcher) stat. n., Torularia humilis (C.A. Meyer) O.E. Schulz ssp. arctica Böcher, Medd. Grønl. 147,7:29,1950.

Braya glabella Rich. has been reported for the Rockies by Moss 1959 and by Eastham 1947. The Alberta report was based on a Banff Park collection (ALTA) which seems closer to B. humilis var. americana. The same remark is likely to apply also to the B.C. report.

Page 78 -- Malcolmia africana (L.) Br. -- Despite reports from Swift Current by Russell 1944, Breitung 1959 and Boivin 1966, we have been unable to find substantiating specimens at CAN, DAO, GH, NY, REG, SASK, SASKP, SCS, etc. Noting that Russell omitted it from his later list of 1954, one may presume that Russell himself considered the original report to be erroneous. The inclusion of Malcolmia in our text is probably unjustified at this stage, even if it seems highly eligible as a potential invader.

Page 79 -- Halimolobos virgata (Nutt.) O.E. Schulz -- The range should be restricted to omit Yukon as there was no specimen at WTU in 1968 to match the range extension by Hitchcock 1964.

Page 79 -- Coronopus didymus (L.) Sm. -- No Banff collection could be found in 1967 at MTMG where Campbell's herbarium is preserved. But there was a sheet so identified and labelled "Robert Campbell, Wolseley, Sask., July" (MTMG). It carries a mixture of Musineon divaricatum and Geranium Robertianum L., but no Coronopus. Judging from their stage of development, the date of collecting is in the first half of May for the flowering Musineon and late May or early June for the rosettes of Geranium. The stated locality for Geranium Robertianum, a species not known to occur anywhere in our area, should not be held as any more reliable than the identification or time of collecting.

Page 83 -- Stellaria crispa C. & S. and S. obtusa Eng. -- We have recently had the privilege of studying two series of borrowed specimens. S. obtusa is now known to us from two Alberta localities: Blairmore (CAN) and Waterton (Calgary U.). And S. crispa from only one locality: Waterton (ALTA). Another Carbondale River collection (Calgary U.) has also been placed with S. crispa, but is not typical, being somewhat transitional to S. calycantha.

We have also noticed that the individual variations in leaf size are too great to provide a satisfactory diagnostic character. The two taxa are best distinguished on floral critera as follows.

S. crispa -- Sepals 2.5-4.0 mm long, triangular-lanceolate, sharply acute, and strongly ribbed on back, the 3 longitudinal nerves being strongly proeminent, especially towards the base. Capsule ellipsoid, (3.5)-4.0-(5.0) mm long. Seeds 0.8-1.0 mm wide, light brown to red brown. Stems usually erect and simple or nearly so. Leaves up to 3 cm long, the main ones usually over 1 cm.

S. obtusa -- Smaller throughout. Sepals at first 1.5-2.0 mm long, elongating to 2.5 mm, oblong to triangular oblong, rounded to acutish at tip, not ribbed, the 3 nerves obscure or finely outlined in paler green, but never rugose. Capsule 2.2-3.0 mm long, globose to ovoid. Seeds ±0.6 mm across, violet black.

Another source of confusion is worth notice. The petioles in S. crispa are sometimes so short as to be obscure, and such specimens should not be confused with S. calycantha. The leaves are usually much narrower in S. calycantha and irregularly ciliate towards the base with tenuous hairs, the longest of which are commonly ±0.5 mm long. Larger-leaved specimens precisely tend to have the longer cilia. While in S. crispa the cilia are mostly lacking or, if present, are stiff and stubby and only 0.1-0.2 mm long.

Most flowers are gathered in a terminal cymes in S. calycantha. But in S. crispa they are mostly axillary with some of them terminal.

Reduced petals, hidden behind the larger sepals are nearly always present in S. calycantha. They are always absent in

S. crispa.

Sepals and capsules have a broader range of variation in S. calycantha.

Page 87 -- Cerastium nutans Raf. var. brachypodum Eng. -- Delete Alberta from the recorded distribution. It had been reported by Rydberg 1917, 1932 and Moss 1959, but we found no justifying specimen at NY in 1965 while the one more recent collection, E.H. Moss 6986, Stony Plain, 1945 (ALTA) proved to be C. vulgatum.

Page 88 -- Sagina saginoides (L.) Karsten -- Line 13 from the bottom. After the word "peduncles", continue as follows: "or else the capsule is smaller, merely about as long as the acutish sepals. The fairly obvious rosette of longer leaves found in S. saginoides and S. nivalis is lacking in the similar species of Arenaria."

Page 96 -- An Alberta report by Macoun 1886 of Silene multicaulis Nutt., a synonym of the more western S. Douglasii Hooker, proved to be based on a specimen (MTMG) of S. Scouleri var. Macounii.

Page 97 -- Last two lines of the key. Change to read:

f. Seed wingless ..... 3.L. Drummondii
ff. Seed winged ..... 7.L. triflora

Page 101 -- Claytonia parvifolia Moç. -- Our plant is the widespread var. parvifolia as contrasted with the coastal var. flagellaris (Bong.) R.J. Davis, the latter larger-flowered, the petals (10)-12-15 mm long.

Usually subdivided in two species on the basis of larger flowers and broader leaves, ovate and over 5 mm wide, for C. flagellaris Bong. The abundant material at hand, mostly from B.C., shows clearly that both characters vary independently and that there is here no morphological discontinuity, only continuous variation. Any segregate that stands on a somewhat arbitrary limit is likely to appear as an extreme of variation.

The bulk of the material at hand has narrow leaves and smaller flowers. Larger-leaved specimens are less common, yet quite frequent and are perhaps more abundant along the coast, but they also occur well in land; our only Alberta sheet is of the broad leaf type, 5-8 mm wide. Further, specimens collected after the first of August are nearly always of the broad leaf type, which implies that the variation in leaf width may be in part a stage of development.

Flower size varies quite a lot. Even in the same collection one may note differences by as much as 5 mm (e.g. 7-12 mm) in petal length. However, the larger-flowered specimens, with all or most flowers over 12 mm long, occur only along the coast and they may be retained as a weak geographical variety: var. flagellaris.

Page 101 -- Claytonia Chamissoi Led. or Montia Chamissoi

(Led.) Dur. & Jacks. was variously reported from Manitoba by Anderson 1946 and Hitchcock 1964, and also from Alberta by Hultén 1944 and Davis 1966, querried by Boivin 1967. No justifying specimens were cited and none could be located at GH in 1965, or S in 1968, or WTU in 1969, etc. The reports are held as unsubstantiated.

Page 106 -- Rumex fennicus Murb. 1899 -- This name should apparently be replaced by the earlier sesquipedalian R. pseudonatronatus Borbas 1880, according to A. Losina, Fl. URSS 5: 462. 1936 and K.H. Rechinger ex Tutin et alii, Fl. Eur. 1: 86. 1964.

Page 107 -- Rumex longifolius DC. -- A recently arrived weed which was incorrectly listed with the typography of a native in our Enumération of 1967.

Page 107 -- Rumex domesticus Hartm. -- According to Frankton, ms. (see under Plantago lanceolata), the earlier reports by Breitung 1957 from Davidson and Wymark were based on sheets since revised to R. fennicus (=R. pseudonatronatus).

Page 108-9 -- Rumex Acetosa L. -- One parenthesis mark is missing in the distribution and PEI should be deleted as this record may have started as a mere lapsus calami in our Enumération of 1967. The corrected distribution should read: (G, Mack)-Y-Aka, NF-SPM, NS, NB-BC, US, (SA), Eur, (Afr, Oc).

Page 112 -- Polygonum erectum L. -- The Point du Chien (MTMG) collection mentioned by Scoggan 1957 has been revised to P. achoreum.

Page 112 -- Polygonum achoreum Blake -- A still earlier collection is Macoun, Point du Chien, Aug. 1, 1872 (MTMG). The 1880 collection was by Macoun in the Cypress Hills (QK). Another early collection is J. Fowler, Brandon, July 7, 1887 (QK; DAO). The existence of such early collections makes one wonder if P. achoreum might not have been native in our area. Unfortunately none of the early collections carries any habitat data.

There is no doubt that P. achoreum is today essentially a common weed of roadsides, railways, farmyards, and other man-disturbed habitats. And its country of origin is still to be determined.

Page 115 -- Polygonum lapathifolium L. -- The range extension to Alaska should be held as unconfirmed as our entry was based on collections now revised to P. lapathifolium var. O'Neillii (Brenkle) stat. n., Persicaria O'Neillii Brenkle, Phytologia 2: 405-6, 1948, which differs from our variety by its somewhat bigger achene, ±2.5 mm wide, substipitate glandulosity, and resembles P. pensylvanicum L. by its darker and reddish perianth, its nerves not so conspicuous and their dichotomous branches not recurved. In P. lapathifolium and P. scabrum the nerves of the perianth are conspicuous and divided at the tip in two recurved branches suggesting an anchor. As var. O'Neillii stands about halfway between P. lapathifolium and P. pensylvanicum, it seems more logical to attach it to the transcontinental P. lapathifolium from which it could readily

have derived than to the geographically removed P. pensylvanicum of eastern distribution.

Page 117 -- Polygonum Fagopyrum L. -- The range should be extended to include Edmonton in Alberta where it is now known to have been collected in 1942 (SASK) as a fleeting adventive.

Page 124 -- Atriplex Nuttallii Watson -- Add to the synonymy A. buxifolia Rydb., a name which has seen some use because of the treatment proposed in a recent but unpublished thesis. A. Nuttallii, when proposed by Watson, A Revision of the North American Chenopodiaceae, Proc. Am. Ac. Arts Sc. 9: 82-126. 1874, was clearly distinguished from A. canescens (Pursh) Nutt. and the basionym of the latter, Calligonum canescens Pursh, was cited page 120 under A. canescens, while on page 116 under A. Nuttallii we find only one questionable synonym (=A. Gordonii) and a series of floristic synonyms (or so-called "sensu" names). It is not justifiable to treat A. Nuttallii as a superfluous (hence illegitimate) name because of the presence of any floristic synonym.

Page 125 -- A study of the Atriplex patula complex has been recently undertaken by C. Frankton and I.J. Bassett. Preliminary results suggest that it may prove possible to distinguish a European introduction, A. patula, against a native A. subspicata (Nutt.) Rydb. (=A. patula var. subspicata (Nutt.) Watson = A. carnosa Nelson), the latter a coarser and more stiffly erect plant, its fruits bigger, more coarsely lobed and in more closely set glomerules.

Page 126 -- Eurotia lanata (Pursh) Moq. -- The range should be extended to southwestern Yukon on the basis of J.A. Neilson 1151, Mt. Wallace, Kluane L., south facing slopes, July 29, 1967 (DAO).

Page 127 -- Line 5. For "Bud-Seed" read "Bug-Seed".

Page 130 -- Line 13 from the bottom. Change the liminary sentence to read: Calyx and corolla of fused parts.

Page 134 -- Add the following colour form: Dodecatheon pulchellum (Raf.) Merr. f. Breitungii Boivin -- Flowers white, including the connectives. But the anthers may be pinkish. McKague. -- S.

F. n., floribus albis. Type: A.J. Breitung, McKague, Sask., low moist meadows, albino, June 26, 1938 (DAO).

Page 135 -- Lysimachia thyrsiflora L. -- The range was extended to Yukon by Gleason 1952, but we found no corresponding specimen at NY in 1965 and the distribution should therefore be amended to read: Mack, Aka, NS-BC, US, Eur.

Page 144 -- Oenothera perennis L. -- Presumably native on the shores of Lake of the Woods, Dawson, 1873 (MTMG), but more likely introduced at Teulon, A. Simpson, 1934 (MPM). These would seem to be the only collections definitely known to come from our area.

Page 146 -- Line 3. Delete the synonym and substitute: var. alpina.

Page 160 -- The end of the key to Group A to be revised

as follows:

hh. Stem not maculate.
  i. No involucre, but the involucels present; all or most pedicels not longer than the fruit; perennials ..... 19. Lomatium
  ii. All or most pedicels much longer than the fruit; annual or biennial weeds.
    j. Pedicels very uneven, the shorter ones shorter than the fruit; reduced involucre and involucels present ..... 11. Carum
    jj. Pedicels nearly isomegueth and many times longer than the fruit; neither involucre nor involucels present ..... 15. Anethum

Page 149 -- Line 11 from the bottom. For "rhomboidea" read: occidentalis.

Page 164 -- Line 14. Change "the main ones" to read "the main leaves".

Page 166 -- Cicuta maculata L. var. angustifolia Hooker -- Change the description of the fruit to read: Fruit 2.5-3.0 mm long, not quite as wide as long.

Page 167 -- Perideridia Gairdneri (H. & A.) Mathias -- Following a lead from a 1966 manuscript by T.I. Chuan, we find possible to distinguish our northern plants as var. montana (Blank.) stat. n., Carum montanum Blank., Mont. Agric. Coll. Stud. 1: 91. 1905, by their usually larger petals showing 1-3 pairs of lateral nerves and tuberous roots usually borne in a cluster, while the typical phase from coastal California shows somewhat smaller petals, usually 1 mm long or slightly less, with the nervation reduced to its midnerve, and the stem usually arising from a single tuber.

Perideridia oregana (Watson) Mathias (Carum oreganum Watson) was reported by Macoun 1890 for our area in the Hand Hills, and also from Victoria. The Hand Hills collection (CAN) has been revised to P. Gairdneri. The Victoria collection has not been located yet, but should probably be similarly revised as P. oregana reaches its northern limit along the southern boundary of the state of Washington.

Page 169 -- Cymopterus terebinthinus (Hooker) T. & G. var. foeniculaceus (T. & G.) Cronq. (Pteryeia terebinthina (Hooker) C. & R. var. foeniculacea (T. & G.) Mathias) -- Reported by Macoun 1883 and Henry 1915, querried by Boivin 1967, for the interprovincial boundary on the basis of a Dawson collection at the Kootenay Pass. We have failed to find such a specimen at MTMG and we know of no other collection. On the basis of general similarity, one can speculate that Dawson's plant probably belonged to Lomatium dissectum.

Page 169 -- Lomatium Cous. Add the following vernacular name: Racine blanche.

INDEX OF GENERA

CONTENTS OF PART II

# A HALF DOZEN NOTEWORTHY PHANEROGAMS

Harold N. Moldenke

ELEPHANTELIA GROENLANDICA var. SURRECTA (Benth.) Moldenke, comb. nov.

Pedicularis surrecta Benth. in Hook., Fl. Bor. Am. 2: 107. 1834.

LANTANA FRUTILLA var. LONGIPES Moldenke, var. nov.

Haec varietas a forma typica speciei pedunculis regulariter 3--3.5 cm. longis recedit.

This variety differs from the typical form of the species in regularly having its peduncles 3--3.5 cm. long during anthesis.

The type of the variety was collected by P. S. Martin & B. E. Harrell (no. 52) at Station Number 9 on the profile across the Sierra Madre Oriental, in a cloud forest at an altitude of 4300 feet, in the region of Goméz Farías (municipios de Xicoténcatl, Goméz Farías y Ocampo), Tamaulipas, Mexico, on July 26, 1960, and is deposited in the herbarium of the Escuela Nacional de Ciencias Biologicas at the Instituto Politecnico in Mexico City.

LANTANA HYPOLEUCA f. ALBIFLORA Moldenke, f. nov.

Haec forma a forma typica speciei corollis albis recedit.

This form differs from the typical form of the species in having white corollas.

The type of the form was collected by Ismael Peredo (no. 261) at Cabezas (Cordillera), Santa Cruz, Bolivia, at an altitude of 420 meters, on February 21, 1945, and is deposited in the Britton Herbarium at the New York Botanical Garden.

LIPPIA RAMBOI var. PILOSA Moldenke, var. nov.

Haec varietas a forma typica speciei recedit foliis maturis ca. 2 cm. longis 8--9 mm. latis, ramis ramulisque foliisque pedunculisque bracteisque dense pilosulis, et bracteis involucrantibus parvioribus.

This variety differs from the typical form of the species in having smaller leaves, the blades being only about 2 cm. long and 8--9 mm. wide, the involucral bracts being smaller and far less conspicuous, and the branches, branchlets, peduncles, both leaf surfaces, and bracts being densely pilosulous throughout.

The type of the variety was collected by Miguel Angel Palacios and Alberto Reolindo Cuezzo (no. 1516) at São Sepé, Rio Grande do Sul, Brazil, on February 22, 1948, and is deposited in the Britton Herbarium at the New York Botanical Garden.

LUPINUS LYALLII var. LOBBII f. ALBIFLORUS Moldenke, f. nov.

Haec forma a forma typica speciei corollis albis recedit.

This form differs from the typical form of the species in having

white corollas.

The type of the form was collected by Andrew Ralph Moldenke and myself (no. 24627) in patches in open woodland at the Carnegie Timberline Experiment Station, at an altitude of 9800 feet, Hall Natural Area, Inyo National Forest, Mono County, California, on July 24, 1968, and is deposited in the herbarium of the Texas Research Foundation at Renner, Texas.

VERBENA SANTIAGUENSIS f. ALBIFLORA Moldenke, f. nov.

Haec forma a forma typica speciei corollis albis recedit.

This form differs from the typical form of the species in having white corollas.

The type of the form was collected by José Manuel Villegas Vaquero (no. 666) at Playa Grande, Partido Gral Pueyrredón, Buenos Aires, Argentina, on December 10, 1944, and is deposited in the Britton Herbarium at the New York Botanical Garden.

- - - - - - - - - - - - - - - -

## ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXI

Harold N. Moldenke

ERIOCAULON Gron.

Additional & emended synonymy: Eriocavlon L. apud Reich. in L., Syst. Pl. 1: 243. 1779. Eriocaulon Juss. ex Jolyclerc, Syst. Sex. Vég., ed. 2, 1: 101. 1810. Eriocolon Jolyclerc, Syst. Sex. Vég., ed. 2, 2: 474, sphalm. 1810. Eriocaulou Alv. Silv., Fl. Mont. 1: pl. 6 ["IV"], sphalm. 1928. Eriscaulon L. O. Williams, in herb.

Additional & emended bibliography: Breyn., Exot. Min. Cog. Pl. Cent. 1: 108--109, pl. 50. 1678; Moris., Pl. Hist. Univ. 3: 259--260, sect. 8, pl. 16, fig. 17. 1699; Pluk., Alm. Bot. Mant. 98. 1700; L., Sp. Pl., ed. 1, pr. 1, 1: 87 & 129 (1753) and 2: [1203]. 1753; J. A. Murr. in L., Syst. Veg., ed. 12, 109 & 834. 1774; Reich. in L., Syst. Pl. 1: 243--244 (1779) and 4: [668]. 1780; J. A. Murr. in L., Syst. Veg., ed. 13, 1: 108--109 (1783) and 2: 855 (1783) and ed. 14, 127--128 & [1004]. 1784; Palau y Verdera, Part. Pract. Bot. 1: 530--532. 1784; Jacq., Ind. Pl. 63. 1785; Lippert, Pflanzensyst. 1: 187--188 (1786) and 2: [2036]. 1786; Palau y Verdera, Part. Pract. Bot. 8: 214. 1788; Pers. in L., Syst. Veg., ed. 15, 132 & [1033]. 1797; J. A. Murr. in L., Syst. Veg., ed. 15 nov., 106--107 & 812. 1798; Jolyclerc, Syst. Sex. Vég., ed. 1, pr. 1, 92 & 781 (1798) and pr. 2, 92 & 781. 1803; Mouton-Fontenille in L., Syst. Pl. 1: 147--148 (1804) and 5: tab. 2: vii & tab. 12: xvii. 1805; Jolyclerc, Syst. Sex. Vég., ed. 2, 1: 101 (1810) and 2: 474. 1810; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 56--57, 61, 861--870, & 938. 1817; Roem. & Schult., Mant. 2: 468--470 & 499. 1824; Spreng. in L., Syst. Veg., ed. 16, 1: 188 & 980 (1825) and 3: 774--776. 1826; Roem. & Schult., Mant. 3: 527, 671, & 687.

1827; Spreng. in L., Syst. Veg., ed. 16, 5: 267—268. 1828; Bong., Ess. Monog. Erioc. Brés. 1—12. 1831; Cham. & Schlecht., Linnaea 6: 43. 1831; A. Wood, Class-book, ed. 1, 405, 470, & 474. 1845; Lindl., Veg. Kingd., ed. 1, 122 & 818 (1846) and ed. 2, 122 & 818. 1847; A. Wood, Class-book, ed. 2, pr. 1, 564, 640, & 645 (1847), ed. 2, pr. 2, 564, 640, & 645 (1848), and ed. 10, pr. 1, 564, 640, & 645. 1848; A. Gray, Man. Bot., ed. 1, 514—515 & 703. 1848; A. Wood, Class-book, ed. 10, pr. 2, 564, 640, & 645 (1849), ed. 10, pr. 3, 564, 640, & 645 (1850), ed. 17, 564, 640, & 645 (1851), ed. 23, 564, 640, & 645 (1851), ed. 29, 564, 640, & 645 (1853), ed. 35, 564, 640, & 645 (1854), ed. 41, pr. 1, 564, 640, & 645 (1855), and ed. 41, pr. 2, 564, 640, & 645. 1856; A. Gray, Man. Bot., ed. 2, pr. 1, 488—489 & 713. 1856; Knieskern, Ann. Rep. N. J. Geol. Surv. 33. 1856; Walp., Ann. 5: 922—947 & 954. 1858; A. Gray, Man. Bot., ed. 2, pr. 2, 488—489 & [615] (1858) and ed. 2, pr. 3, 488—489 & [713]. 1859; Walp., Ann. 6: 1170—1171. 1861; Dalz. & Gibs., Bomb. Fl. 279—280, 316, & 325. 1861; A. Wood, Class-book, [ed. 42], pr. 1, 729—730, 826, & 832. 1861; A. Gray, Man. Bot., ed. 3, 488—489 & [615]. 1862; A. Wood, Class-book, [ed. 42], pr. 2, 729—730, 826, & 832. 1863; A. Gray, Man. Bot., ed. 4, pr. 1, 488—489 & [711] (1863) and ed. 4, pr. 2, 488—489 & [615]. 1864; A. Wood, Class-book, [ed. 42], pr. 3, 729—730, 826, & 832 (1865) and pr. 4, 729—730, 826, & 832. 1867; A. Gray, Man. Bot., ed. 5, pr. 1, 549—550 & 685 (1867) and ed. 5, pr. 2, 549—550 & 687. 1868; A. Wood, Class-book, [ed. 42], pr. 5, 729—730, 826, & 832. 1868; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 1, 352 & 378 (1868) and pr. 2, 352 & 378. 1869; A. Wood, Class-book, [ed. 42], pr. 6, 729—730, 826, & 831 (1869) and pr. 7, 729—730, 826, & 831. 1870; A. Gray, Man. Bot., ed. 4, pr. 3, 488—489 & [615]. 1870; A. Wood, Am. Bot. & Flor., ed. 1, pr. 1, 355, 379, & 390 (1870), pr. 2, 355, 379, & 431 (1871), and pr. 3, 355, 379, & 431. 1872; A. Wood, Class-book, [ed. 42], pr. 8, 729—730, 826, & 831. 1872; A. Wood, Am. Bot. & Flor., ed. 1, pr. 4, 355, 379, & 431 (1873) and pr. 5, 355, 379, & 431. 1874; O. R. Willis, Cat. Pl. N. J. 67. 1874; Lesq., U. S. Geol. & Geogr. Surv. Terr. Ann. Rep. 7: 396. 1874; A. Wood, Am. Bot. & Flor., ed. 1, pr. 6, 355, 379, & 431. 1875; A. Wood, Class-book, [ed. 42], pr. 9, 729—730, 826, & 831. 1876; Lesq., U. S. Geol. Surv. Terr. Rep. 7: [Tert. Fl.] 106, pl. 16, fig. 2 & 2a. 1878; A. Gray, Man. Bot., ed. 5, pr. 8, 549—550 & 687 (1878) and pr. "8" [=9], 549—550 & 687. 1880; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 3, 352 & 378. 1880; A. Wood, Class-book, [ed. 42], pr. 10, 729—730, 837, & 842. 1881; S. Wats., Proc. Am. Acad. 23: 283. 1888; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): [21] & 23—27, fig. 23 G—S. 1888; O. R. Willis in A. Wood, Am. Bot. & Flor., ed. 2, 355, 379, & 431. 1889; Wats. & Coult. in A. Gray, Man. Bot., ed. 6, pr. 1, 566—567 & 753 (1889) and pr. 2, 566—567 & 753. 1890; Niederlein, Bol. Mus. Prod. Argent. 3 (31): 336. 1890; L. H. Bailey in A. Gray, Field For. & Gard. Bot., ed. 2, 456. 1895; Penhallow, Brit. Assoc. Adv. Sci. Rep. 68: 527. 1899; Penhallow, Brit. Assoc. Adv. Sci. Bradford Meet. 335. 1900; Ruhl. in Pilg., Engl. Bot. Jahrb. 30: 146—147. 1901; Komarov, Fl.

Mansh. 1: 418—419. 1901; C. H. Wright, Journ. Linn. Soc. Lond. Bot. 36: 198—202. 1903; Prain, Bengal Pl., pr. 1, 121 & 1125—1127. 1903; V. A. Poulsen in Schmidt, Bot. Tidsskr. 26: 167. 1904; Keller & S. Br., Handb. Fl. Philad. 91—92. 1905; Rendle, Journ. Linn. Soc. Lond. Bot. 37: 474—476. 1906; Schlecht. in Engl., Bot. Jahrb. 40, Beibl. 92: 20. 1908; B. Long, Bartonia 2: 20. 1910; G. T. Stevens, Ill. Guide Flow. Pl. 114, 115, 718, & 746, pl. 9, fig. 5 & 9. 1910; Guillaum., Ann. Mus. Colon. Marseille, sér. 2, 9: 256. 1911; Creevey, Harper's Guide Wild Fls. 42, 44, [45], 469, & 529. 1912; W. Stone, Ann. Rep. N. J. State Mus. 1910: 323—325 & 817, pl. 28, fig. 1 & 2, & pl. 64, fig. 2. 1912; Britton & Br., Ill. Fl., ed. 2, 1: 453—455 & [678], fig. 1140—1143 (1913) and 3: 575 & 625. 1913; Fedch., Rastit. Turk. 811. 1915; House, N. Y. State Mus. Mem. 15 (1): 44, pl. 6A (1918) and 15 (2): 347 & 355. 1918; Knowlton, U. S. Geol. Surv. Bull. 696: 260, 670, 685, 778, & 812. 1919; Palm, Svensk. Bot. Tidsk. 14: 264. 1920; Hayata, Icon. Pl. Formos. 10: 49—56, fig. 27—31. 1921; Saida & Satô, Naigai Syokubutusi 1296, fig. 2009. 1921; Fern., Rhodora 23: 92 & 102. 1921; Rendle, Journ. Linn. Soc. Lond. Bot. 45: 259—260. 1921; Nakai in Mak. & Nemoto, Fl. Jap., ed. 1, 1303—1308. 1925; Mak., Nippon Shokubatsu 725. 1926; N. Taylor, Guide Wild Fls. 6—7, 323, & 333, fig. 13. 1928; Tatew., Veg. Apoi 119 & 131, 1928; Duthie, Fl. Upper Ganget. Plain 3: 318—320. 1929; Pool, Fls. & Flow. Pl., ed. 1, 299 & 359, fig. 169. 1929; Nakai, Veg. Apoi 76. 1930; Knowlton, U. S. Geol. Surv. Prof. Paper 155: 132-133. 1930; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1607—1620. 1931; Nakai in Mak. & Nemoto, Fl. Jap., ed. 2, 1510—1515. 1931; Komarov & Alis., Opred. Rast. Dal'nevost. Kr. 1: 340. 1931; Däniker, Vierteljahrsschr. Naturf. Gesell. Zürich 77, Beibl. 19: 91. 1932; Miyabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. 27 [Fl. Hokk. & Saghal. 3]: 286. 1932; L., Sp. Pl., ed. 1, pr. 2, 1: 87 & 129 (1934) and 2: [1203]. 1934; House, Wild Fls. 44, 347, & 355, pl. 6A. 1934; Marie-Vict., Fl. Laurent., ed. 1, 54, 74, 546, 565, 674, 679—681, 837, & 892, fig. 244. 1935; Svenson, Torreya 35: 119. 1935; Steinberg in Komarov & Schischkin, Fl. U. S. S. R. 3: 494—498 & 748, pl. 27, fig. 1—5. 1935; Satake in Nakai, Icon. Pl. As. Orient. 2: 97—100, pl. 42 (1937) and 2: 173—176 & 192, pl. 65. 1938; Satake, Journ. Jap. Bot. 14: 264. 1938; E. D. Merr. & Metc., Lingn. Sci. Journ. 16: 79. 1937; Terazaki, Zoku Nipp. Syokubutu Zuhu fig. 3712. 1938; Little, Am. Midl. Nat. 19: 378. 1938; Honda, Nom. Pl. Jap. 461—463. 1939; Mak., Illustr. Fl. Jap. 8, 771, & E.26, fig. 2311—2316. 1940; Fern., Rhodora 43: 211. 1941; Pool, Fls. & Flow. Pl., ed. 2, 295 & 407, fig. 189. 1941; Erlandsson, Arkiv Bot. 30B (2): 1—4. 1942; Moldenke in Woodson & Schery, Ann. Mo. Bot. Gard. 31: 65—71. 1944; Moldenke, Phytologia 2: 220. 1947; Guillaum., Fl. Analyt. & Synopt. Nouv.-Calléd. 49—50 & 361. 1948; H. E. Jaques, Pl. Fam., ed. 2, 96, fig. 289. 1949; Moldenke, Phytologia 3: 181. 1949; Govindu, Journ. Mysore Univ. 10 (1): 4. 1949; K. Jessen, Proc. Roy. Irish Acad. 52B: 173, [174], 193, 202, & 249—250, pl. 4, fig. 56 & 57. 1949; Thirumalachar, Razi, & Swamy, Journ. Mysore Univ. 9 (5): 82. 1949; Razi, Journ. Mysore Univ. 11 (1): 6 (1950) and

11 (2): 29. 1950; Razi & Govindu, Journ. Mysore Univ. 12 (9): 107. 1952; Satake, Journ. Jap. Bot. 27: 268. 1952; R. S. Lamotte, Geol. Soc. Am. Mem. 51: 157. 1952; Butters & Abbe, Rhodora 55: 136. 1953; Thorne, Am. Midl. Nat. 52: 281. 1954; Hand, Bull. Torr. Bot. Club 81: 92. 1954; Razi, Proc. Nat. Inst. Sci. India 21B (2): 85. 1955; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1119--1128 & 1333. 1956; Koyama, Journ. Jap. Bot. 31: 6—11, fig. 3. 1956; Bourdu, Bull. Soc. Bot. France 104: 156—158, fig. A--F. 1957; Linderoth, Faunal Con. Eu. & N. Am. 240, 241, & 250. 1957; Anon., Algonquin Prov. Park Mus. Check-list 7. 1957; A. & D. Löve, Bot. Notiser Lund 111: 380—381 & 387. 1958; A. Löve, Rhodora 61: 31. 1959; Straka, Erdkunde 14: 61 & 63. 1960; Nath, Bot. Surv. South. Shan States 9, 20, & 62. 1960; Sparrow, Aquat. Phycomycet., ed. 2, [Univ. Mich. Stud. Sci. 15:] 376 & 1095. 1960; Anon., Billie Bear Plant List 3. 1961; Van Royen, Blumea 11: 224—225, fig. 1. 1961; Seerwani, Bull. Bot. Surv. India 4: 230. 1962; J. K. Maheshwari, Bull. Bot. Surv. India 5: 138. 1963; J. M. Gillet, Canad. Field Nat. 77: 139. 1963; Henry & Buker, Trillia 12: 105 & 131. 1964; Rouleau in Marie-Vict., Fl. Laurent., ed. 2, 83, 90, 546, 674, 679, 680, 837, & 857, fig. 244. 1964; Steinberg in Komarov & Schischkin, Fl. U. S. S. R., Engl. transl., 3: 392—395 & 512. 1964; Moldenke in Guillaum., Mém. Mus. Hist. Nat. Paris, new ser. B, 15: 6. 1964; Panigrahi, Chowdhury, Raju, & Deka, Bull. Bot. Surv. India 6: 241 & 260--261. 1964; R. Good, Geogr. Flow. Pl. 88, 182, 227, 293, 294, & 483. 1964; Roland & Sm., Proc. Nova Scot. Inst. Sci. 26 (2): 191—192, fig. 476, map 173. 1964; Hambler, Journ. Ecol. [Brit.] 52: 581. 1964; Guillaum., Thorne, & Virot, Univ. Iowa Stud. Nat. Hist. 20 (7): 26. 1965; Van Steenis & Jacobs, Fl. Males. Bull. 20: 1359. 1965; Tatew. & Itô, Journ. Jap. Bot. 40: 156—157. 1965; Angely, Fl. Anal. Paran., ed. 1, 199--201. 1965; S. V. Ramaswami, Study Flow. Pl. Bangalore [thesis] 219—223 & 1406—1407. 1966; Begum, Curr. Sci. [India] 35: 262—263. 1966; Lourteig, Taxon 15: 31. 1966; Panigrahi, Bull. Bot. Surv. India 8: 13. 1966; Sebastine & Henry, Bull. Bot. Surv. India 8: 310. 1966; Faden, Idrobo, Jiminez, & Tomlinson, Common Dist. Int. Pl. Cerro Muerte 2. 1966; Hartley, Univ. Iowa Stud. Nat. Hist. 21: 150. 1966; F. H. Montgomery, Pl. from Sea to Sea 4, 9, & 390, fig. 822. 1966; Thornberry, U. S. Dept. Agr. Agric. Handb. 165: 137. 1966; Ogden, Quatern. Paleoecology 7: 175—183. 1967; Sterling, Outer Isl. 159, [161], 167, & 179. 1967; E. L. Braun, Vasc. Fl. Ohio 1: 308--310. 1967; Anon., Ind. Bibliogr. Bot. Trop. 4 (1): 18, 53, & 88. 1967; Begum, Bioresearch Index 1967: 2255. 1967; Satake, Nat. Sci. & Mus. 34: 161—162. 1967; E. G. Voss, Mich. Bot. 6 (2): 41 & 46, fig. 6. 1967; Begum, Proc. Indian Acad. Sci. B.67 (4): 148—156. 1968; Adam, Adansonia 8: 445. 1968; Ogden, Biol. Abstr. 49: 9863. 1968; Winner, Biol. Abstr. 49: 11782. 1968; Hinds & Hathaway, Wildfls. Cape Cod 116, 117, & 168, fig. 107. 1968; Moldenke, Phytologia 18: 165—186 & 243—280. 1969; Anon., Biol. Abstr. 50 (1): S.61. 1969.

Another German vernacular name from literature for members of this genus is "Kugelbinse". It is worth noting here, also, that

the Eriocaulon spadiceum Lam., which is now usually regarded as a synonym of Scirpus brizaeformis Hutchinson, in the Cyperaceae, was regarded as a synonym of Schoenus spadiceus Vahl by Roemer & Schultes (1817).

Good (1964) says that Eriocaulon and Lobelia "are an interesting pair in which the chief feature is absence from western Eurasia except for occurrence on the Atlantic margin".

Ogden (1967) reports that Eriocaulon stems (and he doubtless refers here to E. pellucidum Michx.) rooted near the lake margin on Martha's Vineyard island off the southern coast of Massachusetts show a radiocarbon content of plus 37 percent (above the modern reference standard). The mean of four samples from the upper 10 cm. of sediment shows a radiocarbon content of only plus 4.7 percent, the lower value implies mixing with deeper sediments for there is no detectable limestone in the till to reduce the proportion of $C^{14}$. Sedimentation rates per century are about 4.5 cm. for the early postglacial, 5 cm. for the hypsithermal, and 6.8 cm. for the upper 15 cm. of the core. In this (and another) lake the sedimentation rates for post-colonial times are considerably greater than in the rest of the cores.

It is perhaps also worthy of mention here that the Niederlein (1890) reference given in the bibliography of this genus is sometimes cited as "31: 68. 1890". The Stone (1912) reference is often cited as "1911", the date given on the title-page, but the work was actually not issued until January 26, 1912. Similarly, the Erlandsson (1942) reference is often cited as "1940", but the part in question was not actually issued until February 25, 1942. The Ruhland (1901) work cited above is often cited as "1902", but was actually issued on July 2, 1901 -- the "1902" is merely the volume title-page date.

ERIOCAULON CINEREUM R. Br.

Additional & emended synonymy: Eriocaulon sieboldianum Sieb. & Zucc. ex Walp., Ann. 5: 933, in syn. 1858. Eriocaulon bucharicum Bornm. in Fedch., Rastit. Turk. 811. 1915.

Additional & emended bibliography: Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; Walp., Ann. 5: 933 & 934 (1858) and 6: 1170 & 1171. 1861; Mak., Bot. Mag. Tokyo 8: 507. 1894; Komarov, Fl. Mansh. 1: 418. 1901; Prain, Bengal Pl., pr. 1, 1127. 1903; C. H. Wright, Journ. Linn. Soc. Lond. Bot. 36: 199--201. 1903; Fyson, Journ. Indian Bot. 2: 199 & 313. 1921; Duthie, Fl. Upper Ganget. Plain 3: 318. 1929; Steinberg in Komarov & Schischkin, Fl. U. S. S. R. 3: 495--496, pl. 27, fig. 3 a--d. 1935; Satake in Nakai, Icon. Pl. As. Orient. 2: 98. 1937; Mak., Illustr. Fl. Jap. 771 & E.26, fig. 2311. 1940; Erlandsson, Arkiv Bot. 30B (2): 2--4, fig. 1a & 1c. 1942; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1123, 1127, & 1333. 1956; Steinberg in Komarov & Schischkin, Fl. U. S. S. R., Engl. transl., 392--393. 1964; Moldenke, Phytologia 18: 169, 172--173, 180, 243, 244, 249, & 274. 1969.

Additional illustrations: Steinberg in Komarov & Schischkin,

Fl. U. S. S. R. 3: pl. 27, fig. 3 a--d. 1935; Mak., Illustr. Fl. Jap. fig. 2311. 1940; Erlandsson, Arkiv Bot. 30B (2): 2, fig. 1a & 1c. 1942.

The Maximowicz (1892) reference in the bibliography of this species is sometimes cited as "1893". The Erlandsson (1942) reference in the bibliography is often cited as "1940", but the pages in question were not actually issued until February 25, 1942. The chromosome count is given as n = 16, 2n = 32.

Specht found this plant growing at the edge of a Melaleuca leucodendron lagoon, flowering and fruiting in May, and describes it as an "annual herb".

The E. D. Merrill 7748, distributed as E. cinereum, is actually E. nigriceps Merr., while Ishiba s.n. [Arahama, 24/10/1926] is E. robustius (Maxim.) Mak.

Additional citations: INDOCHINA: Annam: Clemens & Clemens 3652 (W--1427605). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Island undetermined: Loher 6987 (W--713809). AUSTRALIAN REGION: AUSTRALIA: Northern Territory: Specht 409 (W--2316978).

ERIOCAULON COMPRESSUM Lam.

Additional synonymy: Eriocaulon gnaphalioides Michx. ex Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826. Eriocaulon gnaphaloides Michx. apud A. Wood, Class-book, ed. 2, pr. 1, 564. 1847.

Additional bibliography: Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; A. Wood, Class-book, ed. 1, 405 (1845), ed. 2, pr. 1, 564 (1847), ed. 2, pr. 2, 564 (1848), ed. 10, pr. 1, 564 (1848), ed. 10, pr. 2, 564 (1849), ed. 10, pr. 3, 564 (1850), ed. 17, 564 (1851), ed. 23, 564 (1851), ed. 29, 564 (1853), ed. 35, 564 (1854), ed. 41, pr. 1, 564 (1855), and ed. 41, pr. 2, 564. 1856; A. Gray, Man. Bot., ed. 2, pr. 1, 489 (1856) and pr. 2, 489. 1858; Walp., Ann. 5: 928 & 929. 1858; A. Gray, Man. Bot., ed. 2, pr. 3, 489. 1859; A. Wood, Class-book, [ed. 42], pr. 1, 729. 1861; Walp., Ann. 6: 1170 & 1171. 1861; A. Gray, Man. Bot., ed. 3, 489 (1862) and ed. 4, pr. 1, 489. 1863; A. Wood, Class-book, [ed. 42], pr. 2, 729. 1863; A. Gray, Man. Bot., ed. 4, pr. 2, 489. 1864; A. Wood, Class-book, [ed. 42], pr. 3, 729 (1865) and pr. 4, 729. 1867; A. Gray, Man. Bot., ed. 5, pr. 1, 549--550 (1867) and ed. 5, pr. 2, 549--550, 1868; A. Wood, Class-book, [ed. 42], pr. 5, 729. 1868; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 1, 352 (1868) and pr. 2, 352. 1869; A. Wood, Class-book, [ed. 42], pr. 6, 729 (1869) and pr. 7, 729. 1870; A. Gray, Man. Bot., ed. 4, pr. 3, 489. 1870; A. Wood, Am. Bot. & Flor., ed. 1, pr. 1, 355 (1870), pr. 2, 355 (1871), and pr. 3, 355. 1872; A. Wood, Class-book, [ed. 42], pr. 8, 729. 1872; A. Wood, Am. Bot. & Flor., ed. 1, pr. 4, 355 (1873) and pr. 5, 355. 1874; O. R. Willis, Cat. Pl. N. J. 67. 1874; A. Wood, Am. Bot. & Flor., ed. 1, pr. 6, 355. 1875; A. Wood, Class-book, [ed. 42], pr. 9, 729. 1876; A. Gray, Man. Bot., ed. 5, pr. 8, 549--550 (1878) and pr. "8" [=9], 549--550. 1880; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 3, 352. 1880; A. Wood, Class-book, [ed. 42], pr. 10, 729. 1881; Hieron. in Engl. & Prantl, Nat.

Pflanzenfam., ed. 1, 2 (4): 24. 1888; O. R. Willis in A. Wood, Am. Bot. & Flor., ed. 2, 355. 1889; Wats. & Coult. in A. Gray, Man. Bot., ed. 6, pr. 1, 567 (1889) and pr. 2, 567. 1890; Keller & S. Br., Handb. Fl. Philad. 92. 1905; G. T. Stevens, Ill. Guide Flow. Pl. 114. 1910; W. Stone, Ann. Rep. N. J. State Mus. 1910: 323—325, pl. 64, fig. 2. 1912; Moldenke, Phytologia 18: 173—174, 267, & 268. 1969.

Additional illustrations: W. Stone, Ann. Rep. N. J. State Mus. 1910: pl. 64, fig. 2. 1912.

The Stone (1912) reference in the bibliography above is usually cited as "1911", but the work was not actually issued until January 26, 1912.

Another vernacular name recorded for this plant by Wood (1845) is "Gnaphalium-like pipewort".

The Bartram s.n. [Sept. 9, 1906], distributed as E. compressum, is actually E. pellucidum Michx.

ERIOCAULON MELANOCEPHALUM Kunth

Additional bibliography: Moldenke, Phytologia 18: 243 & 279—280. 1969.

Additional citations: CUBA: Pinar del Río: Killip 32380 (N, S). Province undetermined: C. Wright 324la (S, S). VENEZUELA: Bolívar: Wurdack & Monachino 40912 (N). Guaricó: Tamayo 4600 (S). GUYANA: S. G. Harrison 1302 (K). FRENCH GUIANA: Collector undesignated 177, in part (N); Jelski s.n. [Cayenne] (B); Leprieur 149 (N); Leprieur & Sagot s.n. [Herb. Sagot 1330] (B, S, Ut—331). BRAZIL: Amapá: Black & Fróes 51-12273 (Be—70098). Minas Gerais: A. A. de Silveira s.n. [Herb. Magalhães Gomes 3933; Herb. Com. Geogr. & Geol. M. Gerais 2955; Herb. Jard. Bot. Belo Horiz. 26673] (N). Pará: Black, Ledoux, & Stegemann 52-14348 (Be—74076); Egler & Raimundo s.n. [Egler 1223; Herb. Mus. Goeldi 24270] (Bm); Murça Pires & Silva 4828 (N). Rio Branco: Ule 8088 [Herb. Mus. Goeldi 13173] (K, S, Z). São Paulo: Burchell 4208 (Br); Sellow 5850 (B-type, B—isotype), 5856 (B), s.n. [Brasilia] (Br). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B); Mart., Fl. Bras. 3 (1): pl. 43 (B, B, B).

ERIOCAULON MELANOCEPHALUM var. LONGIPES Griseb.

Bibliography: Griseb., Cat. Pl. Cub. 226. 1866; Moldenke, N. Am. Fl. 19 (1): 33. 1937; Moldenke, Phytologia 1: 319. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 43 & 205. 1949; Moldenke, Résumé 51 & 481. 1959.

ERIOCAULON MELANOCEPHALUM subsp. USTERIANUM Beauverd

Synonymy: Eriocaulon usterianum Beauverd, Bull. Herb. Boiss., sér. 2, 8: 284. 1908.

Bibliography: Beauverd, Bull. Herb. Boiss., sér. 2, 8: 284. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and pr. 2, 82.

1938; Moldenke, Known Geogr. Distrib. Erioc. 8, 37, & 41. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89, 293, & 481. 1959.

ERIOCAULON MELANOLEPIS Alv. Silv.

Synonymy: Eriocaulon melanolepis Alv. Silv., Fl. Mont. 1: pl. 6 ["IV"], sphalm. 1928.

Bibliography: Alv. Silv., Arch. Mus. Nac. Rio Jan. 23: 163. 1921; Alv. Silv., Fl. Mont. 1: 19—20 & 398, pl. 6 ["IV"]. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Moldenke, Known Geogr. Distrib. Erioc. 8 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac.,[ed. 2], 77 & 205. 1949; Moldenke, Phytologia 3: 332. 1950; Moldenke, Résumé 89 & 481. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 6 ["IV"]. 1928.

Silveira (1928) cites A. Silveira 500 from Minas Gerais.

ERIOCAULON MERRILLII Ruhl.

Synonymy: Eriocaulon sollyanum var. sumatranum Van Royen ex Moldenke, Résumé Suppl. 15: 20, in syn. 1967.

Bibliography: J. R. Perkins, Fragm. Fl. Philipp. 1: 136. 1904; Prain, Ind. Kew. Suppl. 3: 69. 1908; Hayata, Icon. Pl. Formos. 3: 197. 1913; S. Sasaki, List Pl. Formos. 99. 1928; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 64. 1940; Moldenke, Known Geogr. Distrib. Erioc. 27 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 141 & 205. 1949; Moldenke, Phytologia 3: 332—333. 1950; Moldenke, Résumé 176, 184, & 481. 1959; Moldenke, Résumé Suppl. 15: 12 & 20. 1967; Moldenke, Phytologia 17: 461 (1968) and 18: 186. 1969.

The type of this species was collected by Elmer Drew Merrill (no. 572) — in whose honor it was named — on mossy rocky in the bed of a small stream on Culión, Philippine Islands, in December, 1902, and is deposited in the herbarium of the Botanisches Museum at Berlin. The type of E. sollyanum var. sumatranum appears to be H. H. Bartlett 7457 from Sumatra, although I have not seen the original description of this variety, if, indeed, any has ever been published, and such an original description might designate another type. It is to be regretted that there isn't a worldwide index to subspecific names as there is for specific names in the phanerogams.

Eriocaulon merrillii is said to be related to E. redactum Ruhl. A common name recorded for it is "ruzon-hosikusa". Elmer says of it: "solitary mud plants forming colonies upon stream beds of rocks overlaid with fine mud or wet earth at 750 feet; roots soft, whitish; leaves in dense rosettes, ascendingly recurved, soft and succulent, whitish toward the base, otherwise pale green; inflorescence stalks erect or ascending, green, terete, strict, very unequal in length, several, at the base subtended by a green bract; heads chaffy brown, flattened,April." It has also been collected in flower and fruit in June.

Material has been misidentified and distributed in herbaria as E. hookerianum Stapf, E. sexangulare L., and E. truncatum Hamilt. On the other hand, the M. Ramos s.n. [Herb. Philip. Bur. Sci. 1831], distributed as E. merrillii, is actually E. alatum H. Lecomte, while E. D. Merrill 293 is E. cinereum R. Br. and M. S. Clemens 18023 is E. truncatum Hamilt.

Additional citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Culión: E. D. Merrill 572 (B--type, N--isotype). Luzon: Elmer 6617 (W--853649); Loher 12947 (Ca--242827). Sibuyan: Elmer 12248 (Bi, N, Ut--27543). INDONESIA: GREATER SUNDA ISLANDS: Sumatra: H. H. Bartlett 7457 (Mi).

ERIOCAULON MESANTHEMOIDES Ruhl.

Bibliography: Ruhl. in Engl., Bot. Jahrb. 27: 79. 1899; Ruhl. in Engl., Pflanzenreich 13 (4-30): 62, 76, & 286. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; Moldenke, Known Geogr. Distrib. Erioc. 21 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 117, 120, & 205. 1949; Moldenke, Phytologia 3: 333. 1950; Moldenke, Résumé 144, 149, & 481. 1959.

This species is based on Stuhlmann 9143 from Tanganyika, deposited in the herbarium of the Botanisches Museum at Berlin; the type sheet was previously identified as E. schimperi Körn. and as Mesanthemum radicans (Benth.) Körn. The Goetze 293, cited below, is a mixture with E. volkensii Engl.

Additional citations: TANGANYIKA: Goetze 293, in part (B), 1235 (B, Z); Schlieben 1135a (W--2214315); Stuhlmann 9143 (B--type). MALAWI: Stolz 2098 (B, S, Ut--64652).

ERIOCAULON MEXICANUM Moldenke

Bibliography: Moldenke, N. Am. Fl. 19 (1): 19 & 33. 1937; Moldenke, Phytologia 1: 319--320. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 37. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 30 & 205. 1949; Moldenke, Phytologia 3: 333. 1950; Moldenke, Résumé 35 & 481. 1959; L. O. Williams, Fieldiana Bot. 31: 256. 1967.

Williams (1967) avers that this taxon is closely related to the recently described E. molinae L. O. Williams.

ERIOCAULON MICROCEPHALUM H.B.K.

Synonymy: Eriocaulon microcephalum Humb. & Bonpl. apud Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 865. 1817 [not E. microcephalum Cham. & Schlecht., 1893, nor Hook. & Arn., 1854, nor Sellow, 1959]. Eriocaulon microcephalum Kunth apud Spreng. in L., Syst. Veg., ed. 16, 3: 775, in syn. 1826. Eriocaulon microcephalum Humb. & Kunth ex Kunth, Enum. Pl. 3: 572. 1841. Eriocaulon pusillum Willd. ex Kunth, Enum. Pl. 3: 548, in syn. 1841 [not E. pusillum Bong., 1831, nor R. Br., 1810, nor Poepp., 1863]. Eriocaulon brachypus Van Heurck & Muell.-Arg. in Van Heurck, Obs. Bot.

96. 1870 [not E. brachypus Bong., 1831]. Eriocaulon microcephalun H.B.K. ex Moldenke, Résumé 290, in syn. 1959. Eriocaulon microcepahlum H.B.K. ex Straka, Erdkunde 14: 61, sphalm. 1960. Paepalanthus villosus (H.B.K.) Kunth, in herb.

Bibliography: Breyn., Exot. Min. Cog. Pl. Cent. 1: 108—109, pl. 50. 1678; Moris., Pl. Hist. Univ. 3: 259—260, sect. 8, pl. 16, fig. 17. 1699; L., Sp. Pl., ed. 2, 128. 1762; H.B.K., Nov. Gen. & Sp. Pl., ed. quarto, 1: 253 (1816) and ed. folio, 1: 201—202. 1816; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 865. 1817; Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; Roem. & Schult., Mant. 3: 671. 1827; Cham. & Schlecht., Linnaea 6: 43. 1831; Kunth, Enum. Pl. 3: 548. 1841; Walp., Ann. 5: 930 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 492. 1863; Van Heurck, Obs. Bot. 96. 1870; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 27. 1888; Morong, Bull. Torr. Bot. Club 18: 356—357. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877—879. 1893; Barnhart, Bull. Torr. Bot. Club 29: 585—598. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 42, 53, & 285—287. 1903; H. B. Davis, Life & Works Pringle 105. 1936; Moldenke, N. Am. Fl. 19 (1): 20 & 34—35. 1937; Moldenke, Phytologia 1: 316 & 320. 1939; Moldenke, Known Geogr. Distrib. Erioc. 3, 4, 7, 37, & 39. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877—879. 1946; Moldenke, Phytologia 2: 134. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 27, 30, 39, 69, 72, & 205. 1949; Moldenke, Phytologia 3: 333—334. 1950; Moldenke, Mem. N. Y. Bot. Gard. 9: 175. 1955; Moldenke, Résumé 32, 36, 46, 79, 83, 286, 290, 291, & 481. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Straka, Erdkunde 14: 61 & 63. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877—879. 1960; Moldenke, Résumé Suppl. 3: 9 & 32 (1962), 5: 5 (1962), 6: 5 & 6 (1963), and 8: 2. 1964; Shinners, Sida 2: 441. 1966; Kral, Sida 2: 312—315 & 330. 1966; Faden, Idrobo, Jiminez, & Tomlinson, Common Dist. Int. Pl. Cerro Muerte 2. 1966; Moldenke, Résumé Suppl. 17: 10. 1968.

Illustrations: Kral, Sida 2: 313. 1966.

It should perhaps be noted here that the E. microcephalum attributed to Chamisso & Schlechtendal (but actually published by them as "Eriocaulon species. An microcephalum HBK.") and referred to in the synonymy above, is actually a synonym of E. schiedeanum Körn., while the homonym attributed to Hooker & Arnott is actually E. ehrenbergianum Klotzsch and that credited to Sellow is Paepalanthus tortilis (Bong.) Mart.; the E. brachypus of Bongard is a synonym of Paepalanthus brachypus (Bong.) Kunth; and the E. pusillum of Robert Brown is a valid species, but the homonym attributed to Bongard is Syngonanthus minutulus (Steud.) Moldenke and that credited to Poeppig is Paepalanthus perpusillus Kunth.

The original H.B.K. reference for E. microcephalum is incorrectly dated "1815" by Morong (1891). The specific epithet sometimes is written with a capital initial letter for no valid reason.

Sprengel (1826) regarded E. microcephalum H.B.K. as a synonym of E. triangulare L., now usually listed as Paepalanthus triangularis (L.) Körn. In this connection, therefore, it is important to consult Linnaeus' original description (1762) of his E. triangulare. It reads as follows: "ERIOCAULON culmo triangulari, foliis ensiformibus, capitulo ovato. Plantaginella aurea alopecuroides brasiliana, foliis gramineis Breyn. Cent. pl. 50; Moris. hist. 3: 259, s. 8, t. 16, f. 17. Habitat in Brasilia. Flosculus non potui perspicere in Herb. Pisonis apud Burmannum." Reichard (1779) repeats Linnaeus' description and comments. Sprengel (1826) adds "Quito", apparently based on a specimen to which he mistakenly applied Linnaeus' name (and one which could very possibly have been E. microcephalum). Ruhland (1903) ignores Sprengel's disposition and places E. triangulare -- as Paepalanthus triangularis -- in his Species dubiae with the comment "Folia ensiformia; pedunculus triangularis; capitulum ovatum. Brasilien. Nota: Planta omnino dubia. Dubium etiam, utrum species (potius) ad genus Paepalanthum an ad Eriocaulum an aliud genus pertineat."

Linnaeus' name is obviously based on and typified by the Plantaginella aurea alopecuroides brasiliana, foliis gramineis of Breyne (1678). The original description of this taxon by Breyne reads as follows: "Plantaginella aurea alopecuroides Brasiliana, foliis gramineis. En ex minimis unam, sed rarissimis charissimisq; nostris plantulis. Radix ejus exigua, mille fibris niveis comata, Foliola multa graminea & angusta Graminis Luzulae minoris Johanni Bauhino, sed omninò glabra, in orbem diffundens: ex quorum gremio, coliculi quinquaginta vel plures prosiliunt, tenuissimi, plantae exilitatem Globulis oblongiusculis lanuginosisque, Plantaginis angustifoliae paniculis Lagopi minoribus, uberrimè compensates, singuli, singulis coliculis triuncialibus vel brevioribus insidentes, compositi ex pilis lenissimis leucophaei coloris, inter quos Flosculi flavi perminuti, summâ amoenitate, veluti punctula aurea, emicant, quod jucundissimum, huic plantulae in Brasiliâ vigenti, aspectum conciliat."

Morison (1699) repeats this description almost verbatim: "Plantaginella aurea alopecuroides Brasiliana foliis gramineis, Breyn. Cent. 1. Radix ei exigua, mille fibris niveis comata, foliola multa, graminea & angusta, Graminis Luzulae minoris, J. B. sed omnino glabra, in orbem diffundens. Ex horum autem gremio coliculi quinquaginta vel plures prosiliunt, tenuissimi, plantae exilitatem globulis oblongiusculis lanuginosisque Plantaginis angustifoliae paniculis Lagopi minoribus uberrime compensantes, singuli singulis coliculis triuncialibus vel brevioribus insidentes, compositi ex pilis lenissimis, leucophaei coloris, inter quos flosculi flavi, perminuti, summa amoenitate, veluti punctula aurea emicant. Atque hi jucundissimum huic plantulae in Brasilia vigenti aspectum conciliant."

A glance at the illustration given by Breyne and repeated by Morison shows without any doubt that this taxon has nothing what-

ever to do with Eriocaulon microcephalum, although what evidence there is for removing it from the genus Eriocaulon, where Linnaeus placed it, and shifting it to Paepalanthus, I cannot see. The illustration appears good and the plant ought to be recognizable among the Brazilian members of this family.

Eriocaulon brachypus of Van Heurck & Müller was based on a Peruvian collection.

Eriocaulon microcephalum is an alpine species found in scattered localities from Kern County, California, through the states of México, Puebla, Tamaulipas, Hidalgo, Veracruz, and the Federal District of Mexico, and from the department of San José, Costa Rica to Azuay, Carchi, Loja, and Pichincha, Ecuador, and Cajamarca, Cuzco, and Junín, Peru. Recent collectors describe it as a "tiny herb", the flowers white, gray, or blackish with white woolly hairs, the sepals gray, and the anthers black. It has been found growing in gravelly spongy soil, on paramos, on mosses in moist areas, in wet meadows, open meadows in fir woods, or grassy bogs, in pine woods and sphagnum bogs, and among grasses and sedges of seeps, at altitudes of 2100 to 4050 meters, flowering and fruiting from November to February as well as from May to September. Fosberg, in Ecuador, found it in a "raised bog in pasture, quaking in spots, peaty but without sphagnum, dominant in quaking places, forming a mat on the surface of the water or thin mud". In Peru it was found by Woytkowski growing "in clumps in boggy meadows with low vegetation", while Cazalet & Pennington describe it in Ecuador as "small cushion-forming herbs, leaves fleshy edged with white wool at base and apex, bracts tipped with long hairs, in bogs in paramillos". Rzedowski describes the plant as "pequeña, cabezuelas blanco-moradas, en lugares encharcados". It greatly resembles E. paradoxum Moldenke in habit, but differs in technical characters of the head and florets.

In regard to the California record, Kral (1966) says: "I have seen only one specimen from the United States. This, collected by L. J. Xantus de Vesey in 1857--58 in the vicinity of Fort Tijon (now called 'Tejon') in what is presently Kern County, California, differs in no evident way from material from far to the south in America. I visited the area during the summer of 1964 in hopes of finding this population but a search of the marshy ground about springs in that area was fruitless. The station may well have been destroyed, since the Fort has become considerable of a tourist attraction and much of the stream which used to provide water for the soldiers at the old fort has been 'landscaped'. The most characteristic features of the plants which I have examined appear to be the densely caespitose habit, the stubby, rigid, ascending and imbricate leaves whose bases are partly concealed by ramentum, and the spathe-like character of the male sepals." Morong (1891) notes "This species has found its way from Jalisco, Mexico, where it is common, to Fort Tejon, California, at which place it was collected by Xantus in the expedition of 1857--8, although it is not enumerated in Dr. Gray's list of Xantus' plants. I find specimens of it without a name

in the Torrey Herbarium."

Material has been misidentified and distributed in herbaria as Luzula sp., in the Juncaceae. On the other hand, the Barclay & Juajibioy 9374 and the Holm & Iltis 460, distributed as Eriocaulon microcephalum, are actually Paepalanthus karstenii Ruhl., while Barclay & Juajibioy 6402 & 6450 are something in the Caryophyllaceae or Alsinaceae.

Additional & emended citations: MEXICO: Federal District: Balls B.5041 (Ca--684129); J. Rzedowski 20389 (Ip, Mi, W--2471533), 25710 (Ip). Hidalgo: H. E. Moore Jr. 2800 (Ca--919380), 3334 (Ca--919381). México: Pringle 6144 (Ca--115171, Mm--7958, Ms--15478, S), 7361 (Dt, Mi, S), 13228 (Gg--423411). Veracruz: Balls B.5495 (Ca--684390). COSTA RICA: San José: Standley & Valerio 43637 (F--599294), 43830 (F--716227). COLOMBIA: Magdalena: Cuatrecasas & Castaneda 25027 (Fg). Nariño: André 3484 (N). ECUADOR: Azuay: Barclay & Juajibioy 8361 (N); Harling 1799 (S). Carchi: C. F. Lehmann 567 (B, W--933494). Imbabura: Cazalet & Pennington 5452 (N, W--2405887). Loja: André K.1737 (N); Humboldt s.n. [Loxa] (B--isotype, B--isotype). Napo-Pastaza: Barclay & Juajibioy 8975 (N). Pichincha: F. R. Fosberg 22447 (N). Tunguragua: Asplund 9958 (S); D. H. Knight 273 (Ws). PERU: Cuzco: Vargas C. 13330 (Z). Huanuco: Woytkowski 34117 (Ca--14250, S). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

ERIOCAULON MIKAWANUM Satake & Koyama

Synonymy: Eriocaulon mikawana Satake & Koyama ex Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 180 & 181, fig. 123 (5). 1964.

Bibliography: Satake & Koyama, Journ. Jap. Bot. 30: 114--116. 1955; G. Taylor, Ind. Kew. Suppl. 12: 55. 1959; Moldenke, Résumé 173 & 481. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 180, 181, & 429, fig. 123 (5). 1964; Moldenke, Résumé Suppl. 12: 9. 1965.

Illustrations: Satake & Koyama, Journ. Jap. Bot. 30: 115. 1955; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 180, fig. 123 (5). 1964.

The type of this species was collected by Jisaburo Ohwi and Tetsuo Koyama (no. 12118) scattered in very swampy peat areas with Holoeion sedges and rushes, abundant locally, at the village of Tsukuté, in the province of Mikawa, Honshu, Japan, on October 15, 1954, and is deposited in the herbarium of the National Science Museum at Tokyo. Satake & Koyama (1955) say "Haec planta E. monococcon affinis tamen diversissima bracteis multo brevioribus florem sesqui superantibus paullo latioribus, petalis quam calyx conspicue longioribus, receptaculo piloso". They also record the vernacular name "Mikawa-inunohige". They distinguish the two species as follows:

"Ecailles de l'involucre de 7--8 mm de long, linéaires; pétales

aussi longs que les sépales; réceptacle glabre; plante gracile... E. monococcon.

Ecailles de l'involucre de 3--5 mm de long., lancéolées ou oblongues; pétales; Plus longs que les sépales; réceptacle longuement chevelu; plante comparativement robuste....E. mikawanum.

The species has been collected at 600 meters altitude, flowering and fruiting in October.

Citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Koyama s.n. [17 October 1955] (Ss); Ohwi & Koyama 12118 (Z--isotype).

ERIOCAULON MILHOENSE Herzog

Synonymy: Eriocaulon milhoënse Herzog apud A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938.

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 29: 204--205. 1931; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Moldenke, Known Geogr. Distrib. Erioc. 8 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 177 & 205. 1949; Moldenke, Résumé 89 & 481. 1959.

The type of this species was collected by Freiherr Philipp von Luetzelburg (no. 21536) in Pará, Brazil, and is deposited in the herbarium of the Botanische Staatssammlung at Munich, where it was photographed by Macbride as his type photograph number 18689.

Citations: BRAZIL: Pará: Luetzelburg 21536 [Macbride photos 18689] (N--photo of type, N--photo of type, W--photo of type).

ERIOCAULON MINIMUM Lam.

Synonymy: Eriocaulon sexangulare Burm. f. ex Spreng. in L., Syst. Veg., ed. 16, 3: 776, in syn. 1826 [not E. sexangulare Auct., 1903, nor Fyson, 1959, nor Heyne, 1832, nor L., 1753, nor Mart., 1893, nor Willd., 1841]. Eriocaulon trimeni Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 8, & 412. 1900. Eriocaulon trimenii Hook. f. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 117 & 287. 1903.

Bibliography: Lam., Tabl. Encycl. 1: 213. 1791; Spreng. in L., Syst. Veg., ed. 16, 3: 776. 1826; Roem. & Schult., Mant. 3: 671. 1827; Walp., Ann. 5: 937 (1858) and 6: 1171. 1861; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Hook. f., Fl. Brit. Ind. 6: 585. 1893; Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 8, & 412. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 103, 108, 117, 286, & 287. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; H. Lecomte, Journ. de Bot. 21: 108. 1908; Fyson, Journ. Indian Bot. 2: 199 (1921) and 3: 17. 1922; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23, 24, 37, & 41. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 125, 126, 130, & 205. 1949; Moldenke, Résumé 159, 162, 167, 293, & 481. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 17: 11. 1968; Moldenke, Phytologia 17: 461. 1969.

It should be noted here that the E. sexangulare L., referred to in the synonymy above, is a valid species, while the homonyms

accredited to "Auct." and to Martius are synonyms of E. cinereum R. Br., that accredited to Heyne is E. wightianum Mart., and those credited to Fyson and to Willdenow are E. willdenovianum Moldenke.

Fyson (1921), using the name E. trimeni Hook. f. for this taxon, says "(Bambulla Rk. 1881 in Herb. Ceylon!).....Ruhl. p. 117, 'incognita'. Scapes 1/2 -- 2 in. leaves 1/3 -- 1/4 in. narrow to linear. Heads 1/10 -- 1/8 in. Involucral bracts hyaline, as long or slightly longer than the floral, sub-erect. Floral bracts cuneately oblong or obovate. Receptacle glabrous. Male flowers, sepals 3, but 2 connate; sta 6 (not 1). Female flowers, normal; seeds glistening yellow, smooth. Ceylon. Hooker l.c. compared this with E. Sieboldianum, but the black anthers and flatter head sufficiently distinguish it. Hooker also in error described the male flowers as having only one stamen. There are 6 quite clearly in the plant quoted above. It was referred to E. truncatum Ham. by Trimen, and though differing in its flower and in the involucre being less horizontal is clearly allied to that species." A vernacular name in French for it is "joncinelle naine".

The Macé s.n. [Coromandel] distributed as E. minimum is actually E. cinereum R. Br.

ERIOCAULON MINUSCULUM Moldenke

Bibliography: Moldenke, Phytologia 8: 159--160. 1962; Moldenke, Résumé Suppl. 3: 17. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963.

Citations: CHINA: Sikang: H. Smith 12123 (S--type, Z--isotype).

ERIOCAULON MINUTISSIMUM Ruhl.

Bibliography: Ruhl. in Fedde, Repert. Spec. Nov. 22: 32. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Moldenke, N. Am. Fl. 19 (1): 19 & 25. 1937; Moldenke, Phytologia 1: 320. 1939; León, Fl. Cuba 1: 280. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 43 & 205. 1949; Moldenke, Résumé 51 & 481. 1959.

Additional citations: CUBA: Pinar del Río: Ekman 17948 (S--type).

ERIOCAULON MINUTUM Hook. f.

Bibliography: Hook. f., Fl. Brit. Ind. 6: 579--580. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 103, 111, & 286. 1903; Fyson, Journ. Indian Bot. 2: 313 & 317, pl. 36. 1921; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1613 & 1619. 1931; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Razi, Journ. Mysore Univ. 7 (4): 77. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 205. 1949; Moldenke, Phytologia 3: 334. 1950; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1124, 1127, & 1333. 1956; Bourdu, Bull. Soc. Bot. France 104: 156. 1957; Moldenke, Résumé 159, 162, & 482. 1959; Durand & Jacks., Ind. Kew. Suppl,

1, pr. 3, 158. 1959; Thanikaimoni, Pollen & Spores 7: 185. 1965; Moldenke, Phytologia 18: 60. 1968.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 36. 1921.

Fyson (1921) describes this plant as follows: "Whole plant very small. Leaves linear 1/2 — 3/4 in. long, from a broad 3—5 nerved base. Scapes numerous, very slender, 1 1/2 — 2 1/2 in. Heads obconic, the involucral bracts 1/8 in. long - glabrous, scarious, elliptic-acute and covering the floral. Floral bracts oblong, acute. Female sepals 2 only, narrow, with a pectinate crest along the upper half of the back; petals 0. Male flowers normal, petals small. Seeds oblong elliptic, reddish brown. Plate 36. Rajputana: Mt. Abu: Peninsular India; Mysore and Kanara on the Western Ghats. This species might be mistaken for a small and meagre form of E. xeranthemum."

The species has been collected in flower and fruit in September. It has also been recorded from West Bengal. The Cheluviah 56, distributed as E. minutum, is actually E. ritchieanum Ruhl., while Santapau 2928 is E. xeranthemum Mart.

Citations: INDIA: Bombay: R. R. Fernandez R.1964 (Xa); Patel 7 (Z). Kerala: Law s.n. [Concan] (B--cotype, Z--cotype).

ERIOCAULON MIQUELIANUM Körn.

Synonymy: Eriocaulon miquelianum Koeck. apud Tu, Chinese Bot. Dict., abrdgd. ed., 245. 1933 [not E. miqueliamum Auct. Jap., 1940, nor Miyabe & Kudo, 1940, nor Miyabe & Tatew., 1940, nor Mori, 1940].

Bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 162—163. 1867; Franch. & Savat., Enum. Pl. Jap. 2: 99. 1879; Maxim., Diagn. Pl. Nov. Asiat. 8: 17. 1892; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Mak., Bot. Mag. Tokyo 8: 506. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 12, 13, 65, 92, & 286, fig. 10. 1903; C. H. Wright, Journ. Linn. Soc. Lond. Bot. 36: 200. 1903; Matsumura, Ind. Pl. Jap. 2 (1): 176. 1905; Mak. & Nemoto, Fl. Jap., ed. 1, 1305. 1925; Ruhl., Notizbl. Bot. Gart. Berlin 10: 1043. 1930; Mak. & Nemoto, Fl. Jap., ed. 2, 1512. 1931; Tu, Chinese Bot. Dict., abrdg. ed., 245. 1933; Nemoto, Suppl. Fl. Jap. 1039. 1936; Satake, Bot. Mag. Tokyo 51: 288 [Shib. Comm. Art. 17: 106]. 1937; Honda, Nom. Pl. Jap. 462. 1939; Satake, Journ. Jap. Bot. 15: 629. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 1, 9, 11, 13, 26, 40, 49, 50, 57—60, 77, 80, & 87, fig. 5 (c). 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 46—49. 1940; Mak., Illustr. Fl. Jap. 771 & E.26, fig. 2312. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 37. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Phytologia 3: 334. 1950; Moldenke, Résumé 173, 290, & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Résumé Suppl. 3: 18 & 21. 1962; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 180, 182, & 429, fig. 123 (7). 1964; Moldenke, Résumé Suppl. 12: 9. 1965; Thanikaimoni, Pollen & Spores 7: 182 & 183,

tab. 1. 1965.

Material of this puzzling species has been collected in flower and fruit from July to October, and the vernacular names "imunohige" and "imuno-hige" have been recorded for it.

The E. miquelianum accredited to "Auct. Jap.", as well as the homonyms credited to Miyabe & Kudo and to Miyabe & Tatewaki, are synonyms of E. hondoense Satake, but that credited to Mori is E. tenuissimum Nakai.

Material has been misidentified and distributed in herbaria under the names E. hondoense Satake, E. shikokianum Maxim., and E. sikokianum Maxim. On the other hand, the Collector undesignated s.n. [Ugo, 12-7-1905], Furuse s.n. [Gyoonin-bara, 27 Sept. 1955], Hashimoto 399, Y. Matsumura 6676, Maximowicz s.n. [Hakodate, 1861], Ohwi s.n. [26.X.1930], and Togasi 722, 914, & 1101, distributed as E. miqueliamum, all appear to be better placed under E. hondoense Satake, while Uyezuki s.n. [Sept. 5, 1912] is E. robustius (Maxim.) Mak.

Satake (1940) cites the following Japanese collections: Honshu: Andô 17; Araki s.n. [Aug. 1931]; Arimoto s.n. [Aug. 1903]; Collector undetermined 20 & 23740; Faurie 6, 1869, 1872, 2727, & 13809; Hasimoto 57462, s.n. [Sept. 1928], & s.n. [Oct. 1930]; Hori s.n. [Sept. 1934]; Inagaki 7437 & 8988; Itô s.n. [Sept. 1891]; Iwabuti 5365; Katô 83033 & 83034; Kinashi 39; Koidzumi 107, 108, 10558, 13283, 44941, 52348, & 53571; Nikai 49452; Otaya 72; Simizu 29; Sugimoto 23813 & 272261; Suzuki s.n. [Sept. 1931]; Takahasi 139 & 140; Takeuti s.n. [Sept. 1932]; Tamaki 35 & s.n. [Oct. 1926]; Tiba s.n. [Sept. 1911]; Watanabe s.n. [Oct. 1893]; Yosino 9. Kiushu: Collector undetermined s.n. [Mai 1920]; Greatrex 207/38 & s.n. [Dec. 1919]; Hara s.n.; Masamune s.n.; Mayebara 11, 362, & 363; Miyauti 8; Nakasima 41; Saida 3591; Sugino 19; Tasiro 43766, in part, s.n. [Sept. 1921], & s.n. [Oct. 1924]; Yokoo 57461. Sikoku: Faurie 11639; Oti 2, 7, & 8; Yamasita s.n. [Oct. 1930].

Citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Furuse 17884 (Z), s.n. [27 Sept. 1955] (S), s.n. [Sara-numa, 6 Oct. 1955] (S), s.n. [22 Sept. 1957] (S), & s.n. [25 Sept. 1960] (S); Koyama 7113 (Mg). Sikoku: Wawra 1467 (B).

ERIOCAULON MIQUELIANUM var. ATROSEPALUM Satake

Bibliography: Satake, Journ. Jap. Bot. 15: 629. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 58, & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 48--49. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173 & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 182 & 429. 1964.

This variety is based on a specimen collected by M. Katô (no. 4281) at Takayu, in Uzen province, Honshu, Japan, in September,

1931, and deposited in the herbarium of Kyoto Imperial University. The variety is said to be endemic and no other collections have been cited to date. Its vernacular name is "takayu-inunohige". Satake (1940) says of it "Resembles Eriocaulon Miquelianum and E. atrum, but differs from the former in having blackish olivaceous sepals and a hairy receptacle, and from the latter in having lanceolate involucres longer than the flowers and the acute lobes of the calyx."

ERIOCAULON MIQUELIANUM var. INVOLUCRATUM Nakai

Synonymy: Eriocaulon miquelianum f. involucratum (Nakai) Murata ex Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 182. 1964.

Bibliography: Nakai, Bot. Mag. Tokyo 24: 6. 1910; Mak. & Nemoto, Fl. Jap., ed. 1, 1306 (1925) and ed. 2, 1512. 1931; Nemoto, Suppl. Fl. Jap. 1039. 1936; Honda, Nom. Pl. Jap. 462. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 58, & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 48. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173 & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 182 & 429. 1964; Moldenke, Résumé Suppl. 12: 9. 1965.

Satake (1940) says of this taxon: "A typo differt bracteis involucrantibus lanceolato-lineari-subulatis capitulo triplo longioribus". The type was collected by N. Kinasi (no. 89) at Aomori. in Mutu province, Honshu, Japan, in September, 1899. The only known vernacular name recorded for the taxon is "Mutu-inunohige". Satake (1940) cites also Toba 382 from Honshu and comments that the variety is endemic there.

ERIOCAULON MISERRIMUM Ruhl.

Bibliography: Ruhl. in Fedde, Repert. Spec. Nov. 22: 30. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Moldenke, N. Am. Fl. 19 (1): 19 & 29. 1937; Moldenke, Phytologia 1: 320. 1939; León, Fl. Cuba 1: 280. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 45 & 205. 1949; Moldenke, Phytologia 3: 334. 1950; Moldenke, Résumé 53 & 482. 1959.

Additional citations: ISLA DE PINOS: Ekman 11956 (N--photo of type, S--type, Z--photo of type).

ERIOCAULON MISERUM Körn.

Synonymy: Eriocaulon cristatum Mart. ex Körn., Linnaea 27: 607. 1856 [not E. cristatum Heyen, 1959, nor Mart. in Wall., 1832].

Bibliography: Wall., Numer. List 208 ["207"]. 1832; Körn., Linnaea 27: 607. 1856; Walp., Ann. 5: 932 (1858) and 6: 1171. 1861; Hook. f., Fl. Brit. Ind. 6: 575. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 61, 68, & 286. 1903; Fyson, Journ. Indian Bot. 3:

13--15, pl. 47. 1922; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 205. 1949; Moldenke, Phytologia 3: 334. 1950; Moldenke, Résumé 162 & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Thanikaimoni, Pollen & Spores 7: 185. 1965; Moldenke, Résumé Suppl. 17: 9. 1968; Moldenke, Phytologia 17: 496. 1969.

Illustrations: Fyson, Journ. Indian Bot. 3: pl. 47. 1922.

Jackson (1893), following Hooker (1893), lists an "E. cristatum Mart. ex Körn., Linnaea 27: 607" as a synonym of E. miserum, since Wallich 6070 is in part the actual type collection of the latter taxon. These authors maintain the E. cristatum Mart. "in Wall." (1832) is a valid species quite distinct from E. miserum. The E. cristatum Heyne, referred to in the synonymy above, is a synonym of the true E. cristatum Mart. (1832). Unfortunately Jackson misdated the Körnicke reference for E. miserum and for E. cristatum as "1854".

Eriocaulon miserum has been widely cited as a native only of India, but since the type collection was made by Henry Bruce in "Silhet", it must be included also in the flora of Pakistan, inasmuch as that locality is now in what is known as East Pakistan. Clarke collected it in "Khasia", an area which seems still to be included politically in India.

Additional & emended citations: PAKISTAN: East Bengal: H. Bruce s.n. [Wallich 6070, in part] (B--type). INDIA: Khasi states: C. B. Clarke 42963 (F--photo, K, N, N--photo, Sg--photo, Z--photo).

ERIOCAULON MISSIONUM Castell.

Bibliography: Castell. in Descole, Gen. Sp. Pl. Argent. 3: 81, 88--90, & [103], pl. 18, fig. A. 1945; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 103 & 205. 1949; Moldenke, Phytologia 3: 334. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 123 & 482. 1959.

Illustrations: Castell. in Descole, Gen. Sp. Pl. Argent. 3: pl. 18, fig. A. 1945.

This species has been collected on the campos, flowering and fruiting in December and January.

Citations: ARGENTINA: Misiones: Ekman 1225 (S), 1909 (E--1577142, Mi, N, N, S). MOUNTED ILLUSTRATIONS: Castell. in Descole, Gen. Sp. Pl. Argent. 3: pl. 18, fig. A (N, Z).

ERIOCAULON MITOPHYLUM Hook. f.

Synonymy: Eriocaulon mitophyllum Hook. f. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 60, 67, & 286. 1903. Eriocaulon miserum var. mitophyllum Hook. f. ex Fyson, Journ. Indian Bot. 3: 15, pl. 48. 1922.

Bibliography: Hook. f., Fl. Brit. Ind. 6: 575. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 60, 67, & 286. 1903; Fyson, Journ. In-

dian Bot. 3: 15, pl. 48. 1922; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Moldenke, Known Geogr. Distrib. Erioc. 23 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 205. 1949; Moldenke, Résumé 159, 162, & 482. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158. 1959; Moldenke, Résumé Suppl. 1: 11, 17, & 25 (1959) and 11: 5. 1964; Thanikaimoni, Pollen & Spores 7: 185. 1965.

Illustrations: Fyson, Journ. Indian Bot. 3: pl. 48. 1922.

Actually this taxon is based on W. Griffith 5578 & 5680 and C. B. Clarke s.n., not just on the first of these as implied by me in a previous installment of these notes. Griffith 5558, in the herbarium of the Botanisches Museum at Berlin, has a note appended to its label to the effect that it is "one of the Type specimens!", but this number is not cited in the original description of the species, and so I fail to see how it has any claim whatever to cotype status.

Recent collectors describe the plant as "deep-rooted at bottom of slow-moving stream at the margin in soft mud". It has been found growing at altitudes of 4000 feet, flowering and fruiting in December. Thanikaimoni (1965) reduces it to straight synonymy under E. miserum Körn., while Fyson (1922) regarded it as a variety of the latter.

Additional & emended citations: PAKISTAN: East Bengal: W. Griffith 5558 (B), 5578 (F--photo of cotype, K--cotype, N--cotype, N--photo of cotype, Sg--photo of cotype, Z--photo of cotype). INDIA: Bombay: P. V. Bole 1108 (Xa), 1137 (Xa). Mysore: Padmarajaiah 50 (Bn--3202).

ERIOCAULON MODESTUM Kunth

Synonymy: Eriocaulon proximum Steud., Syn. Pl. Glum. 2 (Cyp.): 280. 1855. Eriocaulum modestum Lesq., Rep. U. S. Geol. Surv. Terr. 7: 106, sphalm. 1878. Eriocaulon moldenkei Herter, Revist. Sudam. Bot. 8: 163--164. 1950. Eriocaulon modestum Auct. ex Herter, Revist. Sudam. Bot. 9: 188, in syn. 1954. Eriocaulon modestum f. elatior Ruhl. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959.

Bibliography: Kunth, Enum. Pl. 3: 547. 1841; Steud., Syn. Pl. Glum. 2 (Cyp.): 280. 1855; Walp., Ann. 5: 930 (1858) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 476, 493, & 500, pl. 42, fig. 2. 1863; Lesq., Rep. U. S. Geol. Surv. Terr. 7: 106. 1878; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23 & 25, fig. 12 J & K. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 58, 286, & 287. 1903; Alv. Silv., Fl. Mont. 1: 12, 20, & 398. 1928; Jacks. in Hook. f. & Jacks.,Ind. Kew., pr. 2, 1: 878 & 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 8, 37, & 39. 1946; Moldenke, Lilloa 14: 65. 1948; Castell., Lilloa 20: 245--246, fig. 3. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77, 100, & 205. 1949; Moldenke, Phytologia 3: 334--335. 1950; Herter, Revist. Sudam. Bot. 8: 163--164. 1950; Rambo, Anais

Bot. 2: 128. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Herter, Revist. Sudam. Bot. 9: 188. 1954; Rambo, Sellowia 6: 130. 1954; Reitz, Sellowia 7: 124. 1956; Moldenke in Dawson, Los Angeles Co. Mus. Contrib. Sci. 7: 5. 1957; Reitz, Sellowia 11: 31 & 103. 1959; Moldenke, Résumé 89, 119, 290, 291, & 482. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Angely, Fl. Paran. 16: 51 (1960) and 17: 24. 1961; Reitz, Sellowia 13: 52, 72, & 90. 1961; Angely, Fl. Anal. Paran., ed. 1, 199. 1965; Moldenke, Résumé Suppl. 14: 2. 1966; Moldenke, Phytologia 18: 261 & 264. 1969.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 42, fig. 2. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23, fig. 12 J & K. 1888; Castell., Lilloa 20: 245, fig. 3. 1949.

This is a widely distributed species, found in Brazil from Pernambuco, Piauí, and Goiás, through Bahia, Minas Gerais, Rio de Janeiro, Matto Grosso, and São Paulo, to Paraná, Santa Catarina, and Rio Grande do Sul, and into Uruguay. It is based on Luschnath s.n. from "Praya Sernambatypa" and Gaudichaud 103 from "Insula S. Catharinae", in "Brasilia meridionalis". Eriocaulon modestum f. elatior Ruhl. appears to be based on G. Gardner 2958 from Piauí, deposited in the herbarium of the Botanisches Museum at Berlin. The initial letter of the specific epithet is uppercased by some authors for no valid reason.

The species has been found by recent collectors in very wet ground, marshy places, and swamps, at altitudes of 2 to 1500 meters, flowering and fruiting in February to May, September, November, and December. Vernacular names recorded for it are "capim manso", "capipoatinga", "gravatá manso", and "sempreviva do campo". Osten found it growing on swampy dunes with Drosera brevifolia Pursh, Utricularia sp., Laurembergia tetrandra Kan., Microcala quadrangularis Griseb., and Lycopodium alopecuroides L.; Dawson found it "in an island of dense forest with stream flowing through"; while Irwin, Maxwell, & Wasshausen describe it as "cespitose; inflorescence to 15 cm. tall; heads whitish; in wet depression near creek, grazed campo and cerrado, upland valley".

Rambo (1950) comments: "Citada por FB para a Ilha de Sta. Catarina, foi constatada em Mostardas por um exemplar da Herbário Anchieta, para os arredores da cidade do Rio Grande por Malme, e para o Uruguai por Herter; no litoral norte ainda não a encontrei."

Osten states that his no. 22940c was growing with a Leiothrix species (no. 23141) and a Sphagnum species (no. 23138). Castellanos (1949) cites the following collections: BRAZIL: Santa Catarina: Reitz 1244. URUGUAY: Castellanos s.n. [29.XII.1946; Herb. Miguel Lillo 15182]; Garalt s.n. [23.X.1933; Herb. Osten 22940], s.n. [6.XI.1933; Herb. Osten 22940b], s.n. [2.I.1934; Herb. Osten 22940c]; Herter 99864; Legrand 961; Osten s.n. [25.XI.1935; Herb. Mus. Montev. 5845]; Rosengurtt B.3900; Steer s.n. [23.XI.1923;

Herb. Osten 16903] and comments "El ejemplar no. 22940b vid. Malme, presenta una de las cebezuelas proliferas, según esto sería E. m. for. viviparum Herzog". Silveira (1928) cites A. Silveira 206 from Minas Gerais.

Herter (1950), in proposing his new peripheral species, says: "Es ist eine oft zu beobachtende Erscheinung, dass die Arten von Gattungen und Familien, deren Hauptverbreitung in den Tropen liegt, an der Peripherie ihrer Areale kleiner sind als im Zentrum. So sind im Uruguay-gebiet unter den Farnen die letzten polwärts ausstrahlenden Trichomanes-Arten kleiner als ihre brasilianischen Verwandten. Aehnlich liegt der Fall bei der winzingen Anogramma lorentzii, bei Marginaria dielsii, bei vielen Dryopteris- und Selaginella-Arten. Unter den Siphonogamen nenne ich Butia stolonifera, Mangonia tweedieana, Feliponiella uruguaya, Heteranthera osteniana. Das gilt mn auch für ein kürzlich von mir in Uruguay aufgefundenes Eriocaulon, das sich von der nächstverwandten, im benachbarten Brasilien vorkommenden Art, E. modestum, vor allem durch seine Kleinheit auszeichnet. Dank des Entgegenkommens meines Freundes Dr. Harold N. Moldenke, Kurator und Administrator des New York Herbariums, dem ich die neue Art widme, konnte ich den Typus des E. modestum Kunth aus dem tropischen Brasilien vergleichen und dank der Gefälligkeit der Herrn Major K. Emrich und Padre B. Rambo SJ in Porto Alegre konnte ich auch südbrasilianisches Material untersuchen. Eriocaulon moldenkei Hert. spec. nov. — Differt ab E. modesto Kunth cui similis radicibus numerosissimis densis filiformibus tortuosis vix 0.5 mm diam., foliis anguste lineari-lanceolatis subrigidis acuminatis lucidis vix fenestratis, 2—2.5 cm long., basi 2 mm lat. — E. modestum Kunth differt radicibus paucioribus 1 mm diam., foliis subtriangularibus, non lucidis, 4—5 cm long., basi 5, saepius 6—8 mm lat., distinctissime fenestratis. Hab.: Uruguay: Canelones, Parque del Plata, in dunis humidis, fl. XII—III, leg. Herter, Pl. Ur. exs. 2110."

Material has been misidentified and distributed in herbaria under the names E. leptophyllum Kunth, E. modestum f. grandifolium Herzog, and "E. aff. E. septangulare With." On the other hand, the Perrottet 1166, distributed as E. modestum, is actually E. leucomelas Steud. Riedel 1476 is a mixture with E. modestum f. viviparum Herzog.

Citations: BRAZIL: Brasilia: Irwin & Soderstrom 6134 (N). Goiás: E. Y. Dawson 14655 (Z); Glaziou 22309 (S). Minas Gerais: P. Clausen 63 (S), s.n. [1845] (Qu); Héringer 3523 (B); Irwin, Maxwell, & Wasshausen 19585 (Rf); Mosén 1058 (P, S, S), 1059 (S, S); L. Riedel s.n. [Rio S. Francisco, Sept. '34] (B); Widgren 169 (S, S), 821 (S, S), s.n. (S). Paraná: Dusén 2467 (S); Reitz & Klein 17625 (Ac). Piauí: G. Gardner 2958 (B, N, W—937206). Rio de Janeiro: Raben 965 (Br). Rio Grande do Sul: Malme 244 (S), 311 (S). Santa Catarina: Gaudichaud 103 (B—cotype, P—cotype); Reitz 5605 (N), C.115 [Herb. Barbosa Rodrigues 966] (N), C.1244

(N); Reitz & Klein 662 (N); Smith & Reitz 5892 (W--2120180). São Paulo: Brade 7196 [Herb. Inst. Biol. S. Paulo 6590] (N), 12226 (S); Burchell 4186 (Br, T); Löfgren 168 (P); L. Riedel 1476, in part (B, B, M, S). State undetermined: Herb. A. Gray s.n. [Brazil] (T); Sellow 115 (B, Br); Weddell 1846 [no. 46; São Francisco de Chave] (Br). URUGUAY: Herter 2110 [Herb. Herter 99864] (B, S, S); Osten 22940b [Nov. 6, 1933] (S), 22940b [Nov. 27, 1933] (S), 22940c (S); Pedersen 3653 (N, S, W--2283842). CULTIVATED: Brazil: Widgren 169 (S). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B); Mart., Fl. Bras. 3 (1): pl. 42, fig. 2 (B).

ERIOCAULON MODESTUM f. GRANDIFOLIUM Herzog

Bibliography: Moldenke, Known Geogr. Distrib. Erioc. 8. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89 & 482. 1959.

Nothing is known to me about this taxon except that it is supposed to be endemic to São Paulo, Brazil. The Brade 7196 [Herb. Inst. Biol. S. Paulo 6590], identified by Herzog as this form and so distributed, appears to be typical E. modestum Kunth and is so cited by me. If, by any chance, this should be the type collection of the form, then the form should be sunk in the synonymy of E. modestum.

ERIOCAULON MODESTUM f. RIGIDIFOLIUM Herzog

Synonymy: Eriocaulon modestum f. rigidifolia Herzog in Luetzelburg, Estud. Bot. Nordéste 3: 147. 1923.

Bibliography: Herzog in Luetzelburg, Estud. Bot. Nordéste 3: 147 & 150. 1923; Moldenke, Phytologia 3: 335. 1950; Moldenke, Résumé 89, 290, & 482. 1959.

Nothing is known to me about this taxon except that Herzog (1923) affirms it to be typical of the "brejo" in Goiás, where it is apparently endemic, the type being from Rio das Femeas.

ERIOCAULON MODESTUM f. VIVIPARUM Herzog

Synonymy: Eriocaulon modestum f. vivipara Herzog in Luetzelburg, Estud. Bot. Nordéste 3: 147 & 150. 1923.

Bibliography: Herzog in Luetzelburg, Estud. Bot. Nordéste 3: 147, 149, & 150. 1923; Moldenke, Known Geogr. Distrib. Erioc. 8. 1946; Castell., Lilloa 20: 246. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Phytologia 3: 335. 1950; Angely, Fl. Paran. 10: 14. 1957; Moldenke, Résumé 89, 290, & 482. 1959; Angely, Fl. Paran. 16: 51 (1960) and 17: 24. 1961; Angely, Fl. Anal. Paran., ed. 1, 199. 1965.

The type of this form was apparently collected on the Rio Preto in Brazil, where the plant is said to be typical of the "brejo". Herzog (1923) indicates that this type locality is in the state of Bahia, but the label on the isotype specimen in the Britton Herbarium states plainly that the locality is in Goiás. Actually, there is a Rio Preto also in Minas Gerais and one in Rio de Janeiro.

Only one very old scape out of seven on the Stockholm herbarium sheet of Dusén 2467 shows the characteristic vivipary of this form, but the other six scapes are actually all too young to be expected to show it. Castellanos (1949) affirms that one scape of Osten 22940b, from Uruguay, also is viviparous. The Riedel 1476, cited below, is a mixture with typical E. modestum Kunth.

Citations: BRAZIL: Goiás: Luetzelburg 15510 (N--isotype). Paraná: Dusén 2467 (S). São Paulo: L. Riedel 1476, in part (B, Ut-332).

ERIOCAULON MOKALENSE Moldenke

Bibliography: Moldenke, Phytologia 3: 414--415. 1951; Moldenke in Humbert, Fl. Madag. 36: 14 & 16, fig. 2 (12--14). 1955; G. Taylor, Ind. Kew. Suppl. 12: 55. 1959; Moldenke, Résumé 156 & 482. 1959.

Illustrations: Moldenke in Humbert, Fl. Madag. 36: 14, fig. 2 (12--14). 1955.

This species is endemic to Madagascar and is known thus far only from the original collection. Eriocaulon apiculatum H. Lecomte, E. heterochiton Körn., and E. mokalense Moldenke need further study. They are obviously very closely related and may even prove to be conspecific.

Citations: MADAGASCAR: Decary 10229 (N--isotype, N--photo of type, P--type, Z--photo of type).

ERIOCAULON MOLINAE L. O. Williams

Synonymy: Eriscaulon molinae L. O. Williams, sphalm. in herb.

Bibliography: L. O. Williams, Fieldiana Bot. 31: 255--256. 1967; Moldenke, Résumé Suppl. 17: 2. 1968.

The type of this species was collected by Albertina R. Molina (no. 18500) -- in whose honor it is named -- abundant on the marshy savannas around the quebrada El Chorrito, Cerro de Hule, 20 km. south of Tegucigalpa, Morazán, Honduras, at an altitude of 1500 meters, on October 27, 1966, and is deposited in the herbarium of the Field Museum at Chicago. Williams (1967) cites also Molina 1740, P. C. Standley 25028 & 29141, and Williams & Correll 29289 from the same department, where in some places it is said to be scarce in shallow open bogs, while in other localities it is common in swampy swales and meadows, at altitudes of 1300--1600 m., flowering and fruiting from October to December. Molina found it also "en pántano, colinas empantanadas, área de pino y roble". Swallen encountered it in water at the edge of a large marsh. Williams (1967) comments that "The species seems to be most closely allied to E. mexicanum Moldenke of the species known from Central America and Mexico. The species being described is more delicate with differences also in detail of floral structure. We have known this species for many years but have misdetermined it as E. seemanii Moldenke, a dimerous species known from lowland Panama." Williams & Correll describe the heads as "blackish".

Citations: HONDURAS: Morazán: Swallen 11173 (W--2085936); Williams & Correll 29289 (N).

ERIOCAULON MONOCOCCOS Nakai

Synonymy: Eriocaulon monococcon Nakai ex Nakai & Honda, Nov. Fl. Jap. 6: 12, 39, 79, & 87, fig. 16. 1940.

Bibliography: Nakai in Matsumura, Icon. Pl. Koisikav. 2: 35, pl. 102. 1914; Prain, Ind. Kew. Suppl. 5, pr. 1, 97. 1921; Mak. & Nemoto, Fl. Jap., ed. 1, 1306 (1925) and ed. 2, 1512. 1931; Miyabe & Kudô, Fl. Hokk. & Saghal. 3: 287. 1932; Nemoto, Suppl. Fl. Jap. 1039. 1936; Honda, Nom. Pl. Jap. 462. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 12, 39, 79, & 87, fig. 16. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 27--28, pl. 4, fig. 7. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Ohwi & Koyama, Journ. Jap. Bot. 30: 114 & 116. 1955; Moldenke, Résumé 173, 290, & 482. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 97. 1960; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 180, 181, & 429, fig. 123 (2). 1964.

Illustrations: Nakai in Matsumura, Icon. Pl. Koisikav. 2: pl. 102. 1914; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 39, fig. 16. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 4, fig. 7. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 180, fig. 123 (2). 1964.

The type of this species was collected by Gen-Iti Koidzumi in the province of Isikari, Hokkaido, Japan, and is deposited in the herbarium of Tokyo University. A common name recorded for the species is "ezo-husikusa", and it has been collected in flower and fruit in August and September. Satake (1940) cites the following collections: JAPAN: Hokkaido: Arimoto s.n. [Sept. 1902]; Koidzumi 91154-55-H; Miyabe & Yokoyama s.n. [Sept. 1938]; Nakai s.n. [Sept. 1939]; Nisida s.n. [Sept. 1912]; Numaziri s.n. [Sept. 1918]; Takenubo s.n. [Aug. 1882]; Tatewaki 462; Tokubuti s.n. [Sept. 1894]. Honshu: Murata 7. He regards E. monococcos var. latifolium Nakai as a synonym.

ERIOCAULON MONOCOCCOS var. LATIFOLIUM Nakai

Synonymy: Eriocaulon monococcon var. latifolium Nakai ex Satake in Nakai & Honda, Nov. Fl. Jap. 6: 39 & 87. 1940.

Bibliography: Nakai in Matsumura, Icon. Pl. Koisikav. 2: 35. 1914; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 39 & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 27. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173, 290, & 482. 1959.

Satake (1940) regards this taxon as a synonym of the typical form of E. monococcos Nakai.

ERIOCAULON MONODII Moldenke

Bibliography: Moldenke, Phytologia 3: 165--166 (1949) and 3:

335. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Monod, Bull. Inst. Fr. Afr. Noir 16: 316. 1954; Moldenke, Résumé 135 & 482. 1959.

Additional citations: SÉNÉGAL: J. G. Adam 18367 (Z).

ERIOCAULON MONOSCAPUM F. Muell.

Bibliography: F. Muell., Fragm. 1: 94--95. 1859; Benth., Fl. Austral. 7: 191, 196, & 792. 1878; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 33, 39, & 286. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 28 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 153 & 205. 1949; Moldenke, Résumé 209 & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960.

ERIOCAULON MUTATUM N. E. Br.

Synonymy: Eriocaulon huillense Rendle, Cat. Afr. Pl. Welw. 2: 95. May or June 1899 [not E. huillense Engl., 1959, nor Engl. & Ruhl., April 7, 1899]. Eriocaulon rendleanum Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1105. October 1901.

Bibliography: Rendle, Cat. Afr. Pl. Welw. 2: 95. 1899; Ruhl. in Engl., Bot. Jahrb. 27: 78. 1899; N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 256. 1901; Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1105. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 33, 39--40, 281, 286, & 287. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; Prain, Ind. Kew. Suppl. 3: 69. 1908; H. Lecomte, Bull. Soc. Bot. France 55: 644 & 647. 1909; Moldenke, Known Geogr. Distrib. Erioc. 22, 35, 37, & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 118, 119, & 205. 1949; Moldenke, Phytologia 3: 335. 1950; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 160, fig. 9 & 10, & 167--170, pl. 9, fig. 1. 1955; Moldenke in Humbert, Fl. Madag. 36: 14 & 15, fig. 2 (6--11). 1955; H. Hess, Bericht. Schweiz. Bot. Gesell. 67: 88--89. 1957; Moldenke, Résumé 147, 149, 156, 289, 291, & 482. 1959; Moldenke, Résumé Suppl. 1: 9. 1959; Moldenke, Phytologia 17: 384 (1968) and 18: 110. 1969.

Illustrations: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 160, fig. 9 & 10, & pl. 9, fig. 1. 1955; Moldenke in Humbert, Fl. Madag. 36: 15, fig. 2 (6--11). 1955.

Annual plant; stems very short; leaves few or rather few, erect-cespitose, green, linear or narrowly deltoid, tapering to a point or subulate, 1.5 cm. long or shorter, about 0.6 mm. wide at the midpoint, about 3-veined, scarcely fenestrate, glabrous, turning yellowish in drying; scapes aggregate, few or many, pale-green throughout or pale yellowish-green below and green above, 4--12 cm. long, 3- or 4-costate or slightly angular and winged above, slightly twisted, glabrous; sheaths loose, scarcely inflated, green or pale-green, glabrous, obtuse at the apex or obliquely bifid, very obtuse and soon lacerate at the mouth; heads subglobose or globose to ovoid, black or nigrescent, 2--3.5 mm. wide, compressed in drying, glabrate; outer involucral bractlets oblong, pale-buff or fuscous-griseous, obtuse at the apex, glab-

rous, the inner ones acute or acutish at the apex and blackish; receptacle glabrous; receptacular bractlets elliptic-lanceolate or lanceolate, nigrescent, concave, acute at the apex; staminate florets: sepals 2, narrowly oblong-cuneate or linear, fuscous, glabrous; petal-tube unlobed at the apex; filaments white; anthers greenish-black; pistillate florets: sepals 2, obliquely suborbicular or very broadly obovate, navicular-concave, membranous, nigrescent, with a broadly winged keel on the back, glabrous; petals 2, narrowly cuneate, dark-fuscous or nigrescent, very obtuse or somewhat emarginate at the apex, glabrous, non-glandulif-erous.

Rendle's binomial is actually the first to have been applied to this taxon, but did not appear in print until May or June of 1899, and is therefore invalidated by the E. huillense of Engler & Ruhland which seems to have appeared in print on April 7 of the same year and is a synonym of E. teusczii Engl. & Ruhl. Fritsch's E. rendleanum, proposed as a substitute name for Rendle's invalidated binomial, was not published until October in 1901 and is therefore antedated by Brown's E. mutatum, which appeared in print in September of that year.

Hess (1955) gives us very copious notes on the characters of this species and affirms that it is related to and hybridizes with E. angustisepalum H. Hess -- a hybrid which is discussed by me under the name xE. hessii Moldenke in this series of notes. In my 1955 work it is stated that E. mutatum grows on "Bords de torrents, boues, tourbières, marais" and that in the central portions of Madagascar it blooms from January to March, but on the west portion of that subcontinent in May. Actually, recent collectors have found this plant growing in boggy ground "under water of flooded pan until recently", in shallow seeping water, and on wet exposed mud on gently sloping rock faces in Tanganyika, at altitudes of 1030—1850 meters, flowering and fruiting from January to June.

Additional citations: TANGANYIKA: Endlich 410 (Mu); Milne-Redhead & Taylor 9920 (B), 10840 (B); Schlieben 1042 (B). ANGOLA: Bié: H. Hess 52/2061 (B). Huila: H. Hess 52/1755 (B, Z). RHODESIA: Brain 3736 (S). MADAGASCAR: Decary 7504 (N, P); Perrier de la Bâthie 2202 (N, P), 7255 (P), 7258 (N, P), 13762 (N, P), 17942 (N, P); Waterlot 476 (N, P, P).

ERIOCAULON NAKASIMANUM Satake

Bibliography: Satake, Journ. Jap. Bot. 15: 143. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 64, 65, 81, & 87, fig. 31. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 54, pl. 9, fig. 18. 1940; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173 & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185 & 429. 1964.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 65, fig. 31. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.]

pl. 9, fig. 18. 1940.

The type of this species was collected by K. Nakasima (no. 49) — in whose honor it was named — at Yakatabaru, near Hukuoka, in Tikuzen province, Kiushu, Japan, in October of 1937, and is deposited in the herbarium of Tokyo University. The only vernacular name recorded for the plant is "tukusi-kuroimunohige". It is described as endemic by Satake (1940).

ERIOCAULON NAKASIMANUM var. SUPERANS Satake

Bibliography: Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 54. 1940.

Satake (1940) describes this variety as follows: "A typo bracteis involucrantibus lanceolatis apice acutis 5—6 mm longis floribus conspicue superantibus differt". The type was collected by Z. Tasiro on Mount Kuzyuzan, in Bungo province, Kiushu, Japan, in September of 1922, and is deposited in the herbarium of Toyko University. Thus far the taxon is known only from the original collection.

ERIOCAULON NAKAYENSE Koyama

Bibliography: Koyama, Philip. Journ. Sci. 84: 372—373, 377, & 378, pl. 2, fig. 1, & pl. 5, fig. A. 1956; Moldenke, Résumé 178 & 482. 1959; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

Illustrations: Koyama, Philip. Journ. Sci. 84: pl. 2, fig. 1, & pl. 5, fig. A. 1956.

The type of this species was collected by Bunzô Hayata at Nakay, Thailand, on December 16, 1931, and is deposited in the herbarium of Tokyo University. Thus far the taxon is known only from the original collection.

ERIOCAULON NANELLUM Ohwi

Bibliography: Ohwi, Bot. Mag. Tokyo 44: 566. 1930; Mak. & Nemoto, Fl. Jap., ed. 2, 1512. 1931; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Nemoto, Suppl. Fl. Jap. 1039. 1936; Honda, Nom. Pl. Jap. 462. 1939; Satake, Journ. Jap. Bot. 15: 630 & 631. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 65, & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 55, pl. 10, fig. 10. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Koyama, Journ. Jap. Bot. 31: 6. 1956; Moldenke, Résumé 173 & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185 & 429. 1964; Moldenke, Résumé Suppl. 12: 9. 1965.

Illustrations: Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 10, fig. 19. 1940.

The type of this species was collected by Père Urbain Jean Faurie (no. 1247) on Mount Gassan, in Uzen province, Honshu, Japan, in September of 1897, and is deposited in the herbarium of Kyoto University. A common name recorded for the plant is "miyama-hinahosikusa". It has been collected in flower and fruit in September. Suzuki calls it a "rare endemic plant" and found it growing on a sunny wet plain in an alpine region at

1300 meters altitude. Hosoi encountered it by a pool in a subalpine region and says that it is "distinguished from E. atrum by slender habit and not pilose petals". Satake (1940) cites also Yuki 3912 & 58814 from Honshu island, where he says the species is endemic.

Citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Hosoi H.16 (Z); Suzuki 163 [Herb. Suzuki 55-489212] (Ca--979049).

ERIOCAULON NANELLUM var. ALBESCENS Satake

Synonymy: Eriocaulon nanellum f. albescens (Satake) Murata ex Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185. 1964.

Bibliography: Satake, Journ. Jap. Bot. 15: 630. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 66, & 87, fig. 32. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 55--56. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173 & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185 & 429. 1964; Moldenke, Résumé Suppl. 12: 9. 1965.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 66, fig. 32. 1940.

This variety differs from the typical form of the species in its pale (not black) heads, the receptacular bractlets of the staminate florets narrowly oblong and acute at the apex, and the sepals of the pistillate florets whitish.

The type of the variety was collected by S. Kobayasi (no. 9) on Mount Nyutumuri-yama, in Ugo province, Honshu, Japan, in August of 1938, where the variety is said to be endemic. Satake (1940) cites also Muramatu 57466 from the type locality. The recommended vernacular name recorded for the plant is "sirobana-miyamahinahosikosa".

ERIOCAULON NANELLUM var. FILAMENTOSUM (Satake) Satake

Synonymy: Eriocaulon filamentosum Satake, Journ. Jap. Bot. 15: 140. 1939. Eriocaulon nanellum var. filamentosum Satake in Nakai & Honda, Nov. Fl. Jap. 6: 67 & 87. 1940.

Bibliography: Satake, Journ. Jap. Bot. 15: 140 & 631, fig. 1. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 7, 13, 67, [86], & 87, fig. 2 (d) & 33. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 56. 1940; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173, 288, & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185 & 429. 1964.

Illustrations: Satake, Journ. Jap. Bot. 15: 140, fig. 1. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 7 & 67, fig. 2 (d) & 33. 1940.

This variety differs from the typical form of the species in having the calyx of the pistillate florets irregularly 3- or 4-lobed at the apex and the petals of the pistillate florets composed of subelongate cells.

The recommended vernacular name for the plant is "ito-hosikusa". Satake (1940) cites Hukuda 1094, Kobayasi 22, and M. Matuda 91453, all from what is presumably the type and only known locality, Hatimantai, in Ugo province, Honshu, Japan, where the variety is said to be endemic. It should be noted that Satake proposed this as a species on page 140 of his 1939 work and reduced it to varietal status on page 631 of the same volume and in the same year.

ERIOCAULON NANTOENSE Hayata

Synonymy: Eriocaulon nantoënse Hayata apud A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929.

Bibliography: Hayata, Icon. Pl. Formos. 10: 51, fig. 28. 1921; Mak. & Nemoto, Fl. Jap., ed. 1, 1306. 1925; Sasaki, List Pl. Formos. 99. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Sasaki, Cat. Govern. Herb. 118. 1930; Mak. & Nemoto, Fl. Jap., ed. 2, 1513. 1931; Masamune, Short Fl. Formos. 262. 1936; Nemoto, Suppl. Fl. Jap. 1039. 1936; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 12, 30, 78, & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 21, pl. 2, fig. 4. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 133 & 205. 1949; Moldenke, Résumé 172 & 482. 1959; Moldenke, Résumé Suppl. 12: 8. 1965.

Illustrations: Hayata, Icon. Pl. Formos. 10: 51, fig. 28. 1921; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 2, fig. 4. 1940.

The type of this species was collected by T. Kawakami at Nantô, in Taityû province, Formosa, in 1913, and is deposited in the herbarium of Tokyo University. The recommended vernacular name recorded for the plant is "Nantô-hosikusa". Satake (1940) cites also Kudô & Sasaki 15387, Suzuki 6609a, and Yamamoto s.n. from Formosa, where he regarded the species as endemic.

Citations: WESTERN PACIFIC ISLANDS: JAPAN: Kiushu: Sakata "C" (Z).

ERIOCAULON NANUM R. Br.

Bibliography: R. Br., Prodr. Fl. Nov. Holl. 254. 1810; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 869. 1817; Spreng. in L., Syst. Veg., ed. 16, 3: 776. 1826; Kunth, Enum. Pl. 3: 571. 1841; Walp., Ann. 5: 934 (1858) and 6: 1171. 1861; Benth., Fl. Austral. 7: 191, 193, & 792. 1878; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 281, 282, & 286. 1903; F. M. Bailey, Compreh. Cat. Queensl. Pl. 584, fig. 565. 1913; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 28 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 153 & 205. 1949; Moldenke, Résumé 209 & 482. 1959; Moldenke, Résumé Suppl. 1: 17. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Phytologia 18: 61. 1968.

Illustrations: F. M. Bailey, Compreh. Cat. Queensl. Pl. fig. 565. 1913.

Kunth (1841) describes this taxon as follows: "Scapo striato (semiunciali), foliis glabris vix longiore; capitulo convexo, nigricante; squamis paleisque nudis, subovatis; perianthio femineo hexaphyllo, immaculato; masculo exteriore spathaceo; interiore obsoleto."

There is an E. nanum Klotzsch (1959) which is a synonym of E. ehrenbergianum Klotzsch. Material has been misidentified and distributed in herbaria as E. smithii R. Br.

Citations: AUSTRALIAN REGION: AUSTRALIA: Queensland: P. O. Flecker 2257 (Qu), 14453 (Z); Manski 3256 (Qu).

ERIOCAULON NAUTILIFORME H. Lecomte

Bibliography: H. Lecomte, Journ. de Bot. 21: 89, [101], & 105-106. 1908; H. Lecomte, Not. Syst. 2: 215 & 393. 1913; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and ed. 2, 82. 1938; Moldenke, Known Geogr. Distrib. Erioc. 26 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136 & 205. 1949; Moldenke, Résumé 176 & 482. 1959.

Citations: INDOCHINA: Cambodia: Thorel 1593 (B--cotype).

ERIOCAULON NEESIANUM Körn.

Synonymy: Eriocaulon thwaitesii Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 6, & 412. 1900 [not E. thwaitesii Körn., 1856]. Eriocaulon thwaitesianum Körn. ex Moldenke, Résumé Suppl. 1: 18, in syn. 1959.

Bibliography: Körn., Linnaea 27: 628. 1854; Walp., Ann. 5: 936 (1858) and 6: 1171. 1861; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878. 1893; Hook. f., Fl. Brit. Ind. 6: 585. 1893; Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 6, & 412. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 103, 105, 286, & 287. 1903; Fyson, Journ. Indian Bot. 3: 18. 1922; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878. 1946; Moldenke, Known Geogr. Distrib. Erioc. 24, 37, & 41. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 130 & 205. 1949; Moldenke, Résumé 167, 293, & 482. 1959; Moldenke, Résumé Suppl. 1: 18. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878. 1960; Moldenke, Phytologia 18: 186. 1969.

The E. thwaitesii Körn., referred to in the synonymy above, is a valid species.

Citations: CEYLON: G. Gardner 936 (B--type, Z--isotype).

ERIOCAULON NEGLECTUM Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 59, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Moldenke, Known Geogr. Distrib. Erioc. 8 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89 & 482. 1959.

Citations: BRAZIL: Goiás: G. Gardner 4381 [Macbride photos 29987] (B--isotype, N--photo of type, Z--isotype). Rio Branco: Black 51-12572 (N), 51-12624 (N).

ERIOCAULON NEO-CALEDONICUM Schlecht.

Synonymy: Eriocaulon neocaledonicum Schlecht. apud Guillaum., Ann. Mus. Colon. Marseille, sér. 2, 9: 256. 1911. Eriocaulon neocaledonica Schlecht. apud Rendle, Journ. Linn. Soc. Lond. Bot. 45: 260, sphalm. 1921.

Bibliography: Schlecht. in Engl., Bot. Jahrb. 40, Beibl. 92: 20. 1908; Guillaum., Ann. Mus. Colon. Marseille, sér. 2, 9: 256. 1911; Prain, Ind. Kew. Suppl. 4, pr. 1, 82. 1913; Rendle, Journ. Linn. Soc. Lond. Bot. 45: 260. 1921; Däniker, Vierteljahrsschr. Naturf. Gesell. Zürich 77, Beibl. 19: 91. 1932; Prain, Ind. Kew. Suppl. 4, pr. 2, 82. 1938; Moldenke, Known Geogr. Distrib. Erioc. 27 & 37. 1946; Guillaum., Fl. Analyt. & Synopt. Nouv.-Caléd. 49--50. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 151 & 205. 1949; Moldenke, Résumé 205 & 482. 1959; Moldenke in Guillaum., Mém. Mus. Hist. Nat. Paris, new ser. B, 15: 6. 1964; Guillaum., Thorne, & Virot, Univ. Iowa Stud. Nat. Hist. 20 (7): 26. 1965; Moldenke, Phytologia 18: 270. 1969.

Franc refers to this species as "rare". Baas Becking 6085, Baumann 15244, and Guillaumin & Baumann 6491 appear to be typical. Däniker (1932) says "NC : D [äniker] 186a, bl. u. bt., in den Teichen des sumpfigen Talbodens des Yatétales (4.X.24) auf den Feldetiquette steht die Notiz: 'Form von 186 (d.i., Eriocaulon schmithii R. Br.) am Rande der Tümpel wachsend, oft submers und nur die Blütenköpfe über das Wasser streckend.' Wenn das nun auch nicht zutrifft, insofern es sich um zwei Arten handelt, so ist doch zu bemerken dass infolge der stark wechselnden Standortsbedingungen je dach dem Grade der Ueberschwemmung des schlammbodens Eriocaulon neocaledonicum Schltr. habituell sehr verschiedengestaltig auftreten kann und insbesondere das Längenverhältnis zwischen den Blättern und dem Schaft dadurch beeinflüsst wird; D [äniker] 186b, bl. u. br., am Ufer des Lac Arnaud (6.X.24) kleine Horste auf nacktem Eisenboden."

Guillaumin (1948) keys this species from the other species of New Caledonia known to him as follows:

1. Plants robust; leaves 20—35 cm. long; heads globose; scape 6-ribbed, 20—30 cm. long.....E. pancheri H. Lecomte.
1a. Plants very dwarf; leaves 13 cm. long or longer.
2. Heads globose.
3. Scapes plainly ribbed.
4. Scapes 6-ribbed, 14--16 cm. long; leaves 5—13 cm. long; pistillate sepals obtuse.....E. comptonii Rendle.
4a. Scapes 5-ribbed, 8—20 cm. long; leaves 3—7 cm. long; pistillate sepals acute.....E. scariosum J. Sm.
3a. Scapes almost cylindric, 5—8 cm. long; leaves 3--7 cm. long.....E. neo-caledonicum Schlecht.
2a. Heads turbinate, very small; scape 7-ribbed, extremely long, 10—100 cm.....E. longipedunculatum H. Lecomte.

According to information on the labels, Hürlimann 3191 was found in a swamp on serpentine rock, while no. 3265 was found in a temporary lake at 155 meters altitude. The former is said by

this collector to grow "15--20 cm. tall" and the latter "to 10 cm. tall", but the actual specimen of 3265 seen by me was no more than 1 cm. tall. His no. 3271 bears a note stating that is "leavee are in rosettes, to 20 cm. tall, forming a distinct zone"! In this connection, a letter from Dr. Hürlimann to me, dated April 8, 1962, is well worth quoting here: "As regards the Eriocaulon specimens from New Caledonia, I think that the specimens are more worthy to be trusted than my subjective indications of dimensions! (As a matter of fact, I have not measured the plants on the spot but noted down only my estimation.) Anyhow, I certainly agree with your view that ecological conditions will probably influence very much the size of the plants (leaves and scape), and only cultivation experiments can show what is really stable in these plants. I have always been surprised to find colonies under the most xerophytic conditions for periods of several months, e. g., in the sinkholes of 'Plaine des Lacs' with water level changes of several meters, on completely dried-out soil covered by sheets of algae and mud.

"What I wonder, however, is the importance of the characters given in Guillaumin's 'Flore analytique....' for distinguishing the species, and especially the value of the cross-section of the scape: 'almost cylindrical" in E. neo-caledonicum, with 5 edges in E. scariosum, with 6 edges in E. pancheri and E. comptonii and with 7 in E. longipedunculatum.....I remember that in some cases, I definitely noticed edges on the scapes of specimens..... There is also some contradiction in the characters of E. comptonii (found by Compton precisely in the places where I collected, too) between the original diagnosis and the key given by Guillaumin: Rendle writes: 'flore foemineo: sepalis 3 ovatis acutis valde carinatis...', but Guillaumin: 'verticille externe du périgone de la fleur ♀ à pièces obtuses'! Rendle indicates also that E. comptonii differs from E. neo-caledonicum in the form of the floral bracts and sepals, but I do not have the diagnosis of the latter given by Schlechter. On the other hand, Daeniker.....indicates E. neo-caledonicum and E. 'Schmithii' R. Br. from the same region, but again without mentioning the differences. I really think that --unless you have already done so -- a clearing up of the mess found in the literature would be highly desirable!"

With this conclusion I agree whole-heartedly, but unfortunately I do not have the time to undertake the task. The citations given below are strictly tentative.

Guillaumin (1911) cites Franc 266 and LeRat 131a. Guillaumin, Thorne, & Virot (1965) cite Thorne 28618 from New Caledonia. Franc A.266 is a mixture with something non-eriocaulaceous. Material has been misidentified and distributed in herbaria as E. pancheri H. Lecomte.

Citations: MELANESIA: NEW CALEDONIAN ISLANDS: New Caledonia: Baas Becking 6085 (Hr); Baumann 6289 (Ca), 6379 (Z), 15244 (Z); Franc A.266, in part (B--cotype, Ca--54182--cotype, Ca--390298--cotype, Ca--390300--cotype, N--cotype, N--cotype, N--cotype), s.n.

(Ca--390299); Guillaumin & Baumann 6491 (Z); Hürlimann 1498 (Z), 3038 (Z), 3191 (Z), 3265 (Z), 3271 (Hr), 3290 (Z); Kraspolin s.n. [N. C.] (Ut--417); LeRat 131a (B--cotype); McKee 3383 (Go). MOUNTED DESCRIPTIONS: Echlecht. in Engl., Bot. Jahrb. 40, Beibl. 92: 20 (B).

ERIOCAULON NEPALENSE Prescott

Synonymy: Eriocaulon viride Körn., Linnaea 27: 637. 1856. Eriocaulon quinquangulare Wall. apud Walp., Ann. 5: 938, in syn. 1858 [not E. quinquangulare Bojer, 1964, nor Heyne, 1832, nor L., 1743, nor Mart., 1854, nor Wight, 1832, nor Willd., 1959]. Eriocaulon nepalense Bong. apud Walp., Ann. 5: 938. 1858. Eriocaulon nepalense Kunth apud Walp., Ann. 5: 938, in syn. 1858. Eriocaulon nepalense "Presc. ex Bong." apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 1283. 1895.

Bibliography: Bong., Mém. Acad. Pétersb., sér. 6, 1: 610. 1831; Bong., Ess. Monog. Erioc. Brés. 10. 1831; Kunth, Enum. Pl. 3: 554. 1841; Körn., Linnaea 27: 637. 1856; Walp., Ann. 5: 938 (1858) and 6: 1171. 1861; Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 163. 1967; Hook., Fl. Brit. Ind. 6: 581 & 585. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and 2: 1283. 1895; Ruhl. in Engl., Pflanzenreich 13 (4-30): 64, 88, 286, & 288. 1903; Fyson, Journ. Indian Bot. 2: 198. 1921; Moldenke, Known Geogr. Distrib. Erioc. 23, 37, & 41. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and 2: 1283. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 125, 126, & 205. 1949; Moldenke, Phytologia 3: 336. 1950; Santapau, Pl. Purandhar 136. 1957; Moldenke, Résumé 159, 160, 162, 293, & 482. 1959; Moldenke, Résumé Suppl. 1: 11 & 18. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and 2: 1283. 1960; N. C. Nair, Bull. Bot. Surv. India 6: 233. 1964; Thanikaimoni, Pollen & Spores 7: 185. 1965; Moldenke, Résumé Suppl. 17: 10. 1968; Moldenke, Phytologia 18: 264 & 274. 1969.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 6. 1921.

Because of various interpretations which have been applied to this taxon, it seems desirable to repeat here certain important descriptions. Bongard (1831) describes it as "Acaule; foliis radicalibus reticulatis, lineari-lanceolatis, obtusis, glabris; pedunculis (caespitosis) elongatis, glabris; vaginis folia subaequantibus, bifidis; capitulis lanatis, minoribus". Kunth (1841) amplifies this, but adds comments indicating some doubts on his part: "Caule brevi, simplici, radiculoso, superne folioso; foliis gramineo-linearibus, obtusiusculis, fenestrato-multinerviis, pellucidis, glabris, vaginas superantibus; pedunculis fasciculato-congestis, 5?-sulcatis, glabris; capitulis albido-villosulis; bracteis involucrantibus obovatis, apice rotundatis, flores stipantibus rhombeo-cuneatis, subacuminatis; floribus masculis hexandris; femineis trigynis; calyce masculo interiore limbo irregulariter trilobo: lobis eglandulosis?, apice ciliatis; sepalis mascilis exterioribus distinctis; femineis interioribus ciliatis."

# BOOK REVIEWS

Alma L. Moldenke

"POISONOUS PLANTS OF HAWAII" by Harry L. Arnold, 71 pp., illus., Charles E. Tuttle & Company, Publishers, Rutland, Vermont 05701 & Tokyo, Japan. 1968. $2.50

The useful material contained in this little book first appeared in 1931 in a Queen's Hospital Bulletin, then in 1944 in book form, and now again in this attractive inexpensive reprinting after the previous editions became exhausted.

Some 90 common and varyingly dangerous plants are described, even including some mushrooms. Twenty-four of these are effectively illustrated from plates in Degener's well-known and important "Flora Hawaiiensis".

Actually, few of these poisonous plants are native to this American paradise. Most are introductions which are now prominent around the warm temperate and subtropical world.

The poisons, their effects, treatments, and location in the plants are usually given for each species by the medically trained author. The botany has been checked by Dr. Otto Degener, who has devoted his professional life to the natural history of this geographical area. The author's first rule for the tourist regarding poisonous plants is "never eat or taste any strange fruit, leaf or root."

"39 STEPS TO BIOLOGY -- READINGS FROM SCIENTIFIC AMERICAN" edited by Garrett Hardin, 344 pp., illus., W. H. Freeman & Company, San Francisco 94104. 1968. $10.00 clothbound, $4.95 paperbound.

The editor has selected those articles from the last twenty years of this popular and valuable journal that he deemed most noteworthy for their intrinsic interest and their good writing, excluding topics in molecular biology. Individual readers will perhaps miss a few of their favorites, but the choice remains excellent as is indicated in this list of chapter titles: Innovations in Biology -- Fleas -- Butterflies and Plants -- Predatory Fungi -- Nocturnal Animals -- Moths and Ultrasound -- Electric Location by Fishes -- Master Switch of Life -- Physiology of the Camel -- Adaptations to Cold -- Habitat Selection -- Crises in the History of Life -- Spider and Wasp -- Evolution of Bowerbirds -- Cleaning Symbiosis -- Biological Luminescence -- Navigation of the Green Turtle -- Differentiation in Social Amoebae -- Pheromones -- Sound Communication in Honeybees -- Curious Behavior of the Stickleback -- Behavior of Lovebirds -- 'Imprinting' in Animals -- Love in Infant Monkeys -- Attitude and Pupil Size -- Ulcers in 'Executive' Monkeys -- Ecosphere -- Human Population -- Last of the Great Whales -- Ecology of Fire

-- Black Death -- Population Control in Animals -- Population Density and Social Pathology -- Control of Air Pollution -- Effects of Smoking -- Thalidomide Syndrome -- Fighting Behavior of Animals -- National Security and the Nuclear-Test Ban -- Shelter-Centered Society.

The photographic illustrations are of finer quality than most reproduced by the offset process.

The usual biographical and bibliographical material is inserted before the index.

"THE SCIENCE OF GENETICS -- AN INTRODUCTION TO HEREDITY" by George W. Burns, x & 399 pp., illus., Macmillan Company, New York 10022 & Collier-Macmillan, Toronto. 1969. $8.95

The outstanding virtue of this excellent text is its clarity. Study of it will lead to basic comprehension rather than memorization of numerous facts and theories. Another value of this text is the effective way it shows the dependence of molecular genetics upon the classical, so that beginning students are not led to feel that the latter is of no significance in today's atom-oriented world. Yet it is up-to-date and even peering into the future with its final chapter on genetic problems and promise in terms of human evolution.

It is effectively illustrated.

In a series of appendices are given answers to the questions at the ends of the chapters, selected life cycles, chemical arrangement of the essential amino acids, useful formulas, ratios, and statistics, general references, and a glossary. All this is followed by an index.

"MANUAL OF WAYSIDE PLANTS OF HAWAII -- INCLUDING ILLUSTRATIONS, DESCRIPTIONS, HABITS, USES AND METHODS OF CONTROL OF SUCH PLANTS AS HAVE A WILD NATURE OF GROWTH, EXCLUSIVE OF FERNS" by Willis T. Pope, 289 pp., illus., Charles E. Tuttle Company, Rutland, Vermont 05701 & Tokyo, Japan. 1968. $6.00

About 160 kinds of weeds are well described and illustrated by means of black-and-white herbarium sheet photographs and drawings. These plants are mostly adventive, hardy introductions found in the islands as well as over much of the warmer temperate and subtropical areas of the world. They are introduced to the reader by means of a popular flower-color key.

This book is very reasonably priced probably because it first appeared in 1929. Its contents have been checked by two well-known botanists long familiar with the Hawaiian flora -- Dr. Otto Degener and Dr. Harold St. John.

In reference to a few of the Verbenaceae listed it should be noted that the commonest form of Lantana on the islands is L. camara var. aculeata. Several other varieties of this species are also common, but the typical form is not abundant. The Stachytarpheta illustrated should be labeled S. cayennensis and is not

nearly as common in Hawaii as S. australis, S. jamaicensis, and S. urticaefolia. The true Vitex trifolia is rare on the islands; the illustration so labeled actually depicts var. simplicifolia and var. subtrisecta, which are the common forms of the species on the islands. The genus Priva is not known from the Hawaiian Islands; all plants so identified in the past have proved to be a species of Salvia.

"THALASSIOPHYTA AND THE SUBAERIAL TRANSMIGRATION" by A. H. Church, 95 pp., Hafner Publishing Company, New York 10003 & London. 1968. $4.00

This offset facsimile of the 1919 edition makes access to it easy and plentiful now. It provides thought-provoking, important, maybe fantastic, but not easy reading for those interested in plant evolution.

The Thalassiophyta, predominantly Thallophyta (Phaeophyceae), are the plants evolved in the sea from the plankton phase to the marine benthon and still retaining their biological station unaffected. By contrast the Xerophyta include all other plants that have survived the subaerial transmigration from the sea. The author claims that "the origins of all the main successful adaptations of the land are to be traced down to the benthic phase of the sea". He even concludes that we are "still isolated human entities, because the effect of wave-action in the surface-waters of the primal ocean involved the minute subdivision of all incipient plankton-phases.....The progress of benthic organism involves conceptions of the 'good of the race', which are subsequently to be crystallized in conceptions of a racial deity."

"TREES" — a studio book by Andreas Feininger, 116 pp., 160 illus. plates, The Viking Press, New York 10022 & Macmillan Company of Canada. 1968. $22.50

The famous author-photographer has herein produced an exquisitely beautiful and moving book which is highly successful in achieving what he wanted it to be — "not a textbook or manual, nor a tree identification book, nor still another picture book proving that trees are beautiful, but a tree-appreciation book."

Interesting and accurate text is given about the importance, history, character, age, structure, size and coloring of trees and forests — all checked by recognized authorities and demonstrated with 40 colored and 120 black and white photographs of amazing clarity and artistry.

For the camera-minded there are definitive notes on the photographs.

For all who peruse the book there is a final chapter on "You Can Help" with the camping rules and conservation principles that must be followed if our world's forests are to remain.

This is truly a tree-appreciation book, because it comes from the mind and heart, the lens and pen of one who has and can so

well share his own tree appreciation!

"MUSHROOMS AND OTHER COMMON FUNGI OF SOUTHERN CALIFORNIA" by Robert T. & Dorothy B. Orr, 91 pp., illus., University of California, Berkeley & Los Angeles. 1968. $1.75 paperbound.

Part of the fine California Natural History Guide, this handbook for the amateur covers 81 genera and 167 species of the common fleshy and woody fungi from the coast, mountains and deserts of the southern half of the state.

Modern nomenclature accompanied by older common synonyms, simply explained technical terms, careful explanations, clear diagrams, visually helpful species descriptions, and 24 beautiful color habitat plates make this book attractive and useful.

It would have been of infinitely greater value with the addition of more color plates since so many amateurs like to finger-hunt the picture pages.

"AN INTRODUCTION TO TREE-RING DATING" by Marion A. Stokes & Terah L. Smiley, ix & 73 pp., illus., University of Chicago Press, Chicago 60637 & London W.C.1. 1968. $5.85

This excellent little book explains for general readers the nature of dendro-chronology from the structure of woody stems to dating principles and practices used in the field and in the laboratory on both archeological and modern specimens. The 'field' in this case is the site in our southwest on Navajo Reservation land. The 'laboratory' is the famous Laboratory of Tree-Ring Research of the University of Arizona with which the authors are associated and where they were consulted as legal experts in a land claims case of the Navajo and where they are constructing a master chronology using Pinus edulis Engelm. This piñon pine was chosen because of its wide geographic distribution, large proportions and conspicuous growth responses to certain controlling factors.

The text is clear, simple and interesting. The diagrams and photographs are attractive and helpful. There is a topical bibliography for readers wishing to delve further into any part of the subject whose periphery is so wide -- botany, forestry, hydrology, watershed management, anthropology, archeology, dendro-climatology, etc.

"MACROMOLECULES OF LIVING SYSTEMS -- STRUCTURE AND CHEMISTRY" by Herbert S. Rhinesmith & Luigi A. Cioffi, xi & 164 pp., illus., Reinhold Science Studies, Reinhold Book Corporation, New York 10022. 1968. $4.75 paperbound.

Much cogent information explained with considerable clarity is aimed at the upper undergraduate and the graduate student who is "on friendly terms with inorganic and organic chemistry". The text kindly provides helpful reviews of the chemical story for each type of macronuclear structure.

The book starts with the "big bang" origin of the universe,

proceeds to the "soups" formation of organic compounds and macromuclear assemblages essential to life, and subsequently sketches the origin of life on earth.

It devotes three excellent chapters to carbon, its tetrahedral atomic form, bond formation, isomerism and conformations. The other chapters deal with the basic macromolecules essential for life -- lipids, carbohydrates, amino acids, proteins and nucleic acids including the derived DNA and RNA.

On page 16 "abundance" is misspelled.

A valuable epilogue emphasizes man's responsibilities on our planet earth. "His brain can solve the relatively simple technical problems of water supply, waste disposal, and new sources of food and energy. But only with his heart can he limit the population, feed the population and live as one with the population. To accomplish this he must take apart his atomic toys and live in peace. He most preserve his most precious heritage -- the pool of human germ plasm which is the end product of his evolutionary past and one requirement for an evolutionary future."

"HOW TO KNOW THE GRASSES" by Richard W. Pohl, x & 244 pp., illus., Picture Key Nature Series, William C. Brown Company, Publishers, Dubuque, Iowa 52001. 1968. $3.25 spiral bound, paper & $4.00 cloth binding.

The highly successful first edition of this work has been considerably revised by the addition of 25 new genera and 27 new species, by the change from the older Hitchcock taxonomy to the newer, author-modified Stebbins and Crampton classification of 1961, and also by new artificial keys to the genera. The first is the expected result of continued study by the author who is a competent teaching agrostologist. The second is the result of more recent chromosomal and epidermal studies and those on convergent evolution. The third is the result of necessary substitutions for the microscopic characteristics in the natural system so that the beginning student and non-specialist can use the book as a field guide.

The key seems to work fairly well. The species descriptions and illustrations are marked for their clarity. Geographical distribution maps are given for almost all species. The introductory discussions of grass structure and economic value are well done. So is the index which is combined with a picture glossary. This is an interesting device for print-saving and reduced page flipping; it might well prove highly advantageous for many texts and field guides.

The various books in this series are priced very reasonably for today's market.

"BRITISH MOSSES AND LIVERWORTS" by E. Vernon Watson, xvi & 495 pp., illus., 2nd edition, Cambridge University Press, New York City 10022 & London N.W.1. 1968. $13.00

This revision of the first edition of 1955 is even an impor-

tant improvement on this fine work because of the addition of several new species with the author's fine illustrations of them, the adjustments in nomenclature to agree with modern check lists, the annotated bibliography, and excellent ecological notes.

About 150 common and/or conspicuous mosses and almost 50 similarly common and/or conspicuous liverworts are treated. The keys seem to be workable, the language in them is clear, and they very often require the use of a microscope. However, the field key of the first edition has been omitted. Several beautiful photographs are included.

This book is really needed in the British Isles and it is of real value to all who are bryologically interested in the United States and Canada, even if some of the genera and species are not represented in the flora here.

"VAN NOSTRAND'S SCIENTIFIC ENCYCLOPEDIA", 4th edition, ix & 2008 pp., illus., D. Van Nostrand Company, Inc., Princeton, New Jersey 08540, Toronto, London, & Melbourne. 1968. $42.75

In about two and a half million words on all these pages in double column format there is much, much valuable scientific material completely updated from the previous editions. The dust jacket lists 125,000 definitions, 16,500 separate articles, 2,000 pictures and diagrams, and 16 colored full-page illustrations as comprising this stupendous work.

Inspection of the contents and the list of well qualified contributors shows that this work favors the physical sciences over the natural sciences even to the extent of excluding some biological terms found in the general Random House dictionary. The "Mangrove" write-up leaves the impression that the only tree involved is Rhizophora mangle — which is certainly far from the truth! Fungi are not mentioned in the "periderm" reference. On p. 54 the initial letter of the generic name Nostoc is not capitalized as is required of scientific generic names. On p. 139 "arthropod" is misspelled. Such small items aside, the text is easily comprehendable, the print is clear, the cross references valuable, and the total usefulness of the book is considerable.

"SOUTH OF YOSEMITE — SELECTED WRITINGS BY JOHN MUIR" edited by Frederic R. Gunsky, xiii & 269 pp., illus., Natural History Press, Garden City, New York 11530. 1968. $7.50

Almost a half century after his death the campaigns sparked by John Muir have resulted in the safe conservation of the larger Yosemite National Park area which includes the expanded boundaries of the original, the King's Canyon and the Sequoia National Parks. Much of these additions, as well as the Big Valley of the Tuolumne and Mono Lake are described in the beautiful prose selections from the author's original notes and augmented appropriately by several fine black and white photographs by Philip Hyde.

The thousands who follow the John Muir Trail, the millions who visit the area in more "touristy" style, and the millions more of

distant and arm-chair naturalists, mountaineers and aroused conservationists hopefully will find this book to enrich their memories, their souls and their country.

In 1875 Muir wrote to his mentor, Mrs. Carr, "But I am more and more made to feel that my gardens and herbariums and woods are all in their places as they grow, and I know them there, and can find them when I will. Yet I ought to carry their poor dead or dying forms to those who can have no better."

In describing the role of fire in sequoia groves, he related how these giants were hollowed out by it after falling, and never from decay.

His description of the glacial formation of the Sierras is very lucid and convincing. It was based on five years of intimate study and contradicted the then accepted scientific view. He defines all yosemites as occurring at the junction of two or more glacial canyons. "No matter how the preglacial mass of the range came into existence, all the separate mountains distributed over its surface between latitude 36°30' and 39°, whether the lofty alps of the summit, or richly sculptured dome clusters of the flank, or the burnished bosses and mountainets projecting from the sides of valleys — all of valleys — all owe their development to the ice sheet of the great winter and the separate glaciers into which it afterward separated. In all this sublime fulfillment there was no upbuilding, but a universal razing and dismantling, and of this every mountain and valley is the record and monument."

This book is second only to having all of John Muir's writings!

"FLORA OF THE QUEEN CHARLOTTE ISLANDS" Part 1 Systematics of the Vascular Plants by James A. Calder & Roy L. Taylor, xiii & 695 pp., illus., $12.50. Part 2 Cytological Aspects of the Vascular Plants by Roy L. Taylor and Gerald A. Mulligan, ix & 148 pp., illus., $7.50. The Queen's Printer, Ottawa, Ontario, Canada. 1968.

These careful studies comprise Monograph 4, parts 1 and 2, of the Research Branch of the Canada Department of Agriculture.

The area covered is a triangular archipelago off the northwest coast of British Columbia, consisting of about 150 islands of varied topography and coast lines subject mainly to cool fogged summers and warm winters.

Part 1 includes the botanical history, physiography, geology, climate, economic botany, plant communities, phytogeography, and material prefacing the systematic section. This last section has the keys to families, then to genera and also then to some species. Species descriptions are given in full detail with much local growing information added. Appended are 594 distribution maps for all species, references, glossary, and index. Throughout there are excellent line drawings as well as black and white and colored photographs.

Part 2 deals with such cytological aspects of the vascular plants as chromosome numbers, apomixis, meiotic aberrations, etc.

and their comparison with other known collections. This is of special interest since the islands are rich in endemics and yet are much influenced botanically by the adjacent mainland flora.

The forthcoming Part 3 is to deal with the systematics and phytogeography of the non-vascular plants.

This excellent work will surely prove of great interest to professional botanists, naturalists, local students and others.

"MANUAL OF THE VASCULAR FLORA OF THE CAROLINAS" by Albert E. Radford, Harry E. Ahles & C. Ritchie Bell, lxi & 1183 pp., illus., University of North Carolina Press, Chapel Hill, North Carolina. 1968. $19.75

Filling an important need, several fine state floras have appeared within the last decade. This one is asmeritorious quantitatively and qualitatively as any that has recently appeared.

The more than 200,000 voucher specimens on which it is largely based are deposited in the herbarium of the university responsible for the publication of the work. Since 1956 the authors have been making a county by county survey in preparation for this manual which now includes 89 ferns, 21 gymnosperms, 940 monocots and 2310 dicots, totalling 3360 species. All plants may be traced through reasonably operative keys that treat the woody plants separate from the herbaceous ones; all are well described; more than half are illustrated with very clear diagrams; almost two-thirds are shown on geographic distribution maps with the remainder located geographically in the text.

This flora is particularly rich because of the long growing season and even more because of the varied topography starting in the west with the mountainous area and going eastward through a wide central piedmont and ending in a long low coastal plain that has been much influenced by shipping.

The glossary is placed immediately after the key and therefore is very handy to use. A list of the authorities for the scientific plant names with dates is included in an appendix before the index.

This book can be useful in the southeastern part of the United States even beyond the borders of the Carolinas and has been planned for use by botanists, teachers, students, amateur naturalists and those whose work is related, such as librarians, foresters, conservationists, wildlife management directors, county agricultural agents, etc.

# PHYTOLOGIA

*Designed to expedite botanical publication*

Vol. 18 August, 1969 No. 6

CONTENTS



Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, $1.25; per volume, $6.75, in advance, or $7 at close of volume

# ORMOSIA SCHUNKEI, another new species from Peru

Velva E. Rudd

ORMOSIA SCHUNKEI Rudd, sp. nov.

Arbor usque ad 30 m. alta, tronco 1-2 m. diametro; ramuli novelli fulvo-sericei; stipulae deltoideae, circiter 0.5 mm. longae, caducae; folia 11-13-foliolata, axe cum petiolo circiter 10-15 cm. longo, petiolo 3 cm. longo, jugis inter sese plerumque 1.5-2.5 cm. distantibus, petiolulis 5 mm. longis, 1 mm. diametro, laminis subcoriaceis, plerumque oblongis, 6-12 cm. longis, 2.5-4 cm. latis, apice acuminatis, basi obtusis, supra glabris, subtus plus minusve glabris praeter costa saepe pubescenti, venis secundariis leviter elevatis; flores non visa; fructus dehiscens, coriaceous vel sublignosus, brunneus, glaber, 1-spermus (fortasse 2- vel plus ?), 3-4 cm. longus, 2-3 cm. latus, circiter 1 mm. crassus, valvulis 0.5-1 mm. crassis; semina bicolora, coccinea macula nigra notata, 12-14 mm. longa, 9-12 mm. lata, 8-9 mm. crassa, hilo apicali, elliptico, 3 mm. longo, 1.5 mm. lato.

Holotype in the U. S. National Herbarium, no. 2554593, collected by José Schunke Vigo (no. 3), February 3, 1969, "en bosque alto, terreno húmedo, altitud 350 m., Huacamayo, sud este de la Quebrada de Aymiría, Depto. Huánuco, Prov. Pachitea, Dto. Honoria, Peru." Paratype, same data, Schunke (no. 4) at US.

According to the collector's notes, the Shipibo Indians use the seeds to make necklaces and an infusion of the bark to bathe infected wounds. The local name is "huairuro."

The relationship of O. schunkei is with my Ormosia series Coccineae (Contr. U. S. Nat. Herb. 32: 291, 292, 326-341. 1965) on the basis of its bicolored seeds and glabrous, or glabrate, pods. The valves are thin as in O. costulata (Miq.) Kleinh., O. jamaicensis Urb., and O. smithii Rudd. The seed markings are essentially identical with those of several species, including O. amazonica Ducke, O. elata Rudd, O. paraensis Ducke, and O. smithii. In vegetative characters O. schunkei most resembles O. jamaicensis and some specimens of O. paraensis.

The following key shows the relative position of the thin-valved species of Ormosia series Coccineae.

Fruit 1.2-2 cm. broad; seeds 6-11 mm. long, the hilum 1-1.5 mm. long; leaflets 1-7 (Surinam; Guyana; Brazil). O. costulata
Fruit 2-3 cm. broad; seeds 12-15 mm. long, the hilum 2-3 mm. long; leaflets 5-13.
Leaflets 9-13, the lower surface puberulent along the midvein, otherwise minutely and sparsely appressed-pubescent, glabrescent; seeds with hilum about 3 mm. long.
Seeds 15-17 mm. long, red except for a black strip 5 mm. wide or less along the chalazal edge (Jamaica) . . . . O. jamaicensis
Seeds 12-14 mm. long, red with a black patch about 8-10 mm. wide along the chalazal edge (Peru) . . . O. schunkei
Leaflets 5-9, the lower surface finely puberulent or suffarinose, sometimes tomentulose along the major veins; seeds with hilum 2 mm. long (Guyana; Brazil) . . . . O. smithii

---

In my treatment of the American species of Ormosia, cited above, I forgot to include as a dubious species, O. zahnii Harms (Feddes. Rep. Spec. Nov. 19: 290. 1924). Two syntypes were cited, Zahn 336 and 688, collected at the "Kamerun: Viktoria, Versuchsgarten" in 1911 and 1914. The origin of the species was given as tropical South America, introduced by P. Preuss. The first director of the botanical garden in Victoria, Paul Preuss visited parts of Mexico, Central and South America, and the West Indies in 1899-1900.

Harms' syntypes, presumably, were at Berlin and have been destroyed. If duplicates exist in other herbaria, or if trees of this species are still extant in Victoria, I should be most interested to see them. There is a good chance that the name O. zahnii would displace one of the names in current use. The seeds were described as red, which eliminates as possibilities the many species with brown, yellow, or bicolored seeds. On the basis of that and other characters, the most likely candidate for synonymy appears to be Ormosia isthmensis Standl.(Publ. Field Mus. Bot. 17: 264. 1937). However, I should not want to make such a decision without examination and comparison of specimens.

# HOMONYMY IN ARTHROSPIRA STIZENB. (OSCILLATORIACEAE)

Francis Drouet

Dr. Paul C. Silva has called my attention to the existence of an earlier homonym of Arthrospira brevis (Kützing) Drouet, "Revision of the Classification of the Oscillatoriaceae" Monographs Acad. Nat. Sci. Philadelphia no. 15, p. 219 (1968). To supplant this later homonym a new name is offered:

Arthrospira NEAPOLITANA (Kützing), COMB. NOV. Oscillatoria neapolitana Kützing [(as "Oscillaria"), Phyc. Gener., p. 185. 1843] ex Gomont, Ann. Sci. Nat. VII. Bot. 16: 229. 1892. O. brevis var. neapolitana Gomont, loc. cit. 1892. Lyngbya tenuis var. neapolitana Hansgirg, Sitzungsber. k. böhm. Ges. Wiss., math.-nat. Cl. 1892: 226. 1893. --TYPE specimen from Italy: Neapel, marina, in herb. Kutzing (L).

The earlier homonym is Arthrospira brevis C. C. Wang, Contrib. Biol. Lab. Sci. Soc. China, Bot. Ser. 9(1): 93 (1933). Its original material, "China: floating in a very slowly flowing stream, Nanking, Chu Chia Wang 318, 24 Sept. 1930" (TYPE: UC; duplicates: F, herb. F. Drouet), proves, upon examination, to have all the characteristics of planktonic Microcoleus lyngbyaceus (Kütz.) Crouan.

Original specimens of another Arthrospira, A. pellucidis [sic!] Wang, published on page 92 of the same paper, "China: with Oscillatoria splendida Grev. on a layer of mud floating, Nanking, Wang 398, 26 Apr. 1930" (TYPE: UC; duplicates: F, herb. F. Drouet), appears to me indistinguishable from other material of A. Jenneri (Hass.) Stizenb.

I wish to thank Mr. Richard W. Hildebrand for providing the literature referred to here and for preparing this typescript. This is part of a revisional study supported largely by the National Science Foundation.

Academy of Natural Sciences, Philadelphia 19103

# A FURTHER NOTE ON CHROMOSOME NUMBERS OF THAILAND COMPOSITAE

by

R. M. King & H. Robinson

Department of Botany, Smithsonian Institution
Washington, D.C., 20560

During the course of the revision of the Eupatorieae, we have encountered a specimen labelled Eupatorium odoratum L. (King 5597). The proper determination of this specimen should be Pluchea indica Lessing. The specimen is of particular interest being a voucher for a chromosome number reported as Eupatorium sp. (King, 1965). Therefore, this report of a chromosome count of n=10 should be credited to Pluchea indica [THAILAND: Pranakorn: 18 kms. S. of Bangkok, King 5597 (US)]. This number is in agreement with others reported for the genus Pluchea. It is entirely fortuitous that n=10 is a common chromosome number in both Pluchea and Eupatorium.

## REFERENCE

King, R. M. 1965. Chromosome numbers of Thailand Compositae. Phytologia 11 (4): 217-218.

# SEVEN MORE NOVELTIES IN THE ERIOCAULACEAE AND VERBENACEAE

Harold N. Moldenke

ALOYSIA HATSCHBACHII Moldenke, sp. nov.

Frutex 1.5 m. alt., ramis ramulisque gracilibus pilosis puberulentibusque brunneis, internodiis perabbreviatis; foliis decussato-oppositis numerosis; petiolis perabbreviatis minutissime puberulis; laminis foliorum lanceolatis 2—4 cm. longis 0.8—1.9 cm. latis plerumque obtusis regulariter serratis, ad basin acutis vel acuminatis integris, supra dense pustulo-pilosulis scaberrimis, subtus densissime peradpresseque albido-tomentellis; inflorescentiis axillaribus spicatis 7—9 cm. longis multifloris; corollis albidis.

Shrub, about 1.5 m. tall; branches and branchlets slender, brown, the younger parts rather densely spreading-pilose and more densely appressed-puberulent; all the internodes much abbreviated, apparently only 2—10 mm. long; leaf-scars quite prominently raised; leaves decussate-opposite, numerous on the young growth, close together, often with abbreviated leafy twiglets in the axils; petioles very short, mostly 1—3 mm. long, very minutely puberulent, brown; leaf-blades firm, brunnescent above in drying and decidedly whitish beneath, lanceolate, 2—4 cm. long, 8—19 mm. wide, mostly rounded (rarely acute) at the apex, regularly sharp-serrate along the margins from slightly below the widest part to the apex, acute or acuminate into the petiole at the base and there entire, densely pustulate-pilosulous above and very scabrous, very densely white-tomentellous beneath with closely appressed tomentum through which the venation projects; venation obscure or the larger parts slightly subimpressed above, very intricate and decidedly prominulent and conspicuous through the tomentum beneath; foliar bracts subtending the spikes at the apex of each branchlet more oblong or spatulate and rather long-stalked, otherwise with the characters of the normal leaves; inflorescence axillary, in the axils of the uppermost leaves or bracts, ascending, slender, 7—9 cm. long, many-flowered, the flowers sometimes in rather separated groups; peduncles very slender, 2—2.5 cm. long, densely brown-puberulent; bractlets lanceolate, one subtending each calyx and almost equaling it, keeled on the back, rather densely spreading hirsutulous at the base, long-attenuate at the apex; calyx about 1.5 mm. long, rather densely spreading-hirsute especially toward the base, decidedly ovate-toothed on the rim; corolla whitish, its tube equaling the calyx.

The type of this species was collected by Gerdt Hatschbach (no. 16101) — in whose honor it is named — on a rocky campo at Pien, Paraná, Brazil, on March 8, 1967, and is deposited in the Britton Herbarium at the New York Botanical Garden. Considering the number of new taxa recently collected, it would appear that this genus needs more intensive collection and study.

ERIOCAULON GIBBOSUM f. VIVIPARUM Moldenke, f. nov.

Haec forma a forma longifolia speciei capitulis viviparis recedit.

This form differs from the long-leaved form of the species in having its inflorescence heads more or less viviparous.

The type of the form was collected by Freiherr Philipp von Luetzelburg (no. 1440) in a marsh at Pedra do Fago, Rio Preto, Goiás, Brazil, in August, 1912, and is deposited in the herbarium of the Botanische Staatssammlung at Munich.

ERIOCAULON MAGNIFICUM var. GOYAZENSE Moldenke, var. nov.

Haec varietas a forma typica speciei bracteis involucrantibus exterioribus obtusis recedit.

This variety differs from the typical form of the species most conspicuously in having the exterior involucral bractlets decidedly obtuse at the apex.

The type of the variety was collected by Ezechias Paulo Heringer and N. Lima (no. 11717) at Rodovia Brasília, Belo Horizonte, divisa do Dist. Fed., Goiás, Brazil, on August 8, 1968, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors note that "Plantinha com flôres brancas, crescendo em brejo".

ERIOCAULON SPRUCEANUM f. VIVIPARUM Moldenke, f. nov.

Haec forma a forma typica speciei capitulis plusminusve viviparis recedit.

This form differs from the typical form of the species in having its inflorescence heads more or less viviparous.

The type of the form was collected by Hernando García y Barriga and Roberto Jaramillo Mejía (no. 17096) on the Sabanas de Arenisca, at an altitude of 235--700 meters, Río Guayabero, La Macarena (Parte Sur), Llanos Orientales, Méta, Colombia, between January and March, 1959, and is deposited in the Britton Herbarium at the New York Botanical Garden. The collectors note "Hierba en rosetón, semi-acuática y submergida. Cabezuelas blancas."

ERIOCAULON WIGHTIANUM f. VIVIPARUM Moldenke, f. nov.

Haec forma a forma typica speciei capitulis plusminusve viviparis recedit.

This form differs from the typical form of the species in having its inflorescence heads more or less viviparous.

The type of the form was collected by John Ellerton Stocks, John Sutherland Law, and their associates at "Malabar, Concan &c.", Kerala, India, and is deposited in the herbarium of the Botanische Staatssammlung at Munich.

LANTANA UNDULATA var. SALTENSIS Moldenke, var. nov.

Haec varietas a forma typica speciei recedit ramulis dense hirsuto-pubescentibus, foliorum laminis lanceolatis vel ovatis ad basin apicemque acuminatis subtus densissime molliterque velutinis, et inflorescentiorum bracteis usque ad 1 cm. longis longissime

acuminato-attenuatis.

This variety differs from the typical form of the species in having its branchlets and youngest growth very densely hirsutulous-pubescent with rather soft ascending brownish hairs, the leaf-blades lanceolate or broadly ovate, 4--6.5 cm. long, 1.8--3.5 cm. wide, decidedly acuminate at both ends, confluent into the obscure petiole at the base, very densely and softly velutinous beneath, and the inflorescence bracts to 1 cm. long, ovate, and very long-acuminate into an awl-like attenuate point.

The type of the variety was collected by Serafin A. Pierotti "H" [Herb. Inst. Miguel Lillo 283] at San Andres, at an altitude of 1800 meters, in the Department of Orán, Salta, Argentina, on February 8, 1945, and is deposited in the Britton Herbarium at the New York Botanical Garden.

VERBENA COMONDUENSIS Moldenke, sp. nov.

Herba alta multiramulosa; ramis ramulisque acute tetragonis striatis parce hirsutulis, angulis prominentibus densiuscule hirsutulis, pilis adpressis vel subadpressis; petiolis alatis indistinctis; laminis foliorum trilobatis, ad basin longe cuneatis, sparse strigosis, lobis irregulariter paucidentatis; inflorescentiis spicatis elongatis multifloris densiuscule adpresso-strigosis non glandulosis.

Apparently a tall herb, widely branched; stems and branches sharply tetragonal, with ridged angles, scattered-hirsutulous and more or less parallel-striate between the angles, more densely and rather antrorsely white-hirsutulous on the angles, the older portions purplish; nodes plainly annulate; leaves decussate-opposite, chartaceous, uniformly green on both surfaces or slightly lighter beneath; petioles winged and not plainly distinct from the lamina, those on the largest leaves more or less confluent with the nodal annulation; leaf-blades 6--9 cm. long when mature, 1.5--5 cm. wide, rather plainly 3-lobed, the central lobe far larger in all respects than the 2 lateral ones, all irregularly incised-dentate, the teeth rather few, irregular in size and shape, mostly rather broadly oblong or ovate on mature leaves and sharply acute or abruptly short-acuminate at the apex, scattered-hirsutulous with white antrorse appressed hairs on both surfaces, most densely so on the larger venation beneath, the venation mostly obscure above or with the largest portions indistinctly subimpressed in drying but not marked by any denser pubescence; inflorescence spicate, mostly terminating all the branches, mostly simple, sometimes with a pair of very much abbreviated branches at the base, to 30 cm. long or longer, densely many-flowered before anthesis, the flowers about 5 mm. apart during anthesis, the fruit 1--2 cm. apart; rachis slender, rather sharply tetragonal, ridged on the angles, striate between the angles, rather densely appressed- or subappressed-hirsutulous or strigose with antrorse white hairs, not noticeably glandulose; bractlets lanceolate, about 3 mm. long and 1 mm. wide, plainly keeled along the midrib, attenuate to an attenuate-acuminate apex,

slightly shorter than the calyx, minutely and sparsely scattered-strigillose-puberulent on the back, more or less ciliolate along the margins; calyx tubular, about 4 mm. long, densely appressed-strigose with antrorse white hairs, the rim 5-apiculate; corolla hypocrateriform, blue, the tube very slightly surpassing the calyx, the limb to 4 mm. wide, white in the throat.

The type of this species was collected by Andrew Ralph Moldenke and Alison Bishop Moldenke (no. 2922) at Comondu, Baja California Norte, Mexico, on March 19, 1969, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors state that the species was a common roadside weed for ten miles in either direction from the type locality.

- - - - - - - - - - - - - - - -

## ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXII

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional & emended bibliography: Pluk., Alm. Bot. Mant. 98. 1799; J. E. Sm. in Rees, Cycl. 13: Eriocaulon. 1809; Lesson in Bougainville, Journ. Navig. Autour Globe 2: 348—351, pl. 46. 1837; A. Wood, Class-book, ed. 1, 405, 470, & 474 (1845), ed. 2, pr. 1, 564, 640, & 645 (1847), ed. 2, pr. 2, 564, 640, & 645 (1848), and ed. 10, pr. 1, 564, 640, & 645. 1848; A. Gray, Man. Bot., ed. 1, lxxii, 514—515, & 703. 1848; Walp., Ann. 1: 889—891, 1053, & 1093. 1849; A. Wood, Class-book, ed. 10, pr. 2, 564, 640, & 645 (1849), ed. 10, pr. 3, 564, 640, & 645 (1850), ed. 17, 564, 640, & 645 (1851), and ed. 23, 564, 640, & 645. 1851; Walp., Ann. 3: 662—663 (1852) and 3: 1014 & 1093. 1853; A. Wood, Class-book, ed. 29, 564, 640, & 645 (1853), ed. 35, 564, 640, & 645 (1854), ed. 41, pr. 1, 564, 640, & 645 (1855), and ed. 41, pr. 2, 564, 640, & 645. 1856; A. Gray, Man. Bot., ed. 2, pr. 1, xxiv, xxviii, 488—489, & 713. 1856; Knieskern, Ann. Rep. N. J. Geol. Surv. 33. 1856; A. Gray, Man. Bot., ed. 2, pr. 2, xxiv, 488—489, & [615] (1858) and pr. 3, xxiv, xxviii, 488—489, & [713]. 1859; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 1, xxxviii, 502—504, 609, & 615. 1860; C. Müll. in Walp., Ann. 5: 919—947, 954, 957, 958, 960, & 964 (1860) and 6: 1170—1171 & 1245. 1861; Dalz. & Gibs., Bomb. Fl. 279—280, 316, & 325. 1861; A. Wood, Class-book, [ed. 42], pr. 1, 729—730, 826, & 832. 1861; A. Gray, Man. Bot., ed. 3, xxviii (c), 488—489, & [615] (1862) and ed. 4, pr. 1, xxviii (c), 488—489, & [711]. 1863; A. Wood, Class-book, [ed. 42], pr. 2, 729—730, 826, & 832. 1863; A. Gray, Man. Bot., ed. 4, pr. 2, xxviii (c), 488—489, & [615]. 1864; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 2, xxxviii, 502—504, 609, & 615. 1865; A. Wood, Class-book, [ed. 42], pr. 3, 729—730, 826, & 832 (1865) and pr. 4, 729—730, 826, & 832. 1867; A. Gray,

Man. Bot., ed. 5, pr. 1, 31, 549—550, & 685 (1867) and pr. 2, 31, 549—550, & 687. 1868; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 1, 29, 352, & 378. 1868; A. Wood, Class-book, [ed. 42], pr. 5, 729—730, 826, & 832 (1868) and pr. 6, 729—730, 826, & 831. 1869; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 2, 29, 352, & 378. 1869; A. Gray, Man. Bot., ed. 4, pr. 3, xxviii (c), 488—489, & [615]. 1870; A. Wood, Class-book, [ed. 42], pr. 7, 729—730, 826, & 831. 1870; A. Wood, Am. Bot. & Flor., ed. 1, pr. 1, 355, 379, & 390 (1870), pr. 2, 355, 379, & 390 (1871), and pr. 3, 355, 379, & 390. 1872; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 3, xxxviii, 502—504, 609, & 615. 1872; A. Wood, Class-book, [ed. 42], pr. 8, 729—730, 826, & 831. 1872; A. Wood, Am. Bot. & Flor., ed. 1, pr. 4, 355, 379, & 431 (1873) and pr. 5, 355, 379, & 431. 1874; O. R. Willis, Cat. Pl. N. J. 67. 1874; Lesq., U. S. Geol. & Goeg. Surv. Terr. Ann. Rep. 7: 396. 1874; A. Wood, Am. Bot. & Flor., ed. 1, pr. 6, 355, 379, & 431. 1875; A. Wood, Class-book, [ed. 42], pr. 9, 729—730, 826, & 831. 1876; Lesq., U. S. Geol. Surv. Terr. Rep. 7: [Tert. Fl.] 106, pl. 16, fig. 2 & 2a. 1878; A. Gray, Man. Bot., ed. 5, pr. 8, 31, 549—550, & 687 (1878) and pr. "8" [=9], 31, 549—550, & 687. 1880; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 3, 29, 352, & 378. 1880; A. Wood, Class-book, [ed. 42], pr. 10, 729—730, 837, & 842. 1881; A. W. Chapm., Fl. South. U. S., ed. 2, pr. 1, xxxviii, 502—504, 681, & 687 (1883), pr. 2, xxxviii, 502—504, 681, & 687 (1884), and pr. 3, xxxviii, 502—504, 681, & 687. 1887; S. Wats., Proc. Am. Acad. 23: 283. 1888; O. R. Willis in A. Wood, Am. Bot. & Flor., ed. 2, 355, 379, & 431. 1889; A. W. Chapm., Fl. South. U. S., ed. 2, pr. 4, xxxviii, 502—504, 658, 681, 687, & 696. 1889; S. Wats. & Coult. in A. Gray, Man. Bot., ed. 6, pr. 1, 16, 29, 566—567, & 753 (1889) and pr. 2, 16, 29, 566—567, & 753. 1890; Maxim., Dec. Pl. Asiat. 8: 7, 9, 21, & 22. 1893; Mak., Bot. Mag. Tokyo 4: 174. 1890; A. W. Chapm., Fl. South. U. S., ed. 2, pr. 5, xxxviii, 502—504, 711, & 718. 1892; Mak., Bot. Mag. Tokyo 8: 506—507. 1894; Massee, Grevillea 22: 67. 1894; L. H. Bailey in A. Gray, Field For. & Gard. Bot., ed. 2, 12, 24, 456, & 511. 1895; A. W. Chapm., Fl. South. U. S., ed. 3, xxxix, 529—531, 648, & 652. 1897; Penhallow, Brit. Assoc. Adv. Sci. Rep. 68: 527. 1899; Rendle in Hiern, Cat. Afr. Pl. Welw. 2: 95—102. 1899; Penhallow, Brit. Assoc. Adv. Sci. Bradford Meet. 335. 1900; Ruhl. in Pilg., Engl. Bot. Jahrb. 30: 146—147. 1901; G. P. Clinton, Rhodora 3: 79—82, fig. 1 & 2. 1901; G. P. Clinton, Journ. Myc. 8: 137. 1902; C. H. Wright, Journ. Linn. Soc. Lond. Bot. 36: 198—202. 1903; V. A. Poulsen in Schmidt, Bot. Tidsskr. 26: 167. 1904; Keller & S. Br., Handb. Fl. Philad. 91—92. 1905; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145, 158, 235, 310, 483, & 501. 1906; Rendle, Journ. Linn. Soc. Lond. Bot. 37: 474—476. 1906; R. W. Sm., Bot. Gaz. 49: 281—289, pl. 19 & 20. 1910; B. Long, Bartonia 2: 20. 1910; G. T. Stevens, Ill. Guide Flow. Pl. 113—115, 718, & 746, pl. 9, fig. 5 & 9. 1910; Nakai, Journ. Coll. Sci. Imp. Univ. Tokyo 31: 281—283. 1911; Hosseus, Beih. Bot. Centralbl. 28 (2): 372—373. 1911; Creevey, Harper's Guide Wild Fls. 42, 44, [45],

469, & 529. 1912; W. Stone, Ann. Rep. N. J. State Mus. 1910: 323-325 & 817, pl. 28, fig. 1 & 2, & pl. 64, fig. 2. 1912; Britton & Br., Ill. Fl., ed. 2, 1: xxiii, 453—456, & [678]—680, fig. 1140—1145 (1913) and 3: 574, 575, 581, 597, & 625. 1913; Fyson, Fl. Nilg. & Puln. Hill-tops 1: 426—432, pl. 272—277. 1915; House, N. Y. State Mus. Mem. 15 (1): 44, pl. 6A (1918) and 15 (2): 347 & 355. 1918; Knowlton, U. S. Geol. Surv. Bull. 696: 260, 670, 685, 778, & 812. 1919; Palm, Svensk. Bot. Tidsk. 14: 264. 1920; Saida & Satô, Naigai Syokubutusi 1296, fig. 2009. 1921; Fyson, Fl. Nilg. & Puln. Hill-tops 3: 118—119, pl. 543. 1921; Fern., Rhodora 23: 92 & 102. 1921; Mori, Enum. Pl. Corea 80. 1922; Nakai in Mak. & Nemoto, Fl. Jap., ed. 1, 1303—1308. 1925; N. Taylor, Guide Wild Fls. 4, 6—7, 323, & 333, fig. 13. 1928; Tatew., Veg. Apoi 119 & 131. 1928; Duthie, Fl. Upper Ganget. Plain 3: 317—320. 1929; Pool, Fls. & Flow. Pl., ed. 1, 299 & 359, fig. 169. 1929; Nakai, Veg. Apoi 76. 1930; Knowlton, U. S. Geol. Surv. Prof. Paper 155: 132—133. 1930; Nakai in Mak. & Nemoto, Fl. Jap., ed. 2, 1510—1515. 1931; House, Wild Fls. 44, 347, & 355, pl. 6A. 1934; Svenson, Torreya 35: 119. 1935; Marie-Vict., Fl. Laurent., ed. 1, 54, 74, 546, 565, 674, 679—681, 837, & 892, fig. 244. 1935; Steinberg in Komarov & Schischkin, Fl. U. S. S. R. 3: 494—498 & 748, pl. 27, fig. 1—5. 1945; Nemoto, Fl. Jap. Suppl. 1038—1040. 1936; Sugawara, Pl. Saghal. 117. 1937; E. D. Merr. & Metc., Lingn. Sci. Journ. 16: 79. 1937; Satake in Nakai, Icon. Pl. As. Orient. 2: 97—100, pl. 42 (1937) and 2: 173—176 & 192, pl. 65. 1938; Satake, Journ. Jap. Bot. 14: 264. 1938; Terazaki, Zoku Nipp. Syokubutu Zuhu fig. 3712. 1938; Little, Am. Midl. Nat. 19: 378. 1938; Sugawara, Illustr. Fl. Saghal. 2: 517, pl. 241. 1939; Honda, Nom. Bot. Pl. Jap. 461—463. 1939; Fern., Rhodora 43: 211. 1941; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145, 158, 235, 310, 483, & 501. 1941; Karling, Torreya 41: 106. 1941; Pool, Fls. & Flow. Pl., ed. 2, 295 & 407, fig. 189. 1941; Erlandsson, Arkiv Bot. 30B (2): 1—4. 1942; Moldenke in Woodson & Schery, Ann. Mo. Bot. Gard. 31: 65—71. 1944; Moldenke, Phytologia 2: 220 & 349—352. 1947; Govindu, Journ. Mysore Univ. 10 (1): 4. 1949; Thirumalachar, Razi, & Swamy, Journ. Mysore Univ. 9 (5): 82. 1949; K. Jessen, Proc. Roy. Irish Acad. 52B: 173, [174], 193, 202, & 249—250, pl. 4, fig. 56 & 57. 1949; H. E. Jaques, Pl. Fam., ed. 2, 96, fig. 289. 1949; Razi, Journ. Mysore Univ. 11 (1): 6 (1950) and 11 (2): 29. 1950; Van Steenis, Bull. Jard. Bot. Buitenz., sér. 3, 18: 460—461. 1950; Razi & Govindu, Journ. Mysore Univ. 12 (9): 107. 1952; Satake, Journ. Jap. Bot. 27: 268. 1952; R. S. Lamotte, Geol. Soc. Am. Mem. 51: 157. 1952; Butters & Abbe, Rhodora 55: 136. 1953; E. J. Salisb., Ind. Kew. Suppl. 11: 38, 88, 133, 157, 175—176, 244, & 272. 1953; Thorne, Am. Midl. Nat. 52: 281. 1954; Hand, Bull. Torr. Bot. Club 81: 92. 1954; [Wiltshire], Rev. Appl. Myc. Ind. Fungi 1: 39, 50, & 393. 1954; E. Müll., Phytopath. Zeitschr. 23: 108—109. 1955; Razi, Proc. Nat. Inst. Sci. India 21B (2): 82 & 85. 1955; Koyama, Journ. Jap. Bot. 31: 6—11, fig. 3. 1956; Linderoth, Faunal Con. Eu. & N. Am. 240, 241, & 250. 1957; Anon., Algonquin Prov. Park Mus. Check-

list 7. 1957; Viennot-Bourgin, Bull. Soc. Bot. France 104: 271 & 273—275, fig. 2D & 3. 1957; A. & D. Löve, Bot. Notiser Lund 111: 380—381 & 387. 1958; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145, 158, 235, 310, 483, & 501. 1959; A. Löve, Rhodora 61: 31. 1959; Sparrow, Aquat. Phycomycet., ed. 2, [Univ. Mich. Stud. Sci. 15:] 376 & 1095. 1960; Nath, Bot. Surv. South. Shan States 9, 20, & 62. 1960; Anon., Billie Bear Plant List 3. 1961; Moldenke, Bol. Soc. Venez. Cienc. Nat. 23: 99—100. 1962; Seerwani, Bull. Bot. Surv. India 4: 230. 1962; J. M. Gillett, Canad. Field Nat. 77: 139. 1963; [Wiltshire], Rev. Appl. Myc. Ind. Fungi 2: 327, 329, 355, 356, 359, 404, 410, & Cum. Ind. 202. 1963; S. K. Maheshwari, Bull. Bot. Surv. India 5: 138. 1963; Henry & Buker, Trillia 12: 105 & 131. 1964; Roland & Sm., Proc. Nova Scot. Inst. Sci. 26 (2): 191—192, fig. 476, map 173. 1964; Panigrahi, Chowdhury, Raju, & Deka, Bull. Bot. Surv. India 6: 241 & 260—261. 1964; Steinberg in Komarov & Schischkin, Fl. U. S. S. R., Engl. transl., 3: 392—395 & 512. 1964; Rouleau in Marie-Vict., Fl. Laurent., ed. 2, 83, 90, 546, 674, 679, 680, 837, & 857, fig. 244. 1964; Van Steenis & Jacobs, Fl. Males. Bull. 20: 1359. 1965; Tatew. & Itô, Journ. Jap. Bot. 40: 156—157. 1965; Hartley, Univ. Iowa Stud. Nat. Hist. 21: 150. 1966; Griffith & Hyland, U. S. Dept. Agr. Pl. Inventory 166: 184 & 386. 1966; F. H. Montgomery, Pl. from Sea to Sea 4, 9, & 390, fig. 822. 1966; Lourteig, Taxon 15: 31. 1966; Panigrahi, Bull. Bot. Surv. India 8: 13. 1966; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 168, 223, 224, 349, 396, 417, 418, 620, 647, 758, 950, 1057, 1091, & 1092. 1966; S. V. Ramaswami, Stud. Flow. Pl. Bangalore [thesis] 219—223 & 1406—1407. 1966; Sebastine & Henry, Bull. Bot. Surv. India 8: 310. 1966; Anon., Ind. Bibliogr. Bot. Trop. 4 (1): 18, 53, & 88. 1967; H. C. D. de Wit, Plant World High. Pl. 2: 256—257. 1967; Sterling, Outer Isl. 159, [161], 167, & 179. 1967; E. L. Braun, Vasc. Fl. Ohio 1: 308—310. 1967; E. G. Voss, Mich. Bot. 6 (2): 41 & 46, fig. 6. 1967; Adam, Adansonia 8: 445. 1968; Backer & Bakh., Fl. Java 3: 25—26. 1968; W. C. Grimm, Recog. Flow. Wild Pl. 36—37. 1968; Hinds & Hathaway, Wildfls. Cape Cod 116, 117, & 168, fig. 107. 1968; Moldenke, Phytologia 18: 241—280 & 295—328. 1969; Anon., Biol. Abstr. 50 (5): S.67 (1969) and 50 (6): S.65 & 189. 1969; Moldenke, Biol. Abstr. 50: 2584 & 3108. 1969; Anon., Torr. Bot. Club Ind. Bot. Lit. 3: 303—310. 1969.

The Stone (1912) reference in the bibliography above is often cited as "1911", but the work in question was not actually issued until January 26, 1912. Similarly, the Erlandsson (1942) reference is often cited as "1940", but the part in question was not actually issued until February 25, 1942. The Ruhland work (1901) cited above is often cited as "1902", but was actually issued on July 2, 1901 — the "1902" is merely the volume title-page date.

De Wit (1967) gives "1200 species in 13 genera" as the statistics for this family. Actually, there are 1467 specific and subspecific taxa recognized by me as valid as of this date.

ERIOCAULON NEPALENSE Prescott

Emended synonymy: Eriocaulon nepalense Bong. apud C. Müll. in Walp., Ann. 5: 926 & 938. 1860.

Additional & emended bibliography: C. Müll. in Walp., Ann. 5: 926 & 938 (1860) and 6: 1171. 1861; Moldenke, Phytologia 18: 264, 274, & 328. 1969.

Completing the description by Kunth (1841), begun on the last page of my previous installment of these notes: "sepalis...femineis.....eglandulosis. E. quinquangulare e Nepalia Wall. Cat. no. 6072. c. — Nepalia. — Folia late linearia, obtusiuscula, plana, laete viridia, 1 1/2 — 2-pollicaria, inferne vix 2 lineas lata. Vaginae laxae, laete virides, glabrae, apice acutae et hyalino-albidae, 1 — 1 1/2 -pollicares. Pedunculi 3 — 4 3/4 -pollicares. Capitula hemisphaerica, magnitudine grani minoris piperis nigri. Bracteae involucrantes obovatae, apice rotundatae, convexae, tenuiter arido-membranaceae, straminео-subcinerascentes, glabrae, capitulo dimidio breviores; bracteae flores stipantes rhombeo-cuneatae, subacuminatae, cinerascentes, ad apicem dorso pilosae. Flores masculi longe pedicellati: Sepala 3 exteriora subspathulata, obtusa, cinerascentia, superne pilosa, subaequalia: lateralia carinata; 3 interiora in tubum brevem infundibularem, irregulariter trilobum glabrum connata; lobis parvis, eglandulosis, antico majore, ciliato. Stamina 6, inaequalia. Antherae biloculares, subdidymo-reniformes, nigro-fuscae. Pistilla rudimentaria 3, subconica, nigra. Flores feminei (juveniles): Sepala 6?. lanceolato-linearia, margine piloso-ciliata, eglandulosa; exteriora longiora?. Ovarium subrotundo-ovatum, tricoccum. Stylus elongatus. Stigmate 3, capillacea, simplicia. E. luzulaefolio proximo, nil nisi hujus forma? An planta nostra vere eadem ac Prescottiana?"

Fyson (1921) says "E. nepalense Prescott (Fide Clarke No. 44827 in Herb. Calc.); F. B. I. vi 581, No. 32; Ruhland No. 130. Stem short or 0. Leaves flaccid, flat, tapering from 1/8 — 1/4 in. base, 2—3 in. long, acute. Scapes many, twice as long. Heads 1/6 — 1/4 in. nearly globular when mature. Involucral bracts black acute, receptacle glabrous. Sepals 3 all boat-shaped. Female petals narrow hairy, seeds oblong with pappilose ribs. Plate 6. Assam; Khasia: and 'from Garwhal to Sikkim.' (F. B. I.) I have not seen the type sheet and am relying on Clarke's plant quoted above, which appears to agree with the description in the F. B. I. The female petals in it have glands, but Ruhland (l.c.) says of the species that there are no glands."

It should be noted that the E. quinquangulare of Linnaeus, referred to in the synonymy above, is a valid species, with the homonym accredited to Wight as a synonym, while the E. quinquangulare credited to Martius and to Willdenow are synonyms of E. sollyanum Royle, that accredited to Heyne is E. cristatum Mart., and that accredited to Bojer is an as yet undetermined Madagascar species of the genus. The original Bongard description of E. nepalense is sometimes cited as "Act. Petrop. Sci. Math., ser. 6,

6: 610" and sometimes as "Mém. Acad. Pétersb., sér. 6, 1: 610". The initial letter of the specific epithet is often uppercased. In the original description Bongard actually does not seem to credit the binomial to Prescott. He merely states that Prescott collected the specimen. However, he does not place his own surname after the binomial anywhere, as far as I can ascertain, so perhaps Jackson (1895) had some valid reason for changing the accredition in the "Index Kewensis" from Bongard to Prescott. He dates the original publication of E. viride as "1854", instead of 1856.

Recent collectors have found E. nepalense growing along streams and in moist places on riverbanks, at altitudes of 2100 to 2830 meters. Ramaswamy found the plant growing "between dripping rocks" on wind-exposed mountaintops and also "completely submerged under water in a huge pond....Only the heads appeared above the surface of the water. It was invariably associated with a species of Isoëtes", at altitudes of 5000 to 5500 feet. He notes that "This plant seems to be a perennial measuring 4--12 inches in height". The mountaintop collection bears a notation that it was growing among grasses, a few sedges, and E. odoratum Dalz. He collected the species flowering and fruiting in October.

Material has been misidentified and distributed in herbaria as E. luzulaefolium Mart. and as E. quinquangulare L. On the other hand, the Saulière 71, distributed as E. nepalense, is actually E. leucomelas Steud.

Additional citations: NEPAL: Poelt s.n. [12.10.1962] (Mu); Wallich 6072c (B). INDIA: East Punjab: Koelz 3032 (N), 10237 (Mi). Khasi States: Hooker & Thomson s.n. [Mont. Khasia] (Br, Ut--310). Mysore: Ramaswamy 1 (Z), 4 (Ac). State undetermined: T. Anderson s.n. [Grand Trunk Road, 11/58] (Br). LOCALITY OF COLLECTION UNDETERMINED: Herb. Martius 85 (Br).

ERIOCAULON NIGERICUM Meikle

Bibliography: Meikle, Kew Bull. 1950: 231. 1950; Meikle & Baldwin, Am. Journ. Bot. 39: 45, 46, & 50, fig. 1--8. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 137, 138, & 482. 1959; Moldenke, Résumé Suppl. 4: 6. 1962; Hambler, Journ. Ecol. [Brit.] 52: 581. 1964.

Illustrations: Meikle & Baldwin, Am. Journ. Bot. 39: 46, fig. 1--8. 1952; Hambler, Journ. Ecol. [Brit.] 52: 581. 1964.

This plant has been found growing on rock outcrops, flowering and fruiting in August, September, and November. Meikle & Baldwin (1952) cite in addition to the specimens I have seen of those collections: LIBERIA: J. T. Baldwin Jr. 9145 (K, Mu, S), 9456 (K, Mu, S), 10088 (K, S), 10336 (K, S). They say "Otherwise known only from the type locality in Nigeria". It is, however, also known from Mali and Guinea.

Citations: MALI: Soudan: Collector undetermined s.n. [Kankan, Octobre 1944] (An). GUINEA: Arrieu 231 [Herb. Chillou 3140] (An). LIBERIA: J. T. Baldwin Jr. 9145 (N), 9456 (N), 10088 (N), 10336 (N).

ERIOCAULON NIGRICEPS Merr.

Bibliography: E. D. Merr., Philip. Journ. Sci. Bot. 10: 290. 1915; Prain, Ind. Kew. Suppl. 5, pr. 1, 97. 1921; Moldenke, Known Geogr. Distrib. Erioc. 27 & 37. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 141 & 205. 1949; Moldenke, Résumé 184 & 482. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 97. 1960; Moldenke, Phytologia 18: 300. 1969.

Material of this species has been misidentified and distributed in herbaria under the name of E. sieboldtianum Sieb. & Zucc.

Citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: E. D. Merrill 7748 (S); J. K. Santos s.n. [Herb. Philip. Bur. Sci. 31747] (B, Z).

ERIOCAULON NIGRUM H. Lecomte

Synonymy: Eriocaulon kaikoensis Masamune, Trans. Nat. Hist. Soc. Formosa 33: 25—26. 1943. Eriocaulon kaikoënse Masamune apud E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953. Eriocaulon kaikoense Masamune apud Koyama, Philip. Journ. Sci. 84: 373, in syn. 1956. Eriocaulon nigrum var. nigrum (H. Lecomte) Koyama, Philip. Journ. Sci. 84: 373, in syn. 1956.

Bibliography: H. Lecomte, Journ. de Bot. 21: 89 & 107—108. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and pr. 2, 82. 1938; Masamune, Trans. Nat. Hist. Soc. Formosa 33: 25—26. 1943; Moldenke, Known Geogr. Distrib. Erioc. 26 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136 & 205. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Koyama, Philip. Journ. Sci. 84: 373 & 378. 1956; Moldenke, Résumé 174, 176, 289, 290, & 482. 1959; Moldenke, Résumé Suppl. 17: 13. 1968.

The type of E. kaikoensis was collected by Genkei Masamune and Noriaki Fukuyama (no. 322) between Suyuei and Kaiko, Hainan Island, on December 17, 1940, and is deposited in the herbarium of the University of Tokyo. Masamune (1943) cites also Masamune & Fukuyama 722 from Hainan, and records the vernacular name "kaiko-hosikusa". Koyama (1956), for E. nigrum, cites Hayata s. n. from Annam, Indochina, and says that the species is also known from Tonkin. His comments are "Through the courtesy of Mr. Keng, I was able to examine the type specimen of Dr. Masamune's E. kaikoense (Masamune & Fukuyama 322!). According to original description published in the Transactions of the Natural History Society of Formosa, E. kaikoense appears to be a smaller plant of E. nigrum reported from Tonkin. Our Annam plants are a little larger than Lecomte's specimen."

ERIOCAULON NIGRUM var. FUSCESCENS Koyama

Bibliography: Koyama, Philip. Journ. Sci. 84: 373 & 378, pl. 6, fig. E. 1956; Moldenke, Résumé 176 & 482. 1959.

Illustrations: Koyama, Philip. Journ. Sci. 84: pl. 6, fig. E. 1956.

Koyama (1956) describes this taxon as follows: "A typo caule

breviter evoluto, foliis latioribus, pedunculis gracilioribus, capitula floribusque pallide fuscescentibus non nigrescentibus praecipue distat."

The type of the variety was collected by Bunzô Hayata at Nhatrang, Annam, Indochina, now Vietnam.

ERIOCAULON NILAGIRENSE Steud.

Synonymy: Eriocaulon browniamum Hook. f. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 76 & 285, in syn. 1903 [not E. brownianum R. Br., 1959, nor Mart., 1832, nor Wall., 1832]. Eriocaulon brownianum var. nilagirense Steud. ex Fyson, Journ. Indian Bot. 2: 262. 1921. Eriocaulon brownianum var. nilagirense Fyson apud Razi, Journ. Mysore Univ. B.14 (10): 460. 1955. Eriocaulon brownianum "Mart., in part" apud C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1127, in syn. 1956. Eriocaulon nilaghirense Steud., in herb.

Bibliography: Steud., Syn. Pl. Glum. 2 [Cypt.]: 271. 1855; C. Müll. in Walp., Ann. 5: 926 & 942—943 (1860) and 6: 1171. 1861; Hook. f., Fl. Brit. Ind. 6: 576. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 62, 76, 285, & 286. 1903; Fyson, Fl. Nilg. & Puln. Hill-tops 1: 427 & 429—430 (1915) and 2: pl. 273. 1915; Fyson, Journ. Indian Bot. 2: 262—264. 1921; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1609 & 1619. 1931; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23, 24, 33, & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126, 129, 130, & 205. 1949; Razi, Journ. Mysore Univ. B.14 (10): 460. 1955; Razi, Contrib. Bot. 40: 92. 1955; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1122, 1127, & 1333. 1956; Moldenke, Résumé 162, 165, 167, 286, & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; Moldenke, Résumé Suppl. 3: 17. 1962; Thanikaimoni, Pollen & Spores 7: 184. 1965; Moldenke, Phytologia 17: 455 (1968) and 18: 170 & 275. 1969.

Illustrations: Fyson, Fl. Nilg. & Puln. Hill-tops 2: pl. 273. 1915; Fyson, Journ. Indian Bot. 2: 263. 1921.

Forrest describes this plant as growing 2 1/2 feet tall; other collectors describe the heads as gray or grayish-white. It has been found growing in old fields, boggy pastures by streams, grasslands, and rice fields, at altitudes of 3000 to 7000 feet, flowering and fruiting in May and August.

Fyson (1915) describes E. nilagirense as follows: "F.B.I. vi 576 included in E. brownianum, but not Wall. Cat. 6066!; I 18*; Black-backed Giant Hatpin-flower, Honey-scented. Rhizone as thick as the finger, with two or three flower-stalks only. Leaves linear-oblong, acute, 6 to 12 by 1/3 to 1/2 inches, translucent, hairy. Peduncle about twice as long, ribbed and hairy, not much twisted: sheath 6 inches, with very long open mouth (1 to 1 1/2 inches), acute, translucent, with a tuft of hairs at the extreme base. Involucral bracts, oblong-ovate, obtuse, black, but covered

with white silky hairs and so almost grey: floral bracts oblanceolate-cuneate, hairy on the back of the triangular, not acuminate end. Male flowers:— Sepals black 1/8 inch, oblong or elliptic, obtuse, free, but connate into a sheath split open in front, glabrous except for a fringe of white hairs at the end. Petals connate into trumpet-shaped corolla, with small, very acute lobes, ciliate only at the tips. Stamens six; anthers oblong, black. Female flowers:— Sepals three, free, boat-shaped with decided ciliate keel, fitting by concave bases over the cells of the ovary. Petals very slender, linear except for the slightly dilated tips, fringed at the obtuse end with stout white hairs, and villous below with long silky hairs, each with a black gland. Each nutlet in fruit enclosed by the base of a sepal, the rest of which forms a slightly twisted wing. t. 273. In damp places. Pulneys: on the Kodaikanal downs. Flowers in September. Fyson 1078, 2083. Bourne 687, 1743.* Nilgiris: Hohenacker 953½; type is No. 950, not seen. The use of the sepal as a wing to the nutlet has not I believe been described before. E. bronianum Wall. Cat. 6066 is a Silhet plant and has smooth, smaller, light brown involucral bracts."

The same author, in his 1921 work, discusses the taxon as follows: "Whole plant hairy and more robust than the type. Leaves usually shorter and broader, but sometimes narrow. Scapes stout and hairy. Heads 1 inch flat or hemispheric. Involucre black, hairy. Female flower:— Sepals less deeply boatshaped. Petals a little broader; otherwise as in the type. See Fig. p. 263. S. India and Ceylon at high elevations. Very common in semi-dry or marshy land at about 7000 ft., forming usually dense tufts a foot or more across. The flowers smell strongly of honey and are visited by small butterflies. The name suggests that this is a variety confined to these regions but in Herb. Calcutta are sheets from Khazia hardly if at all different. Hooker was the first I think to reduce Steudel's species to E. Brownianum Mart. Koernicke considered it closest to E. Wightianum."

Fischer (1956) calls this taxon E. brownianum var. nilagirense Fyson, which he cites to Fyson, Journ. Indian Bot. 2: 263, with a figure on p, 263. Fyson, however, credits the trinomial to Steudel.

Hohenacker 953 in the Stockholm herbarium, and elsewhere, is inscribed "Eriocaulon nilagirense Steud. n. sp." on its printed labels, but Steudel gives the type collection as number "950"; perhaps this is a typographic error on his part. The initial letter of the specific epithet is often uppercased.

It should be noted here that the E. brownianum Mart., referred to in the synonymy above, is a valid species, with the homonyms accredited to Brown and to Wallich as synonyms.

Material of E. nilagirense has been misidentified and distributed in herbaria under the names E. brownianum Mart. and E. hexangulare L. On the other hand, the Herb. Univ. Mich. s.n. [Mountains of India], distributed as E. nilagirense, is actually

E. brownianum Mart.

Additional citations: INDIA: Assam: Cham 1550 (Mi), 1731 (Mi), 7712 (Mi); Chand 7998 (Mi). Madras: Bembower 33 (Mi), 34 (Mi), 429 (Ca—495797, N); Collector undetermined s.n. [M. Nilagiri] (Ca—2416); G. S. Gough s.n. [Mont. Nilgherry] (S); Hohenacker 953 (B, Mu—220, Mu, Mu, N, S, Ut—311), s.n. [in mont. Nilgiri] (B, B); C. McCann 50179 (N, Xa), 50180 (N, Xa), B.1225 (Xa). Mysore: Shetty 53 (Bn—3176). State undetermined: Herb. Heyne 4 (Br); R. Wight 2859 (Mu—330, S), s.n. [Ind. or.] (V—41269, V—41342, V—41346). CEYLON: Hosseus 41 (Mu—397); Thwaites C.V.378 (B). CHINA: Yünnan: G. Forrest 12002 (Ca—230875).

ERIOCAULON NIPPONICUM Maxim.

Synonymy: Eriocaulon decemflorum var. nipponicum (Maxim.) Nakai in J. Matsumura, Icon. Pl. Koisikav. 2: 47. 1914. Eriocaulon decemflorum Komarov apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 17 & [86], in syn. 1940 [not E. decemflorum Maxim., 1893]. Eriocaulon decemflorum var. nipponicum Nakai apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 7, 12, 15, 16, 41, 71, 78, & [86], fig. 1B & 2C. 1940. Eriocaulon decemflorum var. nipponicum f. typicum Nakai ex Satake in Nakai & Honda, Nov. Fl. Jap. 6: 17 & [86]. 1940. Eriocaulon decemflorum var. nipponicum f. yoshinoi Nakai ex Satake in Nakai & Honda, Nov. Fl. Jap. 6: 17 & [86]. 1940. Eriocaulon nipponicum f. yoshinoi Nakai ex Satake in Nakai & Honda, Nov. Fl. Jap. 6: 15 & 87. 1940. Eriocaulon nipponicum f. yosinoi Nakai apud Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 8, in syn. 1940. Eriocaulon decemflorum var. nipponicum f. yosinoi Nakai apud Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 8. 1940. Eriocaulon franchetianum Körn. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959. Eriocaulon nipponicum var. gracile Ruhl. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959.

Bibliography: Maxim., Dec. Pl. Asiat. 8: 9. 1893; Mak., Bot. Mag. Tokyo 8: 506—507. 1894; Komarov, Fl. Mansh. 1: 418. 1901; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 38, & 286. 1903; C. H. Wright, Journ. Linn. Soc. Lond. Bot. 36: 200. 1903; J. Matsumura, Ind. Pl. Jap. 2 (1): 176. 1905; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 501. 1906; Nakai, Journ. Coll. Sci. Imp. Univ. Tokyo 31: 282. 1911; Nakai in J. Matsumura, Icon. Pl. Koisakav. 2: 47. 1914; Nakai in Mak. & Nemoto, Fl. Jap., ed. 1, 1306. 1925; Ruhl., Notizbl. Bot. Gart. Berlin 10: 1043. 1930; Nakai in Mak. & Nemoto, Fl. Jap., ed. 2, 1513. 1931; Miyabe & Kudo, Journ. Fac. Agr. Hokkaido Imp. Univ. 27 [Fl. Hokk. & Saghal. 3]: 286. 1932; Tu, Chinese Bot. Dict., abrdg. ed., 1351. 1933; Nemoto, Fl. Jap. Suppl. 1039. 1936; E. D. Merr. & Metc., Lingn. Sci. Journ. 16: 79. 1937; Satake, Journ. Jap. Bot. 14: 264. 1938; Honda, Nom. Pl. Jap. 462. 1939; Mak., Illustr. Fl. Jap. 771 & E.26, fig. 2313. 1940; Sata-

ke in Nakai & Honda, Nov. Fl. Jap. 6: 1, 6, 7, 12, 15--17, 41, 71, 78, [86], & 87, fig. 1B, 2C, & 6. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 5--9. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158 & 501. 1941; Moldenke, Known Geogr. Distrib. Erioc. 25 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 108, 132--134, & 205. 1949; Moldenke, Phytologia 3: 336. 1950; Moldenke, Résumé 132, 167, 170, 171, 173, 287, & 482. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158 & 501. 1959; Moldenke, Résumé Suppl. 1: 12 & 17 (1959) and 3: 31. 1962; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 429. 1964; Thanikaimoni, Pollen & Spores 7: 182. 1965; Moldenke, Résumé Suppl. 17: 10. 1968; Moldenke, Phytologia 17: 454 (1968) and 18: 47. 1968.

Illustrations: Mak., Illustr. Fl. Jap. fig. 2313. 1940; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 7, & 16, fig. 1B, 2C, & 6. 1940.

According to Inami, this species differs from E. decemflorum Maxim. "by large habit, pilose receptacle and obtusish tip of involucral scale", while Satake (1940) says "A var. genuino differt planta robustiore usque 30 cm alta, foliis multi-nervatis capitulis magnis 5 mm longis 6--7 mm latis bracteis sepalis petalisque dense albo-barbatis". Koyama notes that it is the "most common Eriocaulon in Japan, very polymorphous". Tsang reports it "abundant" on the mainland, in Kwangtung, China. Miyabe & Kudo (1932) record it from Hokkaido. Satake (1940), however, notes that "so many intermediate forms are met with in the field that it is difficult to distinguish E. decemflorum Maxim. from E. nipponicum Maxim. The writer agrees with Prof. Nakai's opinion that the two plants belong to one and the same species."

It has been found growing in meadows and bogs, swampy fields and meadows, very wet places at the sides of ricefields, in moist acid soil at the edge of small pools, in swamps and subalpine region swamps, and growing in loam or silt soil, flowering and fruiting from August to October. Vernacular names recorded for it are "ito-imunohige", "ito-imuno-hige", and "koimunohige". Nakai's f. yoshinoi is a form with abortive flowers. Franchet 3070 appears to be the type collection of E. franchetianum Körn., and Wichura 708 is the type of E. nipponicum var. gracile Ruhl., the holotypes in both cases deposited in the herbarium of the Botanisches Museum at Berlin, where these two taxonomists worked.

The E. nipponicum Körn., referred to in the synonymy above, is a synonym of E. buergerianum Körn., while E. nipponicum Tatew. is E. perplexum Satake & Hara. It should be noted here that Merrill (1937), Ruhland (1903), and Satake (1940) all give "1892" as the date of Maximowicz's original publication, while Durand & Jackson (1902) cite it erroneously to Bull. Acad. Sci. St. Pétersburg. This part of Maximowicz's work was apparently only issued separately.

Material of E. nipponicum has been misidentified and distributed in herbaria under the names E. decemflorum Maxim., E. decem-

lobflorum Maxim., E. parvum Körn., E. sikokianum Maxim., and Juncus prismaticarpus R. Br. Tsang 21681b is a mixture with a species of Rhynchospora.

Satake (1940) cites the following collections, mostly deposited in the herbarium of the Royal Botanic Gardens at Kew: KOREA: Boku s.n. [Kyurei, Aug. 1932]; Faurie 892; Kitamura 1820; Koidzumi s.n. [Hokkan-zan, Aug. 1932] & s.n. [Kangaku-zan, Aug. 1932]; Mori 59; Nakai 2899, 2930, 3113, 3114, & 6003; Nomura 13 & s.n. [Seizyori, Sep. 1935]; Okamoto s.n. [Tiisan, Sept. 1934]; Tyo 110; Utiyama s.n. [Hokkan-zan, Oct. 1900]. KOREAN COASTAL ISLANDS: Quelpart: Faurie 1427 & 1429. Saisyû-tô: Isidoya 76; Taquet 1538, 1541, & 9172. JAPAN: Honshu: Ando 28; Collector undetermined 19, 3596, 14499, 17066, 17153, 23741, 23742, 32720, & s.n. [Hamanosiba, Sept. 1880]; Faurie 7, 1242, 1865, 1874, 2728, 6546, 7200, 7202, 13782, 13809, & 13811; Hasimoto 57458; Hattori s.n. [Notomura, Sept. 1925] & s.n. [Miharu]; Hayata 17061 & 17063; Henmi 1108; Hosomi 52041; Iisiba 49451; Imai 5; Itô s.n. [Seiman-mura, Nov. 1933] & s.n. [Nikko]; Iwabuti 5430; Kato 4280; Kikuti 38233; Koidzumi s.n. [Yonezawa, Aug. 1906] & s.n. [Azumayama, Sept. 1929]; Maekawa 6629; Matuyama s.n. [Kanômizu, Oct. 1929]; Misono 52703; Miura s.n. [Mobara, Jul. 1911]; Murai 145; Nakai s.n. [Mitake, Oct. 1911] & s.n. [Hakone, Sept. 1929]; Nakazima s.n. [Tanabe, Oct. 1924] & s.n. [Sinzyô-mura, Oct. 1925]; Nikai 2374 & 49449; Numazira s.n. [Hutyu, Oct. 1935]; Okuyama 26 & 27; Ono 42438; Ooba 159; Saito 46; Sakaguchi 104; Sakai 42439; Sakurai 3595; Siobara 40337; Sioya s.n. [Hokunô-mura, Aug. 1928]; Sirakami 23127; Sugimoto 23812; Suzuki 52042 & s.n. [Kassiyama, Jul. 1930]; Takagi s.n. [Toyone-mura, Aug. 1928]; Tamaki s.n. [Sendai, Sept. 1914]; Tasiro s.n. [Yamato, Aug. 1912]; Tiba s.n. [Itinoseki, Sept. 1910]; Toba 94; Tuboi s.n. [Yamato-mura, Oct. 1930]; Uemura s.n. [Tonobuti, Oct. 1932]; Watanabe s.n. [Simura, Sept. 1899]; Yamahara s.n. [Yanai, Aug. 1915]; Yamasita 39; Yosikawa 57459; Yosino s.n. [Sengokudani, Oct. 1910]. Kiushu: Collector undetermined s.n. [Buzen, Sept. 1880]; Doi 39; Kozuma 23126; Masamune s.n. [Kagosima]; Mayebara 9 & H.361; Nabesima 27; Nakasima 39 & 40; Sugihara s.n. [Kosiroyama, Sept. 1924]; Suzuki 7; Tasiro 28772, s.n. [Narukawa-mura, Aug. 1907], s.n. [Oohuna-yama, Aug. 1911], s.n. [Tahira-mura, Aug. 1911], s.n. [Zyusso-yama, Aug. 1917], s.n. [Kaziki, Oct. 1917], s.n. [Imuda-ike, Oct. 1918], s.n. [Yuhara, Jul. 1921], s.n. [Seto, Sept. 1921], s.n. [Kanadate-mura, Oct. 1921], s.n. [Hazuki-mura, Sept. 1922], & s.n. [Sinagawanagisa]; Tiba 8 & 10; Tokunaga 5; Yamasita s.n. [Agemine-mura]. Shikoku: Faurie 11866; Kusumoto s.n. [Haramati-mura]; Nikai 49450; Ogata s.n. [Tatekawa, Sept. 1925] & s.n. [Matumaru, Sept. 1926]; Oti 4 & 6; Yaki 38232; Yamasita s.n. [Omaki-mura, Oct. 1930] & s.n.

[Utiko].

Additional citations: CHINA: Chekiang: E. Faber 205 (B, N), s. n. (E); Keng 953 (Ca). Kwangtung: W. T. Tsang 21681b (Ca--23639, Mi, N, S). Manchuria: H. Bohnhof 309 (N). Province undetermined: Tsoong 4403 (Ca--225807). KOREA: Faurie 1428 (V--905). KOREAN COASTAL ISLANDS: Quelpart: Faurie 1429 (V--922). WESTERN PACIFIC ISLANDS: JAPAN: Honshu: E. Elliott 128 (Mi); Faurie s.n. [Kausikawa, 1894] (S); Franchet 3070 (B); Furuse s.n. [Fukuyama, 3 Oct. 1952] (S), s.n. [Inooto-mura, 16 Sept. 1954] (S), s.n. [16/IX/1954] (Ss), s.n. [Gyoonin-bara, 27 Sept. 1955] (S, S, S), s.n. [Orimoto-tooge, 28 Sept. 1955] (S), s.n. [Sara-mura, 6 Oct. 1955] (S), s.n. [Hikusa-mura, 20 Oct. 1955] (S), s.n. [2 July 1956] (S), s.n. [17 Sept. 1956] (S), s.n. [23 Oct. 1956] (S), s.n. [21 Sept. 1957] (S), s.n. [22 Sept. 1957] (S), s.n. [28 Sept. 1957] (S), s.n. [26 Sep. 1960] (S); Hayakawa s.n. [Koonodai, 1904] (S); Inami s.n. [8 September 1954] (Ss); Kawagoe s.n. [Sept. 30, 1906] (Kg); Koyama 13000 (Z); Murata 6688 (Ut--81635b); Ohwi 165 (Go), s.n. [26.X.1930] (N, N); Ohwi & Koyama 137 (Ca--932892, Go, Kg, Mg, Mi, N, S, Vi); Savatier 1362 (B); Suzuki s.n. [Sept. 24, 1951] (Ca--942044); Uyezuki s.n. [Aug. 1912] (Kg); Wawra 1407 (V); Yasuda s.n. [Sendai, Oct. 3, 1917] (S). Kiushu: Collector undetermined s.n. [Kagoshima City] (Kg); Ishada s.n. [Oct. 13, 1920] (Kg); Kawagoe s.n. [Higo, Oct. 10, 1924] (Kg); Naito s.n. [Sept. 7, 1926] (Kg); Rein s.n. [Aidzu] (Mu--349); Suzuki 93 (Ws). Island undetermined: Kayakawa s.n. [1904] (S). LOCALITY OF COLLECTION UNDETERMINED: Wichura 708 (B).

ERIOCAULON NIPPONICUM var. GLABERRIMUM Satake

Synonymy: Eriocaulon decemflorum var. nipponicum f. glaberrimum Satake in Nakai & Honda, Nov. Fl. Jap. 6: 17 & [86]. 1940.

Bibliography: Satake, Journ. Jap. Bot. 14: 264. 1938; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 15, 17, [86], & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 8--9. 1940; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173, 287, & 482. 1959; Moldenke, Phytologia 18: 47. 1968.

This variety differs from the typical form of the species only in having the receptacle completely glabrous.

It is based on H. Iwabuti 5419, 5420, 5421, 5425, 5427, 5428, 5432, 5434, 5447, 5448, 5452, & 5459 and Y. Satake s.n. [Huziwara-mura, Sept. 1933]. It is apparently endemic to the central and northern portions of Honshu Island, Japan, and is known there as "oku-itoinunohige".

Satake (1940) cites the following collections from Honshu: Collector undesignated s.n. [Aizu, Aug. 1880]; Hisauti 2453; Iwabuti 2984, 5366, 5419, 5420, 5421, 5425, 5427, 5428, 5432, 5434, 5447, 5448, 5452, & 5459; Kato 83033 & 83035; Koidzumi 106, 1140,

4940, 10684, 13405, 34739, 34900, 34901, 52347, 52472, 52473, 52474, 55797, & 55798; Maekawa 6749, 6839, & 10031; Miyabe s.n. [Sept. 1893]; Okazaki s.n. [Aug. 1937]; Takahasi s.n. [Sept. 1897].

ERIOCAULON NOSORIENSE Ohwi

Bibliography: Ohwi, Bot. Mag. Tokyo 44: 567. 1930; Mak. & Nemoto, Fl. Jap., ed. 2, 1513. 1931; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Nemoto, Fl. Jap. Suppl. 1039. 1936; Honda, Nom. Pl. Jap. 462. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 70, 81, & 87, fig. 36. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 58—59, pl. 10, fig. 20. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Koyama, Journ. Jap. Bot. 31: 6 & 7. 1956; Moldenke, Résumé 173 & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185 & 430. 1964.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 70, fig. 36. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 10, fig. 20. 1940.

The type of this species was collected by Jisaburo Ohwi at Nosori-no-ike, in the province of Kôzuke, Honshu, Japan, in September, 1929, and is deposited in the herbarium of Kyoto Imperial University. The only recorded vernacular name is "nosori-hosikusa". The species is known thus far only from the type collection.

ERIOCAULON NUDICUSPE Maxim.

Bibliography: Maxim., Diagn. Pl. Nov. Asiat. 8: 19. 1893; Mak., Bot. Mag. Tokyo 8: 506. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 65, 94, & 286. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 501. 1906; Mak. & Nemoto, Fl. Jap., ed. 1, 1306 (1925) and ed. 2, 1513. 1931; Tu, Chinese Bot. Dict., abrdg. ed., 308. 1933; Nemoto, Fl. Jap. Suppl. 1039. 1936; Honda, Nom. Jap. Pl. 462. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 1, 6, 7, 13, 53—55, 80, & 87, fig. 1J, 2G, 24, & 25. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 40—42. 1940; Mak., Illustr. Fl. Jap. 772 & E.26, fig. 2316. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 501. 1941; Moldenke, Known Geogr. Distrib. Erioc. 25 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173 & 482. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 501. 1959; Hara, Outline Phytogeogr. Japan 60. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 182, 183, & 430, fig. 125 (1), pl. 48, fig. 307. 1964.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 7, 54, & 55, fig. 1J, 2G, 24, & 25. 1940; Mak., Illustr. Fl. Jap. fig. 2316. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 183, fig. 125 (1) & pl. 48, fig. 307 [in color]. 1964.

Satake (1940) notes that "This plant which is commonly known by people in the Provinces of Mikawa and Owari, as cut flowers or material for flower arrangements (Ikabana), is sold by florists dur-

ing the flower season (Autumn). It is said that children play with the niveous heads, which are dyed with various colours as ornamental hair-pins". The only recorded common name is "siratama-hosikusa". The plant has been collected in anthesis in September and October. Inami avers that it is "rare in moist places, very local", but Koyama says "abundant locally in marshy place along margin of large pool."

Satake (1940) cites the following collections from Honshu: Collector undesignated 3; Hattori s.n. [Sept. 1929]; Itô s.n. [Sept. 1891]; Koidzumi s.n. [Sakamoto]; Makino s.n. [Aug. 1889]; Matuyama 35027 & s.n. [Oct. 1929]; Satake s.n. [Sept. 27, 1938]; Siota 22.

Citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Furuse s.n. [8 Oct. 1959] (S), s.n. [11 Oct. 1960] (S); Inami 956 (B, Ca—21979, Go, Mg, N, S), 13105 (Z); Koyama s.n. [20 Sept. 1955] (Ss).

ERIOCAULON OBTUSUM Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 42, 46, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Alv. Silv., Fl. Mont. 1: 398. 1928; Moldenke, Known Geogr. Distrib. Erioc. 8 & 38. 1946; Moldenke, Known Geogr. Distrib. Vernenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89 & 482. 1959.

The Eriocaulon obtusa Schult. is a synonym of Eleocharis obtusa (Willd.) Schult. in the Cyperaceae. Widgren 164, cited below, is a mixture with E. sellowianum Kunth. The Macbride photograph 10563 of the type specimen of E. obtusum in the herbarium of the Botanisches Museum at Berlin is erroneously inscribed "Ule 3137". The specimen of Ule 232 in the herbarium of the Muséum National d'Histoire Naturelle at Paris has two labels — the printed one indicates the locality of collection as "Goyaz", but another, in longhand, has that state name crossed out and "Minas Geraes" substituted. Silveira (1928) cites A. Silveira 623 from Minas Gerais. I am assuming that Widgren 164 was taken from cultivated material because the label gives "Jardim" as the locality of collection.

Material of E. obtusum has been misidentified and distributed in herbaria as E. sellowianum Kunth.

Citations: BRAZIL: Goiás: Macedo 3339 (N, S, W—2197098). Mattogrosso: Lindman A.3055 (S, S); Malme 2259 (S). Minas Gerais: P. Clausen s.n. [1840] (S); Ule 232 [Herb. Mus. Nac. Rio Jan. 29529] (P, S). Rio de Janeiro: Ule 3157 [Macbride photos 10563] (B—type, N—photo of type, W—photo of type). CULTIVATED: Brazil: Widgren 164, in part (S).

ERIOCAULON ODASHIMAI Masamune

Bibliography: Masamune, Trans. Nat. Hist. Soc. Taiwan 33: 26. 1943; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé Suppl. 17: 5. 1968.

Masamune's original (1943) description of this taxon is: "Folia rosulata, pauca, lineari-lanceolata membranacea 1.0—1.5 cm longa ca. 1.5 mm lata apice acuminata. 3 nervia. Pedunculi 1—3, 4 costulati, tenues torti glabri ca. 3 cm alti; vaginae laxiusculae, oblique fissae, tenues glabrae ca. 1 cm longae apice acuminatae; capitula glabra hemisphaerica, 4 mm lata; bracteae involucrantes saepe 4 oblongo-lanceolatae glabrae hyalinae apice acuminatae 2.5—3 mm longae 1 mm latae; bracteae flores oblongo-spatulatae hyalinae ca. 2 m longae 0.8 mm latae. Fl. ♂: sepala 2 libera falcato-lanceolata hyalina purpureuscula ca. 1.3 mm longa ca. 1/4 mm lata; stamina saepe 4 anthera nigrae; flos ♀ : sepala 3 lineari-lanceolata ca. 1 mm longa; petala nulla? germen 3 coccum; stylus germine longior; stigmate 3, ca. 1.3 mm longa."

It is most probable that the length of the receptacular bractlets in the above description was intended to read "2 mm". The only recorded vernacular name for the species is "senke-hosikusa". The type was collected by K. Odashima — in whose honor it is named — between Gai and Senketo, Kainanto, Hainan Island, on December 8, 1940, and is deposited in the herbarium of Tokyo University. Thus far the species is known only from the original collection.

ERIOCAULON ODORATUM Dalz.

Synonymy: Eriocaulon odoratum Dolz ex H. Lecomte, Journ. de Bot. 21: 108, sphalm. 1908.

Bibliography: Dalz. in Hook., Journ. Bot. Kew Misc. 3: 280—281. 1851; Körn., Linnaea 27: 683. 1856; C. Müll. in Walp., Ann. 5: 927 & 945 (1860) and 6: 1171. 1861; Dalz. & Gibs., Bomb. Fl. 280. 1861; Hieron. in Engl., Nat. Pflanzenfam., ed. 1, 2 (4): 27. 1888; Hook. f., Fl. Brit. Ind. 6: 574. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 13, 17, 103, 110, & 286. 1903; H. Lecomte, Journ. de Bot. 21: 107 & 108. 1908; Fyson, Journ. Indian Bot. 2: 308 & 310, pl. 24. 1921; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1608 & 1618. 1931; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 74, 77, & [103]. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 205. 1949; Moldenke, Phytologia 3: 336. 1950; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1121, 1127, & 1333. 1956; Moldenke, Résumé 162, 176, & 482. 1959; Moldenke, Résumé Suppl. 1: 11 & 13. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; Thanikaimoni, Pollen & Spores 7: 185. 1965; S. V. Ramaswami, Study Flow. Pl. Bangalore [thesis] 220, 221, & 1407. 1966; Moldenke, Résumé Suppl. 13: 5 (1966) and 15: 8. 1967; Moldenke, Phytologia 17: 494 (1968) and 18: 102. 1969.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 24. 1921.

Fyson (1921) describes this species as follows: "Stem disciform. Leaves 1—3 in. by 1/8 in. at the base, and narrowed to the acuminate apex. Scape filiform, 6—10 in., deeply grooved.

Heads 1/6 — 1/4 in. snow white; bracts cuspidately acuminate. Sepals of the female flowers 3 or 2 only; otherwise flowers normal. Female petals with large glands. Smells strongly of camomile (Dalz.)." He notes that "I have seen only two sheets, both in Herb. Calc. One coll. by Hooker and Thomson, has apparently the female sepals 2 only, and black involucral bracts. The other Meebold No. 9889, has the female sepals 3 and the bracts pale. In other respects and especially in the large glands of the female petals they are alike. Hooker in F. B. I. describes the female sepals as longer than the petals."

The plant has been found growing in standing water and in open sandy soil, at altitudes of 20 to 1300 meters, flowering and fruiting in July, September, and December. Sangkhachand describes it as "common" in damp places on savannas in Thailand, Smitinand calls the plants "gregarious", while Smitinand & Floto found it to be a "tufted herb common in savannas", also in Thailand. The only vernacular names recorded for it are "chuk nok ying" and "pui ka ngong". The initial letter of the specific epithet is uppercased by Dalzell & Gibson (1861).

Material has been misidentified and distributed in herbaria under the names E. conicum Fisch., E. dalzellii Körn., E. pentangulare L., E. quinquangulare L., and E. siamense Moldenke. On the other hand, the Collector undesignated s.n. specimens in the Stockholm herbarium, distributed as E. odoratum, are actually E. gracile Mart.

Additional citations: PAKISTAN: East Bengal: W. Griffith 5564 (C). INDIA: Bombay: Dalzell 1496 (T); Santapau 11743 (Xa), 11756 (Xa). Hyderabad: S. N. Ramaswamy 30 (Ac). Kerala: Stocks, Law &c. s.n. [Malabar, Concan, &c.] (B, Mu--221). Mysore: S. N. Ramaswamy 8 (Rf), 19 (Ac), 25 (Rf), 1042 (Lw), 2267 (Lw). West Bengal: Bennet 1021 (Ac). State undetermined: Wight 2855 [Penins. Ind. orient.] (S, T). THAILAND: Hansen, Seidenfaden, & Smitinand 11096 (Cp), 11099 (Ac, Cp); K. Larsen 9791 (Lw); Sangkhachand 571 [Herb. Roy. Forest Dept. 18174] (Sm); Seidenfaden 2699 (Cp); Smitinand 416 [Herb. Roy. Forest Dept. 5113] (Bk), 3607 [Herb. Roy. Forest Dept. 18240] (Z); Smitinand & Floto 5935 Herb. Roy. Forest Dept. 24088] (Gg); Vesterdal 5d (Cp), 464 (Cp). INDOCHINA: Laos: Pételot 8971 (N).

ERIOCAULON OFFICINALE Körn.

Synonymy: Eriocaulon officinalis Körn. apud Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 25, sphalm. 1888.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 475 & 480. 1863; Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 163 & 164. 1867; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 25 & 27. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 117 & 286. 1903; C. H. Wright, Journ. Linn. Soc. Lond. Bot. 36: 200. 1903; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 77 & [103]. 1945; Jacks. in Hook. f. &

Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 25 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 132 & 205. 1949; Moldenke, Résumé 170 & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960.

This mysterious species is said to come from China. Its exact identity is still in much doubt.

ERIOCAULON OLIVACEUM Moldenke

Bibliography: Moldenke, N. Am. Fl. 19 (1): 18 & 22. 1937; Moldenke, Phytologia 1: 320. 1939; León, Fl. Cuba 1: 280. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4 & 38. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 45 & 205. 1949; Moldenke, Résumé 53 & 482. 1959.

Killip found this plant growing on white sand savannas, flowering in January.

Additional citations: ISLA DE PINOS: Killip 45489 (Mu, Z).

ERIOCAULON OLIVERI Fyson

Bibliography: Fyson, Kew Bull. Misc. Inf. 1914: 331. 1914; Fyson, Fl. Nilg. & Puln. Hill-tops 1: 428 & 431 (1915), 2: pl. 276 (1915), and 3: 118. 1921; Prain, Ind. Kew. Suppl. 5, pr. 1, 97. 1921; Moldenke, Known Geogr. Distrib. Erioc. 23 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 205. 1949; Moldenke, Phytologia 3: 336. 1950; Moldenke, Résumé 164 & 482. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 97. 1960; Moldenke, Résumé Suppl. 11: 5. 1964; Thanikaimoni, Pollen & Spores 7: 184. 1965; Moldenke, Phytologia 17: 463 & 494 (1968) and 18: 264. 1969.

Illustrations: Fyson, Fl. Nilg. & Puln. Hill-tops 2: pl. 276. 1915.

Thanikaimoni (1965) regards this taxon as conspecific with E. collinum Hook. f., reducing both E. christopheri Fyson and E. oliveri Fyson to synonymy under E. collinum. In the present notes all three of these taxa are regarded as distinct.

Fyson (1915) describes his E. oliveri as follows: "I 46; White-headed Hatpin-flower. Similar in habit to E. geoffreyi, but larger and the involucral bracts white: male sepals not black. Scapes solitary, very slender, 4 to 6 inches: sheath 3/4 to 1 inch, with enlarged bifid mouth. Leaves as long acute, glabrous nine-nerved. Heads 1/4 inch, white. Involucral bracts white, glabrous. Floral bracts with numerous thick white hairs. Receptacle villous. Male flowers 1/8 inch. Sepals united into a spathe split in front; light coloured below, darker above but not black, with white hairs upwards on the back. Corolla tube tapering downwards; petals unequal with long fringing hairs and large glands. Anthers black. Female flowers as long. Sepals black. Petals with a few thick white hairs above and long white slender ones to the base. t.276. In damp places. Pulneys 7,500 feet. Fyson 2994." In his 1921 work he adds: "Vol. I, p. 431, II, t. 276. In flower later in the year than E. collinum. Petals of lower male flowers protruding as a fringe, conspicuous when fresh, but not seen when dry."

It may be noted here that his Volume 3 is sometimes cited as "1920", which is actually the title-page date, but the volume was not actually issued until 1921.

Material of E. oliveri has been misidentified and distributed in herbaria as E. conicum (Fyson) C. E. C. Fischer and as E. sexangulare L. On the other hand, the Bembower 431, distributed as E. oliveri, is actually E. leucomelas Steud.

Citations: INDIA: Mysore: S. N. Ramaswamy 2108 (Z); Swamy s.n. [Bannerghatta, 25.11.62] (Bn--3199).

ERIOCAULON ORYZETORUM Mart.

Bibliography: Mart. in Wall., Plant. As. Rar. 3: 28. 1832; Wall., Numer. List 207. 1832; Royle, Illustr. Bot. Himal. 409. 1840; Kunth, Enum. Pl. 3: 552. 1841; C. Müll. in Walp., Ann. 5: 926 & 938--939 (1860) and 6: 1171. 1861; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 27. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Hook. f., Fl. Brit. Ind. 6: 579. 1893; Prain, Beng. Pl., ed. 1, 1127. 1903; Ruhl. in Engl., Pflanzenreich 13 (4-30): 64, 86, & 286. 1903; Fyson, Journ. Indian Bot. 2: 312—313, pl. 32. 1921; Haines, Bot. Bihar & Orissa 6: 1067 & 1069—1070. 1924; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23, 24, 26, & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 125, 126, 129, 139, & 205. 1949; Moldenke, Phytologia 3: 336--337. 1950; Moldenke, Résumé 160, 162, 165, 176, 180, & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; Moldenke, Résumé Suppl. 3: 20 (1962) and 4: 7. 1962; Prain, Beng. Pl., ed. 2, 2: 848. 1963; Nath, Burm. Flow. Pl. 58. 1963; Thanikaimoni, Pollen & Spores 7: 185. 1965; Moldenke, Phytologia 18: 106, 178, & 274. 1969.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 32. 1921; Nath, Burm. Flow. Pl. 58. 1963.

Hooker (1893) regarded E. hamiltonianum Mart. as a synonym of E. oryzetorum. This fact is doubtless the basis for the homonym E. oryzetorum Hook. f. now regarded as a synonym of E. hamiltonianum Mart.

Eriocaulon oryzetorum seems to be based on Wallich 6069 [in some herbaria as Wallich s.n. "e Nepalia"] from Nepal. Prain (1903) records the species also from Chota Nagpur, where he says that it is "A weed of rice-fields". Smitinand tells us that it is "common in wet places" and "common in moist localities on savannas" in Thailand. It has been collected at 1300 meters altitude, flowering and fruiting in November. Koelz 19398 is a mixture with E. cinereum R. Br., E. luzulaefolium Mart., and E. sollyanum Royle.

Fyson (1921) describes this taxon as "Leaves 2—3 in. by 1/6 in. Sheaths as long. Scapes several, slender, 12—17 in. Heads 1/3 in. Involucral bracts blunt; floral acuminate scabrid. Flowers normal.....C. Himalayas; Nepal and southwards to Chota Nagpur and Burma Pegu. Mart. in Wall Pl. As. Rar. iii gives flo-

ral bracts as 'dorso-barbulatis'."

Material has been misidentified and distributed in herbaria as E. stramineum Körn. On the other hand, the Souchère 27, distributed as E. oryzetorum, is actually E. soucherei Moldenke.

Additional citations: NEPAL: Wallich 1821 ["22"] (Br, N), 6069, in part ["e Nepalia"] (B--isotype, E--isotype, Mu--222--isotype). INDIA: Surguja: Koelz 19398, in part (Mi). Uttar Pradesh: Strachey & Winterbottom 1 (Br, N). THAILAND: Smitinand 5014 [Herb. Roy. Forest Dept. 18556] (Gg), 5020 [Herb. Roy. Forest Dept. 18586] (Gg); Sørensen, Larsen, & Hansen 2255 (Cp), 6082 (S), 7049 (S). INDOCHINA: Annam: Souchère 1 (N), 5 (N), 24 (N), 25 (N), s.n. [Herb. Schmid 1411, in part] (Z).

ERIOCAULON OVOIDEUM Britton & Small

Additional bibliography: Britton & Small in N. L. Britton, Bull. Torr. Bot. Club 44: 32. 1917; Moldenke, N. Am. Fl. 19 (1): 19 & 31. 1937; Moldenke, Phytologia 1: 320. 1939; León, Fl. Cuba 1: 280. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 45 & 205. 1949; Moldenke, Phytologia 3: 337. 1950; Moldenke, Résumé 53, 288, & 482. 1959.

Killip found this plant growing on white sand savannas, flowering and fruiting in January.

Additional citations: ISLA DE PINOS: Alain & Killip 2164 (N); Britton, Britton, & Wilson 14220 (S--isotype); Killip 42859 (Le), 45380 (B, Mu, Z); León & Seifriz 17511 (Vi).

ERIOCAULON OZENSE Koyama

Bibliography: Koyama, Journ. Jap. Bot. 31: 6--7, fig. 1. 1956; Moldenke, Résumé 173 & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 185 & 430. 1964; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966.

Illustrations: Koyama, Journ. Jap. Bot. 31: 6, fig. 1. 1956.

Koyama (1956) based this species on a collection made by Hiroshi Hara in a marsh at Shimotashiro, Ozegahara, in the province of Kodzuke, Honshu, Japan, on August 20, 1955, and deposited in the herbarium of the University of Tokyo. He notes "Hoc Eriocaulon ab E. nosoriensi Ohwi quod e Nosori-ike provinciae Kodzuke descriptum est, calyce floris masculi extra dense piloso, petalis intus perdense pilosis sursum subsensim attenuantibus et apicem obovatam fuscatoglaucam dense albopuberulam formantibus statis distinguitur." He records the vernacular name "hara-inunohige". The Furuse collection cited below is said to be a topotype collection.

Additional citations: WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Furuse s.n. [18 Aug. 1954] (Ca--59912, S, Z).

ERIOCAULON PACHYSTROMA Van Royen

Bibliography: Van Royen, Blumea 11: 224—225, fig. 1. 1961; Van Steenis-Kruseman, Fl. Males. Bull. 17: 954 (1963) and 4: lv.

1967.

Illustrations: Van Royen, Blumea 11: 225, fig. 1. 1961.

The type of this apparently endemic species was collected by Cornelis Gijsbert Gerrit Jan van Steenis (no. 9691) in Gajol Alas Lands on Mount Kemiri, at 3000 meters altitude, Sumatra, forming dense cushions on the slope together with Centrolepis, Oreobolus, Monostachya, and Scirpus subcapitatus, flowering and fruiting in February and March. Van Royen (1961) says that the species grows on wet slopes or in poor peaty places, in small hollows with a thin covering of quartz sand, or on stony peaty ridges at high altitudes, from 2950 to 3400 meters above the sea. He notes that "This species closely resembles E. pulvinatum Van Royen described from New Guinea by the dense cushions, but differs by the unequal petals in both types of flowers, by the oblong or ovate-oblong individual bracts, and by the pubescence of the floral bracts." He also cites Van Steenis 8594, 9045, & 9661 from Sumatra.

ERIOCAULON PALLESCENS (Nakai) Satake

Synonymy: Eriocaulon sachalinense var. pallescens Nakai in Miyabe & Kudo, Fl. Hokkaido & Saghal. 3: 288. 1932. Eriocaulon pallescens Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 67, 68, 81, & 87, fig. 34. 1940.

Bibliography: Nakai in Miyabe & Kudo, Fl. Hokkaido & Saghal. 3: 288. 1932; Nemoto, Fl. Jap. Suppl. 1039. 1936; Honda, Nom. Pl. Jap. 463. 1939; Satake, Journ. Jap. Bot. 15: 631—632. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 67, 68, 81, & 87, fig. 34. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 56—57, pl. 11, fig. 21. 1940; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173, 292, & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 183, 184, & 430, fig. 126 (1). 1964; Moldenke, Résumé Suppl. 17: 10. 1968.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 68, fig. 34. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 11, fig. 21. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 184, fig. 126 (1). 1964.

The type of this species was collected by Kenji Miyabe at Titose, in the province of Iburi, Hokkaido, Japan, in September, 1926, and is deposited in the herbarium of the Faculty of Agriculture at Hokkaido Imperial University. An isotype is cited by Satake (1940) in the herbarium of Tokyo University. The species is known thus far only from the type collection, its common name is "siro-ezohosikusa", and Satake notes that "This plant has been regarded as a variety of Eriocaulon sachalinense Miyabe & Nakai, but the flowers are trimerous, and the character of the calyx differs considerably from the type species. The writer therefore offers the opinion that it comes from the type species E. sachalinense and allied species, judging from the fact that the involucres are white or pallescent, the calyx colourless and 3-lobated

at the apex, and the style much shorter than the stigma."

ERIOCAULON PALLIDUM R. Br.

Bibliography: R. Br., Prod. Nov. Holl. 1: 254. 1810; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 867 & 869. 1817; Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; Kunth, Enum. Pl. 3: 570. 1841; C. Müll. in Walp., Ann. 5: 926 & 937—938 (1860) and 6: 1171. 1861; Benth., Fl. Austral. 7: 191, 194, & 792. 1878; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 25. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 103, 108, & 286. 1903; F. M. Bailey, Compreh. Cat. Queensl. Pl. 584. 1913; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 28 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 153 & 205. 1949; Moldenke, Résumé 209 & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960.

Kunth (1841) describes this species as follows: "Scapo angulato (1—2-unciali), foliis planis latiusculis parum longiore; capitulo convexo; paleis imberbibus; perianthio femineo quinquepartito: foliolis 2 exterioribus angustissimis; 3 interioribus ciliatis; masculo triandro: exteriore diphyllo; interioris laciniis obsoletis." The initial letter of the specific epithet is uppercased by Kunth.

ERIOCAULON PALMERI Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 42, 48, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 69. 1908; Moldenke, N. Am. Fl. 19 (1): 19 & 32—33. 1937; Moldenke, Phytologia 1: 320—321. 1939; Moldenke, Known Geogr. Distrib. Erioc. 4 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 30 & 205. 1949; Moldenke, Résumé 36 & 482. 1959.

This species is known thus far only from the type collection.

Additional citations: MEXICO: Durango: Edw. Palmer 172 (B—type, Ca—143780—isotype, Mi—isotype, S—isotype).

ERIOCAULON PALUDICOLA Alv. Silv.

Synonymy: Eriocaulon palludicola Alv. Silv. ex Moldenke, Known Geogr. Distrib. Erioc. 8, sphalm. 1946.

Bibliography: Alv. Silv., Arch. Mus. Nac. Rio Jan. 23: 160. 1921; Alv. Silv., Fl. Mont. 1: 13—16 & 398, pl. 3. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Moldenke, Known Geogr. Distrib. Erioc. 8 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89, 290, & 482. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 3. 1928.

Silveira (1928) cites A. Silveira 553 from Minas Gerais.

ERIOCAULON PALUSTRE Salzm.

Bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 280. 1855; C. Müll. in Walp., Ann. 5: 930 (1860) and 6: 1171. 1861; Körn. in

Mart., Fl. Bras. 3 (1): 475, 480, & 500, pl. 41, fig. 1. 1863; Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 163. 1867; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 25. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 13, 65, 93, & 286, fig. 11. 1903; Moldenke, Known Geogr. Distrib. Erioc. 8 & 38. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89 & 482. 1959; Moldenke, Résumé Suppl. 1: 6. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; Moldenke, Résumé Suppl. 12: 4. 1965.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 41, fig. 1. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 93, fig. 11. 1903.

Pickel found this species growing on wet soil among grasses in a lagoon, flowering and fruiting in October. Material has been misidentified and distributed in herbaria as Leiothrix curvifolia (Bong.) Ruhl.

Citations: BRAZIL: Bahia: Martius s.n. [August '35] (B); Salzmann s.n. [Herb. Bernhardi] (E--isotype, E--photo of isotype, F--photo of isotype, N--isotype, N--photo of isotype, Z--photo of isotype). Minas Gerais: L. Riedel 1031 (Ut--335). Pernambuco: Pickel 2805 (W--1541643). MOUNTED ILLUSTRATIONS: drawings by Körnicke (B); original of Mart., Fl. Bras. 3 (1): pl. 41, fig. 1 (B, B).

ERIOCAULON PANAMENSE Moldenke

Bibliography: Moldenke, N. Am. Fl. 19 (1): 19 & 31--32. 1937; Moldenke, Phytologia 1: 321. 1939; Moldenke in Woodson & Schery, Ann. Mo. Bot. Gard. 31: 68. 1944; Moldenke, Known Geogr. Distrib. Erioc. 4 & 38. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 40 & 205. 1949; Moldenke, Phytologia 3: 337. 1950; Moldenke, Résumé 48 & 482. 1959.

This species has been found growing in wet or swampy meadows at altitudes of 1200 to 1700 meters above the sea.

Emended citations: PANAMA: Chiriquí: Killip 3614 (W--635858--type).

ERIOCAULON PANCHERI H. Lecomte

Bibliography: Guillaum. & Beauvis., Ann. Soc. Bot. Lyon 38: 40. 1914; Prain, Ind. Kew. Suppl. 5, pr. 1, 97. 1921; Moldenke, Known Geogr. Distrib. Erioc. 27 & 38. 1946; Guillaum., Fl. Analyt. & Synop. Nouv.-Caléd. 49--50. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 151 & 205. 1949; Moldenke, Résumé 205, 206, & 482. 1959; Moldenke, Résumé Suppl. 1: 14. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 97. 1960; Moldenke, Résumé Suppl. 16: 12. 1968; Moldenke, Phytologia 18: 270, 326, & 327. 1969.

The Herb. Reichenbach f. 38770 specimen, cited below, was the basis for my previous erroneous recording of E. pancheri from Lord Howe Island. The specimen is labeled as having come from "Ile des

Pins", but the island by this name here referred to is undoubtedly the one in the New Caledonian Islands group of Melanesia, not Lord Howe Island in the Australian region, which is also known as "Isle of Pines". The Herb. Reg. Monac. s.n. collection, also cited below, bears a notation by H. Ross in his own handwriting, to the effect that "Die Pflanze stammt wahrscheinlich von Isla de Pinos, die bei Cuba liegt. Auf den oceanischen Inseln kommt keine Eriocaulon-Art vor. Vgl. Erioc. pseudocompressum Ruhl." However, the specimen is plainly E. pancheri, not E. pseudocompressum, and the original label is inscribed "Isle of Pines, oc. pacific".

The Franc A.266, distributed as E. pancheri, is actually a cotype collection of E. neo-caledonicum Schlecht.

Guillaumin (1948) keys this species from the other species of the genus known to him from New Caledonia as follows:

1. Plants stout (robust); leaves 20—35 cm. long; heads globose; scape 6-angled, 20—30 cm. long.....E. pancheri H. Lecomte.
1a. Plants very dwarf; leaves 13 cm. long or longer.
2. Heads globose.
3. Scapes plainly ribbed.
4. Scapes with 6 ribs, 14—16 cm. long; leaves 5—13 cm. long; pistillate sepals obtuse....E. comptonii Rendle.
4a. Scapes with 5 ribs, 8—20 cm. long; leaves 3—7 cm. long; pistillate sepals acute.....E. scariosum J. Sm.
3a. Scapes almost cylindric, 5—8 cm. long; leaves 3—7 cm. long.....E. neo-caledonicum Schlecht.
2a. Heads turbinate, very small; scapes 7-ribbed, extremely long, 80—100 cm. long....E. longipedunculatum H. Lecomte.

Citations: MELANESIA: NEW CALEDONIAN ISLANDS: Ile des Pins: Herb. Reg. Monac. s.n. [Isle of Pines] (Mu—316); Herb. Reichenbach f.38770 (V). New Caledonia: Franc 266a (N); H. S. McKee 8089 (W—2375789).

ERIOCAULON PAPILLOSUM Körn.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 489. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 55, 57, & 286. 1903; Moldenke, Known Geogr. Distrib. Erioc. 8 & 38. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89 & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960.

Citations: BRAZIL: Goiás: Weddell 2135 (Br—isotype, N—isotype, N—photo of isotype, Z—photo of isotype).

ERIOCAULON PARADOXUM Moldenke

Bibliography: Moldenke, Phytologia 2: 133—134. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 30 & 205. 1949; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 36 & 482. 1959.

This species is known thus far only from the original collection.

ERIOCAULON PARAGUAYENSE Körn.

Additional bibliography: Körn. in Mart., Fl. Bras. 3 (1): 493 & 497—498. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 48, 58, & 286. 1903; Moldenke, Known Geogr. Distrib. Erioc. 8 & 38. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Phytologia 3: 337. 1950; Moldenke, Résumé 89 & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960.

Collectors have found this plant growing in grassy swampy places, flowering and fruiting in February.

Citations: BRAZIL: Mattogrosso: Lindman A.2471 (S, S); Malme 1456b (S), 2225 (S), 2225a (S), 2225b (S), 2225c (S); Weddell 3054 (Br—isotype, N—isotype, N—photo of isotype, Z—photo of isotype). São Paulo: Severén 185 (S).

ERIOCAULON PARANENSE Moldenke

Synonymy: Eriocaulon paranensis Moldenke, Résumé Suppl. 6: 9, in syn. 1963. Paepalanthus paranensis Moldenke, Résumé Suppl. 12: 11, in syn. 1965.

Bibliography: Moldenke, Phytologia 3: 166 (1949) and 3: 337. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Angely, Fl. Paran. 10: 11 & 14 (1957) and 12: 9. 1958; Moldenke, Résumé 89 & 482. 1959; Angely, Fl. Paran. 16: 51 (1960) and 17: 24. 1961; Moldenke, Résumé Suppl. 6: 9. 1963; Angely, Bibl. Veg. Paran. 196. 1964; Moldenke, Résumé Suppl. 12: 11. 1965; Angely, Fl. Anal. Paran., ed. 1, 199. 1965.

This species was found by Luetzelburg on dry campos. Material has been misidentified and distributed in herbaria as E. sellowianum Kunth.

Additional citations: BRAZIL: Paraná: Dombrowski 82 [Herb. Inst. Nat. 6793] (Z); Hatschbach 8723 (Lw); Luetzelburg 6787a (Mu).

ERIOCAULON PARKERI B. L. Robinson

Synonymy: Eriocaulon fistulosum Nees ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959 [not E. fistulosum R. Br., 1810].

Bibliography: B. L. Robinson, Rhodora 5: 175. 1903; Keller & S. Br., Handb. Fl. Philad. 92. 1905; Prain, Ind. Kew. Suppl. 3: 69. 1908; Robinson & Fern. in A. Gray, New Man. Bot., ed. 7, 261 & 898. 1908; M. A. Day, Check List 39. 1908; B. Long, Bartonia 2: 20. 1910; G. T. Stevens, Ill. Guide Flow. Pl. 114. 1910; W. Stone, Ann. Rep. N. J. State Mus. 1910: 323 & 324. 1912; Britton & Br., Ill. Fl., ed. 2, 1: 454, fig. 1141 (1913) and 3: 575. 1913; Marie-Vict., Fl. Laurent., ed. 1, 54, 74, 565, 679—681, & 892, fig. 244. 1935; Svenson, Torreya 35: 119. 1935; Moldenke, N. Am. Fl. 19 (1): 19 & 26. 1937; Moldenke, Phytologia 1: 321. 1939; Fern.,

Rhodora 43: 211. 1941; R. R. Tatnall, Fl. Del. 76. 1946; Moldenke, Known Geogr. Distrib. Erioc. [1], 2, & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed.2], 2—6 & 205. 1949; Moldenke, Phytologia 3: 337—340. 1950; R. McVaugh, Bull. N. Y. State Mus. 360: 93. 1958; A. & D. Löve, Bot. Notiser Lund 111: 380. 1958; Moldenke, Résumé 4—9 & 482. 1959; Moldenke, Résumé Suppl. 1: 17 (1959), 2: [1] (1960), and 3: [1] & 2. 1962; Gleason & Cronquist, Man. Vasc. Pl. 184. 1963;Rouleau in Marie-Victorin, Fl. Laurent., ed. 2, 54, 74, 565, 679—681, & 892, fig. 244. 1964; Shinners, Sida 2: 441. 1966; Kral, Sida 2: 296—297, 299, & 331. 1966; Sculthorpe, Biol. Aquat. Vasc. Pl. 393. 1967; R. M. Harper, Castanea 32: 17. 1967; Moldenke, Phytologia 18: 112. 1969.

Additional & emended illustrations: Britton & Br., Ill. Fl., ed. 2, 1: 454, fig. 1141. 1913; Marie-Vict., Fl. Laurent., ed. 1, 680, fig. 244. 1935; Rouleau in Marie-Vict., Fl. Laurent., ed. 2, 680, fig. 244. 1964; Kral, Sida 2: 296. 1966.

Recent collectors have found this plant in brackish water and on tidal shores with hard bottoms, flowering and fruiting from August to October, and describe the plants as "purplish-green". The only common name recorded for the species is "Parker's pipewort". Rouleau (1964) says that in the Laurentian region it is found only in the intertidal zone of the St. Lawrence estuary, growing with Bidens hyperborea Greene, from Lake Saint Pierre to salt water -- "L'E. Parkeri a une distribution bicentrique: côte de l'Atlantique depuis la Virginie jusqu'à la riviere Penobscot (Maine); estuaire du Saint-Laurent. Cette disjonction est intéressante et soulève tout de problème de l'origine de la florule endemique des grèves estuariennes du Saint-Laurent." The Löves (1958) report the chromosome number as 2n = c. 48.

McVaugh (1958) says "Tidal mud along the Hudson Aiver, otherwide unknown [in New York]. First reported from our area by Svenson (Torreya 35: 119. 1935), who found it in the town of Red Hook, at the mouth of Stony Creek. Poelsburg, 3807; shore east of Rogers Island, 2958." Tatnall (1946) records it "in tidal mud of coastal plain" in Delaware, flowering there from August to mid-October. Fernald & Svenson state that they found it "forming close carpets, extremely fragile on muddy tidal shores" in Massachusetts. Walker reports it "forming dense stands on soft mud covered by fresh water backed up by tide" in Maryland.

It should be noted here that E. parkeri apparently in the taxon which Ruhland (1903) called E. flavidulum Michx. in his monograph as distinct from Syngonanthus flavidulus (Michx.) Ruhl., the correct name for Michaux's plant. Also, it should be noted that the index to Marie-Victorin's work (1935) and Rouleau's later edition of it (1964) states that this species is mentioned on page 75 of that work, but I fail to find it there. It occurs on page 74 instead.

The Stone (1912) reference in the bibliography above is often dated "1911", but the work was not actually issued until January 26, 1912.

Material has been misidentified and distributed in herbaria

under the names E. flavidulum Michx. and E. septangulare With. On the other hand, the E. L. Little s.n. [Utah, Jul. 14, 1929], distributed as E. parkeri, is actually E. körnickianum Van Heurck & Muell.-Arg. and the A. P. Garber s.n. [S. Fla., 1877] is E. ravenelii Chapm. C. C. Plitt 909 is a mixture with Sagittaria subulata (L.) Buch., B. L. Robinson s.n. [Newburyport] is a mixture with Sagittaria montevidensis Cham. & Schlecht., and L. F. Ward s.n. [Aug. 1878] & s.n. [Sept. 29, 1878] are mixtures with Sagittaria pusilla Nutt.

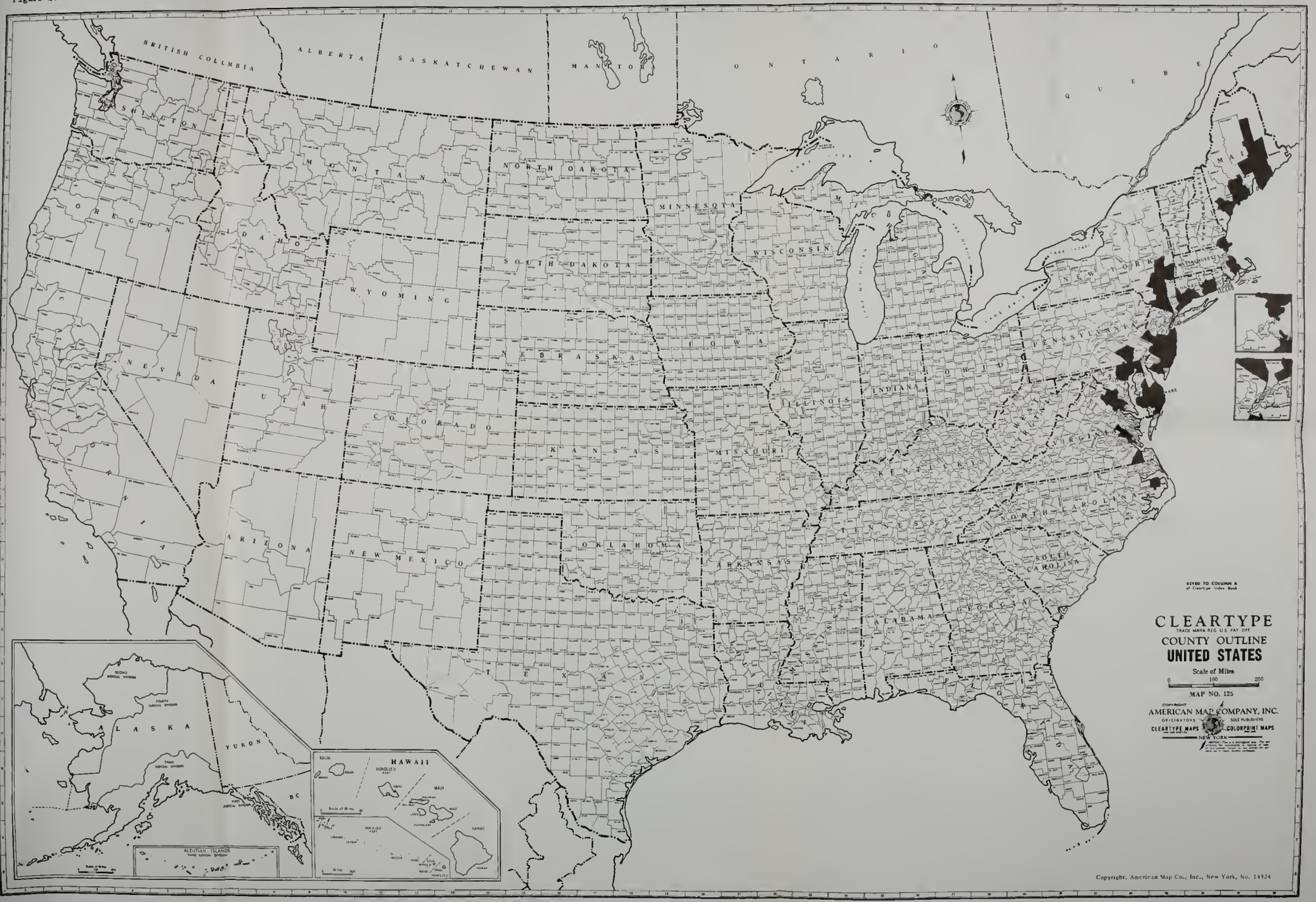
Kral (1966) gives the distribution of this species as "Muddy tidewater riverbanks, southeastern Canada to eastern North Carolina". This is the first published record known to me of the species occurring south of Virginia. He is doubtless referring to the same collection from Tyrrell County cited by me below, the only one known to me from that state. He differentiates the species from E. pellucidum (which he calls E. septangulare With.) as follows: "This species has been most often confused with E. septangulare but may be distinguished from it by the following criteria: a. Scape tending to be straight rather than twisted, and with fewer ridges. b. Head narrower (seldom more than 0.4 mm.), hemisphaerical, the outer involucral bracts a very pale, dull gray or stramineous, in contrast to the broader, when mature subglobose, heads of E. septangulare the outer involucral bracts of which are much darker and more lustrous. c. Bracts and perianth parts sparingly clavate-hairy, often some perianth parts smooth, in contrast to the more pubescent perianth and bractlets of E. septangulare. d. Involucral bracts tending to remain ascending even on the fruiting heads, thus mainly concealing the bractlets and florets while, on E. septangulare, the involucral bracts tend to be reflexed in the flowering and fruiting heads and are themselves partly concealed by the hairy florets."

Additional citations: QUEBEC: Bellechasse Co.: Raymond & Kucyniak 3328 (Mg). Montmagny Co.: Iltis 3509c (Ws); Löve, Löve, & Rousseau 7051 (Wp). Montmorency Co.: Desmarais 1150 (Mg). Portneuf Co.: Marie-Victorin & Rolland-Germain 2412 (Vi). Québec Co.: Clausen & Trapido 2779 (Ca--841794, Ok); Marie-Victorin, Rolland-Germain, & Raymond 56166 (Um--8801); Raymond, Kucyniak, Marie-Victorin, & Rolland-Germain 55073 (Um--9128). MAINE: Cumberland Co.: A. H. Norton s.n. [20 Aug. 1924] (Ws). Penobscot Co.: Fassett 19031 (Ws); Fernald & Long 13165 (B). Sagadahoc Co.: Fassett 2495 (Ws); Fernald & Long s.n. [Pl. Exsicc. Gray. 174] (B, Br, Ca--204649, Dt, Mg, Mu--415, S, Vi, Ws). MASSACHUSETTS: Essex Co.: B. L. Robinson s.n. [Sept. 26, 1903] (Ca--923757), s.n. [Newburyport] (N). Plymouth Co.: S. F. Blake 10964 (B, S, Ws); Fernald & Svenson 860 (Ca--924139). CONNECTICUT: New Haven Co.: D. C. Eaton s.n. [1858] (S). New London Co.: R. W. Woodward s.n. [Old Lyme, Sept. 1, 1918] (Ca--841796, Ms--77192). NEW YORK: Co-

Figure 4. Distribution of Eriocaulon parkeri in the United States

Herbarium curators who have material of this species from additional counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke



lumbia Co.: Muenscher & Curtis 5600 (Ca--586092, Ws). Greene Co.: Muenscher & Curtis 5604 (Mi). Ulster Co.: H. D. House 25069 (Ca-841795); Muenscher, Brown, & Langdon 21534 (S); Muenscher & Curtis 5606b (Ws); Muenscher, Winne, & Isely 20694 (Ca--906911). NEW JERSEY: Camden Co.: Martindale s.n. [Camden, Sep. 1877] (B). Ocean Co.: E. H. Day s.n. [17.7.82] (N). PENNSYLVANIA: Lancaster Co.: Heller & Halbach s.n. [September 12, 1891] (Dt). Philadelphia Co.: R. C. Alexander s.n. [Redbank, 3 Sept. '69] (Ca--379007); Bernhardi s.n. [Philadelphia] (B); E. J. Durand s.n. [Schuylkill River] (Ws). DELAWARE: Sussex Co.: E. C. Earle 1820 (Ca--22688). MARYLAND: Baltimore Co.: C. C. Plitt 909, in part (G). Cecil Co.: W. L. Abbott 2432 (S). Charles Co.: Fassett 22345 (Ws). Worcester Co.: E. H. Walker 4220 (Ws). DISTRICT OF COLUMBIA: F. Blanchard s.n. [bank of the Potomac, Aug. 14, 1891] (Dt); L. F. Ward s.n. [Aug. 1878] (E--881531), s.n. [Sept. 29, 1878] (E--86217, E--773768), s.n. [Sept. 10, 1882] (N). VIRGINIA: King William Co.: Fernald & Long 11539 (S). Nansemond Co.: Fernald, Long, & Clement 15238 (Vi, Ws). New Kent Co.: Mikula 3125 (N). Prince William Co.: F. H. Sargent 6270 (Ok, St). NORTH CAROLINA: Tyrrell Co.: Radford 44454 (N). LOCALITY OF COLLECTION UNDETERMINED: Herb. Mus. Bot. Berol. s.n. (B); Stüve s.n. [1819] (B).

ERIOCAULON PARVICAPITULATUM Moldenke

Bibliography: Moldenke, Phytologia 3: 415--416. 1951; Moldenke in Humbert, Fl. Madag. 36: 12, fig. 1 (32--34). 1955; G. Taylor, Ind. Kew. Suppl. 12: 55. 1959; Moldenke, Résumé 156 & 482. 1959.

Illustrations: Moldenke in Humbert, Fl. Madag. 36: fig. 1 (32--34). 1955.

Citations: MADAGASCAR: Perrier de la Bâthie 7250 (N--isotype, N--photo of type, P--type, Z--photo of type), 7256 (N, P).

ERIOCAULON PARVUM Körn.

Bibliography: Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 163. 1867; Franch. & Savat., Enum. Pl. Jap. 2: 99. 1879; Mak., Bot. Mag. Tokyo 4: 174. 1890; Maxim., Diagn. Pl. Nov. Asiat. Dec. 8: 14. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Mak., Bot. Mag. Tokyo 8: 506. 1894; J. Matsumura, Ind. Pl. Jap. 2 (1): 176. 1905; Nakai, Rep. Veg. Quelp. 28. 1914; Saida & Satô, Naigai Syokubutusi 1296, fig. 2009. 1921; Mori, Enum. Pl. Corea 80. 1922; Mak & Nemoto, Fl. Jap., ed. 1, 1307 (1925) and ed. 2, 1513. 1931; Nemoto, Fl. Jap. Suppl. 1039. 1936; Satake in Nakai, Icon. Pl. As. Orient. 2: 97--100, pl. 42 (1937) and ed. 2, 192. 1938; Terazaki, Zoku Nipp. Syokubutu Zuhu fig. 3712. 1938; Honda, Nom. Pl. Jap. 462. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 1, 6--9, 11, 12, 20, 28, 29, 78, & 87, fig. 1M, 2A, 3A, 5B, & 11. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 19--21. 1940; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1:

879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 25 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 133, 134, & 205. 1949; Moldenke, Résumé 171, 173, & 482. 1959; Moldenke, Résumé Suppl. 1: 12. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 179—180 & 430, fig. 122 (1), pl. 48, fig. 305. 1964; Moldenke, Résumé Suppl. 12: 10. 1965; Thanikaimoni, Pollen & Spores 7: 182. 1965; Moldenke, Phytologia 17: 461 (1968) and 18: 184. 1969.

Illustrations: Saida & Satô, Naigai Syokubutusi fig. 2009. 1921; Satake in Nakai, Icon. Pl. As. Orient. 2: pl. 42. 1937; Terazaki, Zoku Nipp. Syokubutu Zuhu fig. 3712. 1938; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6—8, 11, & 29, fig. 1M, 2A, 3A, 5B, & 11. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 179, fig. 122 (1) & pl. 48, fig. 305 [in color]. 1964.

Collectors have found this plant growing in bogs at the shores of ponds, while Koyama states that he found it "scattered in densely vegetated small marshes and shallow pools with Juncus, Mentha, and Utricularia", flowering and fruiting in September and October. The only recorded vernacular name for it is "kurohosikusa". The Maximowicz (1893) reference in the bibliography above is sometimes cited to "Bull. Acad. Sci. St. Pétersb." and dated "1892", but this work appears only to have been issued as a separate and, according to the Index Kewensis, should be dated "1893".

The Collector undesignated s.n. [Tokyo], distributed as E. parvum, is actually E. cinereum R. Br., while Rein s.n. [Aidzu] is E. nipponicum Maxim.

Satake (1940) cites the following additional collections from various herbaria: KOREA: Boku 140; Faurie 894. JAPAN: Honshu: Hisauti s.n. [Sept. 1922] & s.n. [Oct. 1936]; Itô s.n. [Oct. 1893]; Koto 57465; Maekawa 10030; Makino s.n. [Oct. 1894] & s.n. [Sept. 1895]; Matusima 37354; Matuyama s.n. [Sept. 1928]; Miura s.n. [Jul. 1909]; Nakazima s.n. [Oct. 1927]; Okuyama 51290; Saito 86; Satake s.n. [Oct. 1936]; Sugimoto 42900; Turumati 39; Ui 81650. Kyushu: Collector undetermined 9 & s.n. [Oct. 1909]; Doi 59; Ikebe s.n. [Sept. 1926]; Mayebara s.n. [Oct. 1916], s.n. [Aida, Oct. 1924], & s.n. [Kawa-mura, Oct. 1924]; Nakano 24; Nakasima 37 & 38; Nakazima s.n. [Oct. 1911]; Taniguti s.n. [Amakusa]; Tasiro 36742 & s.n. [Oct. 1926]. Shikoku: Makino 3600 & s.n. [Oct. 1891]; Murai 8; Ogata s.n. [Oct. 1923]; Oti 4; Watanabe s.n. [Sept. 1894]; Yamamoto 2; Yamasita s.n. [Oct. 1930].

Citations: KOREAN COASTAL ISLANDS: Quelpart: Taquet 1542 (B). WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Collector undetermined s.n. [Kasanisi-mura, 29/9/07] (S); Furuse s.n. [6 Oct. 1955] (S); Koyama 13107 (Z), s.n. [7 October 1935] (Ss). Kyushu: Kodama 219 (Kg); Naito s.n. [Nov. 6, 1932] (Kg).

ERIOCAULON PECTINATUM Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 64, 85, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 70. 1908; Fyson, Journ. Indian Bot. 3: 17. 1922; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1613--1614 & 1620. 1931; Moldenke, Known Geogr. Distrib. Erioc. 23 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126 & 205. 1949; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1124, 1127, & 1333. 1956; Razi, Rec. Bot. Surv. India 18: 19. 1959; Moldenke, Résumé 162 & 482. 1959.

Citations: INDIA: Madras: Perrottet 1167 (B--type, Z--isotype).

ERIOCAULON PELLUCIDUM Michx.

Synonymy: Eriocaulon noveboracens Pluk. ex Hook. in Curtis, Bot. Mag. 59: pl. 3126, in syn. 1832. Eriocaulon pumilum Raf., Atl. Journ. 1: 121. 1832 [not E. pumilum Afzel., 1856, nor "Afzel. ex Körn.", 1952, nor N. E. Br., 1903, nor Chapm., 1959]. Eriocaulon pellucidum var. pumilum Raf., Autikon Bot., pr. 1, 189. 1840. Eriocaulon brevifolium Raf., Autikon Bot., pr. 1, 189. 1840 [not E. brevifolium Klotzsch, 1848, nor Mart., 1863]. Eriocaulon sp. Penhallow, Brit. Assoc. Adv. Sci. Bradford Meet. 335. 1900. Eriocaulon septangulare var. natans Hexamer & Meier ex Moldenke, Phytologia 1: 323, in syn. 1939. Lepidosphaera lacustrus La Pylaie ex Moldenke, Résumé Suppl. 1: 19, in syn. 1959. Globularia graminifolia Schreb., in herb.

Additional & emended bibliography: Michx., Fl. Bor. Am. 2: 166. 1803; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 868. 1817; Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; Raf., Atl. Journ. 1: 121. 1832; Hook. in Curtis, Bot. Mag. 59: pl. 3126. 1832; Mart. in Wall., Plant. As. Rar. 3: 28. 1832; Raf., Autikon Bot., pr. 1, 189. 1840; Kunth, Enum. Pl. 3: 540 & 557. 1841; A. Wood, Class-book, ed. 1, 405 (1845) and ed. 2, pr. 1, 564. 1847; A. Gray, Man. Bot., ed. 1, 514--515. 1848; A. Wood, Class-book, ed. 2, pr. 2, 564 (1848), ed. 10, pr. 1, 564 (1848), ed. 10, pr. 2, 564 (1849), ed. 10, pr. 3, 564 (1850), ed. 17, 564 (1851), ed. 23, 564 (1851), ed. 29, 564 (1853), ed. 35, 564 (1854), ed. 41, pr. 1, 564 (1855), and ed. 41, pr. 2, 564. 1856; A. Gray, Man. Bot., ed. 2, pr. 1, 489. 1856; Knieskern, Ann. Rep. N. J. Geol. Surv. 33. 1856; A. Gray, Man. Bot., ed. 2, pr. 2, 489. 1858; C. Müll. in Walp., Ann. 5: 928 (1860) and 6: 1171. 1861; A. Wood, Class-book, [ed. 42], pr. 1, 729. 1861; A. Gray, Man. Bot., ed. 3, 489 (1862) and ed. 4, pr. 1, 489. 1863; A Wood, Class-book, [ed. 42], pr. 2, 729. 1863; A. Gray, Man. Bot., ed. 4, pr. 2, 489. 1864; A. Wood, Class-book, [ed. 42], pr. 3, 729 (1865) and pr. 4, 729. 1867; A. Gray, Man. Bot., ed. 5, pr. 1, 550 (1867) and ed. 5, pr. 2, 550. 1868; A. Wood, Class-book, [ed. 42], pr. 5, 729. 1868; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 1, 352 (1868) and pr. 2, 352. 1869; A. Wood, Class-book, [ed. 42], pr. 6, 729 (1869) and pr. 7, 729. 1870; A. Gray, Man. Bot., ed. 4, pr. 3, 489. 1870; A. Wood, Am. Bot. & Flor., ed. 1, pr. 1, 355 (1870), pr. 2,

355 (1871), and pr. 3, 355. 1872; A. Wood, Class-book, [ed. 42], pr. 8, 729. 1872; A. Wood, Am. Bot. & Flor., ed. 1, pr. 4, 355 (1873) and pr. 5, 355. 1874; O. R. Willis, Cat. Pl. N. J. 67. 1874; A. Wood, Am. Bot. & Flor., ed. 1, pr. 6, 355. 1875; A. Wood, Class-book, [ed. 42], pr. 9, 729. 1876; A. Gray, Man. Bot., ed. 5, pr. 8, 550 (1878) and pr. "8" [=9], 550. 1880; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 3, 352. 1880; A. Wood, Class-book, [ed. 42], pr. 10, 729. 1881; O. R. Willis in A. Wood, Am. Bot. & Flor., ed. 2, 355. 1889; A. W. Chapm., Fl. South. U. S., ed. 2, pr. 4, 658. 1889; S. Wats. & Coult. in A. Gray, Man. Bot., ed. 6, pr. 1, 567 (1889) and pr. 2, 567. 1890; Morong, Bull. Torr. Bot. Club 18: 353—354. 1891; A. W. Chapm., Fl. South. U. S., ed. 2, pr. 5, 658. 1892; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Massee, Grevillea 22: 67. 1894; Britton & Br., Ill. Fl., ed. 1, 1: 371 & 602, fig. 899 (1896) and 3: 537. 1896; A. W. Chapm., Fl. South. U. S., ed. 3, 530. 1897; Penhallow, Brit. Assoc. Adv. Sci. Rep. 68: 527. 1899; Penhallow, Brit. Assoc. Adv. Sci. Bradford Meet. 335. 1900; G. P. Clinton, Rhodora 3: 82. 1901; G. P. Clinton, Journ. Myc. 8: 137. 1902; J. K. Small, Fl. Southeast. U. S., ed. 1, 236. 1903; Ruhl. in Engl., Pflanzenreich 13 (4-30): 19, 32—35, 286, & 287. 1903; Keller & S. Br., Handb. Fl. Philad. 91. 1905; Robinson & Fern. in A. Gray, New Man. Bot., ed. 7, 261 & 898. 1908; M. A. Day, Check List 39. 1908; R. W. Sm., Bot. Gaz. 49: 281—289, pl. 19 & 20. 1910; G. T. Stevens, Ill. Guide Flow. Pl. 114 & 115, pl. 9, fig. 9. 1910; W. Stone, Ann. Rep. N. J. State Mus. 1910: 323 & 324, pl. 28, fig. 1. 1912; Creevey, Harper's Guide Wild Fls. 42, 44, [45], 469, & 529. 1912; Britton & Br., Ill. Fl., ed. 2, 1: 454, fig. 1140 (1913) and 3: 575 & 625. 1913; J. K. Small, Fl. Southeast. U. S., ed. 2, 236. 1913; House, N. Y. State Mus. Mem. 15 (1): 44, pl. 6A (1918) and 15 (2): 347 & 355. 1918; Knowlton, U. S. Geol. Surv. Bull. 696: 260 & 812. 1919; Fern., Rhodora 23: 102. 1921; N. Taylor, Guide Wild Fls. 6—7 & 323, fig. 13. 1928; Pool, Fls. & Flow. Pl., ed. 1, 299 & 359, fig. 169. 1929; House, Wild Fls. 44, 347, & 355, pl. 6A. 1934; Marie-Vict., Fl. Laurent., ed. 1, 546, 674, 679, 680, 837, & 892, fig. 244. 1935; Moldenke, N. Am. Fl. 19 (1): 18 & 24. 1937; Little, Am. Midl. Nat. 19: 378. 1938; Moldenke, Phytologia 1: 323—327. 1939; Pool, Fls. & Flow. Pl., ed. 2, 295 & 407, fig. 189. 1941; Karling, Torreya 41: 106. 1941; Moldenke in Lundell, Fl. Texas 3 (1): 6—7. 1942; Raf., Autikon Bot., pr. 2, 189. 1943; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 76 & [103]. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; R. R. Tatnall, Fl. Del. 75. 1946; Moldenke, Known Geogr. Distrib. Erioc. [1]—3, 20, 38—40, & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 2—6, 11, 12, 14, 15, 107, & 206. 1949; E. D. Merr., Ind. Rafin. 82. 1949; H. E. Jaques, Pl. Fam., ed. 2, 96, fig. 289. 1949; Hare, Journ. Linn. Soc. Lond. Bot. 53: 422—448. 1950; Moldenke, Phytologia 3: 385-397. 1950; Niering, Ecolog. Monog. 23: 132. 1953; Butters & Abbe, Rhodora 55: 136. 1953; Hand, Bull. Torr. Bot. Club 81: 92. 1954; [Wiltshire], Rev. Appl. Myc. Ind. Fungi 1: 39, 50, & 393.

1954; Thorne, Am. Midl. Nat. 52: 281. 1954; Linderoth, Faunal Con. Eu. & N. Am. 240, 241, & 250. 1957; Anon., Algonquin Prov. Park Mus. Check-list 7. 1957; A. & D. Löve, Bot. Notiser Lund 111: 380--381 & 387. 1958; R. McVaugh, Bull. N. Y. State Mus. 360: 93. 1958; A. Löve, Rhodora 61: 31. 1959; Moldenke, Résumé 4--10, 15, 16, 19, 173, 286, 287, 291, 292, 414, & 482. 1959; Moldenke, Résumé Suppl. 1: [1], 2, 7, & 17--19 (1959) and 2: [1] & 2. 1960; Sparrow, Aquat. Phycomycet., ed. 2, [Univ. Mich. Stud. Sci. 15:] 376 & 1095. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; Anon., Billie Bear Plant List 3. 1961; Moldenke, Résumé Suppl. 3: [1], 2, 4, 5, 15, 18, & 31 (1962), 4: [1] (1962), and 6: [1] & 2. 1963; Gleason & Cronquist, Man. Vasc. Pl. 184. 1963; J. M. Gillett, Canad. Field Nat. 77: 139. 1963; R. Good, Geogr. Flow. Pl. 182, 293, & 294. 1964; Melchior in Engl., Syllab. Pfl., ed. 12, 2: 555 & 556, fig. 230 A--D. 1964; Henry & Buker, Trillia 12: 105 & 131. 1964; Roland & Sm., Proc. Nova Scot. Inst. Sci. 26 (2): 191--192, fig. 476, map 173. 1964; Rouleau in Marie-Vict., Fl. Laurent., ed. 2, 546, 674, 679, 680, & 837, fig. 244. 1964; Radford, Ahles, & Bell, Guide Vasc. Fl. Carol. 106 & 107. 1964; Lakela, Fl. Northeast. Minn. 110--111. 1965; Stocking, Nat. Conserv. Ecol. Stud. Leafl. 6: [15]. 1965; F. H. Montgomery, Native Wild Pl., pr. 2, 9, fig. 16. 1965; Shinners, Sida 2: 441. 1966; F. H. Montgomery, Pl. from Sea to Sea 390, fig. 822. 1966; Hartley, Univ. Iowa Stud. Nat. Hist. 21: 150. 1966; Kral, Sida 2: 308--309 & 330. 1966; Moldenke, Résumé Suppl. 13: [1] (1966), 14: [1] (1966), and 15: [1]. 1967; Ogden, Quatern. Paleoecology 7: 175--183. 1967; Sculthorpe, Biol. Aquat. Vasc. Pl. 393. 1967; E. G. Voss, Mich. Bot. 6 (2): 41 & 46, fig. 6. 1967; E. L. Braun, Vasc. Fl. Ohio 1: 308--310. 1967; Sterling, Outer Isl. 159, [161], 167, & 179. 1967; L. S. Thomas, Pine Barrens 23. 1967; Freer, Castanea 33: 168. 1968; W. C. Grimm, Recog. Flow. Wild Pl. 36. 1968; Ogden, Biol. Abstr. 49: 9863. 1968; Hinds & Hathaway, Wildfls. Cape Cod 116, 117, & 168, fig. 107. 1968; Moldenke, Résumé Suppl. 16: 21 (1968) and 17: [1], 8, & 9. 1968; Moldenke, Phytologia 17: 9, 382, 490, & 500 (1968), 18: 45 (1968), 17: 484-485 (1969), and 18: 79--80, 175, 187, 188, 249, 250, 253, 263, 268, 299, & 301. 1969.

Illustrations: Britton & Br., Ill. Fl., ed. 1, 1: 371, fig. 899. 1896; R. W. Sm., Bot. Gaz. 49: pl. 19 & 20. 1910; G. T. Stevens, Ill. Guide Flow. Pl. 115, pl. 9, fig. 9. 1910; W. Stone, Ann. Rep. N. J. State Mus. 1910: pl. 28, fig. 1. 1912; Creevey, Harper's Guide Wild Fls. [45]. 1912; Britton & Br., Ill. Fl., ed. 2, 1: 454, fig. 1140. 1913; House, N. Y. State Mus. Mem. 15 (1): pl. 6A [in color]. 1918; N. Taylor, Guide Wild Fls. 7, fig. 13. 1928; Pool, Fls. & Flow. Pl., ed. 1, 299, fig. 169. 1929; House, Wild Fls. pl. 6A [in color]. 1934; Marie-Vict., Fl. Laurent., ed. 1, 680, fig. 244. 1935; Pool, Fls. & Flow. Pl., ed. 2, 295, fig. 189. 1941; Roland & Sm., Proc. Nova Scot. Inst. Sci. 26 (2): 191, fig. 476. 1964; Rouleau in Marie-Vict., Fl. Laurent., ed. 2, 680, fig. 244. 1964; F. H. Montgomery, Native Wild Pl., pr. 2, fig. 16. 1965; F. H. Montgomery, Pl. from Sea to Sea fig. 822. 1966; E. G.

Voss, Mich. Bot. 6 (2): 46, fig. 6. 1967; E. L. Braun, Vasc. Fl. Ohio 1: 308. 1967; Sterling, Outer Isl. 159 & [161]. 1967; Hinds & Hathaway, Wildfls. Cape Cod fig. 107. 1968.

It is worth noting here that the E. pumilum Afzel. and the E. pumilum "Afzel. ex Körn.", referred to in the synonymy above, belong in the synonymy of E. pulchellum Körn. as does also the homonym accredited to N. E. Brown, while E. pumilum Chapm. is a synonym of Lachnocaulon engleri Ruhl. Rafinesque (1840) describes his E. pellucidum var. pumilum as having "leaves uncial, scape 3 uncial, heads small, on Mts." I feel that it is only a dwarf edaphic form of this very variable species. The type of Lepidosphaera lacustrus appears to be an unnumbered Brongniart collection from "terra nueve" deposited in the herbarium of the Botanisches Museum at Berlin.

The Eriocaulon brevifolium of Klotzsch is a synonym of what is now known as E. klotzschii Moldenke, while the homonym accredited to Martius is E. sellowianum Kunth.

In my earlier publications I united E. pellucidum with the Old World E. septangulare With., as most authors have done. Rouleau (1964) lists E. septangulare, along with Spiranthes romanzoffiana Cham. and Juncus tenuis Willd., as species which occur native in North America and also in Great Britain and which are supposed to represent an ancient flora when the two continents were united. Melchior (1964), however, points out that the "E. septangulare" plants of North America have only half the chromosome count of those living in Europe. Åskell & Doris Löve (1958) have thoroughly investigated this matter and report as follows: "Eriocaulon septangulare is an aggregate complex, the typical unit of which was originally described by Withering (1776) from Ireland. The American species, E. pellucidum described by Michaux (1803) was regarded distinct by Torrey (1826), doubtfully identified with the British plant by Bigelow (1824), whereas Gray (1848) and most later authors have regarded them as synonymous. Some taxa at the specific level have been separated from the American populations by later authors, as, for instance, E. Parkeri of the tidal mudflats and estuaries from Virginia north to the St. Lawrence described by Robinson (1903), and E. Rollandii from Lake Mistassini described by Rouleau (1957), but the common North American plant is still regarded as conspecific with the British taxon by all American authors (Fernald, 1950; Gleason, 1952; Rousseau, 1957). It is rather variable and seems to be greatly affected by environmental conditions in the lakes it inhabits. The only chromosome numbers hitherto reported from Eriocaulon are 2n = 32 and 36 counted by Erlandsson (1940) in three species from Australasia. None of these is closely related to E. septangulare agg. In our material from two localities in western Ireland (plants from Clooney Lakes in southern Kerry County, and germinating seeds from Lough Gall on Achill Island in May County) we counted 2n =

64 chromosomes, a number very close to the inexact 2n = c. 60 reported by Hare (1950) in connection with detailed morphological and anatomical studies on the Irish plant. In our American material of what the manuals name E. septangulare, from Lake Nominingue and Lake Ouareau in the Laurentian Mountains, we counted 2n = 32 chromosomes, and the number 2n = c. 48 is typical for E. parkeri from the estuaries of the St. Lawrence River. There is, thus, good reason to doubt the correctness of the identification of the American plant with the Irish species, and the name E. pellucidum Michx. should be reinstated for this taxon of eastern North America. E. septangulare s. str. differs from E. pellucidum in its generally somewhat broader and shorter leaves when cultivated under similar conditions; the scapes do not reach the same length and are thicker just above the base; the heads are generally larger, more sphaerical at first and later more vertically flattened, and not as depressed-globose as those of the American species; the seeds are ellipsoidal or subsphaerical and definitely larger in the plant from the British Isles than in any of the species from northeastern North America....The present results, conclusive for Eriocaulon and Sisyrinchium, indicate that the explanations hitherto presented for this problem [of North American - European relationships] have been based on insufficient taxonomic evidence, at least in part. It is clear that the two most discussed species of this element are not identical with taxa in North America as has always been thought, and there is considerable doubt as to the occurrence of these species outside of the British Isles. That they are old inhabitants of Ireland is beyond all doubt, and in fact Jessen (1949) has demonstrated that Eriocaulon grew in Ireland in early post-glacial times." They conclude that "Eriocaulon septangulare agg. is divided into three species in America and one in Ireland. No cytological information is available for the recently described E. Rollandii, while the American E. pellucidum has 2n = 32, and E. Parkeri 2n = 48 chromosomes. Irish plants of E. septangulare s. str. have 2n = 64 chromosomes; that species seems to be endemic to the British Isles." It should be mentioned here that several North American botanists, notably the late Agnes Chase and Ellsworth P. Killip, who have observed both the Old and New World populations in the field, agreed that they are not conspecific. Unfortunately, the differences noted in the field are not as obvious on dried and pressed herbarium material.

The fossil described by Penhallow in 1899 came from Taylor Brickyard, Don Valley, Ontario, Canada, in a Pleistocene formation, while that described by him in 1900 was also from the Pleistocene of the Don River Valley, Ontario, and is almost certainly the same taxon.

Eriocaulon pellucidum has been collected on shore sand, on shores or muddy shores, on sandflats at creek mouths, and exsiccated shores at the mouths of brooks, in the swampy edges of lakes,

shallow pools in bog-barrens, wet sandy soil along lakeshores, dessicating mud of boggy roadside pools, peaty quagmire pools in sphagnous bogs, in the shallow water of lakes and bays, in the Sphagnum layers of pond shores, in peaty lake margins, quaking peaty margins of ponds, in water from 1 inch to almost 6 feet in depth, on bottoms of sand, sand and gravel, fibrous peat, muck, or sandy muck, growing at altitude to 550 meters.

Rouleau (1964) says that it is very common in the lakes of the Laurentides and the Appalachians in general in Quebec, also in Gaspé and Anticosti, frequently growing along with Lobelia dortmanna L. In Ontario it is said by Voss to be "occasional in floating bog mats". In Michigan it is described by Van Deusen as "very dense on exposed shoals, scapes 32—39 cm. long", by Mc Vaugh as "very abundant turf-forming", and by Voss as "abundant on moist sandy shores".

In New Jersey it is described by Adams as "submerged in dense colonies in shallow water" and by Kral as "in peaty banks and shallow water at edge of ponds in Chamaecyparis areas, the heads chalk-white, the submerged plants with much longer scapes". Wiegmann found it growing along with Cephalanthus occidentalis, Sphagnum, Pontederia, Castalia, and Eleocharis acicularis in New York, while in North Carolina it is said by Radford, Ahles, & Bell (1964) to be "rare in shallow pools of Bladen, Craven, Perquimans, and Tyrrell Counties". A distribution map preserved in the herbarium of the University of Wisconsin indicates this species as occurring in Ashland, Barron, Bayfield, Burnett, Chippewa, Dane, Dodge, Douglas, Forest, Langlade, Lincoln, Marquette, Oconto, Oneida, Polk, Price, Rusk, Sawyer, Shawano. Vilas, Washburn, Waupaca, and maybe Sheboygan Counties in that state.

Chapman (1889) records "E. septangulare" from southern Mississippi on the basis of an unnumbered Hilgard collection not as yet seen by me.

Sparrow (1960) reports that the leaves of this plant are parasitized by the fungus Endophlyctis texana Karling, a fungus also found on Elodea canadensis and Vallisneria. This report is apparently based on one by Karling (1941) to the effect that he found this fungus on dead leaves of E. septangulare in water in Texas. However, since E. pellucidum does not occur in Texas, he must have misidentified the host, which more probably was Eriocaulon texense Körn.

Clinton (1901) describes a smut fungus, Ustilago eriocauli Clint., from the ovaries of Eriocaulon pellucidum. In his 1902 work he claims that this smut is identical with the Cintractia eriocauli Massee, described from E. fenestratum Bojer in Madagascar.

Tucerman reports the "scapes 8- or 9-ribbed" on his specimens. Voss (1967) notes that the permanent septate appearance of the roots of this pipewort distinguish it at once from all other species of submerged rosette-forming plants in Michigan. Roland &

Smith (1964) say that the "Sterile plants often form a green growth on the bottom of lakes as much as 2 m. below the surface throughout our sandy lake shores, rarely in running water".

McVaugh (1958) distinguishes this species from the much-confused E. parkeri as follows: E. pellucidum -- heads when mature white-hairy at the summit, the involucral bractlets at maturity spreading or reflexed, the head itself hemispheric or nearly spherical. E. parkeri -- heads never white-hairy, depressed-hemispheric, the involucral bractlets closely appressed even at maturity, the involucre short-campanulate. He found E. pellucidum in "Shallow water, margins of ponds; frequent. Sometimes emersed, on muddy shores, or in sphagnum bogs".

The E. decangulare Lightf., previously regarded by me as a synonym of E. pellucidum, belongs in the synonymy of the European E. septangulare With. instead, since it is based on Scottish plants. Martius (1832), under E. quinquangulare L., notes that E. pellucidum "e speciminibus americanis huic et insequenti [E. sexangulare L.] comparari potest". It is interesting to note that he fails to compare it with E. septangulare!

Rafinesque's E. pumilum was said by him (1832) to be from the Catskill Mountains of New York and there is therefore no doubt of its identity. His E. pellucidum var. pumilum, published 8 years later, was proposed without designation of type locality. His E. brevifolium appears to be a mixture of two taxa: he cites New Jersey and Texas as the localities where it is said to grow, but the only species of Eriocaulon known to me from both these states is E. compressum Lam. and this does not fit his description as to size and color of the heads and the size of the leaves. It also seems to me that Merrill's suggestion of Syngonanthus flavidulus (Michx.) Ruhl. for the Rafinesquian plant is highly unlikely since that plant grows neither in New Jersey nor Texas! I suspect that Rafinesque's Texan plant was E. texense Körn. and his New Jersey plant was one of the forms of the highly variable E. pellucidum Michx. His description applies best to E. pellucidum and so I regard his binomial as strictly synonymous with that of Michaux and his Texan reference as an error in identification or remembrance on his part.

Thorne (1954), referring to Georgian material, apparently considers E. lineare Small conspecific with the present species, saying "E. septangulare With. (incl. E. lineare Small). -- Shallow water and wet margins of ponds and borrow-pits and moist pinelands, frequent. Our material may be separable from the more northern typical E. septangulare as a subspecies". Kral (1966) says "Sandy or peaty lakeshores, margins of ponds, ditches, muskeg, and sphagnous bogs, the Canadian Shield of southern Canada, the Great Lakes region, New England, and south in the Appalachians into mountainous North Carolina.....In habit, habitat, and floral character this species most closely resembles E. lineare and E. texense, en-

tities with which it may someday be considered as identical. However, it does differ from E. lineare by its darker, grayish or sooty bracts, bractlets, and sepals and from E. texense by its much smoother receptacle."

The Stone (1912) reference in the bibliography above is often cited as "1911", but the work was not actually published until January 26, 1912.

In the index to his work Sterling (1967) indicates that what he calls E. articulatum is illustrated on page "162", but it is actually depicted on page 161. Tatnall (1946) describes E. pellucidum as follows: "(E. articulatum in part of Gray's 7th); borders of fresh ponds, central part of peninsula [Delmarva]; one coll. in NewCastle Co. along Delaware River; mid July—Sept." Hartley (1966) says "Reported (personal correspondence) from the Trempealeau Lakes Area along the Mississippi River in Trempealeau Co. [Wisconsin] by Wm. Greene of the U. S. Fish & Wildlife Service, Winona, Minnesota. A collection (not seen by this writer) was made from this station by Dr. Greene in 1956 and is on file at the U. S. Fish & Wildlife Service Herbarium at Winona."

Ogden (1968) reports that Eriocaulon pellucidum stems rooted near the old lake margin on Martha's Vineyard island showed a radiocarbon content of + 37 percent (above the modern reference standard). The mean of four samples from the upper 10 cm. of sediment showed a radiocarbon content of only + 4.7 percent — the lower value implies mixing with deeper sediments because there is no detectable limestone in the till to reduce the proportion of $C^{14}$. Sedimentation rates per century are about 4.5 cm. for the early postglacial, 5 cm. for the hypsithermal, and 6.8 cm. for the upper 1.5 cm. of the core. Both here and in an Ohio lake tested, the sedimentation rates for post-colonial times (above the sharp rise in Ambrosia and European weed pollen) are considerably greater than in the rest of the cores.

Common names for E. pellucidum are "eriocaulon à sept angles", "northern pipewort", and "seven-angled pipewort". Lakela (1965) cites Lakela 3027 & 17073 from Minnesota, where she says that the species is "Frequent, shallow water, shores, and marshes". She gives its overall distribution as "Nfld to w Ont, NS to Minn". Freer (1968) cites Freer 7165 from Augusta County, Virginia. Little (1938) records the species from Muskogee County, Oklahoma, but this is surely an error for E. körnickianum Van Heurck & Muell.-Arg. Gillett (1963) cites Gillett 5471 and Schofield 783 from Labrador. The Wherry s.n. [1 m. s. of Flat Rock St., 5-30-1927], cited below, was previously regarded and cited by me as E. lineare Small.

Material has been misidentified and distributed in herbaria under the names E. compressum Lam., E. decangulare L., E. flaviculum Michx., E. lineare Small, E. septangulare With., Danthonia spicata (L.) Beauv., and Eleocharis acicularis Britton.

On the other hand, the W. C. Coker s.n. [4/3/1910] & s.n. [June

27, 1931] and Tharp s.n. [Bellville, 5/4/40], distributed as this species, are actually E. compressum Lam.; F. A. Barkley 13543, W. M. Canby s.n. [Pine barrens, Aug. 1861], and W. R. Taylor T.1073 are E. decangulare L.; E. L. Little Jr. s.n. [Jul. 14, 1929] is E. körnickianum Van Heurck & Muell.-Arg.; R. F. Thorne 1581, 4370, & 5022 and W. Wolf s.n. [Summerdale, July 30, '26] are E. lineare Small; Widgren s.n. is E. modestum Kunth; R. C. Alexander s.n. [Redbank, 3 Sept. '69] and Martindale s.n. [Camden, Sep. 1877] are E. parkeri B. L. Robinson; Lundell & Lundell 11152 and Olds s.n. [Montgomery, 2.20.94] are Lachnocaulon anceps (Walt.) Morong; McCarthy s.n. [Wilmington, June 1892] is Lachnocaulon minus (Chapm.) Small; and Adrien 3308 is a species of Lobelia. A sheet of Nuphar advena (Ait.) Ait. f. was actually identified as E. septangulare in the McGill University herbarium -- doubtless another case of transposed labels!

Additional citations: LABRADOR: Gillett & Findlay 5471 (S). NEWFOUNDLAND: Fernald, Long, & Fogg 1476 (N); Fernald & Wiegand 5068 (S), 5069 (Ca--207734); Grether 7818 (Ca--935540, Ws); Jansson 361 (S), 362 (S), s.n. [Buchans Junction] (Go); K. K. Mackenzie s.n. [7/19/1921] (N); Rouleau 2508 (Mu). PRINCE EDWARD ISLAND: Queens Co.: Fernald, Long, & St. John 7128 (N). NOVA SCOTIA: Digby Co.: Graves & Linder 20590 (S); Fernald & Long 23575 (S, Ws). Guysborough Co.: Faribault 1908 (Vi); Smith, Taylor, Webster, & Slipp 9491 (Vi). Halifax Co.: Dore, Judd, & Gorham 45-1101 (Vi); "A. H. H." s.n. [Halifax] (S); E. G. Knight s.n. [Grand Lake, 12.7.79] (N). Hants Co.: Fernald, Bartram, & Long 23568 (N), 23569 (Vi); Smith, Taylor, Webster, & Slipp 9159 (Vi). Inverness Co.: Smith, Schofield, Sampson, & Bent 4916 (Vi). Lunenburg Co.: Fernald & Long 23574 (Vi); Smith, Taylor, Webster, & Slipp 8986 (Vi). Queens Co.: Fernald, Long, & Linder 20593 (S). Richmond Co.: Rousseau 130088 (S); Smith, Schofield, Sampson, & Bent 5052 (Vi); Smith, Taylor, Webster, & Slipp 10095 (Vi). Shelburne Co.: Fernald & Long 23571 (N), 23572 (N, Vi). Victoria Co.: Smith, Schofield, Sampson, & Bent 4625 (Vi); Smith, Schofield, Taylor, Webster, & Slipp 8090 (Vi); Smith, Taylor, Webster, & Slipp 6638 (Vi). Yarmouth Co.: Fernald & Long 23576 (N). County undetermined: Dawson s.n. [1869] (Mm--3295). Brier Island: Smith, Roland, Collins, Erskine, & Scofield 62 (Vi). Saint Paul Island: Perry & Roscoe 127 (S). NEW BRUNSWICK: Charlotte Co.: Malte 447/29 (S, Vi, Vi). Madawaska Co.: Malte & Watson 733 (S). Saint John Co.: G. U. Hay s.n. [Aug. 4, '77] (Vi). QUEBEC: Abitibi Co.: W. K. W. Baldwin 5471 (S, Vi); Baldwin & Breitung 4325 (S, Vi); Marie-Victorin, Rolland-Germain, & Blain 308 (Um--9130); Marie-Victorin, Rolland-Germain, & Dominique 125 (Um--9131). Argenteuil

Co.: Major-Barnabé s.n. [28 août 1940] (Vi); Marie-Victorin & Rolland-Germain 56405 (Um--9717); Marie-Victorin, Rolland-Germain, Raymond, & Boivin 56488 (Um--9721); Raymond 3045 (Vi); Raymond, Boivin, Marie-Victorin, & Rolland-Germain 56488 (Ca--740926); Rolland-Germain 6070 (S, Vi), s.n. [August 21, 1946] (B, Ca--48598, Hi--200059, N, Ok, S, St, Ur, Ut--69493b, Vi, We). Beauce Co.: P. Masson 3519 (Vi). Brome Co.: Raymond & Kucyniak 807 (Mg). Charleroix Co.: Desmarais 224 (Vi, Ws), 491 (Vi, Ws). Gaspé Est Co.: Proulx s.n. [21 août 1933] (Ca--22931); Taché & Le Page s.n. [18 juillet 1938] (Vi). Gatineau Co.: Minshall & Zinck 197 (Ut--92964A); Senn 197 (Ok), 1860 (Um--41423). Iberville Co.: Marie-Victorin, Rolland-Germain, & Raymond 56191 (Um--9906); Raymond & Cinq-Mars 30331 (Mg). Jacques Cartier Co.: E. Hultén s.n. [Aug. 1959] (S). Joliette Co.: Jolicoeur 1471 (Vi); Marie-Victorin, Rolland-Germain, & Blain 124 (Um--9129). Labelle Co.: Desmarais 1198 (Mg); Dutilly & Lepage 34171 (Mg); Gauthier 11378 (N, S, Vi); Lamarre s.n. [28 août 1955] (Ca--72375); Lucien 204 (Um--9960); Lucien & Éloi 205 (Um--41424); Marie-Victorin s.n. [Lacs des Laurentides, Août 1912] (B); Marie-Victorin, Rolland-Germain, & Blain 124 (Ws); Raymond 243 (Um--58577); E. Roy 1638 (Vi, Vi). Lake Saint John Est Co.: Marie-Victorin 15736 (Vi). Laprairie Co.: Cléonique 4273 (Vi). Maskinongé Co.: Gauthier 2201 (Vi). Matane Co.: Boivin & Blain 782 (Gg--340478, Um--9291, Ut--252156). Montcalm Co.: Cailloux s.n. [30 août 1936] (Vi); Raymond & Kucyniak 55272 (Mg); Rouleau 61 (Um--45740); Rousseau & Goudreault 151 (Go, S); E. Roy 123 (Vi); Sylvio 1229 (Vi), 1335 (Vi), 1385 (Vi). Papineau Co.: Gauthier 11530 (Vi). Portneuf Co.: Anselme 4 (Vi); Marie-Victorin 615 (Mm--23026). Rouyn-Noranda Co.: Hustich 443 (Mg). Saguenay Co.: Markle & Markle s.n. [Bergeronnes, July 26, 1955] (Ms--44351). Saint Maurice Co.: Gauthier 2244 (Vi). Terrebonne Co.: C. M. Boardman 36 (Mg); Cinq-Mars s.n. [août 1948] (Vi); Meilleur 535 (Mg), 562 (Mg); H. N. Moldenke 21740 (Bm, Ca, Gg, Mi, Mm); Nabor-Gabriel 294 (Vi); Rouleau 1229 (Vi). Timiskaming Co.: W. K. W. Baldwin 5968 (Vi). Vaudreuil Co.: E. Roy 1417 (Go, Vi). Wolfe Co.: Raymond & Kucyniak 1421 (Mg). Yamaska Co.: Marie-Victorin, Rolland-Germain, & Meilleur 45028 (Ca--841799). Madore Island: Boivin 4395 (Um--49921). ONTARIO: Algoma Dist.: Fassett 14699 (Ws); Grassl 7617 (Mi), 7619 (Mi), 7620 [Algona] (Mi, Mi); Hosie, Harrison, & Hughes 1317 (S), 1319 (N); Koelz 4622 (Mi); Taylor, Hosie, Fitzpatrick, Losee, & Leslie 1338 (Ca--841800), 1339 (S). Carleton Co.: Rolland 15737 (Ca--841808). Frontenac Co.: J. Fowler 21891 (Ws), s.n. [Battersea, Aug. 18, 1898] (B). Haliburton Co.: G. L. Fisher s.n. [Dorset, Aug. 3, 1898] (S). Hastings Co.: Macoun s. n.

[Aug. 15, 1874] (Mm--2326). Kenora Co.: Bisby s.n. [Ingolf] (Wp); Garton 1749 (Wp); Leach s.n. [Minaki] (Wp); G. B. Rossbach 34 (Ca--28298). Muskoka Co.: Britton & Timmerman s.n. [Port Sandfield, Sept. 1, 1889] (Ca--2419); Grassl 7618 (Mi). Nipissing Dist.: Grassl 7620 [Deer Lake] (Mi). Renfrew Co.: Umbach 10348 (Ws), s.n. [July 22, 1899] (Ok). Sudbury Co.: Grassl 2082 (Mi), 2083 (Mi), 2084 (Mi, N); Krotkov 5086 (Ws); Soper & Soper 3619 (Vi). Thunder Bay Dist.: J. A. Calder 1749 (S, Vi); Core C.46 (We); Garton 7632 (Hi--206119); Hosie, Losee, & Bannan 1401 (Ca--707061), 1402 (Vi); McClement 24893 (Ws); E. G. Voss 10356 (Mi, S). Caribou Island: Grassl 1301 (Mi). Eagle Island: Grassl 2081 (Mi). Georgian Bay Island 510a: E. D. McDonald 482 (Ws). MAINE: Aroostook Co.: G. D. Chamberlain 501 (Ca--841804). Cumberland Co.: Addams s.n. [Bridgeport, July--Aug. 1926] (Ws). Franklin Co.: L. O. Eaton 16988 (Ws). Hancock Co.: R. C. Friesner 3399 (Mi). Kennebec Co.: Fassett 7335 (Ws), 15631 (Ca--539309); Stabler & King 59 (Mi). Lincoln Co.: Fassett 2460 (Ws), 18795 (Ws), 18799 (Ws); C. H. Knowlton s.n. [Newcastle, July 27, 1932] (Hi--166350). Oxford Co.: J. F. Reed 442 (Hi); L. A. Wheeler s.n. [Bethel, 8/5/29] (S). Penobscot Co.: Fernald 369 (Ws). Piscataquis Co.: F. J. Hermann 19124 (Mi), 19612 (N). Somerset Co.: Fassett 13492 (Ws); Goodale s.n. [11 August 1933] (Ms--70876); Spaulding & Collins s.n. [August 21, 1919] (Vi). Waldo Co.: R. C. Friesner 4840 (Mi, Wp), 10224 (Ca--597242, Lb--30195), 23054 (Ok, S). York Co.: Cléonique-Joseph 2367 (Vi), 2617 (Vi). Mount Desert Island: Batchelder s.n. [Aug. 5, 1905] (Dt); Macfarlane & Taylor 1229 (Mi). County undetermined: Houten & Schoenmakers s.n. [Lower Togue Pond] (Ut--52774a). NEW HAMPSHIRE: Belknap Co.: F. F. Forbes s.n. [New Hampton, Sept. 5, 1904] (S). Carroll Co.: Herb. Univ. Wisc. s.n. [L. Winnipisaukee, July 31st '51] (Ws). Cheshire Co.: W. Deane s.n. [Muddy Pond, July 2, 1891] (S), s.n. [Muddy Pond, Aug. 7, 1891] (S), s.n. [Aug. 17, 1896] (Ms--81538). Coos Co.: Collector undetermined s.n. [White Mountains] (B); Heuser s.n. [31 July '96] (B). Grafton Co.: Collector undetermined s.n. [Goose Pond, Sep. 6, 1875] (Ca--67328); Fassett 14353 (Ws); R. H. Piper 1523 (Ok), s.n. [31 July 1932] (Ms--69489). Hillsboro Co.: F. S. Beattie s.n. [7/14/1927] (Ok--2124, Ok--2125, Ok-2126). Merrimack Co.: Eggleston s.n. [N. London, '89] (Dt); Markert s.n. [11 August 1931] (Ms--64989). Rockingham Co.: Foote & Adams s.n. [September 24, 1940] (Ok). VERMONT: Caledonia Co.: F. Blanchard s.n. [Waterman's Pond, July 4th, 1878] (Dt), s.n. [West Danville, Sept. 1, 1884] (Ca--421731). Franklin Co.: Muenscher, Manning, & Maguire 312 (Ws). Grand Isle Co.: Carpenter s.n. [8-6-1919] (Ur). Lamoille Co.: A. R. Moldenke 1145 (Ac). Rutland

Co.: J. A. Drushel 9796 (Ur). Windham Co.: Eggleston s.n. [Marlboro, Sept. 15, 1895] (Dt); M. F. Moseley s.n. [Aug. 11, 1940] (Ms—44449). MASSACHUSETTS: Barnstable Co.: H. C. Cowles s.n. [Cape Cod, Sept. 1900] (E—1286913); B. W. Davis s.n. [Wood's Hole, Aug. 24, 1894] (Mi); Elwell s.n. [Aug. 25, 1891] (Ms—50576); Fernald & Fogg 567 (Ca—923785); D. S. Francis 76 (Ok); J. P. Poole s.n. [Mashpee, 8/18/39] (Go). Berkshire Co.: Pease, Goodale, & Hopkins s.n. [19 Sept. 1930] (Ms—66116). Bristol Co.: O. Ames s.n. [Winnicunnitt Lake, 8/12/1895] (Rf); Baxter s.n. [New Bedford, July 26, 1906] (Ca—841780); Blomberg s.n. [Winnicunnitt Lake, 1894] (Rf); T. A. Greene s.n. [Frog Pond] (Ws). Franklin Co.: W. D. Forbes 414 (Ms--72921); Goodale s.n. [24 July 1925] (Ms—3730); Goodale & Markert s.n. [23 Aug. 1932] (Ms—68268); Goodale, Markert, & Piper s.n. [27 July 1929] (Ms—55835), s.n. [22 Aug. 1929] (Ms—55837); Goodale, Potsubay, & St. John s.n. [25 Aug. 1931] (Ms—62463), s.n. [30 Aug. 1931] (Ms—62462); Jesup s.n. [Locke's Pond, July 2, 1870] (Dt), s.n. [Sept. 1871] (Ms—3895); Livingston & Rowley s.n. [Sept. 9, 1960] (Ms--46191, Ms—46192). Hampden Co.: Bliss & Seymour G.779 (Ms—70764), G.832 (Ms—56861, Ws); Clark & Seymour G.745 (Ms—70763); Markert s.n. [1 Aug. 1930] (Ms—61690); F. C. Seymour 268 (Ms—3894), G.233 (Ms—70767), G.381 (Ms—70766), G.541 (Ms—70765), G.1042 (Ms—70762); E. Tuckerman s.n. [July 1860] (Ms—3896). Hampshire Co.: Goodale, Markert, & Piper s.n. [18 July 1929] (Ms—55832), s.n. [Aug. 1, 1929] (Ms—55834), s.n. [15 Aug. 1929] (Ms—55831), s.n. [26 Aug. 1929] (Ms—55839); Goodale, Potsubay, & St. John s.n. [13 July 1931] (Ms—62464); Jesup 3018 (Dt); C. H. K. Sanderson 3018 (Ms—71975). Middlesex Co.: M. E. Ames s.n. [Groton, 1865] (Dt); Cleaveland s.n. [Horn Pond, Woburn] (Lb—20646); Deane s.n. [Winchester, Oct. 7, 1917] (Dt); R. A. Harper s.n. [Walden Pond] (Ws); Pease 3225 (Ca—69997); C. E. Perkins s.n. [Winchester, Sept. 10, 1879] (Ca—67274); M. M. Stevens s.n. [Middlesex Fells, July 1892] (Dt); W. Trelease s.n. [Spot Pond, 10/3/80] (E), s.n. [Medford, Summer '83] (E). Norfolk Co.: Herb. Mt. Holyoke Sem. s.n. [Wellesley] (Dt). Plymouth Co.: Fernald & Long 9107 (S); M. Hopkins s.n. [17 Oct. 1931] (Ms--65398); F. C. Seymour 4127 (Ws), 4355 (Ws); Trow s.n. [July 17, 1866] (Ms--15484). Suffolk Co.: Boott s.n. [Boston, 1830] (B); Lenander s.n. [Boston, Aug. 27, 1933] (S). Worcester Co.: J. F. Collins s.n. [Oct. 25, 1893] (Vi); Fassett 10624 (Ws); Goodale, Markert, & Piper s.n. [8 Aug. 1929] (Ms—55833), s.n. [17 Aug. 1929] (Ms—55838), s.n. [31 July 1929] (Ms—55836); Hoyten & Schoenmakers 635 (Ut—52775a); G. E. Stone s.n. [Aug. 1890] (Ms--11009); M. B. White s.n. [Aug. 1893] (Vi). County undetermined: Meebold s.n. [Massachusetts?]

(Mu); J. Torrey 23 (S). Martha's Vineyard Island: E. S. Burgess s.n. [July 24, '89] (N), s.n. [Aug. '92] (N), s.n. [Aug. 2, '93] (N); MacKeever MV.707 (N, N, N, N, N, N, N, Z). Nantucket Island: MacKeever N.677 (N, N, N, N, S, Z). RHODE ISLAND: Kent Co.: Congden s.n. [Apponaug, Sept. 11, 1873] (Ca—405215). Providence Co.: J. F. Collins s.n. [September 11, 1900] (Vi); E. J. Palmer 47900 (S). CONNECTICUT: New Haven Co.: G. H. Cornwell s.n. [Black Pond, 1843] (Ws), s.n. (Ws); E. H. Eames s.n. [Lake Whitney, Aug. 14, 1893] (S). New London Co.: Jansson s.n. [Ledyard, July 21, 1929] (Go); Ryon 39 (Dt); W. A. Setchell s.n. [Ledyard, July 19, 1883] (Ca—2417). Tolland Co.: N. L. Britton s.n. [Mansfield, Aug. 1879] (N). Windham Co.: J. L. Sheldon s.n. [Central Village, 1893] (Ws). County undetermined: Lucian 136 [Black Rock State Park] (N); C. Wright s.n. [Conn., 1887] (Lb—20642). NEW YORK: Dutchess Co.: "L. H. H." 93 (Ws); Myron s.n. [Web Twp., summer of 1924] (Ms—15461); Wiegmann s.n. [Stissing Mt., 14 Sept. 1921] (N). Essex Co.: Muenscher & Lindsey 3145 (Dt). Franklin Co.: W. A. Matthews 3919 (Ca—841777); Muenscher, Manning, & Maguire 309 (Ca—512856). Fulton Co.: Muenscher & Lindsey 3150 (Ca—552916). Hamilton Co.: W. A. Matthews 2964 (Ca—841778); Muenscher & Lindsey 3149 (Ws); Muenscher & Maguire 2120 (Ca—512774). Herkimer Co.: W. A. Matthews 2948 (Hi), 2964 (Hi, Ur); Muenscher & Maguire 2119 (Ws). Monroe Co.: Baxter & Dewing s.n. [July 11, 1909] (Ca—841781). Nassau Co.: W. P. Stiles 16 (Ms—3511). Oneida Co.: Haberer 2244 (Ca—841783); Muenscher & Brown 21667 (S). Orange Co.: Raup 7748 (Mi). Oswego Co.: Fernald, Wiegand, & Eames 14204 (N); Wiegand & Hoy s.n. [Fulton, September 11, 1897] (Ca—841802). Rockland Co.: Lehr 923 (N). Saint Lawrence Co.: G. F. Atkinson s.n. [Childwold, September 2, 1896] (Ca—841801). Suffolk Co.: S. A. Cain 1085 (N), 1533 (N), 1717 (N), 1751 (N); Muenscher & Curtis 6817 (Ca—727633), 6818 (N); Muenscher, Winne, & Isely 20695 (Ca—906913). Sullivan Co.: E. G. Whitney 5214 (Ca—841803); Wiegmann s.n. [Highland Lake, July 13, 1913] (N). Warren Co.: T. S. Brandegee s.n. [Adirondacks, 1884] (Ca—115167); D. D. Keck 6460 (Ca—24143, N). Westchester Co.: S. B. Mead s.n. [Peach Pond] (Ws). County undetermined: W. Cooper s.n. [near New York] (S); Herb. Schreber s.n. [Prope Novum Eboracum] (Mu—236); J. Torrey s.n. (B, Ms—15481). NEW JERSEY: Atlantic Co.: Bartram s.n. [Sept. 9, 1906] (Vi). Bergen Co.: A. Brown s.n. [July 31, 1880] (N). Burlington Co.: O. Reed s.n. [July 23, 1950] (We), s.n. [August 6, 1950] (We). Camden Co.: J. W. Adams 49-333 (Hi—54971). Cumberland Co.: J. B. Ellis s.n. [Maurice River, July 23, 1872] (Ca—372291); Kral 22590 (N). Monmouth Co.: Leiderman s.n. [Aug. 7, 1932] (Ws). Morris Co.: J. K. Small s.n. [Budd's Lake, August 12—14, 1890] (Ok);

U. C. Smith s.n. [Budd's Lake, Sept. 1st, 1899] (S). Ocean Co.: K. K. Mackenzie 3692 (S). Sussex Co.: Clausen & Edwards 2289 (Ca--841807); J. L. Edwards s.n. [Sept. 17, 1949] (N). County undetermined: C. F. Austin s.n. [Oct. 1862] (N). PENNSYLVANIA: Luzerne Co.: A. A. Heller s.n. [Lily Lake, July 29, 1889] (Ms--15485); Heller & Halbach s.n. [September 16-17, 1892] (B, Dt); Heller & Heller 691 (Ca--2420), s.n. [September 16-17, 1892] (Ms--15487); J. K. Small s.n. [Lily Lake, August 15-16, 1889] (S). VIRGINIA: Arlington Co.: E. S. Steele s.n. [Four Mile Run, July 31, 1896] (S). NORTH CAROLINA: Bladen Co.: R. K. Godfrey s.n. [White Lake, 6-20-1937] (No--2620); Hueske s.n. [White Lake, 5/24/47] (Hi--29586). Henderson Co.: Wherry s.n. [1 m. s. of Flat Rock Sta., 5-30-1927] (N). Perquimans Co.: A. E. Radford 6535 (Hi--54297). Tyrrell Co.: A. E. Radford 5074 (Hi--47825). OHIO: Portage Co.: Ashcroft 6766 (Ws), 9428 (Ws). INDIANA: Porter Co.: M. W. Lyon s.n. [26.VII.1925] (Mi), s.n. [23.VIII.1925] (Mi); Umbach 10499 (Ws), 22617 (Ws), 31965 (Ws). Steuben Co.: C. C. Deam 55391 (Ws). MICHIGAN: Alger Co.: J. Bailey 181 (Mi); E. G. Voss 2494 (Mi). Allegan Co.: D. L. Allen 6 (Mi); D. C. Chandler 174 (Mi); Cheatum 161 (Mi). Baraga Co.: Beckman 76 (Mi). Benzie Co.: Bobb 822 (Ws). Cass Co.: Eschmeyer 473 (Mi); Roelofs 264 (Mi). Cheboygan Co.: J. H. Ehlers 1109 (Hi--144272, Ws), 5153 (Ca--498930), 6286 (Ca--841782, Mi); F. C. Gates 14899 (Ca--841805, S). Chippewa Co.: E. G. Voss 2452 (Mi). Crawford Co.: E. G. Voss 3217 (Mi). Gobegic Co.: Kilpela 123 (Mi); E. G. Voss 12303 (Mi). Grand Traverse Co.: Dieterle 1395 (Mi, S). Gratiot Co.: C. A. Davis s.n. [Alma, August 13, 1895] (Hi--143520, N). Houghton Co.: Beckman 132 (Mi), 150 (Mi); C. D. Richards 1183 (Mi, S); E. G. Voss 12286 (Mi). Iosco Co.: Dreisbach 8505 (B). Iron Co.: Kilpela 289 (Mi), 358 (Mi). Kalkaska Co.: Hyypio 822 (Mi). Kent Co.: Bazuin 1702 (Mi). Keweenaw Co.: W. S. Cooper 289 (Ca--980289); Houghton s.n. (Ws); Mains s.n. [Aug. 24, 1934] (Mi); G. M. Moore 18 (Mi), 22 (Mi); C. D. Richards 1062 (Mi, Ur); Stuntz & Allen 1356 (Ws). Lake Co.: J. Bailey 69 (Mi). Lapeer Co.: Dreusbach 8238 (Mi). Luce Co.: R. McVaugh 9514 (Mi, Vi), 14781 (Mi); D. E. Miller 202 (Mi). Marquette Co.: Beckman 98 (Mi), 107 (Mi), 115 (Mi); Hazzard s.n. [August 15, 1941] (Mi); Hyypio 1129 (Mi). Mason Co.: E. G. Voss 3255 (Mi). Muskegon Co.: E. G. Voss 2843 (Mi). Newaygo Co.: Bazuin 3724 (Mi). Ontonagon Co.: H. T. Darlington s.n. [8/21/1923] (Mi); Grether 8203 (Ws). Osceola Co.: R. C. Ball 946 (Mi); Shelter LL.4 (Mi); Van Deusen 3 (Mi). Otsego Co.: R. McVaugh 9671 (Mi, Vi). Presque Isle Co.: J. H. Ehlers 6150 (S); F. J. Herman 7012 (Ws). Schoolcraft Co.: Cain, Raymond, & Kucyniak 580 (Mg, S, Vi); Laskowski 1095 (Mi); L. K.

Ludwig 1471 (Mi); R. G. Mills 43-90 (Ur); Van Deusen s.n. [July 21, 1942] (Mi); E. G. Voss 2982 (Mi). Wexford Co.: Reolofs 468b (Mi); E. G. Voss 3280 (Mi). County undetermined: Umbach 7360 [Magician Lake] (Ca--46048), 7472 [Dewey Lake] (Ws), 19769 [Magician Lake] (Ws). Sugar Island: E. G. Voss 11246 (Mi). WISCONSIN: Douglas Co.: Goessl 8603 (B). Marquette Co.: Fassett 22516 (Ca--921778). Rusk Co.: L. S. Cheney s.n. [Aug. 13, 1933] (Ca--539286). Vilas Co.: Greenley s.n. [Sept. 3, 1949] (Ca--903650). Waupaca Co.: Hotchkiss & Martin 4436 (Ca--565778). Outer Island [Ashland Co.]: F. C. Lane 2507 (Ut--85710). MINNESOTA: Aitkin Co.: J. H. Sandberg s.n. [Aug. 1890] (Ca--2418). Carlton Co.: Lakela 4167 (Ca--841779). Chisago Co.: B. C. Taylor 3067 (Ws), 5324 (Ws), s.n. [Linn Lake, Aug. 1892] (S). Cook Co.: Herb. Univ. Wisc. s.n. [Lake Seiganagah, July 23, 1891] (Ws). Morrison Co.: J. H. Sandberg 887 (Ws). Saint Louis Co.: Bednar s.n. [July 14, 1957] (Ur); Moore & Moore 10329 (Ca--797218, S, Vi); Moyle 2388 (Ca--22751). JAPAN: Hokkaido: W. P. Brooks s.n. [southern Hokkaido, 1884] (Ca). LOCALITY OF COLLECTION UNDETERMINED: Brongniart s.n. [Terre nueve] (B); S. C. Brooks s.n. [Locke's Pond, July 24, 1909] (Ca--376824); R. A. Harper s.n. [12/8/1891] (Ws); Herb. Chapman 3966 [Dean Lake] (E); Herb. Kummer s.n. [America borealis] (Mu--237); Herb. Lemmon s.n. [Drumochty Lake] (Ca--366733); Herb. Schreber s.n. (Mu--237, Mu--238); Herb. Zuccarini s.n. [hab. in America septentrionalis paludibus, 1816] (Mu--203); Scouler s.n. (Ms--15462).

ERIOCAULON PERPLEXUM Satake & Hara

Synonymy: Eriocaulon nipponicum Tatew. ex Satake & Hara, Bot. Mag. Tokyo 52: 400, in syn. 1938 [not E. nipponicum Maxim., 1893]. xEriocaulon perplexum Satake & Hara ex Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949.

Bibliography: Tatew., Veg. Apoi 119 & 131. 1928; Nakai, Veg. Apoi 76. 1930; Miyabe & Kudo, Fl. Hokkaido & Saghal. 3: 286. 1932; Satake & Hara, Bot. Mag. Tokyo 52: 400—401. 1938; Honda, Nom. Pl. Jap. 462. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 7, 13, 40, 41, 79, & 87, fig. 1D, 2J, & 17. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 28—29, pl. 4, fig. 8. 1940; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Phytologia 3: 340. 1950; Moldenke, Résumé 173, 290, & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 180, 182, & 430, fig. 123 (3). 1964; Moldenke, Phytologia 17: 454. 1968.

Illustrations: Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 7, & 41, fig. 1D, 2J, & 17. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 4, fig. 8. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 180, fig. 123 (3).

1964.

The type of this rare species was collected by Hiroshi Hara on Mt. Apoi, in the province of Hidaka, Hokkaido, Japan, in August, 1937, and is deposited in the herbarium of the University of Tokyo. The species is said to be endemic to Mt. Apoi and the only vernacular name recorded for it is "ezo-inunohige". The E. nipponicum Maxim., referred to in the synonymy above, is regarded as a valid species by me.

Citations: WESTERN PACIFIC ISLANDS: JAPAN: Hokkaido: Hultén s. n. [Mt. Apoi, IX.20.1961] (S).

ERIOCAULON PERUVIANUM Ruhl.

Synonymy: Eriocaulon glabrum Pennell ex Moldenke, Résumé 288, in syn. 1959 [not E. glabrum Salzm., 1959, nor Steud., 1959].

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 58, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 70. 1908; Moldenke, Known Geogr. Distrib. Erioc. 7 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 72 & 205. 1949; Moldenke, Résumé 83, 288, & 482. 1959.

Collectors have found this plant growing in pools at altitudes of 2320--2400 meters, flowering and fruiting in May and July, and describe the heads and flowers as white. Wurdack notes "locally frequent, forming colonies in seepage areas". It was erroneously recorded by me (1959) from San Martín, Peru. Apparently it is known thus far only from Amazonas. The E. glabrum ascribed to Salzmann and referred to in the synonymy above actually belongs in the synonymy of Syngonanthus gracilis var. glabriusculus Ruhl., while the homonym ascribed to Steudel is typical S. gracilis (Körn.) Ruhl.

Citations: PERU: Amazonas: Mathews s.n. [Chachapoyas; Macbride photos 10564] (B--isotype, Br--type, N--isotype, N--photo of isotype, W--photo of isotype); F. W. Pennell 15904 (N); Wurdack 514 (N, S, W--2403669).

ERIOCAULON PTEROSEPALUM Hayata

Bibliography: Hayata, Icon. Pl. Formos. 10: 55. 1921; S. Sasaki, List Pl. Formos. 99. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Moldenke, Known Geogr. Distrib. Erioc. 25 & 38. 1946; Moldenke, Known Geogr. Distrib, Verbenac., [ed. 2], 133 & 205. 1949; Moldenke, Résumé 172 & 482. 1959.

The vernacular name, "inunohige-modoki", has been recorded for this species.

ERIOCAULON PICTUM Fritsch

Synonymy: Eriocaulon amphibium Rendle, Journ. Linn. Soc. Lond. Bot. 27: 475. 1906.

Bibliography: Fritsch, Bull. Herb. Boiss., sér. 2, 1: 1102--1105. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 63, 79, & 286. 1903; Rendle, Journ. Linn. Soc. Lond. Bot. 27: 475. 1906; Prain, Ind. Kew. Suppl. 3: 70. 1908; Arwidsson, Bot. Notiser 1934: 83. 1934; Moldenke, Known Geogr. Distrib. Erioc. 22 & 38. 1946;

Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 118 & 205. 1949; Moldenke, Phytologia 3: 181. 1949; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 138—145, pl. 8, fig. 3, 4, 7, & 8. 1955; Moldenke, Résumé 147 & 482. 1959; Moldenke, Phytologia 17: 387 (1968), 17: 479 (1969), and 18: 256. 1969.

Illustrations: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: pl. 8, fig. 3, 4, 7, & 8. 1955.

Because of the way taxonomists have bandied E. amphibium Rendle about in the past, the thorough discussion by Hess (1955) is perhaps worthy of being quoted in large part here: "Aus einer Sammlung, die von P. Eugenio Dekindt in der Umgebung von Huila (Angola) zwischen 1899 und 1902 angelegt und dem Botanischen Museum der Universität Wien zugesandt wurde, hat Fritsch (1901) Eriocaulon pictum beschrieben. Er vergleicht die Art mit E. striatum Lam. und mit E. huillense Engl. et Ruhl. und findet, dass E. pictum der Farbe der Sepalen und Brakteen wegen deutlich von den beiden erwähnten Arten geschieden sei. Die Untersuchung am Typus-Material von Dekindt (Nr. 703) haben gezeigt, dass Fritsch bei der Analyse der Blüten die spatha-ähnlich verwachsenen Sepalen der ♂ und ♀ Blüten übersehen hat. Dieses charakteristische Merkmal ist nur zu beobachten, wenn sehr sorgfältig präpariert wird, sonst zerreissen die verwachsenen Sepalen und erscheinen frei. Nach dieser Feststellung fällt ein Vergleich mit E. striatum und E. huillense dahin, da die beiden Arten freie Sepalen haben. Damals was aus Afrika noch keine Eriocaulon-Art mit verwachsenen Sepalen in den ♀ Blüten bekannt.

"Eine andere Art mit verwachsenen Sepalen beschrieb Rendle (1906) unter dem Namen Eriocaulon amphibium. Herkunft: Gebiet von Matopo Hills in Süd-Rhodesien. Das Typus-Material dieser Pflanze ist im British Museum, und ich habe es nicht gesehen. Die Diagnose samt Anhang ist aber so eingehend, dass E. amphibium damit sicher bestimmt werden kann. Rendle erschreibt, dass E. amphibium E. lacteum Rendle ähnlich sehe; E. amphibium unterscheide sich aber durch verwachsene Sepalen in den ♂ und ♀ Blüten von allen bekannten Eriocaulon-Arten Afrikas.

"Später hat Ruhland Eriocaulon amphibium unter die Synonymie von E. lacteum Rendle gestellt; von Arwidson (1934) wurde sie aber wieder als eigene Art anerkannt. In Moldenke (1949) ist E. amphibium unter den gültigen Namen nicht zu finden. In einer andern Publikation aus dem gleichen Jahre (Moldenke, 1949a) zitiert er bloss die oben erwähnte Literatur.

"Nach den eigenen Untersuchungen sind Eriocaulon pictum und E. amphibium identisch und der Name Eriocaulon pictum Fritsch hat von E. amphibium Rendle die Priorität.

"Das Material von Eriocaulon pictum aus Angola ist umfangreich; an 11 Fundorten wurden meist mehrere Bogen dieser Pflanze gesammelt. Dazu kommen noch die Nummern von P. Damann, H. Humbert und Baum."

He cites the following collections: ANGOLA: Benguela: Damann

D52/3001 & D52/3002; H. Hess 51/145, 52/836, & 52/1511a. Bié: Baum 324; H. Hess 52/510a, 52/613, 52/2060, & 52/2087. Huambo: H. Hess 52/886. Huila: H. Hess 52/1814, 52/2148, & 52/2149; Humbert 16651.

He gives the following very interesting discussion about the occurrence of this species: "Eriocaulon pictum wurde nur auf moorig-sandigem Boden entlang Flüssen und Bächen oder auf gleichem Boden an Quelltümpeln oder an stehenden Gewässern beobachtet. Die Pflanze wächst auf Moorboden auch noch auf trockeneren Standorten, ist aber häufig und besser entwickelt auf den nassen und auch zur Trockenzeit noch 1—5 cm tief überschwemmten Böden. Oft finden sich E. pictum auch in Bächen, wobei die Blätter während der ganzen Entwicklung untergetaucht bleiben. Wie die Daten unter den Fundorten zeigen, blüht und fruchtet die Pflanze im Süden von Angola das ganze Jahr. Dies hängt mit der Wasserführung der Moore zusammen: während der Regenzeit entwickeln sich an der Peripherie der Moore die Pflanzen sehr rasch in der nur wenige Zentimeter tief überschwemmten Zone; nach der Regenzeit, wenn der Wasserstand stetig langsam sinkt, kommen die Pflanzen in der vorher tiefer überschwemmten Gebieten zur Blüte. Am Ende fer Trockenzeit ist E. pictum nur noch am Rande der Gewässer und auf deren Grund in Blüte zu finden.

"Baum (1903) schreibt zum Standort: 'sumpfige Stelle am Fluss; Wasserpflanze, teils über, teils unter Wasser.'

"Fast immer ist Eriocaulon pictum mit E. Teusczii Engl. et Ruhl. vergesellschaftet. Oft findet sich an diesen Standorten auch Syngonanthus Wahlbergii (Wikstr.) Ruhl.....

"Was den Blütenbau anbelangt, ist das ganze Material sehr einheitlich. Die grossen Abweichungen in der höhe der Pflanzen und in der Länge der Blätter sind durch den Standort bedingt: Pflanzen an relativ trockenen Standorten entwickeln nur kurze Blätter und weniger hohe Halme. Die üppigsten Exemplare sind jene, deren Blattrosette bis nach der Blüte submers bleibt.....

"Bisher ist Eriocaulon pictum nur durch das Original-Material aus Angola (Gebiet von Huila) bekannt geworden. Berücksichtig man die Synonymie, so ergibt sich eine weitere Angabe aus Süd-Rhodesiens. Nach der nun festgestellten weiten Verbreitung im Süden von Angola ist ein zusammenhänggendes Areal bis Süd-Rhodesien zu erwarten. E. pictum ist neben E. Teusczii im Süden von Angola wohl die häufigste und weitverbreitetste Art dieser Gattung.....

"Eriocaulon pictum Fritsch wird der habituellen Ähnlichkeit wegen immer wieder mit E. Teusczii Engl. et Ruhl. verwechselt. E. pictum hat aber verwachsene Sepalen in den ♂ und ♀ Blüten, während die Sepalen bei E. Teusczii vollständig frei sind. Durch die Präparation können die verwachsenen Sepalen reissen und freie Sepalen vortäuschen. Es besteht aber auch dann noch die Unterschied an den Sepalen der beiden Arten: E. pictum hat dünne fast häutige Sepalen, während sie bei E. Teusczii gegen die Spitze hin holzig verdickt sind. Der Unterschied ist natürlich nur an Blüten mit

reifen Früchten oder an abgeblühten ♂ Blüten sicher festzustellen. Auch die Brakteen der Blüten werden bei E. pictum nie knorpelig verdickt wie es bei E. Teusczii die Regel ist. Bei einiger Übung lassen sich die beiden Arten auch an den Blättern unterscheiden: E. pictum hat gelb-grüne, vom Grunde an verschmälerte, steife und ± spitze Blätter. Bei E. Teusczii sind sie blau-grün oder grau-grün, nicht vom Grunde an verschmälert, weniger steif und vor der stumpfen, knorpeligen Spitze etwas eingeschnürt."

ERIOCAULON PILGERI Ruhl.

Bibliography: Ruhl. in Pilg., Engl. Bot. Jahrb. 30: 147. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 55, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 70. 1908; Moldenke, Known Geogr. Distrib. Erioc. 8 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 205. 1949; Moldenke, Résumé 89 & 482. 1959.

This species is known thus far only from the original collection. The original publication of the name is sometimes cited as "1902", but the part in question was actually issued on July 2, 1901 -- "1902" is merely the volume title-page date.

Citations: BRAZIL: Mattogrosso: Pilger 239 [Macbride photos 10565] (B--type, N--photo of type, W--photo of type, Z--isotype).

ERIOCAULON PILIFLORUM Ruhl.

Synonymy: Eriocaulon ciliatum Ruhl. ex Moldenke, Résumé Suppl. 1: 16, in syn. 1959 [not E. ciliatum Bong., 1831].

Bibliography: Ruhl. in Engl., Bot. Jahrb. 27: 80. 1899; Ruhl. in Engl., Pflanzenreich 13 (4-30): 61, 72, & 286. 1903; Thisel.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; Moldenke, Known Geogr. Distrib. Erioc. 22 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 123 & 205. 1949; Moldenke in Humbert, Fl. Madag. 36: 25--26. 1955; Moldenke, Résumé 156 & 482. 1959; Moldenke, Résumé Suppl. 1: 16. 1959.

Hypogeous stems short, the epigean portions also short; leaves cespitose-spreading, few, linear, 10--11 cm. long, 2--4 mm. wide at the midpoint, flat or often conduplicate, acuminate at the apex, not pellucid, scarcely or not at all fenestrate, about 7-veined with the veins somewhat prominent beneath, glabrous above, rather densely hirsute beneath and along the margins with short rather rigid very spreading hairs in irregularly appressed lines; peduncles solitary, 6- or 7-costate, 12--14 cm. long, scarcely surpassing the leaves, not twisted, glabrous; sheaths rather loose, venose-costate, very spreading-hirsute, deeply and obliquely split, the blade elongate, somewhat recurved, acuminate at the apex; heads finally globose, 5--6 mm. wide, densely whitish-villous throughout; involucral bractlets subcuneate-obovate, gray, olivaceous at the apex, ciliate, acute at the apex; receptacle pilose; receptacular bractlets oblong-cuneate, olive-green at the apex, navicular, apiculate at the apex, pilose at the summit on the back; staminate florets: sepals 3, connate about to the middle into an anteriorly split spathe, pale-olivaceous, obovate, roun-

ded-obtuse at the apex, ciliate; petal-tube with 3 subequal lobes at its apex, the lobes white-ciliate, with a large dark gland at the middle of each; anthers yellowish-white; pistillate florets: sepals 3, separate, broadly obovate, lax, olive-green above, navicular, very obtuse at the apex, puberulous on the back at the apex; petals 3, oblong-spatulate, whitish, obtuse at the apex, long-pilose, with a dark gland below the apex of each.

The species is known thus far only from the original collection, the locality of which is discussed in Proc. Zool. Soc. Lond. 1896: 971—981. The E. ciliatum Bong., referred to in the synonymy above, is a synonym of Paepalanthus ciliatus (Bong.) Kunth, a valid species.

Citations: MADAGASCAR: Forsyth-Major 17 (B—type, Z--isotype).

ERIOCAULON PILIPHORUM Satake

Synonymy: Eriocaulon pilophorum Satake ex Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205, sphalm. 1949. Eriocaulon sikokianum var. piliphorum (Satake) Satake ex Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 182. 1964.

Bibliography: Satake, Bot. Mag. Tokyo 51: 285—287 [Shib. Comm. Art. 17: 103—105], fig. 1. 1937; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 42, 43, 79, & 87, fig. 18. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 30—31, pl. 5, fig. 10. 1940; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 205. 1949; Moldenke, Résumé 173, 291, 419, & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 182 & 430. 1964; Moldenke, Résumé Suppl. 12: 10. 1965.

Illustrations: Satake, Bot. Mag. Tokyo 51 [Shib. Comm. Art. 17]: fig. 1. 1937; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 43, fig. 18. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 5, fig. 10. 1940.

The only recorded vernacular name for this species is "nagatohosikusa". The species is known thus far only from Honshu, Japan.

ERIOCAULON PILOSISSIMUM Van Royen

Bibliography: Van Royen, Blumea 10: 134—135, fig. 1G. 1960; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966; Moldenke, Résumé Suppl. 17: 6. 1968.

Illustrations: Van Royen, Blumea 10: 129, fig. 1G. 1960.

This taxon has recently been described from Celebes, on the basis of Eyma 4009 as the type. Also cited by Van Royen (1960) from the same island are Eyma 1238 & 4009bis.

ERIOCAULON PINARENSE Ruhl.

Bibliography: Ruhl. in Fedde, Repert. Spec. Nov. 22: 32. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 89. 1929; Moldenke, N. Am. Fl. 19 (1): 19 & 25—26. 1937; Moldenke, Phytologia 1: 321—322. 1939; León, Fl. Cuba 1: 281. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4 & 38. 1946; Moldenke, Known Geogr. Distrib. Verben-

ac., [ed. 2], 43, 45, & 206. 1949; Moldenke, Phytologia 3: 340. 1950; Moldenke, Résumé 51, 53, & 482. 1959.

Recent collectors have found this plant growing at the edge of ponds, flowering and fruiting in November.

Additional citations: CUBA: Pinar del Río: Ekman 18769 (S--type). ISLA DE PINOS: Britton, Britton, & Wilson 15008 (S); Killip 45212 (Mu, Z).

ERIOCAULON PLUMBEUM Colla

Bibliography: Colla, Herb. Pedem. 5: 484. 1836; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Moldenke, Résumé Suppl. 17: 3. 1968.

The original description of this species is as follows: "Mart: in sched: (Brasil:). Priori [E. densum Colla] fere duplo elatius caulescens, folia sparsa lineari-lanceolata acuminata margine ciliolata, scapi ut in priori sed glaberrimi, capitulum duplo minus densissimum squamis omnibus arcte adpressis plumbeis tomentosis."

Nothing else is known to me of this plant. The name is unaccounted for in the works of Martius, Körnicke, Ruhland, and others who have worked monographically on this family of plants, nor have I found the name written on any Martius label so far seen by me.

ERIOCAULON PLUMALE N. E. Br.

Synonymy: Eriocaulon rufum H. Lecomte, Bull. Soc. Bot. France 55: 644. 1909. Eriocaulon heterochiton A. Chev. ex Moldenke, Résumé 288, in syn. 1959 [not E. heterochiton Körn., 1867, nor "sensu Lecomte", 1968].

Bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Trop. Afr. 8: 251. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 103, 106, & 286. 1903; Prain, Ind. Kew. Suppl. 3: 70. 1908; H. Lecomte, Bull. Soc. Bot. France 55: 644, 646, & 647. 1909; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and pr. 2, 82. 1938; Moldenke, Known Geogr. Distrib. Erioc. 20, 35, 38, & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 109, 111, & 206. 1949; Moldenke, Phytologia 3: 340. 1950; Bourdu, Bull. Soc. Bot. France 104: 158. 1957; Moldenke, Résumé 133, 136, 288, 292, & 482. 1959; Moldenke, Résumé Suppl. 4: 6. 1962; Berhaut, Fl. Sénégal, ed. 2, 311. 1967; Moldenke, Résumé Suppl. 17: 4, 10, & 11. 1968; Moldenke, Phytologia 17: 454 (1968) and 18: 111 & 245. 1969.

The E. heterochiton Körn., referred to in the synonymy above, is a valid species, while the homonym "sensu Lecomte" belongs in the synonymy of E. irregulare Meikle.

Recent collectors have found this plant in flower and fruit in August. Berhaut (1967) cites Berhaut 1258 & 3266 from Sénégal. The Schnell 2154, distributed as E. plumale and so cited by me in my 1950 work, is actually E. buchananii Ruhl.

Additional citations: MALI: Senegambia: Heudelot 148 (B--isotype, Z--isotype). SÉNÉGAL: J. G. Adam 15422 (Z). REPUBLIC OF GUINEA: Pitot s.n. [9.X.1950] (An, An, An), s.n. [5.IV.1951] (An).

SIERRA LEONE: P. Adames s.n. [Jordan 554] (B).

ERIOCAULON PLUMALE subsp. JAEGERI (Moldenke) Meikle

Synonymy: Eriocaulon jaegeri Moldenke, Phytologia 5: 338—339. 1956. Mesanthemum necopinatum Moldenke, Phytologia 8: 389. 1962. Mesanthemum necopinnatum Moldenke ex Hocking, Excerpt. Bot. A.6: 455, sphalm. 1963.

Bibliography: Moldenke, Phytologia 5: 338—339. 1956; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1956: 28. 1957; Moldenke, Résumé Suppl. 4: 6. 1962; Moldenke, Phytologia 8: 389—390. 1962; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1962: 29. 1963; Moldenke, Biol. Abstr. 42: 1517. 1963; Hocking, Excerpt. Bot. A.6: 455. 1963; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966; Moldenke, Résumé Suppl. 17: 4, 10, & 11. 1968; Meikle, Kew Bull. 22: 142. 1968.

The type of this taxon was collected by Paul Jaeger (no. 4917) — in whose honor it was named — on the very summit of Mont l'Oursa, at an altitude of 1000 meters, a short distance northwest of Dabola (Fouta-Djallon), Republic of Guinea, on September 7, 1954, and is deposited in my personal herbarium at Plainfield, New Jersey. The type of Mesanthemum necopinatum was collected by James Chillou (no. 846) on inundated sandstone on the plantation of Mayon-Couré, Friguiagbé, in the same country, and is deposited in the herbarium of the Institut Francaise d'Afrique Noire at Dakar.

I am adopting the subspecific rank for this plant even though I heartily disapprove of the use of the "subspecies" category in taxonomic nomenclature. I have always felt that the categories of "variety" and "form" should be sufficient to designate any populations beneath the category of "species" that are worthy of nomenclatural designation. Nomenclature is complicated unnecessarily by the use of the terms "subvariety", "subform", "subspecies", "subgenus", "subfamily", "suborder", etc. Populations with sufficient distinguishing characters to warrant the erection of any of the above-mentioned categories could far better be regarded as separate forms, varieties, species, genera, families, or orders. However, in deference to the experts at Kew who feel otherwise and who are certainly far more up-to-date than I in the vagaries of the adopted rules of nomenclature, I am in this case accepting the subspecific status for the plant in question.

Citations: REPUBLIC OF GUINEA: Arrieu 230 [Herb. Chillou 3139] (An); Chillou 846 (An), 906 (Ac, An, Z); Jaeger 4917 (Z—type).

ERIOCAULON PLUMALE subsp. KINDIAE (H. Lecomte) Meikle

Synonymy: Eriocaulon kindiae H. Lecomte, Bull. Soc. Bot. France 55: 646. 1909. Mesanthemum chilloui Moldenke, Résumé Suppl. 4: 6, nom. nud. June 5. 1962; Phytologia 8: 389, December 10. 1962.

Bibliography: H. Lecomte, Bull. Soc. Bot. France 55: 646. 1909; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and pr. 2, 82. 1938; Moldenke, Phytologia 8: 389. 1962; Moldenke, Résumé Suppl. 4: 6

(1962) and 17: 4, 10, & 11. 1968; Meikle, Kew Bull. 22: 142. 1968.

The type of this taxon is Pobéguin 1359bis, collected near Kindia, Republic of Guinea, and deposited in the herbarium of the Muséum National d'Histoire Naturelle at Paris. The type of Mesanthemum chilloui was collected by James Chillou (no. 716) — in whose honor it was named — on inundated sandstone on the plantation of Mayton-Couré, Friguiagbé, in the same country, on September 25, 1938, and is deposited in my personal herbarium at Plainfield, New Jersey.

Citations: REPUBLIC OF GUINEA: Chillou 716 (Z).

ERIOCAULON POILANEI Moldenke

Bibliography: Moldenke, Phytologia 3: 310 & 340. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 176 & 482. 1959.

ERIOCAULON POLUENSE Wang & Tang

Bibliography: Wang & Tang, Contrib. Inst. Bot. Nat. Acad. Peiping 2: 133. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Moldenke, Known Geogr. Distrib. Erioc. 25 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 132 & 206. 1949; Moldenke, Résumé 170 & 482. 1959.

ERIOCAULON POLYCEPHALUM Hook. f.

Synonymy: Erioçaulon longicuspis var. polycephalum Fyson, Journ. Indian Bot. 2: 308. 1921. Eriocaulon longicuspis var. polycephala Fyson, Journ. Indian Bot. 2: 309. 1921. Eriocaulon longicuspus var. polycephala Fyson ex Moldenke, Phytologia 3: 340, in syn. 1950. Eriocaulon longicuspes var. polycephala Fyson ex Razi, Journ. Mysore Univ. B.14 (10): 460, sphalm. 1955.

Bibliography: Hook. f., Fl. Brit. Ind. 6: 573. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 573. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 116 & 287. 1903; Fyson, Journ. Indian Bot. 2: 308—310. 1921; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1608 & 1618. 1931; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 573. 1941; Moldenke, Known Geogr. Distrib. Erioc. 23 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 127 & 206. 1949; Moldenke, Phytologia 3: 340—341. 1950; Razi, Journ. Mysore Univ. 11 (1): 6 (1950) and B.14 (10): 460. 1955; Razi, Contrib. Bot. 40: 92. 1955; Razi, Proc. Nat. Inst. Sci. India 21 B (2): 85. 1955; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1121, 1127, & 1333. 1956; Moldenke, Résumé 162, 289, & 482. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 573. 1959; Thanikaimoni, Pollen & Spores 7: 185. 1965; Moldenke, Résumé Suppl. 14: 8. 1966; Moldenke, Phytologia 18: 270. 1969.

Illustrations: Fyson, Journ. Indian Bot. 2: 309. 1921.

Fyson (1921) describes this taxon as follows: "(Duthie 10,580 in Herb. Calc!) F. B. I. l.c. No. 8. Scapes numerous, otherwise as type. Central India, Pachmarchi; Peninsular India, Mysore, Palghat. I can see no difference except in the numerous scapes

between this and E. longicuspis. A plant collected by Dr. Henry in Yuman, No. 9443 in Herb. Calc. has smaller leaves more like those of E. odoratum and smaller heads. The involucral bracts are not reflexed. It may be a distinct species but is obviously closely related to E. longicuspis." The Henry 9443, to which he refers here, is the type collection of E. henryanum Ruhl.

Eriocaulon polycephalum has been collected at 3000 to 4000 feet altitude, flowering and fruiting in November. Material has been misidentified and distributed in herbaria under the names E. longicuspis Hook. f. and E. quinquangulare L. The Hooker & Thomson collection, cited below, was distributed as E. luzulaefolium Mart. The Munich sheet bears an unsigned annotation: "Non est E. luzulaefolium Mart. an E. viride Koernk.?"

Additional citations: INDIA: Kerala: Duthie 10581 (B). Khasi States: Hooker f. & Thomson s.n. [in montibus Khasiae] (Mu—216). Mysore: Meebold 9737 (Ac, S); S. N. Ramaswamy 9 (Z), 26 (Rf).

ERIOCAULON ? POROSUM Lesq.

Synonymy: Eriocaulon porosum Lesq. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 23 & 287. 1903.

Additional & emended bibliography: Lesq., U. S. Geol. & Geogr. Surv. Terr. Ann. Rep. 7: 396. 1874; Lesq., U. S. Geol. Surv. Terr. Rep. 7: [Tert. Fl.] 106, pl. 16, fig. 2 & 2a. 1878; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 26. 1888; Ruhl. in Engl., Pflanzenreich 13 (4-30): 23 & 287. 1903; Knowlton, U. S. Geol. Surv. Bull. 696: 260 & 778. 1919; Knowlton, U. S. Geol. Surv. Prof. Paper 155: 132—133. 1930; Moldenke, Known Geogr. Distrib. Erioc. 38 & 61. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 166 & 206. 1949; Moldenke, Phytologia 3: 341. 1950; R. S. Lamotte, Geol. Soc. Am. Mem. 51: 157. 1952; Angely, Fl. Paran. 10: 5. 1957; Moldenke, Résumé 226 & 482. 1959; Shinners, Sida 2: 441. 1966.

Illustrations: Lesq., U. S. Geol. Surv. Terr. Rep. 7: [Tert. Fl.] pl. 16, fig. 2 & 2a. 1878.

As stated by me in my 1950 work, I doubt very much whether this fossil represents an Eriocaulon. Lesquereux (1878) describes the fossil and comments on it as follows: "Leaves basilar, rosulate, spreading, entire, linear-lanceolate, broader in the middle, gradually tapering to a slightly obtuse point and downward to the sessile (?) base (not seen); substance thick, spongious. By the thick, apparently porous and spongious consistence, by the rosulate superposition, and by the form, these leaves are referable to this genus. They, however, differ by their larger size and the appearance of a middle nerve. As seen in fig. 2a, enlarged, the middle nerve is traced by a broad, flat depression, along which the veins are parallel, as in some species of this genus; Paepalanthus melaleucus and Eriocaulum modestum of Brazil, for example. ....." [to be continued]

# A NEW SPECIES OF CORDIA (BORAGINACEAE) FROM PANAMA

Joan W. Nowicke

Missouri Botanical Garden and Department of Botany
Washington University, St. Louis, Missouri

Santa Rita Ridge, a previously uncollected area in the Province of Colon, has yielded a new species of Cordia.

Cordia porcata Nowicke, sp. nov.

Frutex, ad ca 3 m altus, ramis junioribus pubescentibus. Folia alterna, elliptica, acuminata, integra, basibus obtusis, ad 24 cm longa et 9 cm lata, ± porcata, parum falcata, ± glabra cinereo-viridiaque super, sparsim pubescentia subter; petioli ca 2-10 mm longi. Inflorescentiae cymae laxae, pedunculis pubescentibus. Flores perfecti, ± sessiles; gemmae clavatae; calyx cupulatus, tubo ca 4 mm longo, glaber, 3-4 lobatus, lobi deltoidei, ca 1.5-2 mm longi; corolla hypocrateriformis, alba, tubo 4-4.5 mm longo, 5-lobata, oblongis lobis ca 5 mm longis 1.8 mm latisque; stamena quinque, exserta, filis ca 3-4 mm longis ad bases pubescentibus, antheris 2 mm longis; ovarium oviforme, stylo sub anthesi ca 4 mm longo. Fructus oblique ellipsoideus, 10-12 mm altus, acuto apice.

Type: Panama: Colon: Santa Rita Ridge lumber road, 3 Oct. 1968, Correya & Dressler 1076 (Holotype: MO).

Additional collections: Panama: Colon: Santa Rita Ridge lumber rd, Correya & Dressler 742 (MO); Santa Rita Ridge, 19 km from Transisthmian Hwy, Dwyer 8581 (MO); Santa Rita Ridge, Hwy to 8 mi E, Dwyer et al. 9027 (MO).

This large and difficult genus is represented in Panama by about 16 species (for a complete treatment see Flora of Panama, part IX. Family 167, Boraginaceae, by J. W. Nowicke, Ann. Missouri Bot. Gard. 56 (1), 1969, in press). Cordia porcata is readily distinguished by its combination of open cymose inflorescences, large flowers, and relatively glabrous, grey-green leaves.

- - - - - - - - - - - - - - - -

## BOOK REVIEWS

Alma L. Moldenke

"PHOTOPHYSIOLOGY - CURRENT TOPICS" Vol. III edited by Arthur C. Geise, xv & 285 pp., illus., Academic Press, Inc., New York 10003 & London W.1. 1968. $15.00.

This rich, compact volume emphasizes plant photobiology mechanistically rather than descriptively even if the former can only be contemplated as a future acquisition. Each article is written by a leader in the field and is provided with carefully compiled bibliographic material.

John D. Spikes mentions a number of reaction mechanisms proposed to account for the still little understood photodynamic action or dye-sensitized photoautoxidations.

Robert M. Page surveys the phototropic responses that have been observed in representatives of all the major groups of fungi but not in their aquatic members and indicates some carotenoid as the possible photoreceptor.

Lester Parker and David W. Deamer, in attempting to assign a precise mechanism to the "in vivo" light-induced structural changes for which photometric evidence has been obtained, note that the main change which occurs when chloroplasts are illuminated is volume decrease.

Norman I. Krinsky develops the protective function of carotenoid pigments across the entire visible spectrum against aerobic photosensitization as a filter system in the cell envelop, as a quencher of photosensitizer triplet states, as a preferred substrate for photosensitized oxidations, and as a stabilizer and repairer of light-damaged membranes -- all shown with a clever diagram.

David Branton analyzes the structure of the photosynthetic apparatus through polarization optics, X-ray diffraction analysis, electron microscopy and correlated interpretations of the ultrastructural studies, especially the photosynthetic membranes.

G. Hoch and R. S. Knox are especially interested in the resonance transfer process so essential to efficient photosynthesis and they discuss pertinent recent experiments in the context of

two kinetic models of the photosynthetic system.

Cyril Ponnamperuma documents a fascinating paper on ultraviolet radiation and the origin of life and concludes that "under simulated primitive earth conditions, molecules of biological significance can be synthesized by the action of ultraviolet radiation. Not only can micromolecules be made by this process but, once made, they can undergo condensation reactions to form complex polymers. Photochemical synthesis must have played an important part before the appearance of life, as photosynthesis does today. As the laws of chemistry and physics are universal laws, these laboratory experiments point out that wherever the right conditions exist, those molecules which can act as precursors of biological systems will arise anywhere in the universe."

It is wise that the Contents of Volumes I, II and IV are given so that the graduate students and specialists who use this book can be kept aware of the valuable papers that appeared in these other volumes.

"GLOSSARY OF GEOGRAPHICAL NAMES - IN SIX LANGUAGES" by Gabriella Lana, Liliana Iasbez and Lidia Meak, 184 pp., Glossaria Interpretum Series of the Elsevier Publishing Company, Amsterdam, London & New York 10017. 1967. $10.00.

Sponsored by the Universities of Geneva, Georgetown, Heidelberg, Mainz, Paris and Trieste and written by three highly skilled professional interpreters and translators, this compact book gives the English, French, Spanish, Italian, Dutch and German equivalents of the more commonly used place names in countries, counties and regions along with rivers and other waterways. There is a total of well over 4,300 separate geographic entries that are cross-indexed. Both old and newer place names are given as in Africa.

To many people in many walks (or more literally works) of life this volume will be ever so helpful. It will appeal particularly to the readers of this journal who are taxonomic botanists, geobotanists and ecologists.

"DISCOVER AMERICAN TREES" by Rutherford Platt, 256 pp., illus., Dodd, Mead & Company, New York 10016. 1968. $4.50.

This positively delightful book by an enthusiastic and appreciative naturalist-author is a revision of his "American Trees, a Book of Discovery" published in 1952. It is a "guide to all the trees from the Atlantic to the Pacific coasts" but it fails to mention the pneumatophored and often viviparous-seeded mangrove (Avicennia germinans (L.) L.) and the account of the ancient bristlecone pine (Pinus aristata Engelm.) is lost to the index because it appears in an unpaged introductory chapter.

Fascinating tidbits of information appear with many of the descriptions. The author includes 46 of his own excellent photographs and over 200 effective drawings by Margaret L. Cosgrove.

The trees are described according to the following regions: (1) the great American forests east of the Rockies, especially in the East and including our flowering, fruit and city trees, (2) the Middle West, (3) the South, (4) the tropical sphere in Southern Florida, (5) the greatest forest region of our country in the Northwest, (6) the unique Californian area and (7) the arid Southwest. There is also a clever pictorial guide to the quick identification of a tree.

"THE ALGAE: A REVIEW" by G. W. Prescott, xi & 436 pp., illus., Riverside Studies in Biology Series, Houghton Mifflin Company, Boston 02107. 1968. $7.95.

This needed book provides a good general survey of these organisms where there has not been one in the field for several years in the United States. It surveys the taxonomy more or less classically, the cytological morphology without any electron microscopic illustrations, the physiology somewhat cursorially, the ecology quite interestingly, the economics and the fossil record.

There are eleven fair photographs and 263 clear, simple line drawings of species representatives. The glossary is particularly well done. On page 32 Oedogoniales is misspelled. On pages 7 and 9 in the classification synopsis no traits are given for Class Chlorophyceae and Class Charophyceae. Fortunately the colored flagellates are not orphaned out of this book. For teaching purposes it is better to learn about them in both protozoology and phycology rather than in neither!

"BERNHARD EDUARD FERNOW - A STORY OF NORTH AMERICAN FORESTRY" by Andrew Denny Rodgers III, 623 pp., illus., Hafner Publishing Company, London and New York 10003. 1968. $11.00.

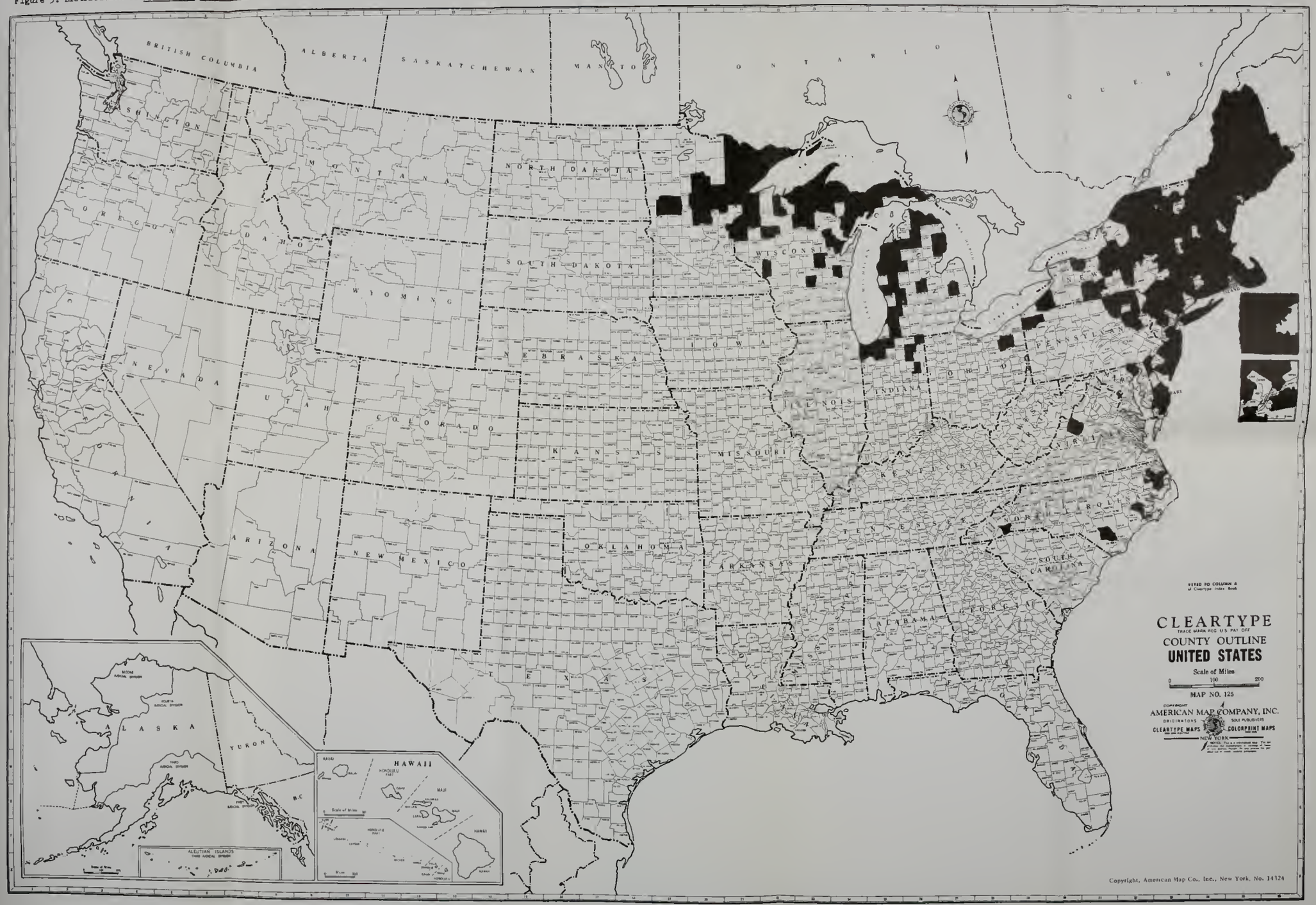
This book is a facsimile of the 1951 edition published by the Princeton University Press relating the start and the establishment of forestry as a recognized biological science and the necessarily concomitant and causal importation of Fernow from Germany as our first professional forester in 1876 and his longtime leadership in this field until 1923. This interestingly told, very detailed story of his life and work is the story of forestry which today has grown to a control of over 18,000,000 wooded acres of reservation in the United States and Canada.

Since forestry is unavoidably about trees, it is a pity that the index could not have been emended to include their names, thus making the book more useful to readers and its contents more readily accessible.

Figure 5. Distribution of Eriocaulon pellucidum in the United States

Herbarium curators who have material of this species from additional counties are asked to send it to the author for verification and record, so that future editions of this map may be more complete

Mapping by counties done by Andrew R. Moldenke



# PHYTOLOGIA

*Designed to expedite botanical publication*

Vol. 18 September, 1969 No. 7

CONTENTS



Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number, $1; per volume, $6.75, in advance, or $7 at close of volume

# PSILOPILUM MEXICANUM SP. NOV.

G. L. Smith[1]

Psilopilum mexicanum sp. nov.: Caules gregarii, simplices, primo flavo-virentes, senescentes atrovirides, deinde coffeati, 1.5-2cm longi, inferne aphylli, superne copiose foliosi. Folia in sicco parte basali vaginanti, parte superna tubulosa, squarrosa, inde introcurva, ansam poculi simulanti; madefacta imbricata, erecto-patentia, oblongo-ovata, tenuiter falcata, membranacea, (3)-4-(5)mm longa, canaliculata, marginibus arrectis integerrimis, apiculo brevi paene cucullato; dorsum folii apicem versus lamellis paucis humilissimis brevibus instructum; cellulae laminae prope basin rectangularis; cellulae partis supernae folii quadratae vel hexagonae, saepe transverse elongatae; cellulae marginis folii ab aliis haud differentes; cellulae dorsi nervi inferne lineares, supernae breviores et aliquantum conturbatae; lamellae adaxiales numerosae, tertiam latitudinis folii obtentae, marginibus undulatis laciniatis, desuper pro striis brevibus temere dispositis visae. Dioica. Folia perigonii latissime ovata, imbricata, involucrum cyathiforme formantia.

Omnes ceterae desunt.

HAB. Mexico in ditione Tlaxcala in prato alpino montis La Malinche, in solo humido (Claudio Delgadillo 2583, 11 Sept 1968) NY! (HOLOTYPUS) MEXU, MICH, TENN; (Delgadillo 2585, 11 Sept 1968) TENN!, MEXU.

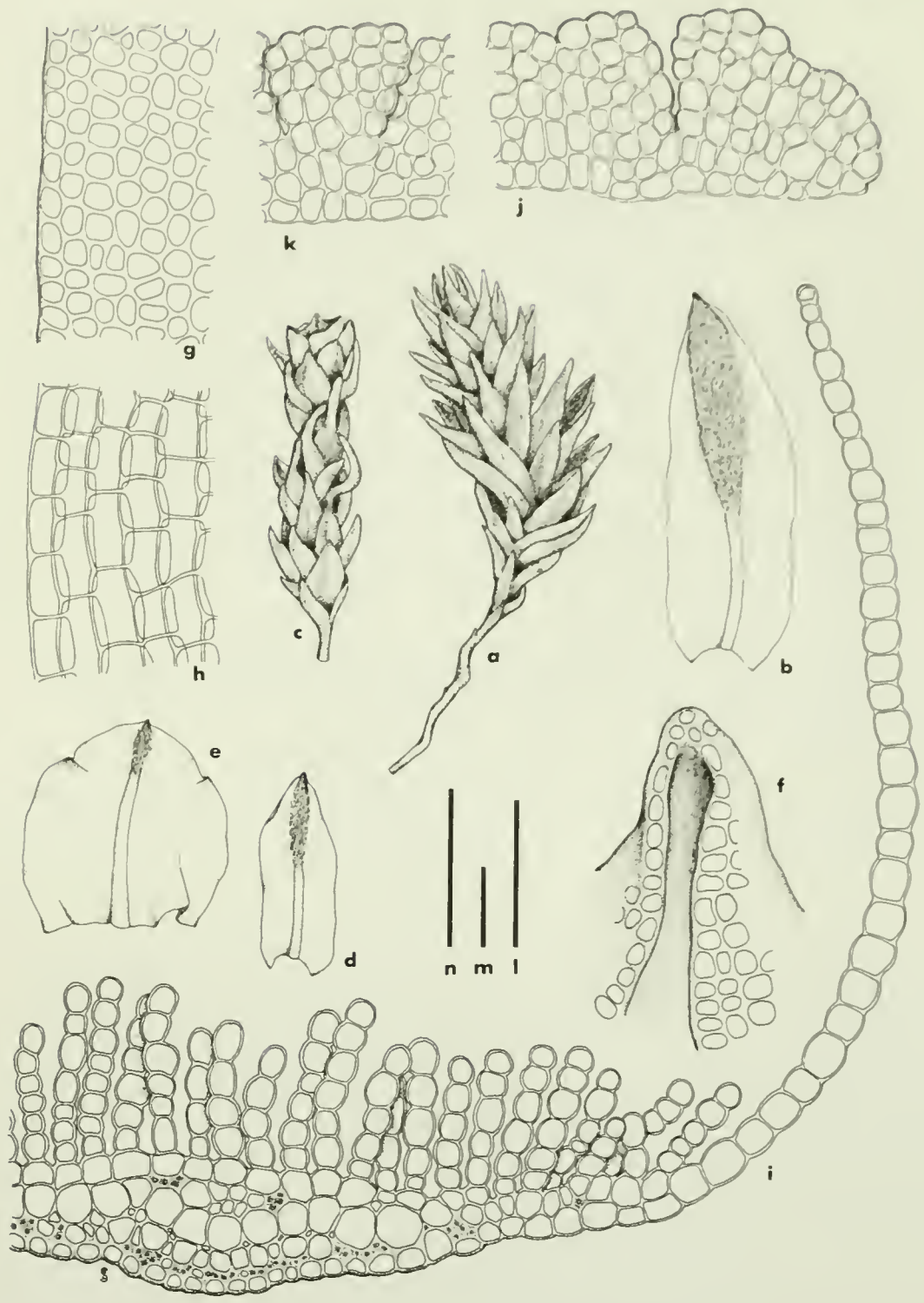
Muscus aspectu Psilopili trichodontis (Hook.f. & Wils.) Mitt. apiculis foliorum brevibus canaliculatis paene cucullatis bene distinctus.

* * * *

Psilopilum mexicanum G.L. Smith - a, tota planta foeminea sterilis; b, folium vegetativum plantae foemineae; c, tota planta mascula florens; d, folium vegetativum plantae masculae; e, folium perigonii; f, apiculum folii; g, cellulae margine partis supernae folii; h, cellulae marginis prope basin folii; i, sectio transversa folii; j,k, partes lamellae a latere visae; l, mensura a,c = 5mm; m, mensura b,d,e = 1mm; n, mensura f-k = 0.1 mm. Omnes figurae ex holotypo.

---

[1]New York Botanical Garden, Bronx, New York 10458.


g
k
j
h
c
a
b
e
d
n m l
f
i
s

# NEW COMBINATIONS IN POLYTRICHACEAE

G. L. Smith[1]

Polytrichum longisetum [Sw.] Brid. var. anomalum (Milde) comb. nov.
Atrichum anomalum Milde, Hedwigia 8: 161. 1869.

Polytrichadelphus rubescens (Mitt.) comb. nov.
Polytrichum rubescens Mitt. Jour. Linn. Soc. Bot. 12: 622. 1869.

Polytrichadelphus subrubescens (Thér.) comb. nov.
Polytrichum subrubescens Thér. Rev. Bryol. Lichenol. 9: 6. 1936.

Oligotrichum afro-laevigatum (Dix.) comb. nov.
Psilopilum afro-laevigatum Dix. Trans. Roy. Soc. S. Afr. 8: 207. 1920.

Oligotrichum austro-aligerum nom. nov.
Oligotrichum magellanicum Card. & Broth. K. Svensk. Vet. Akad. Handl. 63(10): 71. 1923. hom. illeg.

Oligotrichum falcifolium (Griff.) comb. nov.
Polytrichum falcifolium Griff. Calcutta Jour. Nat. Hist. 2: 475. 1842.

Oligotrichum wageri (Broth.) comb. nov.
Psilopilum wageri Broth. in Dix. Trans. Roy. Soc. S. Afr. 8: 207. 1920.

Dendroligotrichum microdendron (Müll.-Hal.) comb. nov.
Catharinea microdendron Müll.-Hal. Hedwigia 36: 339. 1897.

Pseudoracelopus marginatus (Mitt.) comb. nov.
Pogonatum marginatum Mitt. Jour. Linn. Soc. Bot. Suppl. 1: 153. 1859.

Pseudoracelopus ponapensis (Sak.) comb. nov.
Racelopus ponapensis Sak. Bot. Mag. Tokyo 57: 91. 1943.

Racelopodopsis mindanensis (Bartr.) comb. nov.
Pseudoracelopus mindanensis Bartr. Philippine Jour. Sci. 68: 384. 1939.

Racelopodopsis papillosus (Horik.) comb. nov.
Pogonatum papillosum Horik. Bot. Mag. Tokyo 48: 717. 1934.

---

[1]New York Botanical Garden, Bronx, New York 10458.

# NEW TREE SPECIES FROM ESMERALDAS, ECUADOR (CONTINUED)

ELBERT L. LITTLE, JR.

Five new tree species from the Province of Esmeraldas in northwestern Ecuador are published here in the following genera (and families): Osteophloem Warb. (Myristicaceae), Trattinnickia Willd. (Burseraceae), Tapura Aubl. (Dichapetalaceae), Amanoa Aubl. (Euphorbiaceae), and Sterculia L. (Sterculiaceae). The records of the first 4 apparently are also the first of their genera from Ecuador.

This article is a continuation of one with the same title (Phytologia 18: 195-208, illus. 1969), the second in a series. Each description is accompanied by a line drawing prepared for a book on the common trees of Esmeraldas, now in press. The work was done under the forestry project, Desarrollo Forestal de Noroccidente (DEFORNO). This was United Nations Special Fund Project No. 127, administered by the Food and Agriculture Organization (FAO) of the United Nations and the Government of Ecuador.

A note on the generic name Sickingia should follow the publication of S. standleyi Little (Phytologia 18: 204, fig. 5. 1969). H. K. Airy Shaw (in J. C. Willis, Dict. Flowering Plants Ferns ed. 7, 1037, 1040. 1966) has cited Sickingia Willd. (Ges. Naturf. Fr. Neue Schr. 3: 445. 1801) as a synonym of the older name Simira Aubl. (Hist. Pl. Guiane Franç. 1: 170, t. 65. 1775). The name Sickingia Willd. is in almost universal use for a tropical American genus of Rubiaceae with about 35 species. If found to lose priority to an obscure older name, then Sickingia Willd. should be added to the nomina generica conservanda. In the meantime, existing usage should be followed (ICBN, Rec. 15A).

**OSTEOPHLOEM SULCATUM** Little, sp. nov. "Chalviande (frutos surcados)," "chalviande colorado," "chalviande." Fig. 6.

Arbor magna sempervirens ad 30-44 m. alta, trunco 0.5-1.5 m. diametro, anteridibus rotundis vel angulatis. Cortex brunneus vel griseus, squamosus, subtiliter fissuratus; cortex interior fulvescens succo aquoso, amarus. Ramuli longi graciles, gemma foliorum minutorum. Ramuli juvenes, gemmae, folia juvenia, ramuli inflorescentiae, atque flores stellato-pilosi cinnamomei. Folia alterna biserialia, petiolis tenuibus 2-3 cm. longis puberulis, longitudinaliter sulcatis. Laminae anguste oblongae, 15-26 cm. longae, 3.5-7 cm. latae, chartaceae, apice cuspidatae vel acutae, margine parum revolutae, nervis lateralibus 10-14 leviter curvis utroque latere costae sulcatae, supra virides nitidae glabrae, subtus albidae minute stellato-pilosae.


Fig. 6. Osteophloem sulcatum Little, sp. nov. "Chalviande (frutos surcados)."

Dioecia. Inflorescentiae masculinae paniculae axillares 2-6 cm. longae multiflorae. Flores masculini pedicello 2 mm. longo, bracteola 0.5 mm. longa, 4-5 mm. longi et lati, calyce trilobo fere ad basim, androecio columnae cylindrae c. 2 mm. longae c. 12 antheras congestas lineares ferente. Inflorescentiae femineae non visae. Fructi drupae dehiscentes solitariae super pedicellis 2 cm. longis, subglobosae 2.5 cm. diametro (in vivo), sulco magno circum basim, bivalves. Semen subglobosum in arillo rubro.

Large evergreen tree to 30-44 m. high, with trunk 0.5-1.5 m. in diameter, with rounded or angled buttresses. Bark brown or gray, scaly, finely fissured; inner bark yellow brown with watery sap, bitter. Twigs long slender, with bud of minute leaves. Young twigs, buds, young leaves, branches of inflorescence, and flowers with cinnamon-colored stellate hairs. Leaves alternate in 2 rows, with slender petioles 2-3 cm. long, puberulent, longitudinally grooved. Blades narrowly oblong, 15-26 cm. long, 3.5—7 cm. wide, chartaceous, cuspidate or acute at apex, acute at base, slightly revolute at margin, with 10-14 slightly curved lateral nerves on each side of grooved costa, above shiny green and glabrous, beneath whitish with minute stellate hairs.

Dioecious. Male inflorescences axillary panicles 2-6 cm. long, many flowered. Staminate flowers with pedicel 2 mm. long, bracteole 0.5 mm. long, 4-5 mm. long and broad, cinnamon-colored, with calyx 4 mm. long, 3-lobed nearly to base, androecium of cylindric column about 2 mm. long with about 12 crowded linear anthers. Female inflorescences not seen. Fruits dehiscent drupes solitary on pedicels 2 cm. long, subglobose, 2.5 cm. in diameter (fresh), with large groove around base, 2-valved. Seed subglobose in red aril. Collected with flowers in July and August, with fruits in June.

Sapwood cream-colored, heartwood brown, distinctive. The wood is intermediate in hardness and weight. The common name chalviande colorado refers to the colored heartwood.

ECUADOR, ESMERALDAS: Panadero, San Lorenzo, alt. 40 m., wet forest, Apr. 25, 1966, R. G. Dixon 272 (male flower buds; HOLOTYPE, US; isotype, NY); same locality, Sept. 25, 1965, E. L. Little, Jr., and R. G. Dixon 21150 (US, NY); San Lorenzo, alt. 10 m., April 20, 1943, E. L. Little, Jr. 6295 (US); Río Palabi, alt. 100 m., June 25, 1966, C. O. Janse 287 (fruit; US, NY); Mataje, Río Mataje, secondary forest, Aug. 1, 1966, C. Játiva 334 (1159) (fruit; US, LA, MADw); Tobar Donoso, junction Río San Juan and Río Camumbi, alt. 260 m., July 27, 1966, C. Játiva and C. Epling 1141 (US, LA).

COLOMBIA, DEPTO. DEL VALLE: Costa del Pacífico, Río Naya, Puerto Merizalde, alt. 5-20 m., Feb. 20-23, 1943, J. Cuatrecasas 14022 (US).

The genus Osteophloem Warb. has had a single species, O. platyspermum (Spruce ex A. DC.) Warb., of the Amazonian region of Brazil, Peru, and Colombia to Guyana. The basionym Myristica platysperma Spruce ex A. DC. (in DC., Prodr. 14: 695. 1857) was based on 2 specimens collected by Spruce near Panure on Río Vaupes, Colombia.

Albert C. Smith in his monograph (Brittonia 2: 451-453, illus. 1937) published a longer description based on additional specimens. Later, Smith (Contrib. U. S. Natl. Herbarium 29: 326-327. 1950) cited 6 specimens collected by Cuatrecasas in Depto. del Valle, Colombia, in 1943. When recording the range extension to the Pacific Coast, Smith noted that those specimens had the leaf blades sometimes abruptly cuspidate at apex, with a callose-tipped acumen about 5 mm. long, and larger flowers with perianth 5-7 mm. long. However, he concluded that the differences in flowers were not sufficient for recognizing the Pacific Colombian material nomenclaturally. J. C. Th. Uphof (in Engler & Prantl, Natürlich. Pflanzenfam. Ed. 2, 17a: 205. 1959) treated the genus as monotypic.

In 1943 I collected a specimen in Esmeraldas with the forest survey of the Latin American Forest Resources Project. This specimen with very young flower buds was tentatively referred in the published list to Virola as probably a new species but too poor for description (Little, Caribbean Forester 9: 234. 1948). The common name "chalviande" was applied also to that genus.

Now that additional specimens are available, the trees of the Pacific slope of southwestern Colombia and Esmeraldas, Ecuador, are named here as the second species of the genus. Sterile specimens of Osteophloem sulcatum are readily distinguished by their larger, narrowly oblong cuspidate leaves from O. platyspermum, which has smaller obovate leaves 7-14 cm. long and 3-6.5 cm. wide, either rounded or obtuse at apex, and with fewer lateral veins, mostly 6-9 on each side. The immature male flowers of the Esmeraldas specimens were not as large as those described from Colombia.

The distinctive feature used in the field in Esmeraldas to separate this species from those of Virola and Dialyanthera in the same family is the prominent groove that surrounds the base of the drupe, to which the specific epithet refers. Fig. 6 illustrates at lower right a fresh fruit with the conspicuous groove around the base. However, the groove is not conspicuous in dried fruits. Also, each flower bears at the base a minute scale or bracteole. The sap of the trunk is watery rather than red as in species of Virola.

The original description of Osteophloem platyspermum mentioned the fruits as "sulcati," suggesting that a similar groove might be more evident in living fruits, though not recorded afterwards.

This species is common locally in the wet tropical forests at low altitudes near the coast in Esmeraldas, becoming a large tree. The giant from which Little and Dixon 21150 was collected was 40 m. high and 1.5 m. in trunk diameter above the large buttresses to 2 m. high, too large to fell for a specimen. However, leaves and fruits were collected on the ground.

The family Myristicaceae is well represented in the wet tropical forests of Esmeraldas, both in number of species and in number of large trees. The woods are commercially important. There are 2 or 3 species of Dialyanthera and a few of Virola, 2 of which will be named as new.

**TRATTINNICKIA BARBOURII** Little, sp. nov. "Anime pulgande." Fig. 7.

Arbor magna sempervirens ad 45 m. alta, trunco 120 cm. diametro, anteridibus humilibus rotundatis. Cortex laevis, brunneus; cortex interior brunneus odore Glycyrrhizae. Folia alterna, imparipinnata, permagna, 40-50 cm. larga, petiolo crasso 10 cm. longo longitudinaliter sulcato, axe crasso glabro supra carinato. Foliola 5—7-jugata, petiolulis crassis 0.5-1 cm. longis. Laminae oblongae vel lanceolatae, 15-22 cm. longae, 4.5-7 cm. latae, crassae, rigide coriaceae, apice acuminatae, basi inaequales et subcordatae, margine integrae atque parum revolutae, nervis lateralibus multis parallelis fere rectis sub angulo fere 90° abeuntibus, supra nitidae et leviter asperae, subtus pallidae opacae, nervis lateralibus puberulis valde prominentibus et reti prominenti venularum.

Inflorescentia terminalis paniculata 30 cm. longa axibus ramisque crassis et carinatis. Flores non visi. Drupae numerosae, pedicellis crassis angularibus 1 cm. longis, subglobosae, 1 cm. longae, apice mucronatae, nigrae (in sicco), pulpa exili et putamine ovoideo magno.

Large evergreen tree to 45 m. high, with trunk 120 cm. in diameter, with low rounded buttresses. Bark smooth, brown; inner bark brown, with odor of licorice. Leaves alternate, imparipinnate, very large, 40-50 cm. long, with stout petiole 10 cm. long, longitudinally grooved, and stout glabrous axis keeled above. Leaflets 5—7-paired, with stout petiolules 0.5-1 cm. long. Blades oblong or lanceolate, 15-22 cm. long, 4.5-7 cm. wide, thick acuminate at apex, unequal and subcordate at base, with margin entire and slightly revolute, with many parallel nearly straight lateral veins departing at angle almost 90°, above shiny and slightly rough, beneath pale and dull, with puberulent lateral veins very prominent and prominent network of veinlets.

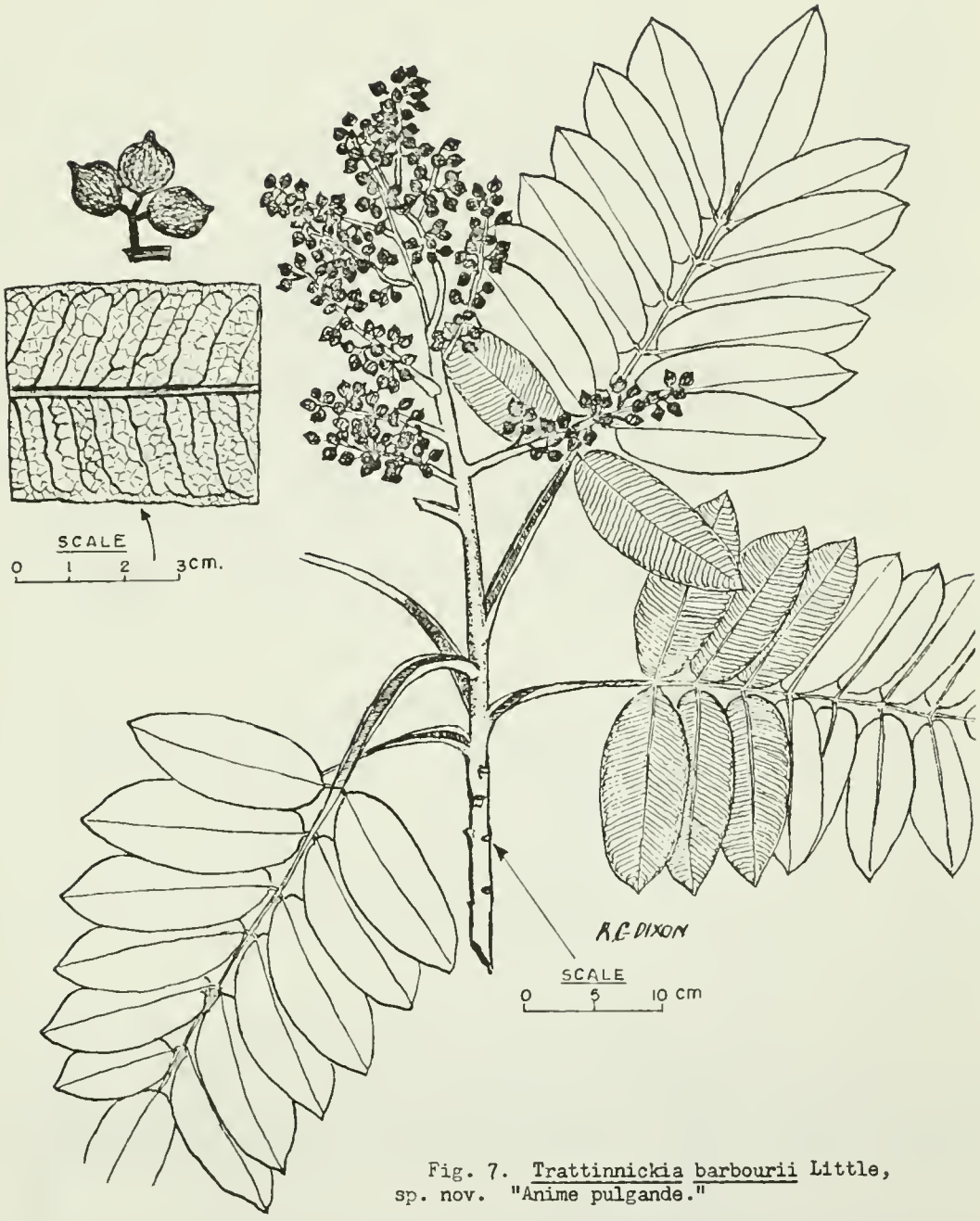



Fig. 7. Trattinnickia barbourii Little, sp. nov. "Anime pulgande."

Inflorescence a terminal panicle 30 cm. long, with stout keeled axis and branches. Flowers not seen. Drupes numerous, with stout angular pedicels 1 cm. long, subglobose, 1 cm. long, mucronate at apex, black (dry), with thin pulp and large ovoid stone.

The wood is light brown, light-weight, soft, and coarse-textured.

ECUADOR, ESMERALDAS: Río Palabí, alt. 90 m., wet forest, May 24, 1966, R. G. Dixon 286 (HOLOTYPE, US; isotype, NY; wood sample, MADw).

PANAMA, PROV. PANAMA: Río Indio drainage, 9 mi. E. Trans-Isthman Hy., alt. 800 ft., rain forest, bark with fragrant resin, "caraña," March 23, 1946, W. R. Barbour 1056 (US).

The genus Trattinnickia Willd. (Sp. Pl. 4: 975. 1806; Burseraceae) contains about 12 species of tropical America from Panama to the Guianas, Brazil, and Bolivia but mainly in the Amazon basin. The original spelling adopted here has been restored in a few references, though Trattinickia is commonly used. J.J. Swart (Rec. Trav. Bot. Néerland. 39: 419-434. 1942) described 9 species in his monograph of the genus. J. F. Macbride (Fl. Peru pt. 3, no. 2: 716-719. 1949) cited 2 species from Peru. José Cuatrecasas (Webbia 12: 420-426. 1957) recorded 5 species from Colombia.

This species is named for the late William R. Barbour, tropical forester of the United States Forest Service and afterwards the Food and Agriculture Organization of the United Nations. Apparently, he made the first collection. It was my good fortune to begin my tropical field work under his guidance in Costa Rica and Panama in February-March 1943. We worked together on the Latin American Forest Resources Project of the U. S. Forest Service. Being inexperienced, I profited greatly from his vast store of information obtained from many years in Puerto Rico and elsewhere in tropical America.

Robert G. Dixon, silviculturist with the United Nations Special Fund Project in Esmeraldas, collected the type specimen and made the accompanying drawing from living material. Barbour's earlier collection from Panama was identified previously as Trattinnickia aspera (Standl.) Swart, a related species with thinner leaflets and fewer lateral veins.

Trattinnickia barbourii has distinctive large leaves with rough stiff thick leaflets, many parallel nearly straight lateral veins, and a prominent network of veinlets on the lower surface. Fig. 7 shows at upper left 3 fruits and a detail of the lower leaflet surface with prominent network of veinlets.


Fig. 8. Tapura angulata Little, sp. nov. "Fruto de pavo."

**TAPURA ANGULATA** Little, sp. nov. "Fruto de pavo." Fig. 8.

Sec. Dischizolaena Baill. Arbor parva sempervirens ad 10 m. alta, trunco 12 cm. diametro aliquantum angulato. Cortex atro-brunneus, fere laevis, verrucosus; cortex interior eburneus succo paulo rubello. Ramuli juventute puberuli, demum glabri, tenues, nodis annulati. Stipulae 1-1.5 cm. longae, angustae acuminatae, gemmam angustam et cicatrices annulares formantes, caducae. Folia alterna serialibus 2, juventute puberula, demum glabrata, petiolis brevibus crassis 1 cm. longis longitudinaliter sulcatis. Laminae ellipticae, 14-21 cm. longae, 5.5-7 cm. latae, chartaceae, apice acuminatae, basi acutae, margine parum revolutae, nervis lateralibus utroque latere 8-10 curvis et leviter impressis.

Flores 3-9 prope apicem petioli insertes, ab alabastro globoso 2 mm. diametro pedicellis puberulis 3-5 mm. longis extensi, 6-7 mm. longi, actinomorphi, campanulati, puberuli; calyx 6 mm. longus 5 lobulis rotundatis imbricatis 3-4 mm. longis; corolla 6-7 mm. longa, alba, tubo cylindrico et 5 lobulis ovatis auriculatis obtusis c. 2 mm. longis fere aequalibus; stamina 5 ad apicem tubi corollae alternatim lobulis inserta, fere sessilia antheris 1 mm. longis; et super disco ovarium ellipsoidale vel subglobosum 3 mm. longum, 3-loculare, 2 ovulis in quoque loculo; stylus 3 mm. longus, hirsutus, 3-partitus. Drupae 1-4, ellipsoidales 1.5-2 cm. longae, 1 cm. diametro, fulvae, puberulae, semine 1.

Small evergreen tree to 10 m. high, with trunk 12 cm. in diameter and somewhat angled. Bark dark brown, nearly smooth, warty, inner bark yellowish white with a little reddish sap. Twigs puberulent when young, at length glabrous, slender, ringed at nodes. Stipules 1-1.5 cm. long, narrowly acuminate, forming narrow bud and annular scars, caducous. Leaves alternate in 2 rows, puberulent when young, at length glabrate, with short stout petioles 1 cm. long, longitudinally grooved. Blades elliptic, 14-21 cm. long, 5.5-7 cm. broad, chartaceous, acuminate at apex, acute at base, slightly revolute at margin, with 8-10 lateral nerves on each side curved and slightly impressed.

Flowers 3-9 inserted near apex of petiole, spreading from globose bud 2 mm. in diameter on puberulent pedicels 3-5 mm. long, 6-7 mm. long, actinomorphic, campanulate, puberulent; calyx 6 mm. long with 5 rounded imbricate lobes 3-4 mm. long; corolla 6-7 mm. long, white, with cylindric tube and 5 ovate auriculate obtuse lobes about 2 mm. long, nearly equal; stamens 5, inserted at apex of corolla tube alternate with lobes, nearly sessile with anthers 1 mm. long; and on the disk the ovary, ellipsoidal or subglobose, 3 mm. long, 3-locular, with 2 ovules in each locule; style 3 mm. long, hirsute, 3-parted. Drupes 1-4, ellipsoidal, 1.5-2 cm. long, 1 cm. in diameter, fulvous, puberulent, with 1 seed.

ECUADOR, ESMERALDAS: Camino Pacto NW. of Quito, alt. 1500 m., lower montane forest, Feb. 26, 1965, E. L. Little, Jr., and R. G. Dixon 20451 (HOLOTYPE, US; isotype, NY).

Fig. 8 illustrates a leafy twig with 2 inflorescences inserted near apex of petiole, also at bottom a leaf bearing 2 drupes.

The genus Tapura Aubl. (Dichapetalaceae) has about 5 species in the West Indies, 15 in tropical South America mostly in the Amazonian region, and 4 in tropical Africa. Three species have been named from Colombia. This new species apparently is the first record of the family from Ecuador.

Engler and Krause (in Engler & Prantl, Natürlich. Pflanzenfam. Ed. 2, 19c: 10. 1931) distinguished 3 sections in the genus Tapura. The auriculate corolla lobes and 5 fertile stamens place this new species from Ecuador in Sect. Dischizolaena Baill., illustrated by T. capitulifera Baill., of Amazonian Brazil and Surinam, with smaller flowers and leaves. The new species, named for its angled trunk, apparently is related to T. costata Cuatr. (Lloydia 11: 221. 1948), from El Chocó, Depto. del Valle, Colombia, described from a specimen with immature flowers. It has a grooved, ribbed, twisted trunk and 5 nearly equal anthers but has smaller leaves with fewer lateral veins and flowers in dense heads on very short pedicels.

**AMANOA AMONALA** Little, sp. nov. "Cuero negro," "piedrita." Fig. 9.

Arbor magna sempervirens ad 30 m. alta, trunco 50 cm. diametro, radicibus fulcrantibus angustis minus quam 1 m. altis. Cortex griseus, fere laevis, valde verrucosus, fissuratus; cortex interior aurantiacus vittis roseis. Ramuli penduli, grisei vel cinnamomei, glabri, lenticellis punctorum similibus et fissuris longitudinalibus. Folia alterna biserialia, glabra, stipulis intra-axillaribus binatis obtusis, squamiformibus, fere 2 mm. longis, petiolis minus quam 1 cm. longis, flavovirentibus, longitudinaliter sulcatis. Laminae ellipticae, 9-15 cm. longae, 3-6.5 cm. latae, plus minusve coriaceae, apice acuminatae, basi rotundae vel acutae, margine integrae, paulo inflexae, nervis lateribus utroque latere 10-13, parum curvis et impressis, supra atrovirentes nitidae, subtus pallido-virides opacae nervis prominentibus.

Dioecia. Inflorescentiae spiciformes terminales et laterales, pendulae, ex 1-3 axibus non ramosis, longis, crassis lignosis angularibus, cinnamomeis, 20-40 cm. longis, 2-3 mm. diametro, floribus multis 5 mm. longis paucis vel pluribus fasciculatis compositae. Flores feminei in pedicellis viridibus 2 mm. longis, sepalis 5 ovatis 5 mm. longis, albidis vel flavescentibus; petalis 5 minutis rotundatis fere 2 mm. longis, albis, fimbriatis; et super disco pistillo 4 mm. longo, ovario conico viridi

3-loculari 3 ovulis et 3 stigmatibus complanatis praedito. Flores masculini fere sessiles, sepalis et petalis eis florum femineorum similaribus, staminibus 5 patentibus, et pistillo rudimentale. Fructi non visi.

Large evergreen tree to 30 m. high and 50 cm. in trunk diameter, with narrow prop roots less than 1 m. high. Bark gray, smoothish, very warty, fissured, inner bark orange, streaked with pink. Twigs pendulous, gray to cinnamon brown, glabrous, with dotlike lenticels and longitudinal fissures. Leaves alternate in 2 rows, glabrous, with intra-axillary paired obtuse scalelike stipules nearly 2 mm. long and with petioles less than 1 cm. long, yellow green, longitudinally grooved. Blades elliptic, 9-15 cm. long, 3-6.5 cm. wide, slightly coriaceous, acuminate at apex, rounded or acute at base, with entire margin, slightly inflexed, with 10-13 lateral nerves on each side, slightly curved and impressed, above shiny dark green, beneath dull light green with prominent nerves.

Dioecious. Inflorescences spikelike, terminal and lateral, drooping, composed of 1-3 unbranched long stout woody angular cinnamon brown axes 20-40 cm. long, 2-3 mm. in diameter, and many flowers 5 mm. long, few to several in fascicles. Female flowers on green pedicels 2 mm. long, composed of 5 ovate sepals 5 mm. long, whitish or light yellow; 5 minute rounded petals nearly 2 mm. long, white, fringed; and on a disk the pistil 4 mm. long with conic green 3-celled ovary with 3 ovules and 3 flattened stigmas. Male flowers almost sessile, with sepals and petals similar to those of female flowers, 5 spreading stamens, and rudimentary pistil. Fruits not seen. Collected with flowers in September.

Wood hard, with pink sapwood cream-colored in outer part and with dark brown heartwood.

ECUADOR, ESMERALDAS: Borbón, alt. 1 m., guandal (fresh-water swamp), Sept. 19, 1965, E. L. Little, Jr., and R. G. Dixon 21095 (female flowers; HOLOTYPE, US; isotype, NY) and 21096 (male flowers; US, NY).

This species seems odd or anomalous in a few characters, being dioecious in a genus characterized as monoecious. The few trees observed together in full flower produced great quantities of flowers uniformly of the same sex. To obtain the female flowers, it was necessary to fell a large tree (21095). The description of the flowers is largely from fresh material. Fig. 9, drawn from a living specimen, shows the pedicellate female flowers. The distinctive terminal inflorescence is pendent or drooping, with stout woody axis much longer than in the other species. It resembles slightly the much shorter and more slender inflorescence of Amanoa oblongifolia Muell.-Arg. of Amazonian Brazil, Colombia, and Venezuela.

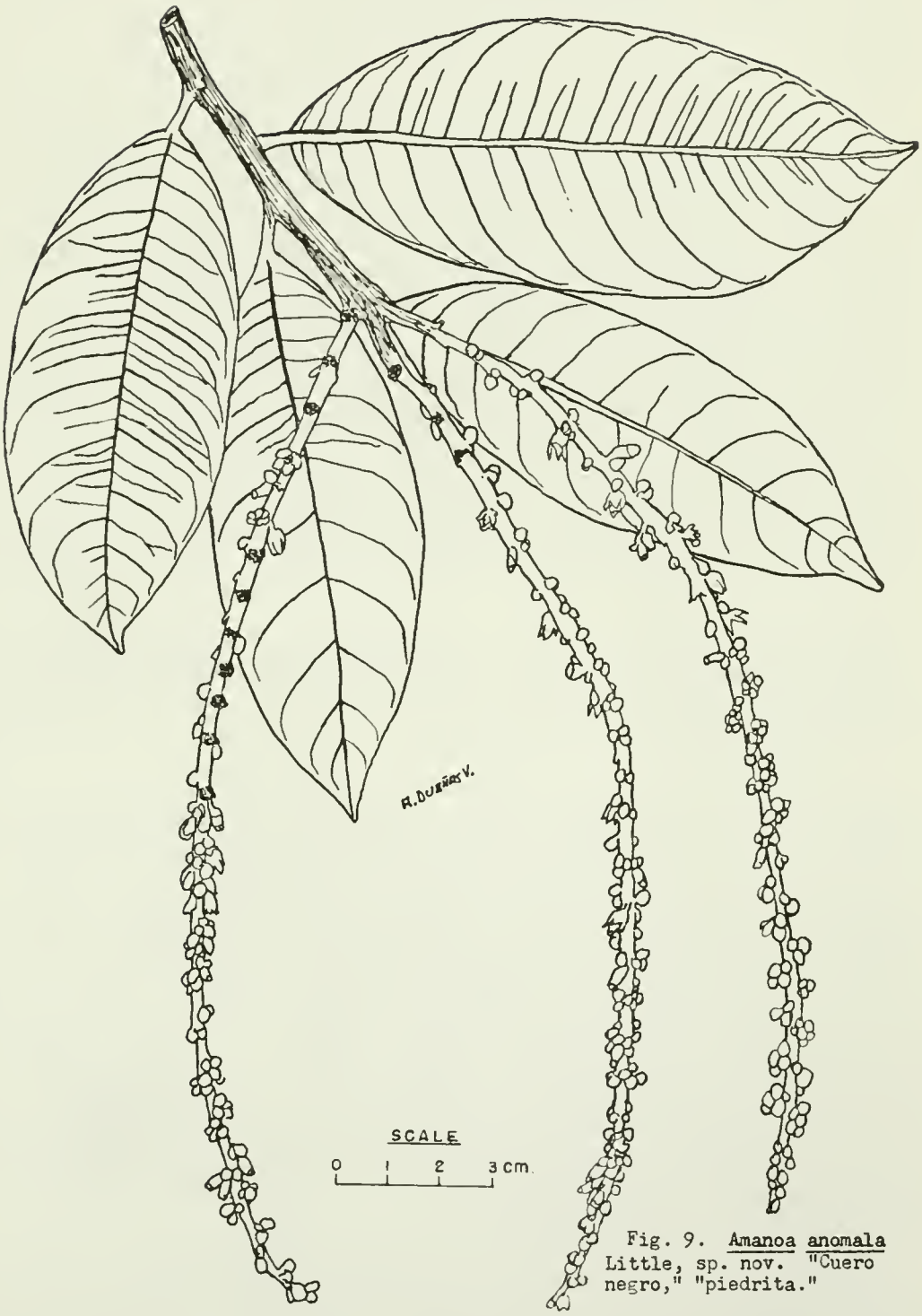



Fig. 9. Amanoa anomala Little, sp. nov. "Cuero negro," "piedrita."

The genus Amanoa Aubl. (Euphorbiaceae) has about 10 species of trees in tropical America from Brazil and Bolivia north to Venezuela, Colombia, Guatemala, British Honduras, and the Antilles. There are also 3 species in tropical Africa.

**STERCULIA CORRUGATA** Little, sp. nov. "Paragua." Fig. 10.

Arbor magna sempervirens ad 35 m. alta, trunco 70 cm. diametro. Cortex griseus, asper lenticellis verrucosis et fissuris angustis; cortex interior fulvescens. Ramuli grisei, crassi, plus quam 1 cm. diametro, cicatricibus foliorum rotundis elevatis notati, gemma squamarum angustarum grisearum puberularum. Squamae et stipulae multae, lanceolatae, valde acuminatae, 5-8 cm. longae et 1.5-2.5 cm. latae, extus puberulae, persistentes. Folia alterna, pauca, ad apicem ramulorum aggregata, simplicia, petiolis crassis teretibus 5-9 cm. longis, stellato-pilosis vel glabratis. Laminae ellipticae, 18-27 cm. longae, 12-18 cm. latae, apice obtusae, basi subcordatae, margine plus minusve undulatae et revolutae, coriaceae, rigidae, maxime corrugatae, e basi 5 nervis principalibus, nervis lateralibus utroque latere 6-9, nervis venulisque reticulatis et valde impressis in sulcis ab porcis ad 5 mm. altis separatis, supra virides nitidae et glabratae, subtus virides pallidae nervis elevatis leviter stellato-pilosis.

Flores non visi. Carpella fructorum veterum irregulariter ovoidea vel pyriformia, 5-8 cm. longa et lata, asymmetrica, apice acuta, rugosa atque puberula, brunnea, pericarpio ad 1 cm. crasso. Semina multa oblonga, 2.2 cm. longa.

Large evergreen tree to 35 m. high, with trunk 70 cm. in diameter. Bark gray, rough, with warty lenticels and narrow fissures; inner bark light brown. Twigs gray, stout, more than 1 cm. in diameter, with round raised leaf scars, with bud of narrow gray puberulent scales. Scales and stipules many, lanceolate, long acuminate, 5-8 cm. long and 1.5-2.5 cm. wide, puberulent on outer surface, persistent. Leaves alternate, few, crowded at apex of twigs, simple, with stout terete petioles 5-9 cm. long, stellate-hairy or glabrate. Blades elliptic, 18-27 cm. long, 12-18 cm. wide, obtuse at apex, subcordate at base, margin slightly wavy and revolute, coriaceous, stiff, very corrugate, with 5 main veins from base, 6-9 lateral veins on each side, the veins and veinlets reticulate and very impressed in furrows separated by ridges to 5 mm. high, the upper surface shiny green and glabrate, the lower surface pale light green with raised veins slightly stellate-hairy.

Flowers not seen. Carpels of old fruits irregularly obovoid or pear-shaped, 5-8 cm. long and broad, asymmetric, acute at apex, wrinkled and puberulent, brown, pericarp to 1 cm. thick. Seeds many oblong, 2.2 cm. long.

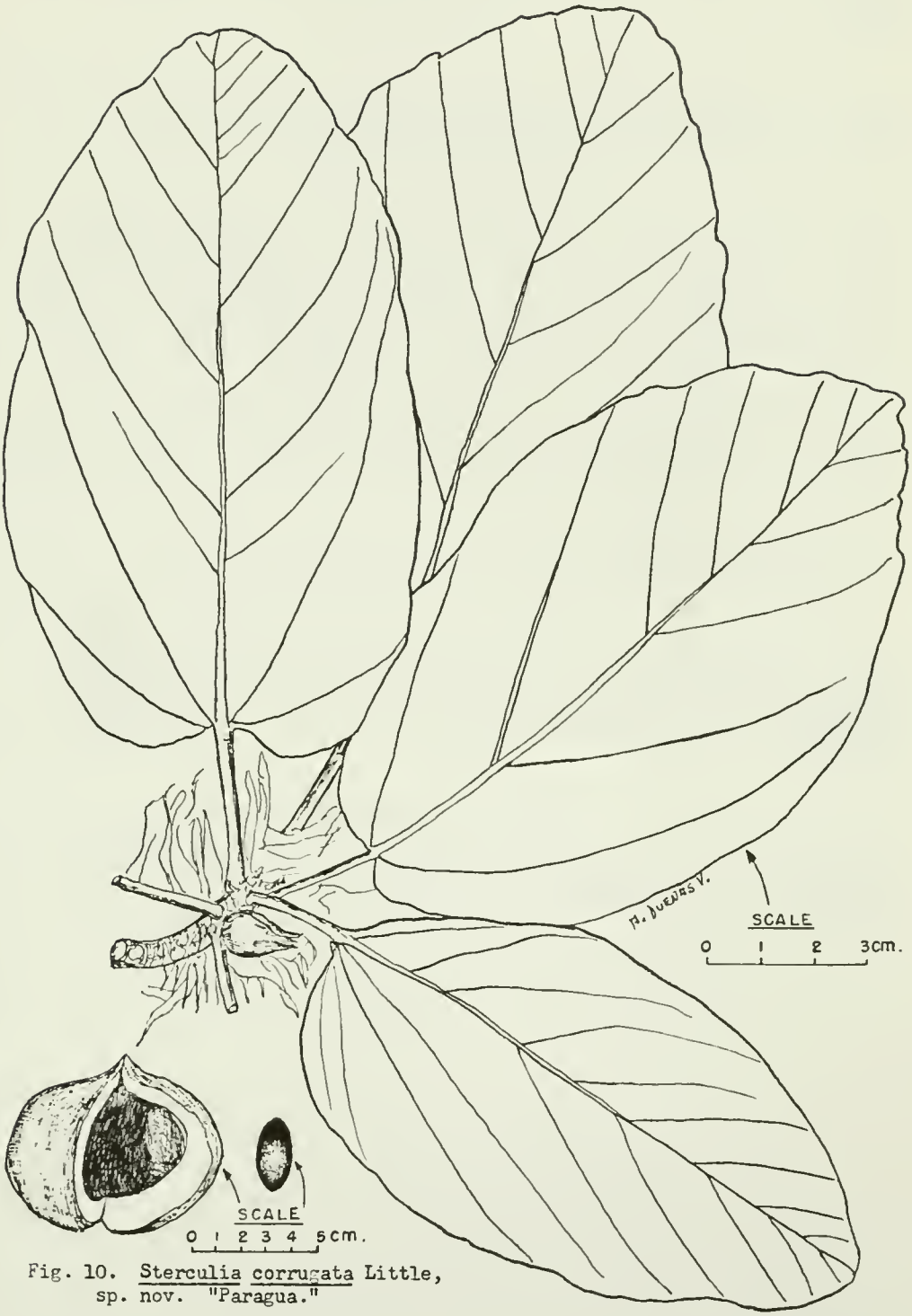



Fig. 10. Sterculia corrugata Little, sp. nov. "Paragua."

Wood with whitish sapwood about 2 cm. thick and whitish brown heartwood, soft, light-weight, coarse-textured, fibrous, with conspicuous large rays. It was reported to be suitable for lumber.

ECUADOR, ESMERALDAS: Borbón, alt. 10 m., wet tropical forest, Sept. 9, 1965, E. L. Little, Jr., and R. G. Dixon 21025 (HOLOTYPE, US; isotype, NY; wood sample, MADw).

This species is readily distinguished by the very corrugate, almost plicate leaves suggesting a relief map with mountain ridges and valleys. It may be related to Sterculia recordiana Standl. of Panama, which has slightly corrugate leaves. Also, the twigs of this new species bear conspicuous large narrow persistent scales 5-8 cm. long, apparently in part stipules.

The tree felled for a wood sample lacked flowers and fruits. However, old fruits containing germinating seeds were collected from the ground beneath. Fig. 10 shows at lower left an opened carpel of an old fruit and a seed.

A second species apparently of this genus is represented in the Esmeraldas collection by an incomplete specimen.

The 5 new tree species from the Province of Esmeraldas, Ecuador, described and illustrated above are: Osteophloem sulcatum (fig. 6), Trattinnickia barbourii (fig. 7), Tapura angulata (fig. 8), Amanoa anomala (fig. 9), and Sterculia corrugata (fig. 10).

(To be continued.)

Forest Service, United States Department of Agriculture, Washington, D. C. 20250.

# TWO NEW SPECIES FROM PANAMA

Joan W. Nowicke

Missouri Botanical Garden and Department of Botany,
Washington University, St. Louis, Missouri

A new species of Scutellaria (Labiatae) and a new species of Cordia (Boraginaceae) are reported from Panama.

Scutellaria lewisiana Nowicke, sp. nov.

Frutex, caulibus superis marroninis et pubem crispam habentibus. Folia elliptica, acuta, serrata, basibus obtusis, ad 6 cm longa et 2 cm lata, glabra, punctis resinosis, aeruginosa supra, subviridia infra; petioli ca 1-2 cm longi. Inflorescentiae verticilli, floribus duobus, ca 1 cm distantes, in racemo falso positae, bractis ellipticis et 3-4 mm longis. Flores pedicellis ca 4-6 mm longis; bracteolae duae, 0.4-0.5 mm longae; calyx ca 4 mm longus florescentia, pubescens molliter; corolla ca 23-25 mm longa, recta, caesia, labio infero albido, pubescente modice; stamina 4, binata, pare inferiore staminum in dimidio supero tubi corollae affixo, antheris ca 0.6 mm longis; ovarium 4-lobatum, stylo ignoto. Nuculae ignotae.

Type: Panama: Chiriqui: Caldera-Chiriquicito Trail, betw Quebrada Hondo and divide, 20 April 1968, Kirkbride & Duke 920 (Holotype: MO).

The genus Scutellaria, while easily separated from the remaining Labiatae by the transverse squama of the upper calyx lip, is a singularly homogeneous group in which specific differentiation is problematical. Scutellaria lewisiana is distinguished primarily by the elliptic leaves with obtuse bases and shrub habit. It is named in honor of Dr. Walter Lewis, noted systematist and student of the flora of Panama. For a complete treatment of the Panamanian Labiatae see Ann. Missouri Bot. Gard. 56(1), 1969, in press.

Cordia dwyeri Nowicke, sp. nov.

Frutex ad 3.5 m, caulibus dense pubescentibus, pilis simplicibus, cinnomomeis. Folia ovata, aliquando ± obovata, accuminata, revoluta, basibus ± rotundatis, ad 31 cm longa et 13 cm lata, sparsim pubescentia supra, dense pubescentia infra, coriacea et conspicue bullata; petioli 1-2 cm longi, crassi, pubescentes. Inflorescentiae cymosae, paniculatae, dense florentes, ramis pubescentibus. Flores perfecti (?), ± sessiles;

calyx cupulatus, dense strigosus, tubo ca 4-5 mm longo, 3-4 lobatus, lobis deltatis et ca 1.5-2 mm longis; corolla hypocrateriformis, tubo 4-5 mm longo 5-lobata, lobis oblongis, 2.5-3 mm longis et 2-2.5 mm latis; stamina 5, exserta, filis ca 7-8 mm longis pubescentibus basaliter, antheris ca 1.5 mm longis; ovarium ovoideum, stylo ca 1.2 mm longo, stigmatibus clavatis. Fructus ignotus.

Type: Panama: Colon: Santa Rita Ridge, 19 km from Transisthmian Hwy, 28 Jan. 1968, Dwyer 8857 (Holotype: MO; isotypes: F, GH).

The striking appearance of the leaves (large, bullate, and densely pubescent on the lower surface) readily separates C. dwyeri from all other Central American species of Cordia. Its closest allies are C. trichoclada DC. and C. grandifolia DC., but C. dwyeri lacks the 10-ribbed calyx attributed to these Brazilian species. It is named in honor of Dr. John Dwyer, a prominent collector and monographer of the flora of Panama.

# THREE NEW SUBSPECIFIC TAXA IN PETREA, PREMNA, AND VITEX

Harold N. Moldenke

PETREA ASPERA f. ALBIFLORA Moldenke, f. nov.

Haec forma a forma typica speciei floribus albis recedit.

This form differs from the typical form of the species in having white flowers.

The type of the form was collected by George Proctor Cooper III (no. 234) at Perme, in the San Blas District, Panama, on April 23, 1933, and is deposited in the Britton Herbarium at the New York Botanical Garden. Apparently, from the notes made by the collector and the evidence of the type specimen, this form has both the calyxes and the corollas white. It is called "bejuco de hajo" and is said to be a showy vine.

PREMNA CRASSA var. YUII Moldenke, var. nov.

Haec varietas a forma typica speciei laminis foliorum juventute maturitateque subtus tantum sparsissime pilosulis recedit.

This variety differs from the typical form of the species in having its leaf-blades merely very sparsely scattered-pilose on both surfaces when young, only on the lower surface when mature or the pilosity persisting on the midrib and larger veins above with an occasional hair persisting on the lamina, too.

The type of the variety was collected by Ta Fuh Yü (no. 16390) — in whose honor it is named — at Shunning, Hila, Yünnan, China, in an open forest at 1700 meters altitude, on June 21, 1938, and is deposited in the herbarium of the Royal Botanic Garden at Edinburgh. The printed collection label gives the collector's initials as "T. T.", apparently in error.

VITEX TRIPINNATA var. PUBESCENS Moldenke, var. nov.

Haec varietas a forma typica speciei inflorescentiis undique distincte puberulis recedit.

This variety differs from the typical form of the species in having its peduncles, rachis, pedicels, bractlets, and calyxes decidedly puberulent throughout; the leaf-blades (especially the lower surface), petiolules, and petioles are also puberulent.

The type of the variety was collected by Vidal (no. 2201) in a disturbed forest on periodically inundated soil, in the vicinity of Vientiane, Laos, on March 8, 1953, and is deposited in my personal herbarium at Plainfield, New Jersey. The collector notes that the plant is used medicinally by women during childbirth. The trunk is described as thorny.

# ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXIII

Harold N. Moldenke

ERIOCAULON ? POROSUM Lesq.

Additional bibliography: Moldenke, Phytologia 18: 396. 1969.

Continuing the quotation from Lesquereux (1878) begun at the conclusion of the previous installment of these Notes: "The leaves of the fossil species, four to five centimeters long, seven millimeters across in the middle, are broader and longer and have also the surface narrowly wrinkled across or in an oblique direction to the middle (fig. 2a), these wrinkles tending downward and passing down along the border, sometimes like anastomoses of the veins. The base of these leaves is either covered by superposition of others or destroyed; it is therefore impossible to further extend the comparison. Abolboda poarchon, Sieb., of Brazil, a species of the same group of the Xirideae, also offers a likeness by its leaves to those of this fossil plant. Habitat. — Sand Creek (Mr. W. H. Holmes), with leaves of Nelumbium and other species found also at Golden, and therefore of Lower Eocene type."

Knowlton (1930) reviews the status of this plant as follows: "Lesquereux's original description reads as follows: Leaves basilar, rosulate, spreading, entire, linear-lanceolate, broader at the middle, gradually tapering upward to a slightly oblique point and downward to a very short petiole; median nerve broad, concave; lateral veins two, nearly parallel, with apparent ramifications toward the borders, forming round polygonal small areolae. The leaves are thick, of a spongious texture apparently; the meshes along the borders are not distinct and may be formed by contraction of the epidermis. I do not find any species to which this form may be compared, except the leaves of some large rosulate Eriocaulon. The specimen is cut through by rootlets as thick as the leaves are broad.

"Thus far the type specimen, which is before me as I write (U. S. Nat. Mus. No. 137), is the only one that has been found. The type specimen is preserved on a piece of soft, fine-grained clay and has been fairly well described and figured by Lesquereux. It is preserved on and partly wrapped around the end of the piece of matrix, and the 'leaves', therefore, so not all lie in the same plane. Apparently, however, as Lesquereux supposed, they were disposed in a circle, possibly around a stem. The nervation in these 'leaves' is uncertain. There is clearly a strong central nerve or midrib and apparently about two thinner ribs on each side, but the remainder is obscure and uncertain. The 'leaf' was evidently a very thick and leathery one, and the surface has been more or less wrinkled, in addition to which there are numerous obvious joint checks, so that any actual nervation, if present, is difficult to make out. It seems probable, however, that some of

the meshing or areolation must belong to the nervation.

"In subsequent years a number of organisms were found, mainly in older rocks, that were at first thought to be at least congeneric with the E. ? porosum of Lesquereux. They were mostly isolated 'leaves' or segments, though occasionally several were found that showed these segments pretty closely associated. It was not, however, until some very perfect examples were found in the Vermejo formation in the Canon City field of Colorado that the distinctness from Lesquereux's species became clear. These were described under the name Palaeoaster inquirenda Knowlton [U. S. Geol. Surv. Prof. Paper 101: 278, pl. 69, fig. 5 & 6. 1918] with the frank admission that their affinity was unrecognized. They consist of 8 to 12, usually about 9 narrow, erect 'leaves' or members 3.5 to about 4.5 centimeters long and 6 to 10 millimeters wide in the middle. They are slightly narrowed to the sessile base, where they are in contact, though evidently perfectly free from each other. Above they are narrowed to a very slender acuminate point, usually somewhat incurved. The segments are thick and leathery, if not indeed woody, and are traversed dorsally by a deep median furrow. These specimens, preserved in rather coarse sandstone, show very little trace of structure other than the median rib.

"It seems probable that these organisms were terminal, for there is some evidence of the presence of a scar or point of attachment at the base, but no axis on which they might have stood has ever been noted. They are certainly not leaves whorled around a stem, for, had they been, some trace of the stem should have been detected in some of the numerous specimens. It appears much more likely that they were capsular in nature, for, if the now spreading segments were brought together, they would apparently make a tightly closed 'capsule'. The incurved tips of the segments lend support to this view, though no evidence of seeds or other interior structure has been observed.

"Among the several lots of specimens from the Raton Mesa region there is one found near Walsenburg that consists of a number of detached leaves or segments. Only three or four leaves are preserved on any piece of matrix, but these seem to arise from a central point, as in the other examples referred to Palaeoaster inquirenda and as in the type of Eriocaulon ? porosum. The leaves in these Walsenburg specimens are rather longer and narrower than common, and they appear, if anything to have been thicker, as shown by the layer of carbonaceous matter remaining in favored places. The midrib is very deeply impressed-channeled, in fact — and at right angles to it there are minute parallel lines connecting with the margin. These specimens approach most closely Eriocaulon ? porosum, and it is possible that they should be united. However, the specimens involved are so few in number and their nature so obscure that it seems best to hold them apart until more conclusive data are forthcoming. It is, of course, practically certain that Lesquereux's species has no connection whatever with the genus Eriocaulon, but, on the other hand, it is

not at all clear that there is any closer affinity.

"The specimen from Black Buttes, Wyo., that was refered by Lesquereux [The Tertiary Flora 296, pl. 59, fig. 10. 1878] to Eucalyptus haeringiana ? Ettingshausen is probably also congeneric with Eriocaulon ? porosum and possibly also with the leaves above mentioned from Walsenburg. In any event it is fairly clear that this specimen has nothing to do with Eucalyptus.

"Occurrence: Denver formation, Sand Creek about 12 miles east of Denver, Colorado, supposed to have been collected by W. H. Holmes."

ERIOCAULON PRINGLEI S. Wats.

Bibliography: S. Wats., Proc. Am. Acad. 23: 283. 1888; Morong, Bull. Torr. Bot. Club 18: 358. 1891; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 56, & 287. 1903; H. B. Davis, Life & Works Pringle 43 & 55. 1936; Moldenke, N. Am. Fl. 19 (1): 20 & 37. 1937; Moldenke, Phytologia 1: 322. 1939; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Moldenke, Known Geogr. Distrib. Erioc. 4 & 38. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 30 & 206. 1949; Moldenke, Phytologia 3: 341. 1950; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158. 1959; Moldenke, Résumé 36 & 482. 1959.

Additional citations: MEXICO: Chihuahua: Pringle 2018 (B, Ca--115170, Ms--15479, Mu--369).

ERIOCAULON PSEUDOCOMPRESSUM Ruhl.

Bibliography: Ruhl. in Urb., Symb. Ant. 1: 492. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 32, 34, 285, & 287. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; Moldenke, N. Am. Fl. 19 (1): 18 & 24--25. 1937; Moldenke, Phytologia 1: 322. 1939; León, Fl. Cuba 1: 279, fig. 112. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4, 35, & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 43 & 206. 1949; Moldenke, Phytologia 3: 341. 1950; Moldenke, Résumé 51, 288, & 482. 1959; Moldenke, Phytologia 17: 498 & 500 (1968) and 18: 367. 1969.

Illustrations: León, Fl. Cuba 1: 279, fig. 112. 1946.

Recent collectors have found this plant in flower in December.

Additional citations: CUBA: Pinar del Río: Ekman 11221 (S), 11471 (S), 17237 (S); Killip 32372 (N); León 17005 (Vi); Marie-Victorin 58318 (Vi, Vi); Marie-Victorin & Alain 327 (Mv), 377 (Mv); C. Wright 3741 (S--isotype).

ERIOCAULON PSEUDOQUINQUANGULARE Ruhl.

Synonymy: Eriocaulon pseudo-quinquangulare Ruhl. apud Fyson, Journ. Indian Bot. 3: 16. 1922.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 61, 73, & 287. 1903; Prain, Ind. Kew. Suppl. 3: 70. 1908; Fyson, Journ. Indian Bot. 3: 16. 1922; Duthie, Fl. Upper Ganget. Plain 3: 318 & 320. 1929; Moldenke, Known Geogr. Distrib. Erioc. 23 & 39. 1946;

Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 127 & 206. 1949; Razi, Rec. Bot. Surv. India 18: 19. 1959; Moldenke, Résumé 162 & 482. 1959.

Citations: INDIA: Uttar Pradesh: Lehmann s.n. [Saharampore, Jard. bot.] (B--type, Z--isotype).

ERIOCAULON PTEROSEPALUM Herzog

Bibliography: Herzog in Fedde, Repert. Spec. Nov. 29: 204, pl. 120. 1931; A. W. Hill, Ind. Kew. Suppl. 9: 105. 1938; Moldenke, Known Geogr. Distrib. Erioc. 8 & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 206. 1949; Moldenke, Phytologia 3: 341. 1950; Moldenke, Résumé 89 & 482. 1959.

Illustrations: Herzog in Fedde, Repert. Spec. Nov. 29: pl. 120. 1931.

The species has been collected on wet campos, "almost in water", flowering and fruiting in September. The E. pterosepalum Hayata is a synonym of E. sexangulare L. The Simada 432, distributed as E. pterosepalum, is actually E. sexangulare L.

Additional citations: BRAZIL: Amazonas: Luetzelburg 21052 [Herb. Mus. Nac. Rio Jan. 47705; Macbride photos 18690] (Mu--type, N--photo of type, W--photo of type), 21053 (Mu, Z).

ERIOCAULON PUBIGERUM Bong.

Bobliography: Bong., Mém. Acad. Pétersb., sér. 6, 1: 628, pl. 42. 1831; Kunth, Enum. Pl. 3: 575. 1841; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and pr. 2, 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 8 & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 206. 1949; Moldenke, Résumé 89 & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960.

Kunth (1841) writes the initial letter of the specific epithet of this species with a capital and describes the plant as follows: "Acaule; foliis lineari-lanceolatis, acutis, pubescentibus; pedunculis gracilibus, pubescentibus; vaginis apice piloso-barbatis. Bong. -- Brasilia". He also cites the original publication as "Act. Petrop. 6. 1. 628, t. 42", but comments that the illustration was never actually published. The name has been overlooked by Körnicke, by Martius, and by Ruhland. Nothing is known to me about the plant except what is stated in the above bibliography.

ERIOCAULON PULCHELLUM Körn.

Synonymy: Eriocaulon pumilum Afzel. ex Körn., Linnaea 27: 621. 1856 [not E. pumilum Chapm., 1959, nor Raf., 1832]. Eriocaulon pumilum N. E. Br. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 97 & 287, in syn. 1903. Eriocaulon sierraleonense Moldenke, Known Geogr. Distrib. Erioc. 21 & 40, hyponym, February 9. 1946; Phytologia 2: 134, July 8. 1946. Eriocaulon pumilum "Afzel. ex Körn." apud Meikle & Baldwin, Am. Journ. Bot. 39: 45. 1952.

Bibliography: Körn., Linnaea 27: 621--622. 1856; C. Müll. in

Walp., Ann. 5: 926 & 935 (1860) and 6: 1171. 1861; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 24. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Thiselt.-Dyer, Fl. Trop. Afr. 8: 237. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 65, 97, 99, & 287, fig. 13. 1903; Hutchinson & Dalz., Fl. W. Trop. Afr. 2: 326. 1936; Moldenke, Known Geogr. Distrib. Erioc. 20, 21, 36, 39, & 40. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Phytologia 2: 134. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 111 & 206. 1949; Moldenke, Phytologia 3: 398. 1950; Meikle & Baldwin, Am. Journ. Bot. 39: 45. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 136, 137, 289, 291, 292, & 482. 1959; Moldenke, Résumé Suppl. 1: 18, 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; Moldenke, Résumé Suppl. 4: 6 (1962) and 17: 4. 1968; Moldenke, Phytologia 18: 367. 1969.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 99, fig. 13. 1903.

Meikle & Baldwin (1952) say "The opinion of N. E. Brown that E. pumilum Afzel. ex Koern. and E. pulchellum Koern. are conspecific is accepted. Moldenke distinguished between the two and applied the name E. sierraleonense to the plant formerly (and incorrectly) designated E. pumilum." In a letter to me, dated October 26, 1951, Meikle says also that he follows N. E. Brown in uniting the "E. pumilum Afzel." with E. pulchellum Körn. because on the basis of Kew material the bract characters given by Ruhland are not valid. It should be noted here that the E. pumilum Chapm., referred to in the synonymy above, is actually a synonym of Lachnocaulon engleri Ruhl., while the homonym of Rafinesque is a synonym of E. pellucidum Michx.

It should also be noted that the E. kindiae H. Lecomte formerly regarded by me as a synonym of E. pulchellum is now better regarded as E. plumale subsp. kindiae (H. Lecomte) Meikle. The Afzelium 11 in the Stockholm herbarium, cited below, may actually be part of the type collection of E. pulchellum Körn. or of E. pumilum Afzel., or both, although the Berlin herbarium specimens actually examined by Körnicke are unnumbered.

The species has been collected at altitudes of 2000 to 2500 feet on savannas, flowering and fruiting in August and October. Baldwin describes it as "common on open rock in seepage" in the Republic of Guinea.

Citations: SÉNÉGAL: J. G. Adam s.n. [Oct. 1961] (Z). REPUBLIC OF GUINEA: J. T. Baldwin 9800 (N); Boismare 376 [Herb. Chillou 3894] (An); Schnell 2365 (An). SIERRA LEONE: Afzelius 11 (S), s.n. (B--type, B--isotype); Jaeger 397 (An). LIBERIA: J. T. Baldwin 9176 (N). MOUNTED ILLUSTRATIONS: Ruhland fig. 14 E--N (B).

ERIOCAULON PULLUM Koyama

Bibliography: Koyama, Journ. Jap. Bot. 31: 11--12, fig. 4. 1956; Moldenke, Résumé 170 & 482. 1959; G. Taylor, Ind. Kew. Suppl.

13: 52. 1966.

Illustrations: Koyama, Journ. Jap. Bot. 31: 11, fig. 4. 1956.

The type of this species was collected by Bunzô Hayata at Yünnanfou, Yünnan, China, and is deposited in the herbarium of the University of Tokyo.

ERIOCAULON PULVINATUM Van Royen

Bibliography: Van Royen, Blumea 11: [224]—225, fig. 1. 1961; Moldenke, Phytologia 18: 364. 1969.

Illustrations: Van Royen, Blumea 11: 225, fig. 1. 1961.

ERIOCAULON PUMILIO Hook. f.

Bibliography: Hook. f., Fl. Brit. Ind. 6: 581—582. 1893; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 158. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 116 & 287. 1903; H. Lecomte, Journ. de Bot. 21: 108. 1908; Fyson, Journ. Indian Bot. 2: 198—199, pl. 7. 1921; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 158. 1941; Moldenke, Known Geogr. Distrib. Erioc. 23 & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 127 & 206. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 158. 1959; Moldenke, Résumé 162 & 482. 1959.

Illustrations: Fyson, Journ. Indian Bot. 2: pl. 7. 1921.

Fyson (1921) cites Duthie 4473 in the Dehra Dun herbarium and says "Very small. Stem 0, tufted. Leaves 1/4 — 1/2 in. acicular. Scapes 1 in. Heads 1/8. Involucral bracts obtuse, pale nearly or quite horizontal. Floral bracts cuneate-cuspidate, dark but hairy. Receptacle glabrous. Female fl: sepals 2, deeply boat shaped; petals 3. Male fl: normal.....Western Himalayas at 3—4000 ft.; Kumaon and Gharwal at 8—9,000 ft. (F. B. I): Nr. Ramri. I have seen only the one specimen quoted above. The sepals are large, Ruhland says of the species that they are flat and concave only at the tips, but those of the specimen seen by me are quite boat shaped for the whole length."

The initial letter of the specific epithet is often uppercased.

ERIOCAULON PUSILLUM R. Br.

Bibliography: R. Br., Prod. Fl. Nov. Holl. 1: 254. 1810; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 869. 1817; Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; Kunth, Enum. Pl. 3: 571. 1841; C. Müll. in Walp., Ann. 5: 926 & 935 (1860) and 6: 1171. 1861; Benth., Fl. Austral. 7: 191, 194, & 792. 1878; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 24. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 103, 107, & 287. 1903; F. M. Bailey, Compreh. Cat. Queensl. Pl. 584. 1913; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 28 & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 153 & 206. 1949; Moldenke, Résumé 209 & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; Moldenke, Phytologia 18: 303 & 304. 1969.

Kunth (1841) uppercases the initial letter of the specific

epithet and describes the species as follows: "Scapis setaceis, striatis (4—6 lin.), vagina laxa vix duplo longioribus; squamis involucrantibus oblongis, scariosis, albis, capitulum turbinatum pauciflorum superantibus; antheris nigris. Brown. — Nova Hollandia tropica." It should be noted that E. pusillum Bong. (1831) is a synonym of Syngonanthus minutulus (Steud.) Moldenke, E. pusillum Poepp. (1863) is a synonym of Paepalanthus perpusillus Kunth, and E. pusillum Willd. (1841) is a synonym of E. microcephalum H.B.K.

ERIOCAULON PYGMAEUM Soland.

Synonymy: Eriocaulon nigricans R. Br., Prod. Fl. Nov. Holl. 1: 254. 1810.

Bibliography: Soland. ex J. E. Sm. in Rees, Cycl. 13: Eriocaulon. 1809; R. Br., Prod. Fl. Nov. Holl. 1: 254. 1810; Roem. & Schult. in L., Syst. Veg., ed. 15 nova, 2: 869. 1817; Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; Kunth, Enum. Pl. 3: 570. 1841; Dalz. in Hook., Kew Journ. 3: 281—282. 1851; C. Müll. in Walp., Ann. 5: 926, 927, 934, & 947 (1860) and 6: 1171. 1861; Benth., Fl. Austral. 7: 191, 194, & 792. 1878; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 25. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893; Britten, Journ. Bot. 38: 481—483. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 115, 286, & 287. 1903; F. M. Bailey, Compreh. Cat. Queensl. Pl. 584, fig. 566. 1913; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879. 1946; Moldenke, Known Geogr. Distrib. Erioc. 28, 37, & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 153 & 206. 1949; Moldenke, Résumé 209, 290, & 482. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879. 1960; J. S. Beard, Descrip. Cat. W. Austral. Pl. 9. 1965; Moldenke, Résumé Suppl. 15: 14. 1967; Moldenke, Phytologia 17: 477 (1966) and 18: 167 & 250. 1969.

Illustrations: F. M. Bailey, Compreh. Cat. Queensl. Pl. fig. 566. 1913.

It should be mentioned here that Bentham (1878) and Jackson (1893) reduce E. achiton Körn. to synonymy under E. nigricans R. Br., but I regard it as a valid species from Pakistan and India. The E. pygmaeum Dalz. is a synonym of E. xeranthemum Mart., while E. pygmaeum Körn. is now called E. koernickei Britten and E. pygmaeum Mart. is in the synonymy of Paepalanthus bifidus (Schrad.) Kunth.

Citations: AUSTRALIAN REGION: AUSTRALIA: Queensland: E. Henry 4653 (Qu). State undetermined: Banks & Solander s.n. [New Holland, 1770] (B--isotype, Z—isotype). MOUNTED CLIPPINGS: original description (B).

ERIOCAULON QUINQUANGULARE L.

Synonymy: Randalia maderaspatana Petiv., Mus. 796. 1695. Scabiosa graminifolia nudicaulis, capitulis argenteis, s. Statice minima Maderaspatana Pluk., Almag. 3: 336, Phytogr. pl. 221, fig.

7. 1696. Gramen junceum Ind. Orient. minus, capiculo rotundo, ex paleaceis spiculis, in cacumine caulis glomerato; Graminis bufonij aemolv. Callapillee Malabarorum, cum proxime praecedenti plurimum convenit Pluk., Alm. Bot. Mant. 98. 1700. Gramen indicum capitulis tomentosis Herm., Mus. Zeyl. 17. 1717. Gramen junceum, chamaemeli capitulis, aphyllis, albis Herm. ex J. Burm., Thes. Zeyl. 108—109. 1737. Gramen junceum, Indiae Orientalis, minus, capitulo rotundo, ex paleaceis spiculis in cacumine caulis glomerato Pluk. apud J. Burm., Thes. Zeyl. 108, in syn. 1737. Kokmotha zeylonensibus J. Burm., Thes. Zeyl. 108, in syn. 1737. Gramen indicum, capitulis tomentosis Herm. apud J. Burm., Thes. Zeyl. 108, in syn. 1737. Eriocavlon scabiosa Crantz, Inst. Rei Herb. 1: 360. 1766. Eriocavlon quinquangulare L. apud Reich. in L., Syst. Pl. 1: 243. 1779. Eriocaulon quinquang. L. apud J. A. Murr. in L., Syst. Veg., ed. 13, 1: 109. 1783. Leucocephala graminifolia Roxb., Hort. Beng. 68, hyponym (1814); Fl. Ind. 3: 612. 1832. Sphaerochloa quinquangularis Beauv. & Desv., Ann. Sci. Nat. 13: 47. 1828. Eriocaulon argenteum Mart. in Wall., Plant. As. Rar. 3: 28. 1832 [not E. argenteum Bong., 1831]. Eriocaulon quinquangulare Wight ex Wall., Numer. List 207, in syn. 1832 [not E. quinquangulare Bojer, 1964, nor Heyne, 1832, nor Mart., 1854, nor Wall., 1858, nor Willd., 1959]. Eriocaulon setaceum Wight ex Wall., Numer. List 207, in syn. 1832 [not E. setaceum Auct., 1903, nor Benth., 1893, nor Crantz, 1766, nor Heyne, 1832, nor L., 1753, nor Lour., 1790, nor Rottl., 1960, nor Wall., 1893, nor Willd., 1959]. Gramen junceum Chamaemeli capitulis albi aphyllis J. Burm. apud Mart. in Wall., Plant. As. Rar. 3: 28, in syn. 1832. Scabiosa graminea nudicaulis, capitulis argenteis s. Statice minima maderaspatana Pluk. apud Mart. in Wall., Plant. As. Rar. 3: 28, in syn. 1832. Eriocaulon triangulare Bernhardi ex Kunth, Enum. Pl. 3: 556, in syn. 1841 [not E. triangulare L., 1762]. Eriocaulon argenteum Wight ex Kunth, Enum. Pl. 3: 556, in syn. 1841. Eriocaulon argyraeum Steud., Syn. Fl. Glum. 2: [Cyp.] 271. 1855. Eriocaulon leucocephalum Steud., Syn. Pl. Glum. 2: [Cyp.] 272. 1855. Eriocaulon erythropodum Miq. ex Körn., Linnaea 27: 642. 1856. Eriocaulon quinquangulare var. *α* C. Müll. in Walp., Ann. 5: 940. 1860. Eriocaulon argyreum Steud. apud C. Müll. in Walp., Ann. 6: 1170, sphalm. 1861. Eriocaulon scabiosa Crantz apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879, in syn. 1893. Sphaerochloa quadrangularis Beauv. ex Hook. f., Fl. Brit. Ind. 6: 582, in syn. 1893. Eriocaulon quinqueangulare L. ex Prain, Beng. Fl., pr. 1, 1127. 1903. Eriocaulon argenteum Heyne ex Moldenke, Résumé 285, in syn. 1959. Eriocaulon pentangulare L. ex Moldenke, Résumé

291, in syn. 1959. Eriocaulon 5-angulare L. ex Moldenke, Résumé 294, in syn. 1959. Gramen junceum Chamaemeli capitulis, aphyllis J. Burm. apud Lourteig, Taxon 15: 31, in syn. 1966. Eriocaulon setosum Wight ex Moldenke, Résumé Suppl. 18: 11, in syn. 1969.

Bibliography: Breyn., Exot. Al. Min. Cogn. Pl. Cent. 1: 108—109, pl. 50. 1678; Petiv., Mus. 796. 1695; Pluk., Almag. 3: 336, Phytogr. pl. 221, fig. 7. 1696; Pluk., Alm. Bot. Mant. 98. 1700; Herm., Mus. Zeyl. 17. 1717; J. Burm., Thes. Zeyl. 108—109. 1737; L., Fl. Zeyl. 48. 1743; L., Sp. Pl., ed. 1, 1: 129. 1753; Crantz, Inst. Rei Herb. 1: 360. 1766; J. A. Murr. in L., Syst. Veg., ed. 12, 109. 1774; Reich. in L., Syst. Pl. 1: 243. 1779; J. A. Murr. in L., Syst. Veg., ed. 13, 1: 109 (1783) and ed. 14, 127. 1784; Palau y Verdera, Part. Práct. Bot. 1: 531. 1784; Jacq., Ind. Pl. 63. 1785; Lippert, Pflanzensyst. 1: 187. 1786; Pers. in L., Syst. Veg., ed. 15, 132. 1797; Willd. in L., Sp. Pl., ed. 4, 1: 485. 1797; J. A. Murr. in L., Syst. Veg., ed. 15 nova, 106. 1798; Jolyclerc, Syst. Sex. Vég., ed. 1, pr. 1, 92 (1798) and pr. 2, 92. 1803; Mouton-Fontenille in L., Syst. Pl. 1: 148. 1804; Jolyclerc, Syst. Sex. Vég., ed. 2, 1: 101. 1810; Roxb., Hort. Beng. 68. 1814; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 862. 1817; Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; Beauv. & Desv., Ann. Sci. Nat. 13: 47. 1828; Roxb., Fl. Ind. 3: 612. 1832; Mart. in Wall., Plant. As. Rar. 3: 28. 1832; Wall., Numer. List 207 & 245. 1832; Royle, Illustr. Bot. Himal. 409. 1840; Kunth, Enum. Pl. 3: 554, 556—558, & 567. 1841; Steud., Syn. Pl. Glum. 2: (Cyp.) 271—272. 1855; Körn., Linnaea 27: 642. 1856; C. Müll. in Walp., Ann. 5: 926 & 939—940. 1860; F. Muell., Fragm. 1: 91. 1859; Walp., Ann. 6: 1170 & 1171. 1861; Dalz. & Gibs., Bomb. Fl. 280. 1861; Thwait. & Hook. f., Enum. Pl. Zeyl., pr. 1, 341. 1864; Benth., Fl. Austral. 7: 190, 192, & 792. 1878; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 27. 1888; Hook. f., Fl. Brit. Ind. 6: 582—583. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877—879 (1893), 2: 71 (1894), and 2: 960. 1895; Hook. f. in Trimen, Handb. Fl. Ceylon 5: 2, 9—10, & 412. 1900; Prain, Beng. Pl., ed. 1, 1127. 1903; Ruhl. in Engl., Pflanzenreich 13 (4-30): 60, 64, 85, 86, 282, & 284—287. 1903; V. A. Poulsen in Schmidt, Bot. Tidsskr. 26: 167. 1904; H. Lecomte, Journ. de Bot. 21: 102. 1908; Fyson, Journ. Indian Bot. 2: 204 & 259—260, pl. 9. 1921; Haines, Bot. Bihar & Orissa 6: 1066 & 1068—1069. 1924; Duthie, Fl. Upper Ganget. Plain 3: 318—320. 1929; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1615 & 1620. 1931; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877—879 (1946) and 2: 71 & 960. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23, 24, 26, 32, 34, 36—39, 42, 44, & 56. 1946; Govindu, Journ. Mysore Univ. 10 (1): 4. 1949; Thirumalachar, Razi, & Swamy, Journ. Mysore Univ. 9 (5): 82. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 127, 129, 130, 136, & 206. 1949; Razi, Journ. Mysore Univ. 11 (1): 6 (1950) and 11 (2): 29. 1950; Moldenke, Phytologia 3: 341—342. 1950; Razi & Govindu, Journ. Mysore Univ. 12 (9): 107. 1952; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]:

1125, 1128, & 1333. 1956; Moldenke, Résumé 158, 159, 162, 165, 167, 176, 285, 287, 289—291, 294, 309, 345, 415, & 482. 1959; Moldenke, Résumé Suppl. 1: 16 & 18. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877—879 (1960) and 2: 71 & 960. 1960; Van Royen, Blumea 10: 135. 1960; Nath, Bot. Surv. South. Shan States 62. 1960; Moldenke, Résumé Suppl. 3: 15 & 17. 1962; Seerwani, Bull. Bot. Surv. India 4: 230. 1962; Prain, Beng. Pl., ed. 2, 2: 847 & 848. 1963; J. Joseph, Bull. Bot. Surv. India 5: 297. 1963; J. K. Maheshwari, Bull. Bot. Surv. India 5: 138. 1963; Punt, Reg. Veg. 36: 9. 1964; Bhattacharyya, Bull. Bot. Surv. India 6: 208. 1964; Panigrahi, Chowdhury, Raju, & Deka, Bull. Bot. Surv. India 6: 241, 260, & 261. 1964; Moldenke, Résumé Suppl. 11: 6 (1964) and 12: 7. 1965; J. S. Beard, Descrip. Cat. W. Austral. Pl. 9. 1965; Thanikaimoni, Pollen & Spores 7: 185. 1965; Subramanyam & Henry, Bull. Bot. Surv. India 8: 214. 1966; Sebastine & Ramamurthy, Bull. Bot. Surv. India 8: 182. 1966; Panigrahi, Bull. Bot. Surv. India 8: 13. 1966; Malick, Bull. Bot. Surv. India 8: 58. 1966; Begum, Curr. Sci. India 35: 262—263. 1966; S. V. Ramaswami, Stud. Flow. Pl. Bangalore [thesis] 220, 222--223, 1406, & 1407. 1966; J. L. Ellis, Bull. Bot. Surv. India 8: 329 & 339. 1966; Sebastine & Henry, Bull. Bot. Surv. India 8: 310. 1966; Lourteig, Taxon 15: 31. 1966; Moldenke, Résumé Suppl. 14: 9 (1966) and 15: 8 & 14. 1967; Begum, Bioresearch Index Tit. 1967: 2255. 1967; Anon., Ind. Bibliog. Bot. Trop. 4 (1): 18. 1967; Moldenke, Résumé Suppl. 16: 9 (1968) and 17: 11. 1968; Begum, Proc. Indian Acad. Sci. B.67: 148—156. 1968; Moldenke, Phytologia 17: 463 (1968), 18: 52 & 53 (1968), and 18: 101, 102, 169, 173, 174, 243, 244, 258, 263, 264, 273, 328, 348, 360, 379, & 396. 1969; Anon., Biol. Abstr. 50 (1): S.61. 1969; Begum, Biol. Abstr. 50: 422. 1969.

Illustrations: Pluk., Almag. 3: Phytogr. pl. 221, fig. 7. 1696; Fyson, Journ. Indian Bot. 2: pl. 9. 1921; Begum, Proc. Indian Acad. Sci. B.67: 148—156. 1968.

Prain (1963) describes this species as follows: "Involucral bracts alone glabrous, floral bearded or pubescent; receptacle villous.....Perennial; rootstock elongated, slender or stout; leaves ensiform or broadly subulate.....Female flowers distinctly pedicelled.....Involucral bracts at length reflexed under the globose grey or snow-white heads; leaves reddish, often semitranslucent." He says that the plant is an "herb of rice-fields and wet places.....In all the provinces" of Bengal. Recent collectors have found it growing in mud, at altitudes of 80 to 1330 meters, flowering and fruiting from September to March. Common names recorded for it are "bhuri", "bhurli", and "guri", while German authors call it "5winklichte Kugelbinse".

Ramaswamy says of his no. 3 "The average height of the plant was in between 6—14 inches. The plants were generally pinkish with light grey heads. They were luxuriantly growing in the black cotton soil [of Mysore]. The associated plants were the marsh plants of Commelinaceae and Poaceae." Malick (1966) calls it common in West Bengal and cites Biswas 11. Ellis (1966) found

it in marshy places near the fringes of puddles formed during the rainy season in January and February in Andhra Pradesh, and cites the Herb. Indian Bot. Surv. 15743; Sebastine & Henry (1966) refer to it as "common" in the same state and cite 11675. Bhattacharyya (1964) avers that the species is "common in moist rice fields" in Uttar Pradesh, while Seerwani (1962) records it from Jabalpur. Panigrahi and his associates (1964) call it a hygrophyte and state that it is "abundant in fields" in Orissa. Panigrahi (1966) found it to be abundant in rice fields, in semi-dry mud, or on rock shoulders with a soil cover in Bihar, citing 11876 & 12005. Givindu (1949) says that it blooms from December to February in Bangalore. Joseph (1963) reports it "common in wet localities" in Madhya Pradesh, while Maheshwari (1963) found it to be "common in washes and in wet or dry fallow land" in the same state, from which Subramanyam & Henry (1966) cite 7098 & 7212. It is said to be "common" in Madras by Sebastine & Ramamurthy (1966), who cite 15082 in the Survey herbarium. Waring reports that in Orissa it is rubbed on the body to cure ringworm.

Fyson (1921) describes E. quinquangulare as follows: "Stem short or 0. Leaves 1—2 in. long, narrowed from the 1/4 in. base flat, usually red. Scapes numerous, 3—5 in. long, slender. Heads 1/5 — 1/4 in diam., globular or often conical, black gray or white. Involucre light brown, reflexed. Receptacle hairy; flowers normal; sepals flat.....Central Himalaya, Kumaon; Bengal; Chota Nagpur; Central Provinces; and southwards through the Peninsular India on the plains and the Mysore plateau to Ceylon. Not apparently on the higher levels and not in Burma, except Var. Martiana. I have seen Linnaeus' own type but not of course dissected it and the description is taken from sheets in Herb. Calc. and living plants." He says, further, that it can be distinguished from E. dianae Fyson only by the characters of the pistillate sepals. Thirumalachar, Razi, & Swamy (1949) describe the species as "Marsh herbs.....involucral bracts not longer than the floral bracts and the flowers; leaves linear-ensiform, 5—11 nerved, purplish beneath, often drying red; heads globose ovoid, grey or snow-white. Nandi Hills."

It is worth noting here that E. setosum Wight seems to be based on Wight 16. The Petit-Thouars 2, in the Paris herbarium, cited below, is labelled "E. Thouarsii H. Lecomte" and so may very well actually represent the type collection of that species and therefore be from Madagascar. No locality of collection is indicated on the sheet. The Monin s.n., also cited below, was actually examined by and identified as E. quinquangulare by Körnicke himself.

Kunth (1841) cites Herb. Willdenow 2356 and Wight 2365. He also avers that the left-hand "frustulo" on Herb. Willdenow 2359 is "quod certissime E. quinquangulare". He further notes that E. gracile Mart. is hardly distinguishable from E. quinquangulare and comments that "In specimine a Sonneratio in India orientali lecta

sepala 3 exteriora mascula distincta. E. sexangulari affine, sed sat distinctum. — E. pellucidum Mich. huic et E. sexangulari Linn. comparari potest."

The E. argenteum Bong., referred to in the synonymy above, is actually a synonym of Paepalanthus argenteus (Bong.) Körn., and E. triangulare L. is now known as Paepalanthus triangularis (L.) Körn. The E. quinquangulare accredited to Heyne is actually E. cristatum Mart., the homonyms credited to Martius and to Willdenow are E. sollyanum Royle, while the one credited to Wallich is E. nepalense Prescott; E. quinquangulare Bojer is still not satisfactorily placed.

The E. setaceum L., also referred to above, is a valid species, with the homonyms accredited to Crantz and to Wallich as synonyms, while the homonym credited to Bentham is E. bifistulosum Van Heurck & Muell.-Arg., that credited to "Auct." is E. intermedium Körn., that credited to Heyne is E. sexangulare L., those ascribed to Rottler and to Willdenow are E. cinereum R. Br., and that credited to Loureiro is Fimbristylis setacea Benth. in the Cyperaceae.

Lourteig (1966) tells us that the polynomial, Germen junceum Chamaemeli capitulis, aphyllis, is based on P. Hermann 154, in part — this number being a mixture with Panicum dimidiatum L. and Hottonia indica L.

Regarding the E. quinquangulare of Bojer, referred to above, Punt (1964) says "Misinterpreted by Bojer. According to Moldenke there are 3 species of Eriocaulon at Mauritius; E. longifolium Nees ex Kunth, E. johnstonii Ruhl., and E. fenestratum Bojer. It is not yet known which one is the species of Bojer."

Crantz (1766) cites "PLVK. alm. T.221.F.7" as the type for his Eriocavlon scabiosa. Martius (1832) cites Plukenet's work as page "366", but this is an error for p. 336. In Plukenet's work (1696) this famous author adds "ex Herbar. Vivo du Boisiano Phytogr. tab. 221, fig. 7. Huic proximè accedit Plantaginella aurea alopecuroides Brasiliana foliis gramineis Breyn. Cent. 1. 108". However, Breyne's plant does not appear to have anything to do with an Eriocaulon and certainly bears no resemblance whatever to E. quinquangulare. For the record, Breyne's original description is repeated here (it is accompanied by an illustration): "Plantaginella aurea alopecuroides brasiliana, foliis gramineis. Cap. L. En ex minimis unam, sed rarissimis charissimisq; nostris plantulis. Radix ejus exigua, mille fibris niveis comata, Foliola multa graminea & anhusta Graminis Luzulae minoribus Johanni Bauhino, sed omnino glabra, in orbem diffundeus: ex quorum gremio, coliculi quinquaginta vel plures prosiliunt, tenuissimi, plantae exilitatem Globulis oblongiusculis lanuginosisque, Plantaginis angustifoliae paniculis Lagopi minoribus, uberrime compensantes, singuli, singulis coliculis triuncialibus

vel brevioribus insidentes, compositi ex pilis lenissimis leucophaei coloris, inter quos Flosculi flavi permixti, Summa amoenitate, veluti puhctula aurea, emicant, quod jocundissimum, huic Plantulae in Brasilia vigenti, aspectum conciliat."

Martius (1832) comments about E. pellucidum Michx. in his discussion of E. quinquangulare, saying "e speciminibus americanis huic et insequenti [E. sexangulare] comparari potest". He and Wallich (1832) both regarded E. trilobum Hamilt. as a synonym of E. quinquangulare, but this name is now placed in the synonymy of the very similar E. sollyanum Royle. Thwaites & Hooker (1864) place E. argenteum Mart. in the synonymy of what they called E. quinquangulare var. argenteum Thwaites (which is now called E. walkeri Hook. f.).

Jackson (1893) and other authors give "1854" as the date of publication for E. erythropodum Miq., but actually pages 129—799 of Linnaea, volume 27, were not issued until 1856. The initial letter of the specific epithet of E. quinquangulare is uppercased by Dalzell & Gibson (1861), and by other authors, for no apparent valid reason.

Begum (1969) gives an interesting summary of the embryology of this species: "The unisexual flowers are borne on a terminal globose head. The development of floral parts is acropetal. The hypodermal archesporium in the anther is 1—2-celled. The wall of the mature anther is 4-layered; the innermost of these layers functions as the glandular tapetum. The macrospore tetrads are of isobilateral and decussate types. A well-developed stomium is present. The pollen grains are generally shed at the 2-celled stage. The tenuinucellar ovules are bigamic and pendulous. The primary archesporium is hypodermal and functions directly as the megasporocyte. The megaspore tetrads are of linear, obliquely linear and T-shaped type. The chalazal megaspore is functional and develops into a Polygonum type embryo sac. The antipodals form the most conspicuous part of the embryo sac and are linear in arrangement. Endosperm is free nuclear and becomes cellular later. Embryo development is of the asterad type."

The usual redness of the leaves of this species is particularly well seen on the Falconer 1194, Ramaswamy 1738 & 2125, Sedgwick & Bell 5091, G. Thomson s.n., Thwaites 792, and Wight 2367 & 2367F collections, cited below.

In addition to the various Bot. Surv. India herbarium numbers referred to above, Panigrahi cites 11876.

Material has been misidentified and distributed in herbaria under the names E. gracile Mart., E. hexangulare L., and E. sollyanum Royle. On the other hand, the Herb. Zuccarini s.n., distributed as E. quinquangulare, is actually E. cinereum R. Br., E. J. Schmidt 250 & 302a are E. dianae Fyson; Strachey & Winterbottom 6 is E. gracile Mart.; D. I. Jeffrey 5096 is E. laosense Moldenke; W. Griffith 5564 and R. Wight 2855 are E. odoratum Dalz.; Meebold

9737 is E. polycephalum Hook. f.; Ezekiel 30361, Lisboa s.n., and R. Wight 2367N are E. sollyanum Royle; and Boeea 7468 is E. truncatum Hamilt.

Additional citations: SIERRA LEONE: Afzelius s.n. [Sierra Leone] (S). REUNION: Monim s.n. [Ile Bourbon, 1833] (P). INDIA: Bihar: Dahlstrand s.n. [2.10.1952] (Go). Bombay: P. V. Bole 503 (Xa); Santapau 11755 (Xa); Sedgwick & Bell 5091 (N, Xa). Madras: E. W. Erlanson 5621 (Mi). Mysore: S. N. Ramaswamy 3 (Rf), 18 (Rf), 1738 (Lw), 2125 (Lw); G. Thomson s.n. [Maisor & Carnatic] (Br, Mu--226, N). Orissa: Waring 4 (Z). State undetermined: Falconer 1194 (T); Herb. Heyn 12 (Br, N); Hügel s.n. [India orientali] (Mu--224), s.n. [mont. Himal.] (Mu--225); R. Wight 15 (Br), 16 (Br, N), 2367 (N), 2367F (N, N), 2855 [Peninsula Indiae Orientalis] (Mu--341, Mu--343), s.n. [Ind. or.] (V--41341, V--159841). CEYLON: Gardner s.n. [Colombo, Aug. 26th 1820] (B); Macrae 123 (Br); Thwaites 792 (Br, N). THAILAND: Hansen, Seidenfaden, & Smitinand 10817 (Cp, Z), 10818 (Ac, Cp). LOCALITY OF COLLECTION UNDETERMINED: Herb. Mus. Paris s.n. [Cayenne?] (P); S. Kurz s.n. [Ind. or. Bengala? Andamans? Malayae?] (Mu--314), s.n. (Mu-313); Petit-Thouars 2 (P).

ERIOCAULON QUINQUANGULARE var. MARTIANUM Wall.

Synonymy: Eriocaulon martianum Wall., Numer. List 245, hyponym. 1832. Eriocaulon quinquangulare var. martiana Wall. ex Fyson, Journ. Indian Bot. 2: 204. 1921.

Bibliography: Wall., Numer. List 245. 1832; Fyson, Journ. Indian Bot. 2: 204 & 260. 1921; Moldenke, Résumé 165, 291, & 482. 1959; Moldenke, Phytologia 18: 53. 1968.

Martius, on the label of the type collection in the Brussels herbarium, notes "Eriocaulon argenteum Mart. forma E. quinquangulare L. prolifera". Fyson (1921) describes the variety as "Involucral bracts much longer than the floral and extending about 1-1/4 inch beyond the head. Burma. Hooker in F. B. I. called this plant a proliferous state of E. quinquangulare, But the plant with this number in the Calcutta Herbarium is not proliferous." The variety is based on Wallich 7279 from somewhere in Burma. Fyson also tells us that E. dianae var. longibracteatum Fyson "corresponds" to this taxon "and might be considered that plant with one sepal smaller and flat." His "1-1/4 inch beyond the head" is obviously a misprint, but what figure he intended is not clear. Wallich, in his Numerical List (1832), give no locality of collection whatever for his number 7279.

Citations: BURMAL State undetermined: R. Wight s.n. [Wallich 7279] (Br--isotype, N--isotype, N--photo of isotype, Z--photo of isotype).

ERIOCAULON RAVENELII Chapm.

Synonymy: Eriocaulon ravenelli Chapm. ex Moldenke, Résumé 291, in syn. 1959. Eriocaulon ravenellii Chapm. ex Moldenke, Résumé 291, in syn. 1959.

Additional bibliography: Chapm., Fl. South. U. S., ed. 1, pr. 1, 503 (1860), ed. 1, pr. 2, 503 (1865), ed. 1, pr. 3, 503 (1872), ed. 2, pr. 1, 503 (1883), ed. 2, pr. 2, 503 (1884), ed. 2, pr. 3, 503 (1887), and ed. 2, pr. 4, 503. 1889; Morong, Bull. Torr. Bot. Club 18: 355. 1891; A. W. Chapm., Fl. South. U. S., ed. 2, pr. 5, 503 (1892) and ed. 3, 530. 1897; J. K. Small, Fl. Southeast. U. S., ed. 1, 236 (1903) and ed. 2, 236. 1913; J. K. Small, Fl. Miami 37--38. 1913; J. K. Small, Man. Southeast. Fl. 257 & 258. 1933; Moldenke, N. Am. Fl. 19 (1): 19 & 26. 1937; Moldenke, Phytologia 1: 322. 1939; Moldenke, Known Geogr. Distrib. Erioc. 2, 3, & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 8, 9, & 206. 1949; Moldenke, Phytologia 3: 342. 1950; Moldenke, Résumé 10, 12, 291, & 482. 1959; Moldenke, Résumé Suppl. 2: 9. 1960; Radford, Ahles, & Bell, Guide Vasc. Fl. Carol. 106 & 107. 1964; Kral, Sida 2: 293--295, 297, & 331. 1966; Shinners, Sida 2: 441. 1966; Moldenke, Phytologia 18: 253 & 370. 1969.

Illustrations: Kral, Sida 2: 294. 1966.

Morong (1891) notes that "Chapman states that the style is occasionally simple and the seeds minutely pubescent. The specimens which I have examined failed to show either. Wet grounds, S. C." Eyles & Robertson (1944) say for it "Swamps, Coastal Plain, Florida to Mississippi and South Carolina. Apparently the most infrequent of the genus." Radford, Ahles, & Bell (1964) say "in low pinelands, very rare, Berkeley Co., S. C." Kral, in Levy County, Florida, found the species growing "in sandy peat-muck of somewhat brackish edge of marsh in slash pine - saw palmetto flatwoods, the rosettes in exposed areas, the young heads pale, darkening in age, associated with Lipocarpha maculata, Fuirena breviseta, Ludwigia alata, and Eleocharis geniculata, and, in Lee County, "in full sunlight of disturbed area in association with Dichromena colorata, Psilocarya sp., Fimbristylis schoenoides, F. caroliniana, and Fuirena scirpoidea, the young heads straw-colored, the older ones darker."

Kral (1966) gives a very full description of the species and comments as follows: "Mildly acid sandy pineland swamps, particularly on wet disturbed areas toward the Atlantic coast, eastern South Carolina south to Florida, west to Mississippi...Eriocaulon ravenelii appears to be one of the rare species of Eriocaulaceae of the southeastern United States; at least it is scarce in the larger collections. However, it is locally abundant in the lower peninsula of Florida, generally being found on sweeter soils than those occupied by the other Eriocaulons of the area. I have seen it in but three localities and in each case it was growing on moist exposed pine flatwoods sands bordering Typha-Cladium-Spartina marsh near the Florida coast. It actually seems to occupy the ecotone between the two abovementioned vegetational types. It

comes in quickly on disturbed sands or sandy peats but appears not to compete well with the grasses and sedges which also rapidly invade such areas; therefore it does not persist long on a site. It appears to be most abundant on intermittently but shallowly flooded sands and, where I have seen it, is associated with such herbs as Cyperus flavescens, C. haspan, C. odoratus, C. polystachos var. texensis, Lipocarpha maculata, Hemicarpha micrantha, Eleocharis albida, E. geniculata, E. atropurpurea, Fimbristylis caroliniana, F. diphylla, F. schoenoides, Rhynchospora inundata, R. microcarpa, R. schoenoides, R. tracyi, Dichromena colorata, Fuirena breviseta, F. scirpoidea, Psilocarya nitens, P. schiediana, Panicum hemitomon (and several Dichanthelium panicums), Manisuris rugosa, Juncus megacephalus, J. scirpoides, Asclepias lanceolata, Proserpinaca pectinata, Amannia latifolia, Lythrum lanceolatum, Rhexia cubensis, Sabatia grandiflora, Hydrolea corymbosa, Litrisa carnosa, Liatris garberi, Flaveria linearis, Coreopsis leavenworthii and Cacalia lanceolata, etc. Even when present in abundance E. ravenelii is seldom conspicuous, being a low plant and lacking the startling white masses of trichomes possessed by some of the other Eriocaulons. Both in habit and in its ecology it appears to be very similar to E. parkeri, a coastal species further north, this fact commented on some time ago by B. L. Robinson (1903). While all descriptions of this species contain no definitive statement about trichomes, there are some examples in which a very few trichomes are present on bractlets and perianth parts. When such do appear, they are similar in shape, size and colour to those of E. lineare."

I might add, parenthetically, that my own experience with this species has been that it was not even seen until I bent on my knees to collect some other plants growing with it and completely obscuring it.

It has been collected in flower and fruit in November. Material has been misidentified and distributed in herbaria as E. parkeri B. L. Robinson and Lachnocaulon glabrum Körn. On the other hand, the C. R. Bell 219, distributed as E. ravenelii, is actually Lachnocaulon anceps (Walt.) Morong, Bright 3842 is Lachnocaulon ciliatum Small, Fassett 19914 is Lachnocaulon engleri Ruhl., and Meebold 28102 is Lachnocaulon glabrum Körn.

Additional citations: SOUTH CAROLINA: County undetermined: M. A. Curtis s.n. [S. Car. 1848] (E); Ravenel s.n. [S. C.] (Ms--15480). FLORIDA: Dade Co.: A. A. Eaton 176 (Rf). Lee Co.: Kral 22923 (N). Levy Co.: Kral 22940 (N). Palm Beach Co.: A. R. Moldenke 1383 (Z). County undetermined: A. P. Garber s.n. [S. Florida, 1877] (Ms--15500, N).

ERIOCAULON RECURVIFOLIUM C. H. Wright

Bibliography: C. H. Wright, Kew Bull. Misc. Inf. 1919: 264. 1919; Moldenke, Résumé Suppl. 17: 4. 1968.

The type of this species was collected by Hyacinthe Vandereyst (no. 3133) in the Republic of the Congo.

ERIOCAULON REDACTUM Ruhl.

Synonymy: Eriocaulon dubium Körn. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 13, 104, 113, & 287. 1903; J. R. Perkins, Fragm. Fl. Philipp. 1: 136. 1904; Prain, Ind. Kew. Suppl. 3: 70. 1908; Fyson, Journ. Indian Bot. 3: 16. 1922; Moldenke, Known Geogr. Distrib. Erioc. 23 & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 127 & 206. 1949; Moldenke, Résumé 162 & 482. 1959; Moldenke, Résumé Suppl. 1: 17 (1959), 3: 17 & 20 (1962), 13: 5 (1966), and 15: 8. 1967; Moldenke, Phytologia 18: 302. 1969.

It appears that Körnicke intended to apply the name E. dubium to the very same Stocks, Law, &c. s.n. [Malabar, Concan] specimen in the Berlin herbarium which was chosen later by Ruhland as the type of his E. redactum. The species has been found growing at 1300 meters altitude. Smitinand describes it as an "herb common in wet places" in Thailand, with blackish flowers, blooming in July. Perkins (1904) avers that it is related to E. merrillii Ruhl.

Material has been misidentified and distributed in herbaria as E. cinereum R. Br., E. sexangulare L., and Cyperus tenuispicatus Böck.

Citations: INDIA: Bombay: Hohenacker 131b (Ut—316); Stocks, Law, &c. s.n. [Malabar, Concan, &c.] (B—type, C—isotype, S—isotype, Ut—317—isotype, Z—isotype). Kerala: Hohenacker s.n. [Mangalore] (Mu—296). Mysore: S. N. Ramaswamy 22 (Rf). West Bengal: Bennet 1040 (Ac). State undetermined: R. Wight 2366 (B, C). THAILAND: Smitinand 5852 [Roy. Forest Dept. 23734] (Bk).

ERIOCAULON REGNELLII Moldenke

Bibliography: Moldenke, Phytologia 3: 35—36. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 206. 1949; Moldenke, Phytologia 3: 342. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 89 & 482. 1959.

Irwin, Maxwell, & Wasshausen describe this species as a cespitose plant, with gray flowing heads, growing in wet ground on sandy slopes and outcrops, at 1500 meters altitude, flowering in February.

Additional citations: BRAZIL: Minas Gerais: Irwin, Maxwell, & Wasshausen 19687 (Rf); Regnell III.1740 (S—isotype, S—isotype).

ERIOCAULON REMOTUM H. Lecomte

Bibliography: H. Lecomte, Bull. Soc. Bot. France 55: 643 & 644. 1909; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and pr. 2, 82. 1938; Moldenke, Known Geogr. Distrib. Erioc. 20 & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 111 & 206. 1949; Bourdu, Bull. Soc. Bot. France 104: 158. 1957; Moldenke,

Résumé 136 & 482. 1959.

ERIOCAULON RITCHIEANUM Ruhl.

Synonymy: Eriocaulon horsley-kondae Fyson, Journ. Indian Bot. 1: 52. 1919. Eriocaulon horsely-kundae Fyson, Fl. Nilg. & Puln. Hill-tops 3: 119. 1921. Eriocaulon horsley-kundae Fyson, Journ. Indian Bot. 3: 13—14, pl. 43. 1922. Eriocaulon horsleykondae Fyson apud C. E. C. Fischer, Kew Bull. Misc. Inf. 1931: 261. 1931. Eriocaulon horsleykundae Fyson ex Moldenke, Résumé 289, in syn. 1959. Eriocaulon horsleykonsae Fyson ex Moldenke, Résumé Suppl. 18: 11, in syn. 1969.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 61, 73, & 287. 1903; Prain, Ind. Kew. Suppl. 3: 70. 1908; Fyson, Journ. Indian Bot. 1: 52 (1919) and 3: 13—14, 16, & 18, pl. 43. 1922; A. W. Hill, Ind. Kew. Suppl. 6: 78. 1926; C. E. C. Fischer, Kew Bull. Misc. Inf. 1931: 261. 1931; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1611—1612 & 1619. 1931; Razi, Journ. Mysore Univ. 7 (4): 77. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23, 35, & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 127 & 206. 1949; Moldenke, Phytologia 3: 342. 1950; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1123, 1127, & 1333. 1956; Razi, Rec. Bot. Surv. India 18: 20. 1959; Moldenke, Résumé 162, 289, & 482. 1959; Thanikaimoni, Pollen & Spores 7: 185. 1965; S. V. Ramaswami, Study Flow. Pl. Bangalore [thesis] 219, 223, & 1407. 1966; Moldenke, Phytologia 18: 264 & 310. 1969.

Illustrations: Fyson, Journ. Indian Bot. 3: pl. 43. 1922.

Material of this species has been misidentified and distributed in herbaria as E. cristatum Mart. and as E. minutum Hook. f. On the other hand, the Meebold 9735 and Nusrath 39, distributed as E. ritchieanum, are actually E. leucomelas Steud.

Additional citations: INDIA: Bombay: Ritchie 1248 (B—type); Santapau 10904 (Xa). Mysore: Cheluviah 56 (Bn—3101); S. V. Ramaswami 1359 (Z).

ERIOCAULON ROBINSONII Moldenke

Bibliography: Moldenke, Phytologia 2: 220. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 136 & 206. 1949; Moldenke, Phytologia 3: 342—343. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 176 & 482. 1959.

Collectors have found this plant growing in damp places on dunes. Material has been misidentified and distributed in herbaria under the name E. sieboldianum Sieb. & Zucc. The Clemens & Clemens 3275, cited below, is a mixture with something non-eriocaulaceous.

Additional citations: INDOCHINA: Annam: Clemens & Clemens 3275, in part (Ca—340779, Mi, Ut—89a); Pételot 8075 (N), 8970 (N); Squires 91 (Ca—307312).

ERIOCAULON ROBUSTIUS (Maxim.) Mak.

Synonymy: Eriocaulon alpestre β robustius Maxim. ex Mak., Bot. Mag. Tokyo 4: 174, nom. nud. (1890); Diagn. Pl. Nov. As. 8: 25. 1893. Eriocaulon alpestre var. robustius Maxim. ex Mak., Bot. Mag. Tokyo 8: 506. 1894. Eriocaulon robustium Mak., Journ. Jap. Bot. 3: 26. 1926. Eriocaulon robustius Mak. apud A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933. Eriocaulon alpestre Ruhl. apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 46 & [86], in syn. 1940 [not E. alpestre Hook. f. & Thoms., 1867]. Eriocaulon buergerianum Miyabe & Kudô apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 47 & [86], in syn. 1940 [not E. buergerianum Körn., 1867]. Eriocaulon buergerianum Nemoto apud Satake in Nakai & Honda, Nov. Fl. Jap. 6: 47 & [86], in syn. 1940. Eriocaulon robustum Mak. ex Moldenke, Résumé Suppl. 1: 18, in syn. 1959 [not E. robustum Steud., 1855]. Eriocaulon alpestre var. robustius Nakai ex Moldenke, Résumé Suppl. 17: 9, in syn. 1968.

Additional & emended bibliography: Mak., Bot. Mag. Tokyo 4: 174. 1890; Maxim., Diagn. Pl. Nov. As. 8: 25. 1893; Mak., Bot. Mag. Tokyo 8: 506. 1894; J. Matsumura, Ind. Pl. Jap. 2 (1): 175. 1905; Nakai, Bot. Mag. Tokyo 25: [220], fig. C. 1911; Mak., Journ. Jap. Bot. 3: 26. 1926; Mak., Nippon Shokubatsu 725. 1926; Komarov & Alis., Opred. Rast. Del'nevost. Kr. 1: 340, pl. 105. 1931; Mak. & Nemoto, Fl. Jap., ed. 2, 1514. 1931; Miyabe & Kudô, Fl. Hokk. & Saghal. 3: 287. 1932; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Steinberg in Komarov & Schischkin, Fl. U. S. S. R. 3: 497, pl. 27, fig. 4 a & b. 1935; Nemoto, Fl. Jap. Suppl. 1038 & 1039. 1936; Hara, Bot. Mag. Tokyo 52: 401. 1938; Honda, Nom. Pl. Jap. 462. 1939; Satake, Journ. Jap. Bot. 15: 629. 1939; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 33—36. 1940; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 9, 13, 46—48, 65, 74, 79, [86], & 87, fig. 4A & 20. 1940; Mak., Illustr. Fl. Jap. 772 & E.26, fig. 2314. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25, 39, & 61. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 108, 130, 133, 134, & 206. 1949; Moldenke, Phytologia 3: 343. 1950; Koyama, Philip. Journ. Sci. 84: 367—368. 1956; Moldenke, Résumé 132, 167, 171, 173, 285, 286, 291, 292, & 482. 1959; Moldenke, Résumé Suppl. 1: 12 & 18 (1959) and 3: 17, 18, & 21. 1962; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 183, 184, 429, & 430, fig. 125 (3), pl. 48, fig. 309. 1964; Steinberg in Komarov & Schischkin, Fl. U. S. S. R., Engl. transl., 3: 394. 1964; Moldenke, Résumé Suppl. 17: 9 & 10. 1968; Moldenke, Phytologia 17: 386 (1968) and 18: 77, 80, 182, 300, & 311. 1969.

Illustrations: Nakai, Bot. Mag. Tokyo 25: [220], fig. C. 1911; Komarov & Alis., Opred. Rast. Dal'nevost. Kr. pl. 105. 1931; Steinberg in Komarov & Schischkin, Fl. U. S. S. R. 3: pl. 27, fig. 4 a & b. 1935; Mak., Illustr. Fl. Jap. fig. 2314. 1940; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 9 & 47, fig. 4A & 20. 1940; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 183, fig. 125 (3), pl. 48, fig. 309. 1964.

Koyama (1956) cites the original Maximowicz publication referred

to in the bibliography above as "1892"; his own paper is sometimes cited as "1955", but was not actually issued until 1956.

Recent collectors have found this plant growing in rice puddles and rice fields, flowering and fruiting from July to November. Utsumi says "abundant in rice puddles", but Koyama says "occasional in rice puddles". Tsang found it "abundant in sandy soil of swamps and rice terraces". Popular names recorded for it are "hiroha-inunohige", "hirohano-inunohige", "hirohano-inuno-hige", "inunohige", and "kuro-inunohige".

Material has been misidentified and distributed in herbaria under the names E. atrum Nakai, E. miquelianum Körn., E. robustius var. nigrum Satake, E. sexangulare L., E. sieboldianum Steud., and E. truncatum Hamilt. The Furuse s.n. [Hirataki-muma, 19 Sept. 1955], cited below, is a mixture with E. hondoense Satake; Furuse s.n. [Sara-muma, 6 Oct. 1955] is said by Koyama to represent a hybrid (unnamed) between E. robustius and E. hondoense, but I fail to see the evidence for this.

Satake (1940) states that E. robustius grows in "Manchuria, China (?), Siberia" and cites the following collections: KOREA: Boku 139 & 141; Faurie 893; Nakai s.n. [Aug. 1916]; Uchiyama s.n. [Sept. 1902]. KOREAN COASTAL ISLANDS: Quelpart: Faurie 1430; Taquet 1516. WESTERN PACIFIC ISLANDS: JAPAN: Hiratozima: Kawati s.n. [Nov. 1925]. Hokkaido: Akiyama 3289; Faurie 8671; Hara s.n. [1933]; Yamamoto s.n. [Oct. 1925]. Honshu: Akiyama 4910; Andô 32; Collector undetermined 32725 & s.n. [Mukoogaoka-mura]; Faurie 1327, 1868, 1871, 7218, & s.n. [Oct. 1886]; Habuta s.n. [1928]; Hasimoto 44198, 57470, & s.n. [Sept. 1910]; Hisamatu s.n. [Sept. 1895]; Itô s.n. [Oct. 1893]; Iwabuti 5367 & 5439; Katô s.n. [1931]; Kinashi s.n. [Sept. 1908]; Kinouti 44702; Koidzumi 10559, 10683, 24562, 24563, 34364, 52470, & 52471; Kudô 26186; Kurosawa s.n. [Sept. 1928]; Maekawa s.n. [Oct. 1936]; Matsumura s.n. [Oct. 1879], s.n. [Sept. 1880], & s.n. [Sept. 1885]; Misono 52705; Nagasawa 54433 & 57464; Naohara s.n. [Sendai]; Nakai s.n. [Nov. 1936]; Nakazima s.n. [Oct. 1928]: Nikai 49456; Ohwi & Tagawa s.n. [Sept. 1931]; Okamoto s.n. [Oct. 1932]; Okuyama 24; Satake s.n. [Oct. 1936]; Sugimoto s.n. [Oct. 1927]; Takagi 35028; Tasiro s.n. [Sept. 1927] & s.n. [Oct. 1930]; Tiba s.n. [Itinoseki]; Tuboi s.n. [Oct. 1930]; Turumati 14; Watanabe s.n. [Sept. 1899]. Kyushu: Doi 63; Kozuma 23130; Nabesima 8; Nakasima 18883 & s.n. [Oct. 1936]; Ogata s.n. [Iwata-mura]; Takagi s.n. [Aug. 1934]; Tasiro 29999, in part, & 43768, in part. Shikoku: Faurie 11854 & 11856; Murai 9; Ogata 329; Oti 3; Watanabe s.n. [Sept. 1894]; Yamaguti 8; Yamamoto s.n. [Sept. 1913]; Yamasita s.n. [Oct. 1930]. RYUKYU ISLAND ARCHIPELAGO: SATSUNAN ISLANDS: Tanegasime: Tasiro s.n.

Additional & emended citations: UNION OF SOCIALIST SOVIET REPUBLICS: Far Eastern Republic: Kusnezow 4 (N); Melvil s.n. [31/VIII/1926] (S). CHINA: Fukien: Chang & En 2907 (Ca--299603). Kwangtung:

W. T. Tsang 20687 (Ca--611685). Shantung: Faber s.n. [Chefoo] (V--989). KOREA: Tomiyama s.n. (Kg). KOREAN COASTAL ISLANDS: Quelpart: Taquet 1540 (B), 3366 (S), s.n. [15 Oct. 1907] (V--1343). WESTERN PACIFIC ISLANDS: JAPAN: Honshu: Collector undetermined s.n. [Komaba bei Tokyo, 7/10/07] (S); Furuse 2 (Ss), 19850 (S), s.n. [Nagamma, 29 Sept. 1953] (S), s.n. [Makino Oganaka-mura, 29 Sept. 1953] (S), s.n. [Hirataki-numa, 19 Sept. 1955] (S), s.n. [Gyoonin-bara, 27 Sept. 1955] (S, S, S), s.n. [Aburado, 28 Sept. 1955] (S), s.n. [Oh-nagura, 29 Sept. 1955] (S), s.n. [Sara-numa, 6 Oct. 1955] (S), s.n. [2 July 1956] (S), s.n. [16 Oct. 1956] (S, S), s.n. [28 Sept. 1957] (S); C. Hashimoto 850 (B, Ca--55789, Go, Mg, N, S); Herb. Sci. Coll. Imp. Univ. s.n. [Musashi, Oct.] (Vt); Iishiba s.n. [Arahama, 24/10/1926] (Ca--342483, S), s.n. [Sendai, Sep. 30, 1928] (Go); Kawagoe 509 (Kg), s.n. [30 Sept. 1906] (Kg); Kirino 418 (S); T. Koyama 13101 (Z), s.n. [13 October 1954] (Ss); Naito s.n. [Nov. 6, 1932] (Kg); Ohmura s.n. [25 Sept. 1955] (Ss); Tagawa s.n. [29.IX.1931] (Ac, Ws); Togasi 915 (B, Ca--21964, Go, Mg, N, S); Utsumi 223 (Ss); Uyezuki s.n. [Sept. 5, 1912] (Kg). Kyushu: Kodama 218 (Kg).

ERIOCAULON ROBUSTIUS var. NIGRUM Satake

Synonymy: Eriocaulon alpestre var. nigrum (Satake) Koyama, Philip. Journ. Sci. 84: 368. 1956.

Bibliography: Satake, Journ. Jap. Bot. 27: 268. 1952; Koyama, Philip. Journ. Sci. 84: 368. 1956; Moldenke, Résumé 173, 285, & 482. 1959; Moldenke, Phytologia 17: 386. 1968.

The Furuse s.n. [Aburado, 28 Sept. 1955], distributed as var. nigrum, seems to be typical E. robustius (Maxim.) Mak.

ERIOCAULON ROBUSTIUS var. PERPUSILLUM (Nakai) Satake

Synonymy: Eriocaulon alpestre var. perpusillum Nakai, Bot. Mag. Tokyo 24: 6. 1910. Eriocaulon robustius var. perpusillum Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 48, & 87. 1940.

Bibliography: Nakai, Bot. Mag. Tokyo 24: 6. 1910; Mak. & Nemoto, Fl. Jap., ed. 1, 1303 (1925) and ed. 2, 1510. 1931; Nemoto, Fl. Jap. Suppl. 1038. 1936; Honda, Nom. Pl. Jap. 461. 1939; Satake, Journ. Jap. Bot. 15: 629. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 13, 43, 48, [86], & 87. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 36. 1940; Moldenke, Known Geogr. Distrib. Erioc. 25 & 61. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 206. 1949; Moldenke, Résumé 173, 285, & 482. 1959; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Jap. 3: 184 & 430. 1964; Moldenke, Résumé Suppl. 17: 10. 1968.

This variety differs from the typical form of the species in being very dwarf in stature, the calyx-tube of the staminate florets being very short, and the free portions of the sepals of the pistillate florets being larger.

The type of the variety was collected by N. Kinasi at Aomori, in

Mutu province, Honshu, Japan, in September, 1903, where the variety is said to be endemic. The only vernacular name recorded for it is "tyabo-imunohige".

ERIOCAULON ROBUSTO-BROWNIANUM Ruhl.

Synonymy: Eriocaulon mysorense Fyson, Kew Bull. Misc. Inf. 1914: 331. 1914. Eriocaulon rhodae Fyson, Journ. Indian Bot. 1: 50, nom. nud. (1919) and 2: 264 & 266. 1921.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 62, 77, & 287. 1903; Prain, Ind. Kew. Suppl. 3: 70. 1908; Fyson, Kew Bull. Misc. Inf. 1914: 331. 1914; Fyson, Journ. Indian Bot. 1: 50 (1919) and 2: 264 & 266, pl. 18. 1921; Prain, Ind. Kew. Suppl. 5, pr. 1, 97. 1921; A. W. Hill, Ind. Kew. Suppl. 6, 79 (1926) and 7: 89. 1929; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1609—1610 & 1619. 1931; Razi, Journ. Mysore Univ. 7 (4): 77. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23, 37, & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 126, 127, 205, & 206. 1949; Moldenke, Phytologia 3: 343. 1950; Razi, Journ. Mysore Univ. 11 (1): 7. 1950; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1122, 1127, & 1333. 1956; Moldenke, Résumé 162, 165, 291, 294, & 482. 1959; Razi, Rec. Bot. Surv. India 18: 20. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 97. 1960; Moldenke, Résumé Suppl. 3: 17 (1962), 6: 8 (1963), and 11: 5. 1964; Thanikaimoni, Pollen & Spres 7: 185. 1965; Moldenke, Résumé Suppl. 14: 8. 1966; K. Larsen, Dansk. Bot. Ark. 23: 375—399. 1966; Ornduff, Reg. Veg. 55: 13 & 118. 1968.

Illustrations: Fyson, Journ. Indian Bot. 2: 265 & pl. 18. 1921.

The type of this perplexing species was collected by John Sutherland Law in the Dharwar and Bellavy Districts, Bombay, India, and was originally misidentified and distributed in herbaria as Ameletia floribunda Wight. Ruhland (1903) unfortunately misspelled the collector's surname "Saw". Recent collectors have found the species growing at 3000 feet altitude, flowering and fruiting in November and December. Santapau states that it grows in Kerala. Bole describes it as an "herb 1—1.5 feet tall, heads white, very common in the clearings". Larsen (1966) reports the chromosome number as 2n = ca. 110.

It is important to repeat here Fyson's (1921) descriptions of E. robusto-browniamum and of what he called E. rhodae: "E. robusto-brownianum Ruhl. (Law in Canara, Dharwar, and Bellary in Herb. Calc.!).....Size and habit of the last species [E. brownianum Mart.] but leaves half as long as the scapes. Floral bracts acuminate, very white because covered with thick white hairs, giving the head a white echinulate appearance. Female petals hairy, narrow at the base, with large glands.....Peninsular India, Western Mysore and Kanara. A very striking plant because of the white acuminate floral bracts. There are no sheets exactly like it from Burma of the Malay, but the species re-appears in Yuman (Dr. Henry) in a smaller form. Wall. Cat. 6967 B, described by me in Kew Bulletin 1914 as E. mysorense sp. nov. is I think this species. [I

had not then seen Ruhland's type quoted above, but I have not seen Wallich's sheet again to compare with the type).....E. Rhodae Fyson, sp. nov. (Fyson 9696 in Herb. Madras) Caulis perbrevis. Folia iisdem sp. E. nilagirense similes Pedunculi plures 15—30 cm. Capitula globosa 1.2—2 cm. Bractae involucrantes reflexae. Bractarum flores superantium inferiores albae, acutae; superiores quomodo nigrescentes, dorse pubescentes. Receptaculum villosum. Flores trimeres flos ♀ longi-pedicellata, sepala aequalia, navicularia, alba, glabra; petala magna, lanceolata, sub-spongiosa, dorso sparsepilosa. Semen rubrum, glabrum. Flos ♂ o breviter pedicellata; antherae nigrae.....Peninsular India; Mysore and Wynaad in water. Remarkable for the white sepals and bracts and for the stalked petals as in E. lanceolatum. Also for the long pedicels of the flowers, especially of the female which are often stalked beyond the male recalling but in reverse, the arrangement of spkelets in Andropogon. The scarious floral bracts, very nearly glabrous, distinguish the plant in the field from the other species of the group. In the herbarium the plants are characterized by untidy-looking heads, in great contrast to the very firm neat echinulate heads, of E. robusto-brownianum, which occurs in the same localities."

Material has been misidentified and distributed in herbaria as E. brownianum Mart. and as E. wightianum Mart.

Additional citations: INDIA: Bombay: P. V. Bole 1530 (Xa); Law s.n. [Dharwar & Bellavy Districts] (B—type, Z—isotype); Ritchie 1244 (T). Madras: Pichamuthu 95 (Bn—3228). Mysore: Fyson 3664 (S); Iyer S.4 (Bn—3116); Meebold 9730 (S), 9734 (S); S. N. Ramaswamy 1 (Z), 24 (Ac); Shivanna 6 (Bn—3220); M. B. N. Singh s.n. [Mercara, 8.8.50] (Bn—3146). THAILAND: Sørensen, Larsen, & Hansen 6341 (Cp).

ERIOCAULON ROBUSTUM Steud.

Synonymy: Eriocaulon bracteosum Steud., Syn. Pl. Glum. 2: (Cyp.) 272. 1855. Eriocaulon robustum var. foliis nitenti-glaucis Steud., Syn. Pl. Glum. 2: (Cyp.) 271. 1855. Eriocaulon bracteosum var. α C. Müll. in Walp., Ann. 5: 944. 1860. Eriocaulon bracteosum var. β C. Müll. in Walp., Ann. 5: 944. 1860. Eriocaulon robustom Fyson, Journ. Indian Bot. 2: 312, sphalm. 1921.

Bibliography: Steud., Syn. Pl. Glum. 2: (Cyp.) 271 & 272. 1855; C. Müll. in Walp., Ann. 5: 926 & 944 (1860) and 6: 1170 & 1171. 1861; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 27. 1888; Hook. f., Fl. Brit. Ind. 6: 572. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 64, 85, 285, & 287. 1903; Fyson, Fl. Nilg. & Puln. Hill-tops 1: 427—429 (1915) and 2: pl. 272. 1915; Fyson, Journ. Indian Bot. 2: 310—312, pl. 29. 1921; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1607 & 1618. 1931; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 77 & [103]. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877. 1946; Moldenke, Known Geogr.

Distrib. Erioc. 23, 33, & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 127 & 206. 1949; Moldenke, Phytologia 3: 343. 1950; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. repr. 2, 8 [3]: 1121, 1126, & 1333. 1956; Moldenke, Résumé 162, 286, & 482. 1959; Moldenke, Résumé Suppl. 1: 18. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877. 1960; Thanikaimoni, Pollen & Spores 7: 185. 1965.

Illustrations: Fyson, Fl. Nilg. & Puln. Hill-tops 2: pl. 272. 1915; Fyson, Journ. Indian Bot. 2: 311 & pl. 29. 1921.

Eriocaulon robustum is based on Hohenacker 1307 as type, the var. foliis nitenti-glaucis is typified by Hohenacker 1309, and E. bracteosum is based on Hohenacker 1308.

Müller (1860) divides this species into two varieties as follows: "var. α. foliis lanceolatis elongatis, 8—14 1/2 pollices longis. Eriocaulon robustum et var. foliis nitenti-glaucis Steudel Synops. 2. 271 (v. s.). var. β. foliis oblongo-lanceolatis, 2—3 1/2 pollices longis. Eriocaulon bracteosum Steudel Synops. 2. 272. India orientalis: var. α. In montibus Nilagiri ad rivulos prope Utacamund (Incolis: Dabbe) Martio leg. Metz n. 1307 et 1309 (Hb. Steudel). — var. β. Leg. Huegel (Hb. Vindob. et Zuccarini). In montibus Nilagiri leg. Metz n. 1308 (Hb. Steudel). — Species propter capitula floribus laxis magnis composita et pilis longis sub lente visis subcrystallino-nitentibus insignis. Inter varietas robusti veri ab auctore ipso pronunciatas non vidi discrimen."

It should be noted here that the E. robustum var. caulescens (Hook. f. & Thoms.) Fyson is regarded by me as a synonym of E. atratum var. major Thwaites.

Fyson (1921) describes E. robustum as follows: "Stem short and stout to as much as 1 in. in thickness: thinner and branched in var. b [=E. atratum var. major]. Ls. up to 12 in. by 2 in., many nerved, glossy, coriaceous. Scapes to 24 in. Heads 1 1/4 in. Involucre white or gray. Floral bracts acute, cilate, entirely hidden when these are fully out by the very large protruding male petals. Receptacle hour-glass shape.....South India; Nilgiris 5—6,000 ft." What Fyson means by "Ls. up to 12 in. by 2 in." I do not know; it is obviously an error in the use of systems of measurement abbreviations.

In his 1915 work, Fyson goes into far more detail: "F. B. I. vi 572; I 4; White-tailed Hatpin-flower, Chrysanthemum scented. Rootstock stout, as thick as the finger or thicker, sometimes creeping, densely clothed below with the dead leaves: Leaves usually 3 or 4 inches long (1 to 9), and narrowed gradually from a clasping base, 1 inch broad, to the obtuse end, lanceolate or oblanceolate, quite glabrous, finely striate with only very small and close cross nerves, firmly erect or spreading, in section boat-shaped without keel, of a fresh light green or bluish colour. Flower stems solitary; about a foot high (8 inches to 3 feet); finely ribbed and twisted; sheath rather longer than the leaves,

expanded 1/2 inch below the mouth, which may be split down one side 1/2 inch or more. Heads 1/2 to 3/4 inch broad, and not quite so high; usually broadest near the top with sloping sides and so narrower at the bottom; covered when the flowers are out with the long white; downward directed, petals of the male flowers; except, often, in a band above the base, so that the head has a waist and approaches the form of a very flat hour glass; very slightly scented like Chrysanthemum. Involucral bracts many-seriate, ovate, acute, glabrous or with a very few short hairs, scarious, olive-black in colour. Receptacle villous, more or less hollowed at the top. Floral bracts, obovate-lanceolate-deltoid, fringed at the top with white hairs. Male flowers: — Sepals connected only at the base, much the same in shape as the floral bracts, with white hairs on the back. Petals connected into a distinct tube, oblanceolate, hairy, one much longer than the other two and the bract, and more hairy, all three with a black gland on the inner face a little above the mouth of the tube. Stamens six; anthers black on slender, curved filaments. Female flowers: — Stalk shorter. Sepals and petals with long hairs at the base, in addition to the terminal fringe of thicker ones at the back: sepals free: petals oblanceolate, quite free, all equal in length, with black glands. Ovary of three cells, yellow: styles long connected only near the base. t. 272. b. bracts; r receptacle in section; s three stamens. On the bank of the river at Pykara. Fyson 2561, 2694, 2860. Coonoor (Clarke). Only known from the Nilgiris. The slight enlargement of the sheath just below the mouth is not mentioned in the descriptions in F. B. I. and Das Pflanzenreich, but seems distinctly characteristic; so also is the frequent narrowing of the head above the base, by the greater length of the long petals of the male flowers in the upper and the lowest circles. The flower-head has none of the strong honey scent of E. nilagirense, but the faintest trace of that of the Chrysanthemum."

The species has been collected in flower and fruit in March and April. The only vernacular name recorded is "dabbe".

Additional citations: INDIA: Bombay: C. McCann 50177 (N, Xa), 50178 (N, Xa); Santapau 10850 (Xa). Madras: Bembower 35 (Mi); Fyson 2564 (S); Hohenacker 1307 (Mu—231—isotype); Hooker f. & Thomson s.n. [Nilghiri] (B); Schmid 820 (B), 824 (B); R. Wight s.n. [Nilgherry Hills] (V—41252). State undetermined: Hügel s. n. [Ind. orient.] (Mu—232); R. Wight 2860 [Peninsula Indiae orientalis] (Mu—338), s.n. [Ind. or.] (V—41340).

ERIOCAULON ROCKIANUM Hand.-Mazz.

Synonymy: Eriocaulon rockii Moldenke, Phytologia 2: 219—220. 1947.

Bibliography: Hand.-Mazz., Symb. Sin. 7: 1246. 1936; Moldenke, Phytologia 2: 219—220. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 132 & 206. 1949; Moldenke, Phytologia 3: 343. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Ré-

sumé 170 & 482. 1959; E. H. Walker, Bibl. East. Asiat. Bot. Suppl. 1: 235. 1960; Moldenke, Résumé Suppl. 17: 5. 1968.

Both binomials applied to this taxon were based on the same type collection, J. F. C. Rock 10843, from Yünnan, China. That of Handel-Mazzetti, being the earlier, is the one which must be adopted.

Additional citations: CHINA: Yünnan: Maire 3925 (Ca—389088).

ERIOCAULON ROLLANDII Rousseau

Bibliography: Rousseau, Bull. Jard. Bot. Brux. 27: 372. 1957; A. & D. Löve, Bot. Notiser Lund 111: 380 & 385. 1958; Moldenke, Résumé 424 & 483. 1959; Moldenke, Résumé Suppl. 1: [1]. 1959; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966; Moldenke, Phytologia 18: 376 & 377. 1969.

The type of this species was collected in the Lake Mistassini region of Canada. No cytological information is as yet available concerning it.

ERIOCAULON ROSEUM Fyson

Bibliography: Fyson, Journ. Indian Bot. 1: 50 (1919) and 2: 204 & 205. 1921; A. W. Hill, Ind. Kew. Suppl. 6: 79 (1926) and 7: 89. 1929; Moldenke, Known Geogr. Distrib. Erioc. 24 & 39. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 129 & 206. 1949; Moldenke, Résumé 165 & 483. 1959.

Illustrations: Fyson, Journ. Indian Bot. 2: 205. 1921.

Fyson's original description of this species (1921) is as follows: "E. roseum Fyson, sp. nov. (Kurz. 232 in Herb. Calc.) Caulis perbrevis. Folia caespitosa 2—8 cm. longa, basi ad apicen contracta, plana, tenuia, in sicco rubescentia. Pedunculi plures, valde tenuia, glabra, 10—25 cm. alta. Capitula 4—6 mm., lata, sed bractae involucrantes demum 2—3 mm. longiores, tenues et reflexae. Bractae flores superantes acutae, nigrescentes. Receptaculum altum, valde villosum. Flores trimeri, flos ♂; sepala in spathan antice fissam connata; petala parva, subequalia; antherae nigrae. Flos ♀: — sepala acqualia, nigrescentia; petala angusta-oblanceolata. Burma: Pegu, Kurz. This may be considered a very pronounced stage in the lengthening of the involucral bracts, begun in this series by var. Martiana of E. quinquangulare and it might perhaps be more properly considered a variety of that species. Its close relationship is shown in the very similar flowers, and the leaves being red or drying red. Of the young heads the involucral bracts are not much longer than the others, they lengthen with age."

ERIOCAULON ROSULATUM Körn.

Synonymy: Paepalanthus rosulatus Mart., Fl. Bras. 3 (1): 487, in syn. 1863.

Bibliography: C. Müll in Walp., Ann. 5: 930 (1860) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 486—488 & 500, pl. 41, fig. 3. 1863; Ruhl. in Engl., Pflanzenreich 13 (4—30): 42, 53, & 287. 1903; Moldenke, Known Geogr. Distrib. Erioc. 8, 39, &

53. 1952; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 77 & 206. 1949; Moldenke, Résumé 89, 328, & 483. 1959; Moldenke, Résumé Suppl. 12: 10. 1965.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 41, fig. 3. 1863.

The type of this species was collected by Carl Friedrich Philipp von Martius "in sedis arenoso-lutosis prope S. Francisci prope Salgado et in adscensu planities altae Alto de Paranan", Minas Gerais, Brazil, in August, 1818, and is deposited in the herbarium of the Botanische Staatssammlung at Munich. The same specimen is also the type of Martius' binomial.

Citations: BRAZIL: Minas Gerais: Martius s.n. [Macbride photos 18691] (Mu--294--type, N--photo of type, W--photo of type). MOUNTED CLIPPINGS & ILLUSTRATIONS: Mart., Fl. Bras. 3 (1): pl. 41, fig. 3 (B, B); drawings & notes by Körnicke (B).

ERIOCAULON ROUXIANUM Steud.

Synonymy: Eriocaulon rousciamum Steud. ex Moldenke, Known Geogr. Distrib. Erioc. 39, in syn. 1946.

Bibliography: Steud., Syn. Pl. Glum. 2: (Cyp.) 270. 1855; C. Müll. in Walp., Ann. 5: 926 & 936 (1860) and 6: 1171. 1861; Dalz. & Gibs., Bomb. Fl. 316. 1861; Ruhl. in Engl., Pflanzenreich 13 (4-30): 116 & 287. 1903; Fyson, Journ. Indian Bot. 3: 18. 1922; C. E. C. Fischer, Kew Bull. Misc. Inf. 1931: 261. 1931; Moldenke, Known Geogr. Distrib. Erioc. 23 & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 127 & 206. 1949; Moldenke, Résumé 162, 292, & 483. 1959; Moldenke, Phytologia 17: 494. 1968.

ERIOCAULON RUBESCENS Moldenke

Bibliography: Moldenke, Bol. Soc. Venez. Cienc. Nat. 23: 99--100. 1962; Moldenke, Résumé Suppl. 3: 12. 1962; Sandoval, Biol. Abstr. 46: 2128. 1965.

Citations: VENEZUELA: Guarico: Tamayo & Aristeguieta 4274 (Ve--type).

ERIOCAULON RUHLANDII Schinz

Bibliography: Schinz, Bull. Herb. Boiss., sér. 2, 6: 710. 1906; Prain, Ind. Kew. Suppl. 4, pr. 1, 82 (1913) and pr. 2, 82. 1938; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 265. 1955; Moldenke, Résumé 483 & 494. 1959; Moldenke, Résumé Suppl. 1: 10 & 25. 1959; R. H. Compton, Journ. S. Afr. Bot. Suppl. 6: 33. 1966; Moldenke, Résumé Suppl. 16: 8. 1968.

Hess (1955) gives a detailed description of the flowers of this species: "♀ Blüten: Sepalen 2; diese sind 1--1,3 mm lang, bootförmig oder konkav, vom Kiel bis an den Rand 0,2--0,3 mm breit, spitz, einwärts gebogen, in der oberen Hälfte schwarzgrau, unten weisz, stets kahl. Petalen 3; 0,9--1,2 mm lang, 0,3 mm breit, weisz, innerseits und am Rande mit 0,3--0,5 mm langen Haaren besetzt, auszerseits kahl, an der Spitze mit auffälliger, schwarzer Drüse. Die Frucht ist dreusamig; die rei-

fen Samen sind braun, fast kugelig, der Durchmesser beträgt ca. 0,3 mm. Der Griffel ist um 0,3 mm lang; die drei Narben sind etwa 1 mm lang. ♂ Blüten: Sepalen 2; sie sind 0,9 mm lang, von gleicher Form und Farbe wie die ♀ Blüten. Alle drei Petalen sind stark reduziert, höchstens 0,1 mm lang, tragen an der Spitze aber eine grösszere schwarze Drüse als bei E. ciliipetalum. Die Petalen sind kahl. Die 6 Antheren (nicht vier, wie Schinz [1906] in der Diagnose schreibt) sind schwarz. Aus dem Vergleich der beiden Arten ergeben sich folgende Unterschiede: Eriocaulon Ruhlandii hat gedrehte und höhere Halme, grau-schwarz Blütenköpfe, kleinere Hüllbrakteen und kleinere Blüten als E. ciliipetalum."

The type of the species was collected by Friedrich Richard Rudolf Schlechter (no. 2955) at Claremont, at an altitude of 20 meters, Natal, South Africa, on July 18, 1893, flowering and fruiting in July. To Hess the species was known only from the type collection, but Compton (1966) has since recorded it from Swaziland.

Citations: SOUTH AFRICA: Natal: F. R. R. Schlechter 2955 (B—isotype, Z--isotype).

ERIOCAULON SACHALINENSE Miyabe & Nakai

Bibliography: Miyabe & Nakai, Bot. Mag. Tokyo 42: 479. 1928; Mak. & Nemoto, Fl. Jap., ed. 2, 1514. 1931; Miyabe & Kudô, Fl. Hokk. & Saghal. 3: 288. 1932; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Nemoto, Suppl. Fl. Jap. 1039. 1936; Sugawara, Pl. Saghal. 117. 1937; Honda, Nom. Pl. Jap. 462. 1939; Sugawara, Illustr. Fl. Saghal. 2: 517, pl. 241. 1939; Satake, Journ. Jap. Bot. 15: 629 & 632. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 13, 61—63, 68, 81, & 87, fig. 1A & 28. 1940; Satake, Bull. Tokyo Sci. Mus. 3: [Rev. Jap. Erioc.] 51—53, 56, & 57, pl. 8, fig. 15. 1940; Moldenke, Known Geogr. Distrib. Erioc. 24 & 39. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 130 & 206. 1949; Moldenke, Résumé 167 & 483. 1959; Moldenke, Phytologia 18: 255 & 364. 1969.

Illustrations: Sugawara, Illustr. Fl. Saghal. 2: pl. 241. 1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6 & 62, fig. 1A & 28. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 8, fig. 15. 1940.

The type of this species was collected by S. Sugawara in wet places at Hukakusa, on Sakhalin Island, in August, 1927, and is deposited in the herbarium of Tokyo University.

Satake (1940) cites Sugawara s.n. [Otiai, Oct. 1927] in the Kew herbarium and notes "As Prof. Nakai has already found, this plant is very interesting and a good species in having dimerous flowers, its appearance being nearest to Eriocaulon atrum Nakai." He also comments that E. kusiroense Miyabe & Kudô lies between E. atrum and E. sachalinense in its taxonomic characters. The only vernacular name recorded for E. sachalinense is "karahuto-hosikusa".

ERIOCAULON SANTAPAUI Moldenke

Bibliography: Moldenke, Phytologia 3: 166—167 (1949) and 3: 343. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Razi, Rec. Bot. Surv. India 18: 20. 1959; Moldenke, Résumé 162 & 483. 1959.

ERIOCAULON SATAKEANUM Tatew. & Itô

Bibliography: Tatew. & Itô, Journ. Jap. Bot. 40: 156—157. 1965; Van Steenis & Jacobs, Fl. Males. Bull. 20: 1359. 1965.

The type of this species was collected by Misao Tatewaki and Koji Itô in the Kokemuma moor, about 1 km. northeast of Kijima, Inaniwa-kawazure-machi, Ogachi-gun, in Akita Prefecture, on northern Honshu, Japan, in August, 1964.

ERIOCAULON SCARIOSUM J. Sm.

Synonymy: Eriocaulon smithii R. Br., Prodr. Fl. Nov. Holl. 254. 1810. Busseuillia novae-hollandiae Lesson in Bougainville, Journ. Navig. Autour Globe 2: 348—351, pl. 46. 1837. Randalia scariosa Beauv. & Desv. apud Kunth, Enum. Pl. 3: 571, in syn. 1841. Eriocaulon lhotskyi Steud., Syn. Pl. Glum. 2: (Cyp.) 270 & 334. 1855. Eriocaulon lhotzkyi Steud. apud Körn., Linnaea 27: 653, in syn. 1856. Eriocaulon smithii var. α Körn., Linnaea 27: 652—653. 1856. Eriocaulon smithii var. β Körn., Linnaea 27: 652—653. 1856. Eriocaulon smithii var. γ Körn., Linnaea 27: 652—653. 1856. Randalia scariosa Beuav. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 681, in syn. 1895. Eriocaulon schmithii R. Br. apud Däniker, Vierteljahrsschr. Naturf. Ges. Zürich 77, Beibl. 19: 91, sphalm. 1932. Eriocaulon leucocephala Roxb. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959. Eriocaulon sordidum Ruhl. ex Moldenke, Résumé Suppl. 2: 9, in syn. 1960.

Bibliography: J. E. Sm. in Rees, Cycl. 13: Eriocaulon. 1809; R. Br., Prodr. Fl. Nov. Holl. 254. 1810; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 869. 1817; Spreng. in L., Syst. Veg., ed. 16, 3: 775. 1826; Desv., Ann. Sci. Nat. Paris, sér. 1, 13: 47. 1828; Lesson in Bougainville, Journ. Navig. Autour Globe 2: 348—351, pl. 46. 1837; Kunth, Enum. Pl. 3: 569—571. 1841; Steud., Syn. Pl. Glum. 2: (Cyp.) 270 & 334. 1855; Körn., Linnaea 27: 652—655. 1856; F. Muell., Fragm. 1: 94 & 95. 1859; C. Müll. in Walp., Ann. 5: 925—927 & 941 (1860) and 6: 1171. 1861; Benth. & F. Muell., Fl. Austral. 7: 191—193, 197, & 792. 1878; F. Muell., Syst. Census Austral. Pl. 123. 1882; F. M. Bailey, Syn. Queensl. Fl. 578. 1883; Moore & Betche, Handb. Fl. N. S. Wales 440. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 681. 1895; Britten, Journ. Bot. 38: 482 & 483. 1900; F. M. Bailey, Queensl. Fl. 6: 1715. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 60, 66, 286, & 287. 1903; F. M. Bailey, Compreh. Cat. Queensl. Pl. 584. 1913; Domin, Bibl. Bot. 20: 507. 1915; Maiden & Betche, Census N. S. Wales Pl. 38. 1916; Däniker, Vierteljahrsschr. Naturf. Gesell. Zürich 77, Beibl. 19: 91. 1932; Moldenke, Known Geogr. Distrib. Erioc. 28, 36, 39, & 40. 1946; Jacks. in Hook. f. &

Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 681. 1946; Guillaum., Fl. Analyt. & Synopt. Nouv.-Caléd. 50. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 153, 155, & 206. 1949; Van Steenis, Bull. Jard. Bot. Buitenz., sér. 3, 18: 460—461. 1950; Moldenke, Phytologia 3: 343—344. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 38. 1953; Moldenke, Résumé 209, 211, 240, 289, & 483. 1959; Moldenke, Résumé Suppl. 1: 17 & 18 (1959) and 2: 9. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 681. 1960; Moldenke, Résumé Suppl. 3: 26 & 32. 1962; J. H. Willis, Handb. Pl. Vict. 281. 1962; Beadle, Evans, & Carolin, Handb. Vasc. Pl. Syd. Dist. 483. 1963; J. W. Vickery, Contrib. N. S. Wales Nat. Herb. 3: 450. 1965; B. G. Briggs, Contrib. N. S. Wales Nat. Herb. 4: 26. 1966; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 168. 1966; O. D. Evans, Contrib. N. S. Wales Nat. Herb. Fl. Ser. 27/28: 10--12. 1966; Ornduff, Reg. Veg. 55: 13 & 113. 1968; Moldenke, Phytologia 18: 80, 326, 327, & 367. 1969.

Illustrations: Lesson in Bougainville, Journ. Navig. Autour Globe 2: pl. 46 [in color]. 1837.

The original description of E. scariosum by Sir J. E. Smith (1809) is "Stalks aggregate, five-angled. Leaves and sheaths smooth, of equal length. Head globose. Calyx-scales obovate, acute. -- Communicated from New South Wales in 1792, by John White, M.D. — Stalks five or six inches high. Head of a silvery white, scarcely so large as a pea, being about twice as big as the former." By the expression "the former" he doubtless means E. pygmaeum Soland., previously described by him.

Eriocaulon smithii is based on Sieber, Fl. Nov. Holl. 582, and was originally described as follows: "Scapo angulato, striato (5—8-unciali), foliis glabris planis multoties longiore; capitulo florido globoso; squamis involucrantibus paleisque imberbibus; perianthiis obsolete barbatis". Kunth (1841) has greatly amplified this description from the type collection with the addition also of fruit characters taken from another collection (collected by d'Urville).

The E. scariosum of Brown, now known as E. brunonis Britten, is described by him as "Scapo multistriato (spithamaeo), foliis planiusculis longiore; capitulo florido subgloboso, scarioso, pallido; squamis exterioribus vacuis, obtusis; paleis mucronatis, imberbibus; perianthii feminei exterioris foliolis lateralibus falcatis carina alata."

It is possible that the J. E. Smith collections cited below may represent the original type material collected by Dr. White. The Herb. Roth s.n. specimen in the Berlin herbarium has a label reading "Heyne 1874 in India orientali legit" and another reading "Eriocaulon leucocephala Roxb." attached to the sheet, but these labels probably do not belong there — E. leucocephalum Steud. is a synonym of E. quinquangulare L.

Körnicke (1856) divides the species into three unnamed varieties, as follows: "var. α — pedunculis usque 8-pollicaribus; foliis [cont.]

# BOOK REVIEWS

Alma L. Moldenke

"NOBLE FELLOW - WILLIAM STARLING SULLIVANT" by Andrew Denny Rodgers III, xxii & 361 pp., illus., Hafner Publishing Company, London & New York 10003. 1968 facsimile of the 1940 edition. $9.50.

Since this valuable work has been missing from the book markets for several years, it is good to welcome this facsimile, since it provides for the new generation of professional and amateur bryologists the interesting and accurate story of the founding of this science in the United States, of its founder, and of the development of Ohio.

The author, a skilled writer of other botanical biographies and histories, is a great-grandson of Sullivant. As a returned compliment he dedicated the book to the international Sullivant Moss Society.

There is appended a thorough index, a bibliography of published material used in the preparation of and mentioned in the text, and a list prepared by Richard T. Wareham of the Ohio State University of the new species of mosses and liverworts described by William S. Sullivant and by him jointly with Leo Lesquereux.

"THE THEORY OF ISLAND BIOGEOGRAPHY" by Robert H. MacArthur and Edward O. Wilson, xi & 203 pp., illus. Monographs in Population Biology I, Princeton University Press, Princeton, New Jersey 08540. 1967. $8.00 cloth, $3.95 paper.

These respected scientist-authors have herein expanded the natural history - taxonomic approach to biogeography to include and apply in theoretical analysis and experimentation the first principles of population ecology and genetics. This is done at the species level and island limitation as a forerunner to the explanation of distribution itself and of evolution.

Starting with the strikingly orderly area-diversity curve, their reasonable theory of equilibrium of species is developed. The biotic equilibrium is reached on an island when the immigration and extinction rates, measured in species/unit time, equal each other. Equilibrium models they expect will lead to new knowledge concerning the dynamics of immigration and extinction.

Summarizing and extending Baker and Stebbins' theory on colonizing species, the authors develop equations for the prediction of probability that a propagule of a given species will establish a successful colony or its concomitant extinction rate. They discuss the problems in terms of predators, prey and competitors facing a species attempting to invade a new island or "habitat island", which is a habitat surrounded by other

distinct habitats. During dispersal along island chains there is a loss in the absolute numbers of both species and higher taxa but an increase in the relative diversity in the species that succeed in dispersal. The potential role of stepping-stone islands in increasing biotic exchange has been checked by dispersal models.

The authors conclude these writings with suggestions for manipulating experimentally the biota of islands or "habitat islands" so that information yielded and interpreted through quantitative theory could have galvanic effects on biogeography, ecology and evolutionary theory.

"Indispensable" is misspelled on page 19.

The book is small; its contribution is big!

"SCIENTIFIC WRITING FOR GRADUATE STUDENTS" — edited by F. Peter Woodford, x & 199 pp., illus., The Rockefeller Press, New York 10021. 1968. $5.75.

The Council of Biology Editors' Committee on Graduate Training in Scientific Writing prepared this work as a teacher's manual and appealed for formal instruction in this field as an integral part of a scientist's university training because these editors are acutely aware that "It is no longer the exception but rather the rule that scientific writing is heavy, verbose, pretentious and dull."

Challengingly organized and effectively written itself, this book offers valuable plans and suggestions for the teaching of such a course by a scientist. A literate, careful student could gain much individually from this book if no such course were available in his university. The annotations in the bibliography add much of value.

In summarizing the chapter on doctoral theses the author writes "If I were asked for a single measure of scholarship, a single indicator of disciplined thinking, and therefore the best single criterion of a good thesis, I would put forward a plea for simplicity. This quality is, unfortunately, the one most conspicuously lacking in present-day theses and the one least prized among ambitious young scientists."

"KEYS TO GENERA OF HIGHER FUNGI" by Robert L. Shaffer, edition 2, iv & 131 pp. University of Michigan, Ann Arbor Station, Ann Arbor, Michigan 48104. 1968. Paper, $3.00.

The first edition of this work dates from 1953 and the pen of Dr. Alexander H. Smith. The present new edition by Dr. Shaffer is also planned primarily for mycology students at the University of Michigan on its campus and at its biological station, but it will be useful to many students, scholars and amateurs throughout our temperate areas. The selection of genera is limited by this avowed purpose and by the requirement of their possessing macrosporic fruiting structures.

The keys are dichotomous, reasonably easy to follow, often leading to infrageneric taxa, but not to species, and using "classical" modern nomenclature.

This is a handy book to have. I envision not a few people transferring (or intending to) their personal notes from their dogeared copy of the first edition to this new one!

"THE ALGAE AND THEIR LIFE RELATIONS" by Josephine E. Tilden, xii & 550 pp., illus., 2nd edition, a facsimile of the 1937 edition. Hafner Publishing Company, London & New York 10003. 1968. $13.50.

Exclusive of this current decade but for the two preceding ones many have considered this book the best text available for teaching phycology on the graduate and undergraduate levels. Recently it has just not been available, but now again it is. There are very few modern texts in English in this field today and none of the quality of Dr. Tilden's book. But her book can not be used as a sole text because it predates many taxonomic changes, electron microscope studies, and modern biochemical and physiological studies. How much better the publishing company would have served this field of learning if it had added just three chapters on these topics and an additional couple of pages of modern bibliography!

I have always been particularly grateful to this author for the fine illustrations used, her facile explanations, and especially those of the often pupil-mind-blocking alternation of generations in plants and animals, her myriad of fascinating items of interest -- as, for instance, the green alga growing on the red alga on the hairs of the three-toes sloth!

Today's and tomorrow's algal students will be cheated if not exposed thoroughly to this book!

"NATURE'S WAYS -- HOW NATURE TAKES CARE OF ITS OWN" by Roy Chapman Andrews, 206 pp., illus. Crown Publishers, Inc., New York 10016. 1969. $10.00.

This is the seventh printing of this book that first appeared in 1951 and now appears in an enhanced format. There are 144 familiar and excellent illustrations of which 72 are in full color. Besides a full index, there is a table of contents classified according to camouflage and concealment, mimicry, immobility, speed, sight, smell, defensive armor and offensive devices, specialization, adaptation, food-storing and foraging devices, and symbiosis. Fortunately scientific names are regularly given for the organisms described.

The stories should prove fascinating to any reader from a child up to any highly trained scientist. Naturally most of them refer to animals, and plants get mentioned only indirectly in these accounts. Out of the 150 stories, a few deal directly with plants -- the manchineel tree that blinds, the pitcherplants

and other plants that turn the tables by consuming insects, the acacias and cacti equipped with barbed wire, the ragwort with its reservoirs to meet the water problems of desert survival, the African silk-cotton tree whose trunk base spreads widely to withstand the force of tornadoes.

"He wears an armor of moss" seems to be the only ill-chosen title because the "moss" consists of algae — green and red — not moss, and the coating is not protective in the armor sense but only in the camouflage sense.

"ATLAS AND MANUAL OF PLANT PATHOLOGY" by Ervin H. Barnes, xxix & 325 pp., illus. Appleton-Century-Crofts Division of the Meredith Corp., New York 10016. 1968. $9.50 in paper & spiral binding.

This manual is effectively planned for individual and class lectures, laboratory exercises and field work for the beginning student in plant pathology. The book will prove particularly useful in colleges of agriculture and schools of horticulture because the explanations are simple and clearcut, the black and white photographs are large and clearly demonstrative, and the author's own drawings are very helpful.

A very clever means of substitution for the use of color in the text (which would have made the book prohibitive in price) is the preparation of a series of color transparencies matching the photographs precisely. They can be used by the teacher in lectures or even by individual students in the laboratory. The publisher's literature indicates the source of these transparencies, which may be purchased in complete sets, subsets or singly. Since color is often a diagnostic feature of the host, suscept, vector, parasite and/or pathogen, this system becomes an excellent innovation.

The book commences with carefully thought out definitions, then follows with interpretations of microscopic observations, while the bulk of the work treats of diseases, especially of crops, caused by bacteria, viruses, the various kinds of fungi, higher plant parasites and nematodes.

In one place on page 120 "Latin" is correctly printed but in another the initial letter is lowercased.

"INSECTS IN RELATION TO PLANT DISEASES" by Walter Carter, xiv & 705 pp., illus., 2nd printing. International Publishers of John Wiley & Sons, London, Sydney, & New York 10016. 1966. $25.00.

This book is the first similarly comprehensive text published since Leach's "Insect Transmission of Plant Diseases" back in 1940. The first printing of Carter's work rolled off the presses in 1962 and it is literally crammed with valuable material, well organized, well illustrated and well documented.

Part I deals with plant pathogens — bacterial and fungal — transmitted by insects and their specialized vector-pathogen re-

lationships.

Part II deals with toxicogenic insects and the resultant primary and systemic phytotoxemias and malformations.

Part III deals with plant viruses, their entities, their clinical aspects in disease, modes of transmission through seed, soil, dodder, grafting, mechanical transfers, and by arthropods and other animals. The vector-virus relationships are very effectively described. Ecological aspects of the plant virus transmission are also carefully explained and demonstrated. Much thought is spent on the control of viruses and virus diseases in plants through heat therapy, production of virus-free plants, chemical controls, replacement control, resistant and tolerant varieties, cross protection and prospects for the future.

"PLANT STRUCTURE AND DEVELOPMENT — A PICTORIAL AND PHYSIOLOGICAL APPROACH" by T. P. O'Brien & Margaret E. McCully, x & 114 pp., illus. Collier-Macmillan Ltd., London, and Macmillan Co., New York 10022. 1969. $5.50 paper, $9.95 cloth.

Offered to replace old style waning separate courses in plant morphology and plant physiology, this integrated program stresses developmental biology. The topic is treated pictorially, mainly from excellent photomicrographs, photomacrographs, electron micrographs, and limitedly from prepared microscope slides of only those structures whose functions are known. This orientation and presentation are modern, impressive and interest-sustaining.

The vocabulary is intentionally simple, descriptive and functional. New terms are italicized when first presented. The structures covered are the cell with its mitosis and tissue organization, the stem with its specialized apex, leaves and buds, the reproductive tissues and the seed. For each topic there are bibliographies of general references and of reviews and research papers.

It would have been better if full scientific names were given for all rather than some of the plants depicted in these superb illustrations. There are always some good taxonomic botanists around to verify voucher specimen identifications or to make them.

An appendix gives the methods used in specimen preparation.

Much can be taught and concomitantly learned thrillingly and thoroughly from a course using this dynamic text.

# PHYTOLOGIA

*Designed to expedite botanical publication*

Vol. 18 October, 1969 No. 8

CONTENTS



Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.



Price of this number, $1; per volume, $6.75 in advance, or $7 at close of volume plus postage

# NEW TREE SPECIES FROM ESMERALDAS, ECUADOR (CONTINUED)

ELBERT L. LITTLE, JR.

Five new tree species from the Province of Esmeraldas in northwestern Ecuador are published here in the following genera (and families): Talauma Juss. (Magnoliaceae), Macrolobium Schreb. (Leguminosae, Caesalpinioideae), Zanthoxylum L. (Rutaceae), Freziera Sw. ex Willd. (Theaceae), and Clusia L. (Guttiferae). Also, a new name is published in Cassia L. (Leguminosae) for a tree species planted at Quito (Province of Pichincha).

This article is a continuation of articles with the same title (Phytologia 18: 195-208, 404-418, illus. 1969), the third in a series. Each description is accompanied by a line drawing prepared for a book on the common trees of Esmeraldas, now in press. The work was done under the forestry project, Desarrollo Forestal de Noroccidente (DEFORNO). This was United Nations Special Fund Project No. 127, administered by the Food and Agriculture Organization (FAO) of the United Nations and the Government of Ecuador.

**TALAUMA DIXONII** Little, sp. nov. "Cucharillo." Fig. 11.

Arbor magna sempervirens ad 38 m. alta, trunco 70 cm. diametro, anteridibus humilibus angustis. Cortex fere laevis lenticellis multis verrucosis et lineis multis horizontalibus, griseo-roseus; cortex interior flavescens condimenti sapore amaro. Ramuli crassi glabri, virescentes, demum atrovirentes, nodis multis annulatis. Stipula perlonga, gemmam longam anguste cylindricam 6-10 cm. longitudine obducens, ad petiolum partim adnata, caduca, cicatricem supra formans. Foliorum alternorum petioli 1-4 cm. longi, complanati supra, parum alati, glabrati. Laminae ellipticae, 9-19 cm. longae, 4-9 cm. latae, coriaceae, glabrae, apice et basi rotundatae, margine integra, leviter inflexae et 8-13 nervis parum curvis atque impressis costae lateralibus utroque, supra atrovirentes nitidae, subtus virescentes nitidulae.

Flores terminales solitarii permagni albi fragrantes, erecti pedunculo crasso accrescenti annulis multis. Alabastrum ovoideum, flavidum, 5-6 cm. longum, 3.5-4.5 cm. diametro, bractea spathacea atro-brunnea puberula intus albida secus lineam unicum findente obtectum, caducum. Sepala 3, 8-10 cm. longa, 4-5 cm. lata, albida demum brunnea, crassa concava extus puberula. Petala 6, obovata, 10-11 cm. longa, 4-6 cm. lata, alba, obtusa crassa carnosa. Stamina numerosa congesta 16 mm. longa angusta albida. Gynoecium ellipsoideum, 3 cm. longum, 2.3 cm. diametro, carpellis multis aggregatis angustis 16 mm. longis, 2 mm. latis, stylis albidis.

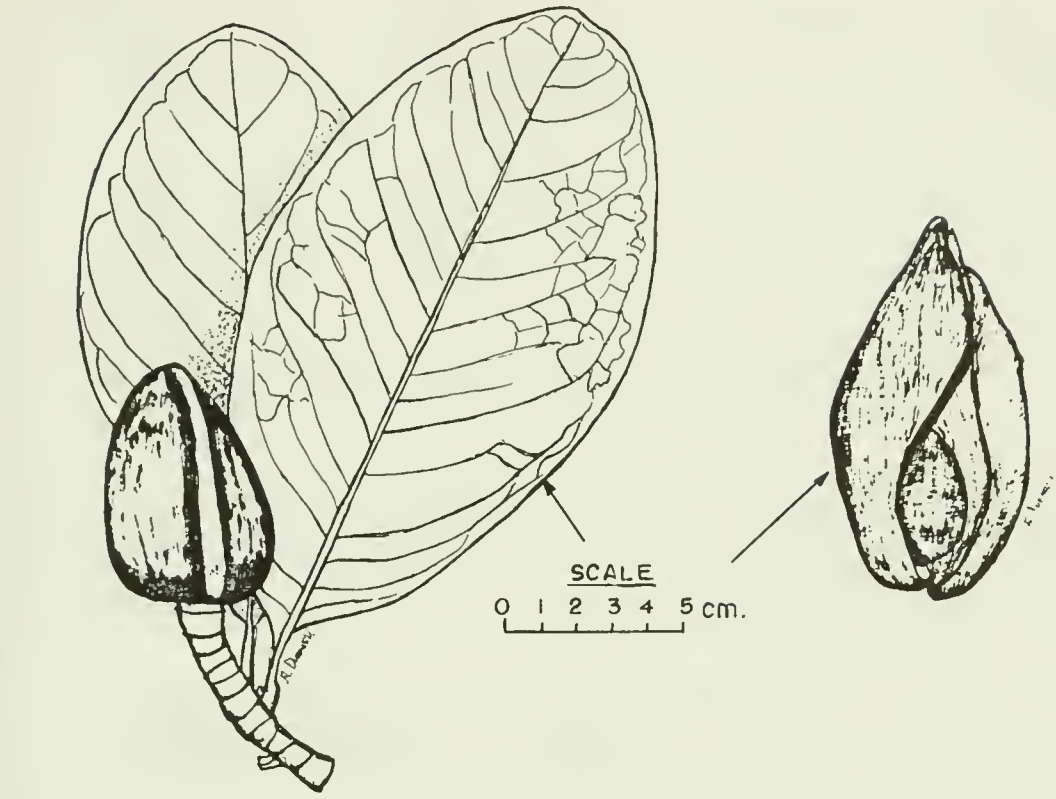
Fructus pedunculo longo pendens, aggregatus, permagnus, obovoideus vel ellipsoideus, 13-14 cm. longus, 11 cm. diametro, atro-brunneus carpellis multis concretis formatus, fere laevis carpellorum lineis multis et stylorum acuminibus multis signatus, lignosus pergravis (0.7-0.8 kilo), circumscissilis, pariete crasso (2.5 cm.) ex basi irregulariter disrumpens. Semina multa, 2 cm. longa, 9 mm. diametro, angulata rubra, 1 vel 2 in loculo, in filo albo ex loculis multis axis lignosi ellipsoidei acuti 6-13 cm. longi suspensi.

Large evergreen tree to 38 m. high, with trunk 70 cm. in diameter, with low narrow buttresses. Bark smoothish with many warty lenticels and many horizontal lines, pink gray; inner bark light yellow, with bitter taste of spice. Twigs stout, glabrous, light green, afterwards dark green, with many ringed nodes. Petioles of the alternate leaves 1-4 cm. long, flattened above and slightly winged, glabrate. Stipule very long, covering long narrowly cylindric bud 6-10 cm. long, partly adnate to petiole, caducous, forming a scar on upper surface. Blades elliptic, 9-19 cm. long, 4-9 cm. wide, coriaceous, glabrous, rounded at both apex and base, with entire margin, slightly inflexed on both sides of midrib, with 8-13 slightly curved and slightly impressed lateral nerves on each side, upper surface shiny dark green, and lower surface slightly shiny light green.

Flowers terminal, solitary, very large, white fragrant, erect on stout enlarged peduncle with many rings. Flower bud ovoid, light yellow, 5-6 cm. long, 3.5-4.5 cm. in diameter, covered by a dark brown finely hairy spathaceous bract whitish inside, that splits open on one side, shedding early. Sepals 3, 8-10 cm. long, 4-5 cm. wide, whitish turning brown, thick, concave, puberulent on outside. Petals 6, obovate, 10-11 cm. long, 4-6 cm. wide, white, obtuse, thick, fleshy, concave. Stamens numerous, crowded, 16 mm. long, narrow, whitish. Gynoecium ellipsoidal, 3 cm. long, 2.3 cm. in diameter, with many crowded narrow carpels 16 mm. long and 2 mm. wide, with whitish styles.

Fruit pendulous on long peduncle, aggregate, very large, obovoid or ellipsoidal, 13-14 cm. long, 11 cm. in diameter, dark brown, formed by many concrescent carpels, smoothish with many lines of the carpels and many points of styles, woody, very heavy (0.7-0.8 kilo), circumscissile, with thick wall 2.5 cm. thick, breaking off irregularly from base. Seeds many, 2 cm. long, 9 mm. in diameter, 1 or 2 in a locule, angled, red, suspended on white thread from many locules of ellipsoidal acute woody axis 6-13 cm. long. Collected with flower buds, few flowers, and fruits in September.

Wood attractive, the sapwood whitish and heartwood olive green. It is used for lumber and dugout canoes.



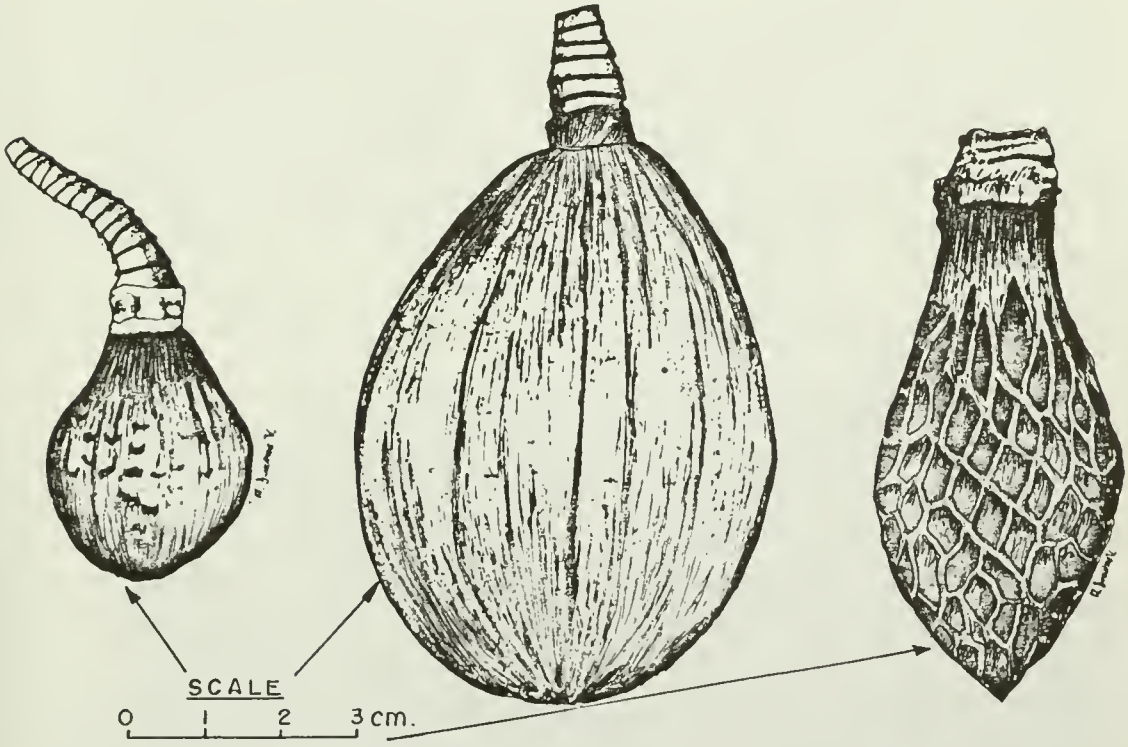




Fig. 11. Talauma dixonii Little, sp. nov. "Cucharillo."

ECUADOR, ESMERALDAS: Near junction of Río Hoja Blanca and Río Hualpi, alt. 75 m., wet tropical forest, Sept. 15, 1965, E. L. Little, Jr., and R. G. Dixon 21066 (HOLOTYPE, US; isotype, NY).

The type tree of this new species was discovered by Robert G. Dixon, silviculturist with the forestry project in Esmeraldas, and myself while following a forest survey line. This giant of the canopy was conspicuous with its large ball-like fruits hanging from the high branches. When cut with axes, it fell against another tree. That also was cut, and the crown finally came to the earth. While a section of the trunk was being removed for wood samples and testing, I collected herbarium specimens. It was a surprise to recognize the flower buds as a magnolia.

The notes and measurements are from fresh specimens. Fig. 11 shows at upper left a twig with 2 leaves and flower bud, upper right old partly dried flower, lower left immature fruit, lower center mature fruit, and at lower right the axis of fruit after outer wall and seeds have been shed.

This new species probably is the first representative of the Magnoliaceae noted in Ecuador. A second species found afterwards in Esmeraldas has been named Magnolia striatifolia Little (Phytologia 18: 198, fig. 2. 1969).

The genus Talauma Juss. contains about 40 species mostly in tropical and subtropical Asia, also in tropical America from southern Mexico and West Indies to eastern Brazil, according to J. E. Dandy (in J. Hutchinson, Gen. Fl. Plants 1: 55. 1964). This new Ecuadoran species is related to Talauma ovata St.-Hill. of Brazil, which has ovate leaves, similar ball-like fruits of concrescent carpels, and thick wall breaking off irregularly from base. Perhaps these species merit recognition as a segregate genus.

**MACROLOBIUM INAEQUALE** Little, sp. nov. "Nato de río." Fig. 12.

Sect. Stenosolen Harms. Arbor magna sempervirens ad 23 m. alta, trunco 40 cm. diametro. Cortex laevis, bruneus; cortex interior pallido-brunneus. Ramuli grisei glabri lenticellis elevatis punctorum similibus. Folia alterna, paripinnata, 2—jugata, 12-16 cm. longa, petiolo breve puberulo, basi dilatato, 0.5-1 cm. longo, axe breve 1.5-2 cm. longo puberulo longitudinaliter sulcato, petiolulis brevibus dilatatis 2-3 cm. longis. Laminae ellipticae, asymmetricae, pari inferiore parvo 3-5 cm. longo, 1.5-3 cm. lato, pari superiore triplo magno, 10-15 cm. longo, 4-7 cm. lato, papyraceae, glabratae, apice acutae, basi inaequales rotundataeque vel acutae, margine parum revolutae, costa leviter curva, nervis lateralibus utroque latere 6-16 impressis, versus marginem connatis, supra nitido-virides, subtus pallido-virides nervis lateralibus tenuibus prominentibus.


Fig. 12. Macrolobium inaequale Little, sp. nov. "Nato de río."

Inflorescentia racemosa 6-10 cm. longa, ad nodos infra folia lateralis, floribus multis pedicellis brevibus 0.5-1 cm. longis. Flores 15 mm. longi, hypanthio anguste tubulari 6 mm. longo, 2 mm. lato. Sepala 4 oblonga 10-11 mm. longa, subaequalia. Petalum 1 rotundatum parum unguiculatum fimbriatum. Stamina 3, 8 mm. longa, staminodia 2, 3 mm. longa. Pistillum stipite ad parietum hypanthii prope apicem affixo, ovario complanato glabro 1-loculare, 4 ovulis, stylo filiforme curvo, et stigmate capitati. Fructi non visi.

Large evergreen tree to 23 m. high and 40 cm. in trunk diameter. Bark smooth, brown; inner bark light brown. Twigs gray, glabrous with raised dotlike lenticels. Leaves alternate, paripinnate, 2-paired, 12-16 cm. long, with short petiole 0.5-1 cm. long, puberulent, enlarged at base and short axis 1.5-2 cm. long, puberulent, longitudinally grooved above, and with short enlarged petiolules 2-3 mm. long. Leaf blades elliptic, asymmetric, the lower pair small, 3-5 cm. long, 1.5-3 cm. wide, the upper pair 3 times as large, 10-15 cm. long, 4-7 cm. wide, papyraceous, glabrate, acute at apex, unequal and rounded or acute at base, margin slightly revolute, with midrib slightly curved, with 6-16 lateral nerves on each side impressed and connate toward margin, upper surface shiny green, and lower surface light green with fine prominent lateral nerves.

Inflorescence racemose, 6-10 cm. long, lateral at nodes below leaves, with many flowers on short pedicels 0.5-1 cm. long. Flowers 15 mm. long, with narrowly tubular hypanthium 6 mm. long and 2 mm. wide. Sepals 4 oblong, 10-11 mm. long, subequal. Petal 1 rounded, slightly clawed, fringed. Stamens 3, 8 mm. long, and staminodia 2, 3 mm. long. Pistil with stipe attached to wall of hypanthium near apex, flattened 1-celled ovary, 4 ovules, threadlike curved style, and capitate stigma. Collected with flowers in July.

Wood very hard, heavy, with light brown sapwood and dark brown streaked heartwood.

ECUADOR, ESMERALDAS: Río Pambil Estero, alt. 20 m., common along river banks with inundation, wet forest, July 9, 1966, C. Jativa 312 (1091) (HOLOTYPE, US; isotypes LA, NY; wood sample, MADw).

The genus Macrolobium Schreb. is represented by more than 50 species in tropical America from Costa Rica and Panama south to Peru and Brazil. The thorough monograph by Richard S. Cowan (A taxonomic revision of the genus Macrolobium (Leguminosae—Caesalpinioideae). N. Y. Bot. Gard. Mem. 8: 257-342, illus. 1953) accepted 48 species, and several others have been named since. This new species from Esmeraldas is distinguished by 2 very unequal pairs of leaflets, the upper pair 3 times as large as the lower pair.

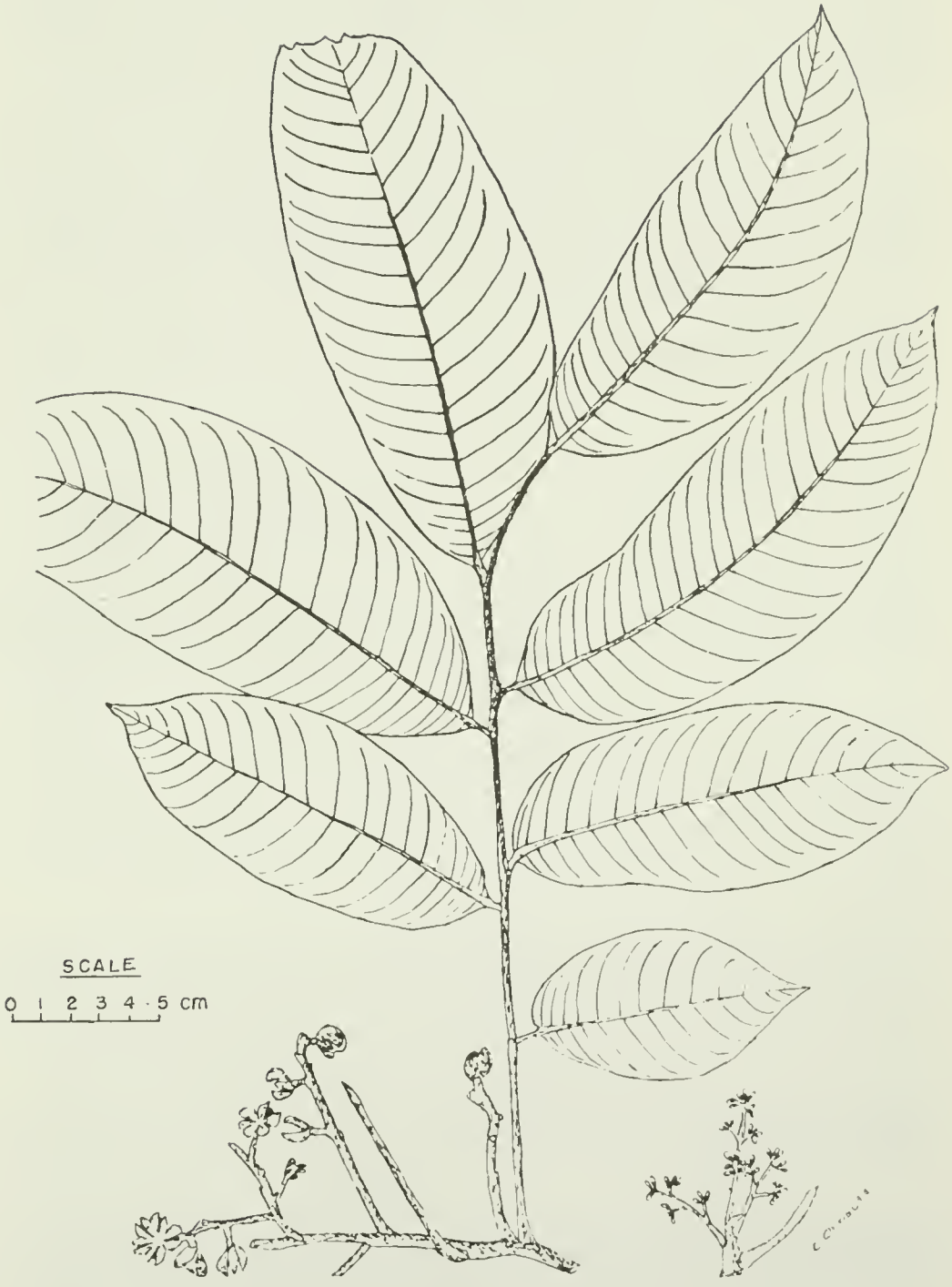



Fig. 13. Zanthoxylum tachuelo Little, sp. nov. "Tachuelo."

An unnamed fruiting specimen (J. Cuatrecasas 17569; Colombia, Depto. del Valle, Costa del Pacífico: Río Cajambre, alt. 5-80 m., May 5-15, 1944; US) is closely related or possibly a variation of the same species. That specimen has 1 pair of much larger leaflets 20 cm. long and 9 cm. wide and apparently scars of a lower, smaller pair. The large flat brown pods are about 20 cm. long and 7 cm. wide and become much curved and twisted in opening. Seeds few, rounded, very flat, brown, 4-4.5 cm. in diameter.

Another species, Macrolobium stenosiphon Harms, "chípero dormilón" or "dormilón," is common along river banks at low altitudes in Esmeraldas. Named from Colombia, it was collected in Ecuador by the forest survey in 1943 and again in 1965. That distinct species with leaves 20—30-jugate was segregated in a monotypic genus as Pseudovouapa stenosiphon (Harms) Britton & Killip.

**ZANTHOXYLUM TACHUELO** Little, sp. nov. "Tachuelo," "azafrán." Fig. 13.

Subgen. Fagara (L.) Triana & Planch. Arbor magna sempervirens ad 30 m. alta, trunco 40 cm. diametro, anteridibus humilibus rotundatis, saepe spinis validis brevibus in trunco et ramibus. Cortex cineraceus fere laevis multis verrucis parvis et saepe spinis; cortex interior flavido- et aurantiaco-vittatus, amarus. Ramuli crassi, viridi-grisei punctis pallidis, ramuli atque folia obtrita Citri odore atque sapore valido praediti. Folia alterna magna, pinnata, 40-60 cm. longa, glabrata, petiolo tereti crasso 5-7 cm. longo, 3-5 mm. diametro, axe crasso pallido-viride 20-35 cm. longo, supra longitudinaliter sulcato, foliolis 8-13 oppositis vel alternis petiolulis 5 mm. longis. Laminae ellipticae, 6-20 cm. longae, 3.5-8.5 cm. latae, papyraceae, apice acuminatae vel acutae, basi rotundatae atque inaequales, margine integrae, inaequilaterales, punctis translucidis, supra atrovirentes nervis lateralibus multis impressis, subtus obscure pallido-virides.

Dioecia. Inflorescentiae femineae paniculatae laterales axillares, 4-8 cm. longae, ramis crassis puberulis, multis floribus unisexualibus minutis 3 mm. longis pallido-viridibus. Flores feminei 5 sepalis 1 mm. longis, 5 petalis 2 mm. longis, glandulo-punctatis, disco, pistilloque 1 mm. longo, ovario rotundato 5-loculare et stigmate complanato. Capsulae depresso-globosae 11 mm. longae, 15 mm. diametro, nigricantes, 5-loculares, secus nervas 5 dehiscentes. Semina 5, ellipsoidalia, 7 mm. longa, nitido-nigricantes.

Large evergreen tree to 30 m. high and 40 cm. in trunk diameter, with low rounded buttresses, often with short stout sharp spines on trunk and branches. Bark light gray, nearly smooth, with many small warts and often spines; inner bark light yellow

and orange streaked, bitter. Twigs stout, greenish gray, with light dots, twigs and crushed leaves with strong taste and odor of Citrus. Leaves alternate, large, pinnate, 40-60 cm. long, glabrate, with terete stout petiole 5-7 cm. long, 3-5 mm. in diameter, stout pale green axis 20-35 cm. long, longitudinally grooved above and 8-13 leaflets opposite or alternate with petiolules 5 mm. long. Blades elliptic, 6-20 cm. long, 3.5-8.5 cm. broad, papyraceous, glabrate, acuminate or acute at apex, rounded and unequal at base, with entire margin, sides unequal, with translucent dots, upper surface shiny dark green with many impressed lateral nerves, lower surface dull light green.

Dioecious. Female inflorescences paniculate, lateral, axillary, 4-8 cm. long, with stout puberulent branches and with many minute light green unisexual flowers 3 mm. long. Female flowers with 5 sepals 1 mm. long, 5 gland-dotted petals 2 mm. long, disk, and pistil 1 mm. long with rounded 5-celled ovary and flattened stigma. Capsules depressed globose, 11 mm. long, 15 mm. in diameter, blackish, 5-celled, opening along 5 lines. Seeds 5, ellipsoidal, 7 mm. long, shiny blackish. Collected with flowers and fruits in October and with fruits in July.

Wood hard, of good quality, with thick light yellow sapwood and light brown heartwood.

ECUADOR, ESMERALDAS: Río Guayllabamba near Quinindé, alt. 130 m., wet forest, Oct. 4, 1965, E. L. Little, Jr., and R. G. Dixon 21222 (HOLOTYPE, US; isotype, NY). Río Pambil, alt. 25 m., secondary forest, common, July 7, 1966, C. Játiva 307 (1081) (US, LA).

The large genus Zanthoxylum L. sens. lat. (including Fagara L.) contains more than 270 species in tropical, subtropical, and warm temperate regions of the world. Reasons for uniting Fagara as a subgenus have been stated by G. K. Brizicky (Arnold Arboretum Jour. 43: 6-9, 80-83. 1962) and others.

This new species was not represented in the large collections at the U. S. National Herbarium. It may be related to Zanthoxylum sprucei Engl. of Peru. Another species, Z. rhoifolium Lam., known also as "tachuelo," was collected at San Lorenzo, Esmeraldas, by the forest survey in 1943.

The specific ephithet is taken from the common name of this and other species of the same genus in Esmeraldas. The common name from Spanish "tachuela," tack, describes the many stout spines on trunk and branches.

Figure 13 by Carlos Chiriboga shows a portion of a twig with a leaf and fruits, also at lower right a female inflorescence.

**FREZIERA ESMERALDANA** Little, sp. nov. Fig. 14.

Arbor magna sempervirens ad 35 m. alta, trunco 60 cm. diametro, anteridibus humilibus angustis. Cortex fere laevis brunneus lenticellis verrucosis; cortex interior roseo-vittatus, sapore arenoso et modice amaro. Ramuli longi, juventute virides puberuli, demum atro-brunnei multis lenticellis puntis pallidis. Gemma nuda foliorum juvenium plicatorum sericeorum composita. Folia alterna biserialia, petiolis brevibus crassis viridibus 1 cm. longis, longitudinaliter sulcatis. Laminae anguste ellipticae, 10-15 cm. longae, 3.5-6 cm. latae, coriaceae, apice et basi acutae, margine serrulatae, punctis translucidis, nervis lateralibus multis parallelis impressis, supra atrovirentes, glabratae, modice nitidae, subtus obscure pallido-virides puberulae; laminae juvenes lineis 2 tenuibus vel plicis utroque costae latere et margine parallelis.

Flores laterales, pauci, fasciculati, fere sessiles foliorum axillis et nodis infra folia, fere 1 cm. lati, viridi-albi. Alabastra rotundata, 5 mm. diametro. Flos bracteolis 2, rotundatis puberulis 1 mm. longis. Sepala 5, imbricata, rotundata viridia 2 mm. longa, puberula, persistentia. Petala 5 imbricata, alba, elliptica, concava, 4 mm. longa. Stamina vel staminodia c. 15, 2-3 mm. longa, filamentis tenuibus et antheris angustis 1 mm. longis. Pistillum ovario rotundato 5-loculare, ovulis paucis, stigmate brevi. Fructus non visus.

Large evergreen tree to 35 m. high and 60 cm. in trunk diameter, with low narrow buttresses. Bark smoothish with warty lenticels, brown; inner bark pink streaked, with gritty, slightly bitter taste. Twigs long, green and puberulent when young, afterwards dark brown with many light dot lenticels. Bud naked, of folded silky young leaves. Leaves alternate in 2 rows, with short stout green petiole 1 cm. long, longitudinally grooved. Blades narrowly elliptic, 10-15 cm. long, 3.5-6 cm. broad, coriaceous, acute at apex and base, finely serrate at margin, with translucent dots, lateral nerves many, parallel, and impressed, upper surface dark green, glabrate, and slightly shiny, and lower surface dull light green and puberulent; young leaves with 2 fine lines or folds on each side of costa parallel with margin.

Flowers lateral, few, fascicled and almost sessile at leaf axils and at nodes below leaves, nearly 1 cm. wide, greenish white. Buds rounded, 5 mm. in diameter. Flower with 2 rounded puberulent bracteoles 1 mm. long. Sepals 5, imbricate, rounded, green, 2 mm. long, puberulent, persistent. Petals 5, imbricate, white, elliptic concave, 4 mm. long. Stamens or staminodia about 15, 2-3 mm. long, with slender filaments and narrow anthers 1 mm. long. Pistil with rounded 5-celled ovary, few ovules, and short stigma. Fruits not seen. Collected with flowers in September.


Fig. 14. Freziera esmeraldana Little, sp. nov.

Wood slightly soft, with whitish thick sapwood and pinkish brown heartwood.

ECUADOR, ESMERALDAS: Alto Tambo, alt. 650 m., lower montane forest, Sept. 22, 1965, E. L. Little, Jr., and R. G. Dixon 21118 (HOLOTYPE, US; isotype, NY; wood sample, MADw).

The genus Freziera Sw. ex Willd. contains about 40 species in mountains of tropical America from Costa Rica to Venezuela, Ecuador, and Bolivia, also Cuba. It was monographed by Clarence E. Kobuski (Studies in the Theaceae, VIII. A synopsis of the genus Freziera. Arnold Arboretum Jour. 22: 457-496. 1941). The new species is related to another Ecuadoran species, F. verrucosa (Hier.) Kobuski, which has long petioles 2-3 cm. long and long pedicels to 10 m. Both, as well as a few others, have prominent raised whitish dot lenticels.

**CLUSIA DIXONII** Little, sp. nov. "Ducu." Fig. 15.

Arbor parva ad 10 m. alta, trunco 15 cm. diametro. Cortex griseus laevis, latice alba. Ramuli percrassi, teretes, glabri. Folia opposita glabra, petiolis crassis alatis 1-2 cm. longis. Laminae obovatae, magnae, 16-21 cm. longae, 9-13 cm. latae, virides, percrassae et fere succulentae, apice rotundatae, basi acutae, margine revolutae, costa crassa, in vivo sine nervis lateralibus manifestis, in sicco multis nervis lateralibus tenuibus parallelis.

Capsulae 1-2 terminales pedicellis brevibus crassis 1 cm. longis, magnae, ovoideae, 3.5-6 cm. longae, 3-4 cm. diametro, succulentae, multis sulcis longitudinalibus profundis, pariete crasso, apice stigmatibus nigricantibus 8-9 fere 1 cm. latis in circulo sessilibus, 8—9-locularibus, nervis longitudinalibus dehiscentes, basi 4 vel pluribus sepalis rotundatis persistentibus, etiam petalis paucis similaribus. Semina multa, 7 mm. longa, anguste cylindrica. Flores non visi.

Small tree to 10 m. high, with trunk 15 cm. in diameter. Bark gray, smooth, with white latex. Twigs very stout, terete, glabrous. Leaves opposite, glabrous, with stout winged petioles 1-2 cm. long. Blades obovate, large, 16-21 cm. long, 9-13 cm. wide, very thick and almost succulent, rounded at apex, acute at base, with revolute margin, with stout midrib, upper surface green, lower surface light green, in living state without visible lateral nerves, in dried state with many fine parallel lateral nerves.

Capsules terminal, 1-2 on short stout pedicels 1 cm. long, large, ovoid, 3.5-6 cm. long, 3-4 cm. in diameter, succulent, with many deep longitudinal grooves, with thick wall, and at apex 8-9 blackish stigmas nearly 1 cm. wide sessile in a circle, 8—9-celled, opening by longitudinal lines, at base with 4 or

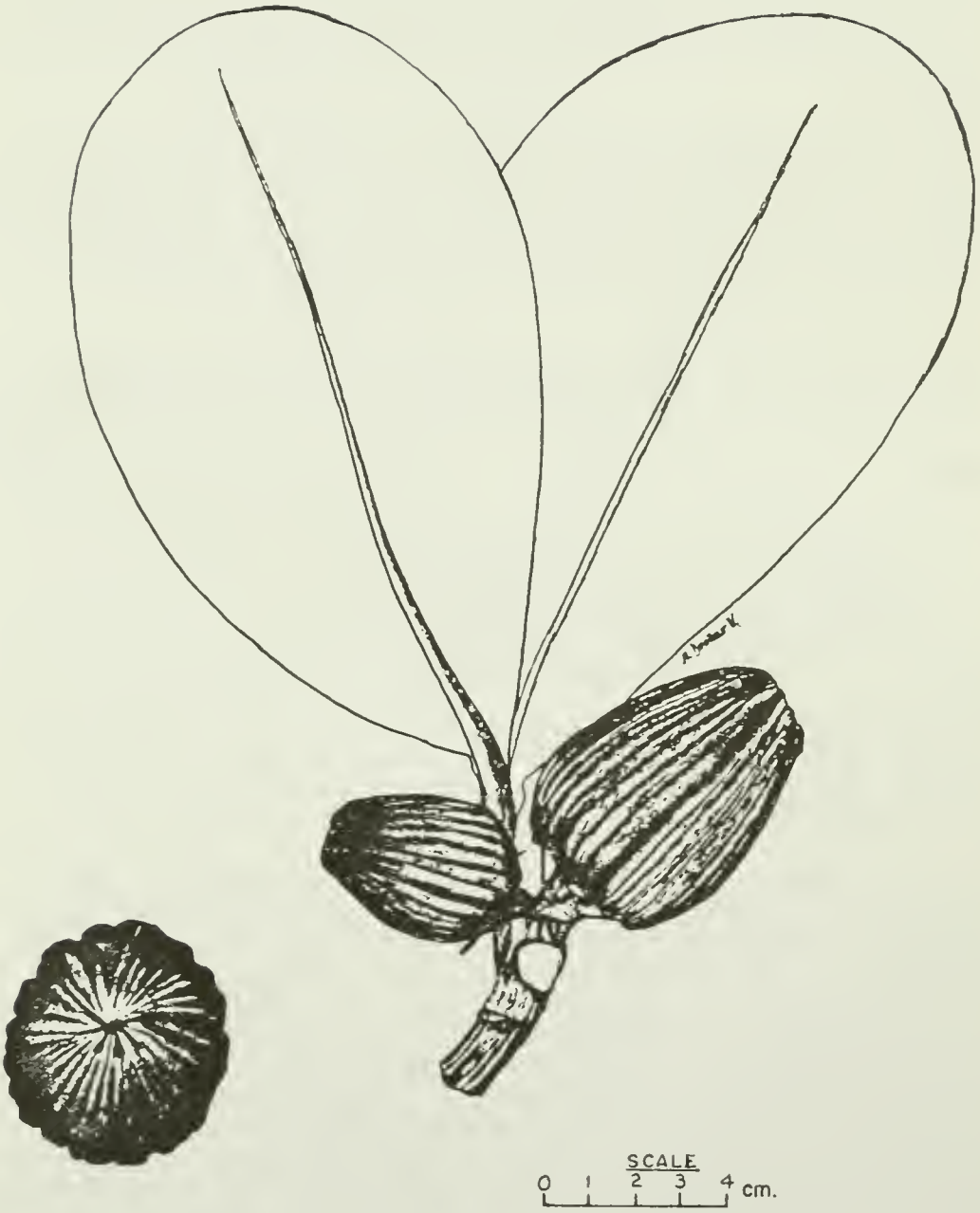



Fig. 15. Clusia dixonii Little, sp. nov. "Ducu."

more rounded persistent sepals 1 cm. long, also a few similar petals. Seeds many, 7 mm. long, narrowly cylindric. Flowers not seen. Collected with fruits in October.

ECUADOR, PICHINCHA: Río Guayllabamba near Gualea Cruz [near boundary of Esmeraldas], alt. 1200 m., lower montane forest, Oct. 23, 1965, R. G. Dixon 263 (HOLOTYPE, US; isotype, NY).

This species has sufficiently distinct large fruits. However, the specimen lacks flowers and cannot be placed in the section without male flowers. Robert G. Dixon, silviculturist with the forestry project in Esmeraldas, collected the type. It was reported that the white latex has served as incense in the churches.

The common name "ducu" has long been applied in the Andes of Ecuador to at least a few species of this genus. Clusia ducu Benth., so named from a collection in Loja, is a very different species with small obovate leaves scarcely 5 cm. long. The common name "duco" was recorded for C. ecuadoriana Steyerm., collected in Azuay and El Oro.

Another species, Clusia polystigma Little (Wash. Acad. Sci. Jour. 38: 104, fig. 15. 1948), was named from a collection from San Lorenzo by the forest survey of 1943.

**CASSIA VIARUM** Little, nom. nov. "Botón de oro." Fig. 16.

Chamaesenna velutina Britton & Killip, N. Y. Acad. Sci. Ann. (Mimos. Caesalp. Colombia) 35: 179, t. 2. 1936. Non Cassia velutina Vogel, Synops. Gen. Cassiae. Linnaea 11: 670. 1837 (Brazil). Non Peiranisia velutina Britton & Killip, N. Y. Acad. Sci. Ann. 35: 181. 1936 (Colombia).

This small tree of the northern Andes of Ecuador and Colombia needs a new specific epithet in the genus Cassia L. Specimens of all 3 species cited above have been filed together in the same species folder under Cassia at the U. S. National Herbarium.

In my report of the 1943 collection in Ecuador, this species was listed as Chamaesenna velutina Britton & Killip (Not Cassia velutina Vogel) (Little, Caribbean Forester 9: 243. 1948). The Leguminosae of that collection were named by the late Ellsworth P. Killip, of the U. S. National Museum. A specialist on the flora of Colombia, he was invited after the death of J. N. Rose to collaborate with N. L. Britton on the taxonomic treatment of the Mimosaceae and Caesalpiniaceae of Colombia, cited above. Naturally, the earlier nomenclature with many segregate genera was continued. Killip used these generic names for the Ecuador specimens. At the time it seemed best to follow the nomenclature of the Colombian reference, and I refrained from renaming the species. The present trend is to suppress the generic segregates.


Fig. 16. Cassia viarum Little, nom. nov. "Botón de oro."

Chamaesenna Pittier, based upon Cassia sect. Chamaesenna DC., had only about 10 binomials.

The type collection (Killip and Smith 19655; isotype seen at US) was made in 1927 in a plaza at Mutiscua, Norte de Santander, Colombia, 2600 m. The original description contains a photograph of the type tree.

Cassia viarum is a handsome ornamental small tree commonly 6-8 m. high (reported to reach 15 m.) and 10 cm. in trunk diameter, with broad rounded crown of dark green foliage and many bright yellow flowers. It is planted occasionally along roads and streets in Quito and Bogotá. I first collected it in 1943 on the grounds of my hotel in Quito (Little 6113; US). In 1965 I found it on the street in front of my pension and opposite the project office in Quito (Little 21253; US, NY). The U. S. National Herbarium contains 3 other collections from Ecuador, all from the Andes in the Province of Pichincha. The localities were a dry mountainside near Quito, near the village Nono, and between Nono and San Francisco (common name "cholan").

The first collection of this species was made in 1920 at Bogotá, Colombia, by Wilson Popenoe (Popenoe 1144; US), who recorded the local common name "alcaparro." He described this small tree as attractive, broad-topped, 20 feet high, producing bright yellow flowers freely during a large part of the year. It was planted along several streets in a suburb of Bogotá, where it withstood the severe conditions of street planting in that climate. The herbarium sheet bears the pencil name Chamaesenna velutina ined., apparently by J. N. Rose.

Another specimen from Jardín Botánico, Ciudad Universitaria, Bogotá, has the common name "alcaparro de Bogotá." One collection is from Sabana de Bogotá. This tree was collected also from a roadside, probably cultivated or escaped, in the disturbed shrub and dwarf forest type southeast of Bogotá (E. L. Little, Jr., and R. R. Little 9221, Jan. 7, 1945; US) and noted as occasionally planted in Bogotá.

The 5 new tree species from Esmeraldas, Ecuador, described and illustrated above are: Talauma dixonii (fig. 11), Macrolobium inaequale (fig. 12), Zanthoxylum tachuelo (fig. 13), Freziera esmeraldana (fig. 14), and Clusia dixonii (fig. 15). Also published is a new name, Cassia viarum (fig. 16).

(To be continued.)

Forest Service, United States Department of Agriculture, Washington, D. C. 20250.

# A SYNOPSIS OF THE GENUS PISCIDIA (LEGUMINOSAE)

Velva E. Rudd

Piscidia is a genus of faboid legumes, usually arborescent, occurring chiefly in the northern neotropics. As indicated by the name, it is one of several genera known as "fish-poison" plants. Members of the genus are most readily recognized by their pods, which are 4-winged.

The generic name, Piscidia, based on Erythrina piscipula L., was published by Linnaeus in 1759 after his pupil, Pehr Löfling, observed that the species belonged to a separate genus, not to Erythrina. Linnaeus' original description of E. piscipula (Sp. Pl. 707. 1753) was based on Sloane's work ("Sloan. jam. 143. hist. 2. p. 39. t. 176. f. 45" [4 and 5]. Linnaeus may have seen specimens in Sloane's herbarium in the course of his visit to Chelsea in 1736, but most likely would have had little time for careful examination of the material.

On March 4, 1755, Löfling (Loefling) found in Venezuela a tree there known as "barbasco", which he recorded as "Piscidia erythrina. Sp. Pl. 707. n. 3", a reference to Linnaeus' Erythrina piscipula. He wrote a full description and noted that [translated] the figure of the flower shows that it is scarcely a species of Erythrina, rather a separate special genus (Iter Hisp. 275. 1758). Actually, the species Löfling observed probably was P. carthagenensis Jacq. rather than Erythrina piscipula L. Unfortunately, none of Löfling's Venezuelan collections are known to exist. Linnaeus accepted the separation of this species from Erythrina but changed the name of the new genus to Piscidia, and the species to Piscidia erythrina (Syst. Nat. ed. 10, 1151, 1155, 1358, 1376. 1759).

In the meantime, P. Browne had published Ichthyomethia (Civ. Nat. Hist. Jam. 296. 1756) with two "species", but without specific names, polynomial nomenclature having been used. Under the first, "Dog-wood", were cited references to works of Linnaeus, Sloane, and Plukenet, all referable to Piscidia erythrina L. The description of the second "species", "Mountain Dog-wood", suggests some species of Lonchocarpus.

A few years later, P. Miller published yet another synonym, Robinia alata Miller (Gard. Dict., ed. 8, Robinia no. 6. 1768), citing "Plum. cat. 19" and Linnaeus' "Sp. pl. 707." The Plumier plant might very well have been Piscidia carthagenensis Jacq., but the other citation referred to Piscidia erythrina L.

In 1760 Jacquin published his Piscidia carthagenensis, from Colombia (Enum. Pl. Carib. 27. 1760). This species was included by Linnaeus in his subsequent works, but with the reservation, "an varietas prioris ?" [ie., P. erythrina L.]. For some time P. carthagenensis more or less fell into limbo through lack of new collections from Colombia and through confusion with the similar Jamaican species, P. erythrina.

Additional collections of Piscidia made in the Antilles and Mexico in the latter part of the 18th and the early 19th centuries were mostly identified as P. erythrina, although some are now correctly referred to P. carthagenensis. Sessé and Mociño, in about 1792, collected what they considered to be a new species, P. americana, but publication was delayed almost a century (Plantae Novae Hispaniae, in La Naturaleza, ser. 2 (1), append. 116. 1889). It now appears to belong in synonymy under P. carthagenensis. Humboldt and Bonpland cited as P. erythrina two collections from Mexico (Nov. Gen. et Sp. 6: 382. 1823). I have not seen those specimens, both from near Acapulco, but should expect them to be P. carthagenensis.

Two species based on early Mexican collections, P. punicea Cav. (Icon. 4: 8. 1797) and P. longifolia (Cav.) Willd. (Sp. Pl. 3: 920. 1803) are now treated as species of Sesbania, sensu lato.

Vellozo erroneously reported Piscidia erythrina as occurring in Brazil (Fl. Flum. 303. 1825; Icon. 7: pl. 100. 1835) but his illustration was later cited as referable to Dahlstedtia pinnata (Benth.) Malme (Arkiv. Bot. Stockh. 4 (9): 4. 1905).

No additions to Piscidia were made until the belated publication of Plantae Novae Hispaniae, cited above. Not long after, Rose published P. mollis based on a Mexican collection made by Palmer in 1890 (Contr. U. S. Nat. Herb. 1: 98. June 1891). In September 1891 (Garden and Forest 4: 436. 1891) Sargent stated that the correct name for the "Jamaican dogwood" should be Piscidia piscipula, not P. erythrina. A month later (op. cit. 4: 472. 1891) he published excerpts from a letter in which Hitchcock pointed out that Browne's Ichthyomethia had priority over Piscidia. Sargent agreed, "there seems to be no reason why the name of the West Indian Dogwood should not be Ichthyomethia Piscipula, Hitchcock."

The Second International Botanical Congress, held in Vienna in 1905, adopted a list of nomina conservanda prepared by Harms. Included was the name Piscidia Linnaeus, to be conserved over the earlier names Ichthyomethia P. Browne and Piscipula Loefling.

Urban published P. cubensis (Symb. Ant. 7: 229. 1912) which Britton later transferred to a new genus, Canizaresia (Mem. Torr. Club 16: 69. 1920).

In 1917, Britton and Wilson, adhering to the American Code of Botanical Nomenclature, which rejected the principle of nomina conservanda (Bull. Torr. Bot. Club. 34: 167-178. 1907), published another new species from Cuba, Ichthyomethia havanensis (Bull. Torr. Club. 44: 34. 1917).

In 1919 Blake, also following the American Code, published the first comprehensive study of the genus, "Revision of Ichthyomethia, a genus of plants used for poisoning fish" (Jour. Wash. Acad. Sci. 9: 241-252. 1919). He treated eight species, including those previously assigned to Piscidia, two described as new, I. acuminata and I. communis, and one, I. grandifolia (Donn. Sm.) Blake, transferred from Derris.

Sandwith added a new variety, P. grandifolia var. glabrescens, based on two Mexican collections (Kew Bull. 1936: 3. 1936). In 1942 Pittier transferred his Venezuelan Lonchocarpus guaricensis to Piscidia (Mesa Guanipa 49. 1942). Gentry described a new species of Piscidia from Mexico, P. sinaloensis (Brittonia 6: 316. 1948) but the next year it was transferred to Lonchocarpus by Hermann (Jour. Wash. Acad. Sci. 39: 311. 1949). In 1948 Stehlé and Quentin reduced Blake's species, I. acuminata, to a variety of I. piscipula (Fl. Guadeloupe et Depend. et Martinique 2 (2): 124. 1948).

In this present paper I am treating Piscidia as comprising seven species including one being described as new.

## Economic consideration

The names of Piscidia and its synonyms, Piscipula and Ichthyomethia, were inspired by the observation that Jamaican natives used these plants to poison fish. According to Sloane (Hist. 2: 39, 40. 1725), "The Bark of this Tree stamp'd and thrown into the standing Pool where Fish are, intoxicates them for some Time, they turning their Bellies up, and coming above Water, but if they are not presently caught, they come to themselves and recover . . . The Indians and Negro's make use of this Bark to take Fish . . . The Fish caught after this manner, are counted very wholesome and good food . . . This is a Providence of God to those barbarous People, being a natural Help for present Food and Sustenance." Browne (Nat. Hist. Jam. 296. 1756) provided a similar account. He also mentioned that "The tree is generally considered one of the best timber trees on the island. The wood is very hard and resinous; and lasts almost equally in or out of water."

Over the years the wood of Piscidia has been used locally for fuel and building purposes. Extracts, chiefly of the root and stem bark, have been used medicinally as a narcotic. According to G. F. Gaumer (data on herbarium sheet of P. piscipula, Gaumer no. 23219, Sisal, Yucatan, March 1916) "a fluid extract of the root bark is a local anaesthetic of great value; it is also a powerful anti-inebriate; internally it relieves the pain of fractures and surgical operations; it calms the nervous system and produces sound sleep without any of the bad effects of opium." According to Reko, Piscidia is one of the ingredients of a Mexican tea, "Sinicuichi, the magic drink causing oblivion" (Pharm. Montsh. 16: 155. 1935).

More recent chemical and pharmacological studies have been summarized by E. Gautier Auxence in "A pharmacognostic study of Piscidia erythrina L." (Econ. Bot. 7: 270-284. 1953) and in a series involving several authors, on "The extractives of Piscidia erythrina L." (Tetrahedron 20: 1317-1330, 1331-1338. 1964; Suppl. 7: 333-348. 1966). Among the products isolated have been piscidic acid, the isoflavons, ichthynone, jamaicin, lisetin, piscerythrone, and piscidone, and the rotenoids, dehydromilletone, isomillettone, millettone, rotenone, and sumatrol.

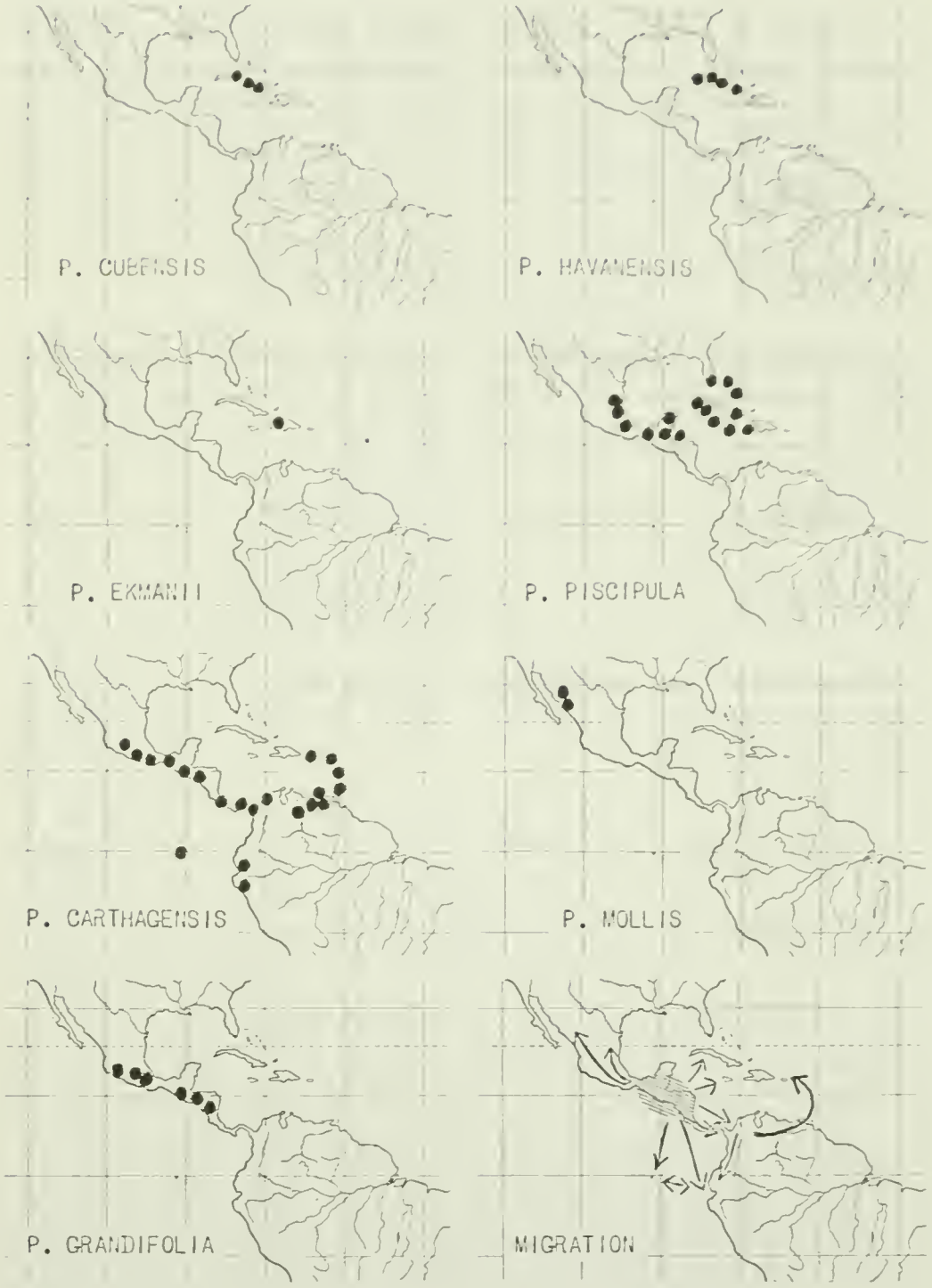



Fig. 1 - Geographic distribution of species of Piscidia; hypothetical area of origin of Piscidia (shaded) and routes of migration.

## Geography

Piscidia is known from Sonora, Mexico and southern Florida southward through Central America and the West Indies to northern Peru and Venezuela, chiefly in dry woodlands. Some species appear to be restricted to limestone areas, one to serpentine, and others seem to be more tolerant of acidity, such as in volcanic and siliceous soils. For most of the specimens in herbaria the soil data are lacking.

Four of the seven species of Piscidia here recognized are now known from Mexico, P. carthagenensis, P. grandifolia, P. mollis, and P. piscipula. It is probable that the genus originated on the old geologic nucleus of Guatemala and southern Mexico. From there it spread northward to Sonora, or beyond, southward into South America, and eastward into the Antilles and southern Florida. Although the winged pods are readily dispersible by wind, the major eastward migration could have taken place during Tertiary time when there was a land connection between Central America and the Greater Antilles.

Volcanism and orogenic movements in Miocene time, again in the Pliocene, and continuing to the present, would alter the ecological conditions and encourage speciation. In some areas igneous activity would completely destroy the vegetation, in others, the effect would be selective. Calciphilous species such as P. piscipula and P. mollis would be eliminated where the limestone soils were modified by volcanic or siliceous material, but could be replaced by more tolerant species such as P. carthagenensis and P. grandifolia. The three species endemic to the Antilles, P. havanensis, in Cuba, and P. ekmanii, in Hispaniola, both on limestone, and P. cubensis, on serpentine in Cuba, appear to have been derived from P. piscipula, a species of the Greater Antilles and eastern Mexico.

## Morphological characters

All species of Piscidia are woody and unarmed; the plants may be low and sprawling or trees up to about 20 m. tall with the trunk to about 60 cm. in diameter; the bark is rough and grayish. The wood characters have been summarized as hard, heavy, and strong, the grain often roey, the heartwood yellowish-brown, darkening on exposure, the sapwood whitish (Record & Mell, Timbers of Tropical America 298, 299. 1924; Record & Hess, Timbers of the New World 308. 1943).

The young plants are generally pubescent, with the stems and leaves sometimes glabrescent. The stipules are paired at the base of the petiole and serve as bud scales; they are early caducous; their shape, varying from obliquely-ovate to reniform, can be used to some degree in specific identification. Stipels are lacking.

The leaves are alternate, imparipinnate, 5-27-foliolate. The axis of the leaves, the petiole and rachis, varies from about 2 cm. long in P. cubensis to 30 cm. or more in P. grandifolia.

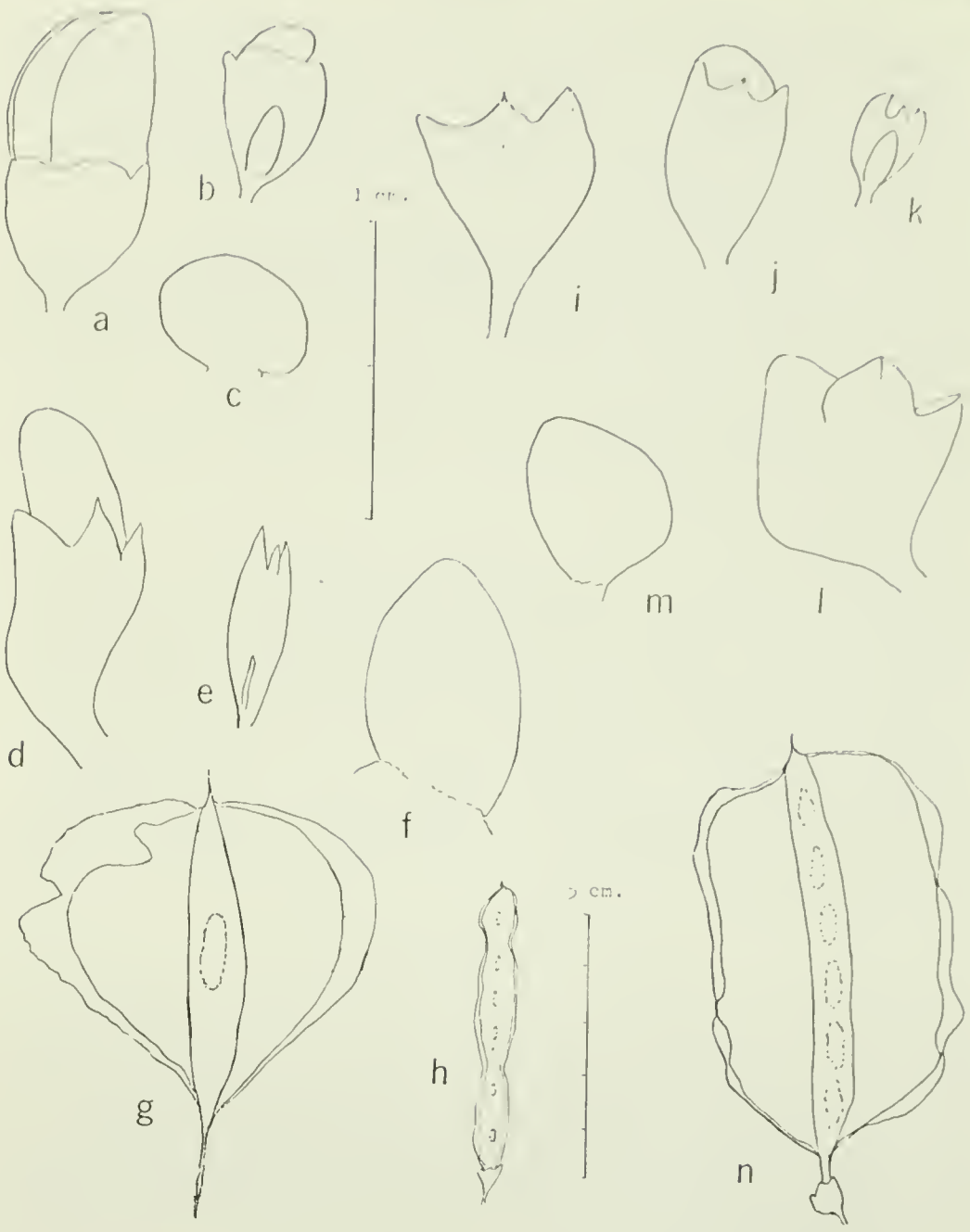



Fig. 2 - Piscidia piscipula: a, flower bud showing calyx; b, young flower bud with bracteole; c, stipule. P. grandifolia var. grandifolia: d, flower bud with calyx; e, flower bud with bracteole; f, stipule. P. grandifolia var. glabrescens: g, fruit. P. cubensis: h, fruit. P. carthagenensis: i, calyx from Lesser Antilles; j, flower bud with calyx; k, young flower bud with bracteole; l, calyx from Mexico; m. stipule; n. fruit.

The lateral leaflets are paired, coriaceous or subcoriaceous at maturity, elliptic to oblong, ovate, or obovate, 1-20 cm. long and 0.5-13 cm. broad. The terminal leaflet often is obovate and slightly larger than the laterals. The venation is pinnate with the secondary veins essentially parallel and the tertiary veins reticulate, sometimes conspicuously so. The blades of P. piscipula show a micro-alveolar structure on the lower surface.

The inflorescences are racemose, axillary or pseudoterminal, sometimes few-flowered as in P. cubensis, sometimes with large panicles as in P. carthagenensis, or spicate as in P. grandifolia. The bracts and bracteoles are small and early caducous; they are lanceolate to linear in P. grandifolia, ovate to elliptic in the other species.

The flowers are papilionoid, 12-18 mm. long. The calyx is campanulate with 5 short lobes, broad and obtuse in some species, deltoid, acute in others. The two vexillar lobes are connate, at least in part. The corolla is white, sometimes with pink, red, or lavender markings. The vexillum, or standard, is suborbicular, pubescent on the outer face except glabrous in P. grandifolia. The wing petals are usually a little longer than the vexillum and keel and are adherent to the keel. The keel petals are connate above.

The stamens are 10, monadelphous, but with the vexillar filament free at the base. The anthers are oblong, dorsifixed. The ovary is pubescent, essentially sessile, with up to 10 ovules; the style is glabrous above, the stigma terminal and minutely penicillate.

The fruits are indehiscent, 2-17 cm. long, 1-10-seeded, the body compressed but with 4 longitudinal wings that may stand out forming a broad X in cross-section. The wings vary from 1-2 mm. wide in P. cubensis to as much as 3 cm. wide in P. grandifolia vars. gentryi and glabrescens. The body is from 2 mm. wide in P. havanensis to 13 mm. wide in P. grandifolia. In most cases the pods are short-stipitate, the stipe about 1-6 mm. long, but in some species, especially P. carthagenensis, the stipe may appear to be as long as 20 mm. or more due to abortion of the lower ovules. At maturity the fruits become brittle and break, releasing the seeds. The seeds are reniform, 3-13 mm. long, lustrous, tan to reddish or dark brown. The hilum is lateral, orbicular or elliptic, 0.5-2 mm. long and 0.5-1.5 mm. wide.

A chromosome count of 2n = 22 has been reported by Atchison (Amer. Journ. Bot. 38: 541, 544. 1951) for her collection no. 139 from Atkins Garden, Soledad, Cuba. The specimens of that number, with flowers only, were originally identified as P. piscipula but they have acute calyx lobes and appear, rather to be referable to P. carthagenensis. Unfortunately, the origin of the trees, whether native or introduced, has not been noted. I can find no record of other chromosome studies dealing with Piscidia.

Anatomical data on stems and leaves of P. piscipula are given by Gautier in her "Pharmacognostic study of Piscidia erythrina" (Econ. Bot. 7: 270-284. 1953).

Taxonomic relationships

Piscidia is a faboid genus that has been variously placed in "Sect. Phaseoli" by Adanson (Fam. 2: 326. 1763), "Spartieen" by Sprengel (Anleit, ed. 2, 748. 1818), tribe Loteae subtribe Galegeae by DeCandolle (Prod. 2: 267. 1825), tribe Dalbergieae by Bentham (Comm. Leg. Gen. 27, 42. 1837), Dalbergieae subtribe Lonchocarpeae by Bentham (Proc. Linn. Soc. London 4, Suppl. 27, 116. 1860), and in the tribe Lonchocarpeae by Hutchinson (Gen. Fl. Pl. 1: 384. 1964). Either of the latter two positions is acceptable in view of our current knowledge.

It is one of several leguminous genera with longitudinally 4-winged, or 4-angled pods. In each case the modification seems to have developed independently, since the genera exhibiting this character are not closely related, and the position of the wings differs somewhat. In two species, for example, the African Tetrapleura tetraptera (Schum. & Thonn.) Taubert, in the Mimosoideae, and the widespread Cassia alata L., in the Caesalpinioideae, the larger pair of wings have developed as costae on the surface of the valves, with a slightly narrower pair of wings along the closed sutures of the indehiscent pods. Faboid species with tetrapterous fruits, such as Sophora tetraptera Ait., from Chile, S. chrysophylla (Salisb.) Seem., from Hawaii, Tetragonolobus purpureus Moench, from Europe, Sesbania punicea (Cav.) DC., from tropical and subtropical America, and Psophocarpus tetragonolobus (L.) DC., from Africa, as well as the caesalpinioid Lophocarpinia aculeatifolia (Burk.) Burk., from Argentina and Paraguay, exhibit wings that, as in Piscidia, are extensions of the margins. Another Cassia, C. pentagonia Mill., from tropical America, has fruits with a similar structure but there is a fifth wing along one margin. The generic circumscriptions have not been uniform. In some cases, such as in Sophora and Sesbania, the current interpretation of the genera include some species with winged and others with wingless fruit. Lophocarpinia, Psophocarpus, and Piscidia are restricted to species with winged pods. Additional studies of morphology, cytology, and chemistry are needed to help in resolving such seemingly inconsistent divisions.

On the basis of floral and vegetative characters, the nearest relatives appear to be in Derris, Lonchocarpus, Muellera, and Pongamia, as pointed out by Bentham in his "Synopsis of the Dalbergieae" (Jour. Linn. Soc. London 4, suppl. 18-24. 1860). The most striking differences are found in the fruits. In contrast to the 4-winged pods of Piscidia, Muellera and Pongamia have somewhat thickened pods and those of Derris and Lonchocarpus are laterally compressed. The nearest approach to tetrapterous fruits occurs in Lonchocarpus. A few species, notably L. xuul Lundell, or L. yucatanensis Pittier, sens. lat., L. dipteroneurus Pittier, and L. guilleminianus (Tul.) Malme, are somewhat winged along one or both sutures. Somewhere in this complex of incipient-winged Lonchocarpus one should seek either ancestral or derived species that form the hypothetical link between these two genera.

## Systematic treatment

PISCIDIA L. Syst. Nat. ed. 2. 1151, 1155, 1376. 1759, nom. cons.
Type: P. piscipula (L.) Sarg. Jamaica.
Ichthyomethia P. Browne, Nat. Hist. Jam. 296. 1756, in part.
Type: "Ichthyomethia 1." = P. piscipula (L.) Sarg.
Piscipula Loefling, Iter Hisp. 275. 1758. Based on Erythrina piscipula L. = P. piscipula (L.) Sarg.
Canizaresia Britton, Mem. Torr. Bot. Club 16: 69. 1920. Type: C. cubensis (Urban) Britton = Piscidia cubensis Urban.

Trees or shrubs, unarmed. Leaves alternate, imparipinnate, 5-27-foliolate; leaflets opposite; stipules (bud scales) obliquely ovate, semi-orbicular, or reniform, early caducous; stipels absent. Flowers white with pink to purplish markings, in axillary or lateral inflorescences, usually racemose, sometimes spicate. Bracts, at base of pedicels, minute, ovate, elliptic, or lanceolate, early caducous; bracteoles paired at base of calyx, ovate, oblong to linear, caducous. Calyx campanulate with 5 short, subequal lobes, the vexillar pair often connate. Corolla with vexillum suborbicular, usually pubescent on the outer face, but glabrous in one species; wing petals falcate, oblong, commonly a little longer than the vexillum, adherent to the keel; keel petals connate at the base. Stamens 10, monadelphous but the vexillar filament free at the base; anthers oblong, dorsifixed. Ovary sessile, many-ovulate; style glabrous above, the stigma minutely penicillate. Fruit indehiscent, 1-10-seeded, compressed, with 4 longitudinal wings. Seeds reniform, tan to reddish or dark brown, laterally compressed; hilum lateral, elliptic to suborbicular.

## Key to species of Piscidia

Flowers with vexillum pubescent on the outer face; vexillar filament partially united with the others; stipules ovate to oblong or reniform; body of fruit 2-6 (-7) mm. wide; seeds 3-10 mm. long, 2-5 mm. wide.
  Fruit about 6-8 mm. wide with wings 1-2 mm. wide, much narrower than the body; leaflets 1-2 cm. long, 0.5-1 cm. wide (Cuba) 1. P. cubensis
  Fruit about 1-5.5 cm. wide with wings much broader than the body; leaflets 2-20 cm. long, 1-11 cm. wide.
    Leaflets oblong to elliptic, 2-6.5 cm. long, 1-3 cm. wide, the lower surface minutely crisp-pubescent, the tertiary veins raised, strongly reticulate; fruit 2-3 cm. wide with body 2-2.5 mm. wide (Cuba) . . . . 2. P. havanensis
    Leaflets ovate or obovate to elliptic, 3-20 cm. long, 2-11 cm wide, the lower surface pubescent to subglabrous, the tertiary veins not conspicuously raised; fruit 1.5-5 cm. wide with body 2.5-5 mm. wide.
      Fruit 1.5-2 mm. wide, the wings 1 cm. wide or less, the body 2.5-3 mm. wide; lower surface of leaflets tomentulose (Hispaniola) . . . . . 3. P. ekmanii

Fruit 2-5.5 cm. wide, the wings 1-2.5 cm. wide, the body 3-6 (-7) mm. wide; lower surface of leaflets pubescent to subglabrous but not tomentulose.

Flowers 12-15 mm. long, predominantly less than 15 mm. long, the calyx 4-6 mm. long with lobes obtuse; body of fruit 3-4 mm. wide; lower surface of leaflets minutely pubescent with subappressed to crispate hairs; stipules reniform (Florida; Bahamas; Greater Antilles; eastern Mexico; Guatemala; British Honduras; Isla Roatán, Honduras) . . . . . 4. P. piscipula

Flowers 13-18 mm. long, predominantly more than 15 mm., the calyx 5-8 mm. long with lobes obtuse to acuminate; body of fruit 4-6 (-7) mm. wide; lower surface of leaflets minutely appressed-pubescent to sericeous; stipules suborbicular to broadly ovate.

Leaflets silvery, conspicuously so when young, the lower surface sericeous or subsericeous, the upper surface minutely pubescent, glabrescent; stipules suborbicular; calyx lobes obtuse; bracteoles 3-4 mm. long, 2.5-3 mm. wide; seeds 8-10 mm. long, 4-5 mm. wide (Mexico: Sonora, Sinaloa) . . . . 6. P. mollis

Leaflets not silvery, the lower surface minutely appressed-pubescent or the hairs lax to patent, the upper surface essentially glabrous; stipules broadly ovate; calyx lobes acute to acuminate; bracteoles 1.5-2 mm. long, 1-1.2 mm. wide; seeds 5-8 mm. long, 3-4 mm. wide (Lesser Antilles; western and southern Mexico; Central America; Venezuela; Colombia; Ecuador; northern Peru) . 5. P. carthagenensis

Flowers with vexillum glabrous; vexillar filament free from the others; stipules linear; body of fruit (6-) 8-13 mm. wide; seeds 12-13 mm. long, 6 mm. wide.

Leaflets 9-19, elliptic to ovate or obovate, puberulent above at maturity or glabrescent, tomentose below.

Flowers 15-18 mm. long; calyx 7-8 mm. long; fruit 1.5-4 cm. wide including wings 0.5-1.5 cm. wide and body 6-10 mm. wide; leaflets 9-13, mostly elliptic to obovate, the base rounded (Guatemala; El Salvador; Honduras; Nicaragua) . . 7a. P. grandifolia var. grandifolia

Flowers about 15 mm. long; calyx 6-7 mm. long; fruit 3-6 cm. wide including wings to 3 cm. wide and body 6-8 mm. wide; leaflets 13-19, mostly elliptic to ovate, the base rounded to cordate (Mexico: Oaxaca, Puebla) . . . . . 7b. P. grandifolia var. gentryi

Leaflets 15-27, elliptic to elliptic-oblong, essentially glabrous above at maturity, moderately pubescent with lax hairs below, glabrescent; flowers 13-15 mm. long; calyx 5-7 mm. long; fruit 3-6 cm. wide including wings 1.5-3 cm. wide and body 8-13 mm. wide (Mexico: Colima, Guerrero, Mexico, Michoacan, Morelos, Puebla) 7c. P. grandifolia var. glabrescens

1. PISCIDIA CUBENSIS Urban, Symb. Ant. 7: 229. 1912.
Lectotype: Shafer 1171. Cuba (Designated by Blake, l. c.)
Ichthyomethia cubensis (Urban) Blake, Jour. Wash. Acad. Sci. 9: 251. 1919.
Canizaresia cubensis (Urban) Britton, Mem. Torr. Club 16: 69. 1920.

Shrub, to about 2 m. high; young stems ferrugino-puberulent or subsericeous, glabrate; stipules obliquely ovate, obtuse or subacute, about 1 mm. long; leaves (3-) 5-9-foliolate; leaflets with blades coriaceous, elliptic, slightly revolute, 1-2 cm. long, 0.5-1 cm. broad, obtuse, mucronulate, sometimes retuse, rounded at the base, the upper surface sparsely pubescent, glabrate, nitid, the lower surface moderately appressed-pubescent, glabrate, the secondary veins visible but not conspicuous, the tertiary veins inconspicuous; inflorescences short-racemose, 1.5-3.5 cm. long; bracts ovate, acute, 1 mm. long and wide, or less; bracteoles ovate to oblong, acute, 1-1.5 mm. long and ½ mm. wide; flowers about 12-15 mm. long; calyx ferrugino-sericeous, 4-5 mm. long with tube 3-3.5 mm. long and 3-3.5 mm. in diameter, the three carinal lobes rounded or acute, the vexillar pair adnate forming one broad, emarginate lobe; corolla with vexillum white, rose toward the center, pubescent on the outer face; fruit dark brown, puberulent, 1-8-seeded, about 2-7 cm. long including stipe about 3 mm. long, 6-8 mm. wide including wings 1-2 mm. wide and body 4-5 mm. wide; seeds reddish-brown, 3-4.5 mm. long, 3 mm. broad, lustrous, the hilum whitish, suborbicular, 0.8-1 mm. in diameter.

Distribution: Dry serpentine barrens of Cuba.

CUBA:
Matanzas: Ceiba Mocha, Ekman 18598 (S). NW of Pan de Matanzas, SE of Canasí, Ekman 16504 (GH, NY, S).
Las Villas (Santa Clara): Santa Clara, Britton, Britton & Wilson 6051 (NY, US); Britton & Cowell 10179 (NY, US), 13293 (F, GH, NY, US); Ekman 14058 (S), 16335 (BM, F, S, US); Howard et al. 409 (A, MICH, NY, UC). El Cumbre, Ekman 18983 (A, NY, S, UPS). Loma Cruz, Alain 3992 (GH, US). Placetas, León 8173 (GH, NY). Sabanas de Motembo, León 11380 (NY).
Camagüey: Riverside to Minas, Shafer 1171 (F, NY lectotype, US). Near Camagüey, Britton, Britton & Cowell 13137 (NY).
Oriente: Between Holguín and Cacocum, Shafer 1549 (NY syntype) Yareyal, Holguín, León 15515 (GH, US).

This species is most readily distinguished from others of the genus by its small fruits with very narrow marginal wings, and by its small, somewhat revolute leaflets. On the basis of available specimens it would appear that leaves are present at the time of flowering, in February to April.

2. PISCIDIA HAVANENSIS (Britton & Wilson) Urban & Ekman, Fedde Rep. Spec. Nov. 22: 362. 1926. Type: León & Roca 6194. Cuba. Ichthyomethia havanensis Britton & Wilson, Bull. Torr. Bot. Club 44: 34. 1917.

Shrub or small tree, to about 2 m. high; young stems ferrugino- or fusco-tomentulose, glabrate; stipules suborbicular to ovate, obtuse, about 1.5-2 mm. long and 2 mm. wide; leaves 9-13-foliolate; leaflets with blades coriaceous, oblong to elliptic, 2-6.5 cm. long, 1-3 cm. wide, obtuse to subacute, sometimes mucronulate, rounded to cuneate at the base, the upper surface minutely crisp-pubescent, the secondary veins conspicuous, the tertiary veins conspicuously reticulate; bracts ovate, about 1 mm. long, 1 mm. wide; bracteoles caducous, not seen; inflorescences racemose, about 5-15 cm. long; flowers 12-14 mm. long; calyx subsericeous, about 5 mm. long with tube 3.5 mm. long, 3.5 mm. in diameter, the lobes rounded, 1.5 mm. long, the vexillar pair adnate, forming one broad, retuse or emarginate lobe; corolla with vexillum white with reddish markings, pubescent on the outer surface; fruit light brown, puberulent, about 2-6-seeded, 2-6.5 cm. long including stipe 2-3 cm. long, 2-3 cm. wide including wings 0.6-1.5 cm. broad and body 2-2.5 mm. wide; seeds reddish-brown, 4-5 mm. long, 2.5-3 mm. wide, the hilum whitish, suborbicular, 1 mm. long and 0.8 mm. wide.

Distribution: Limestone areas of Cuba, especially in coastal thickets.

CUBA: Without exact locality, Wright 3539 (NY).
Pinar del Río: Mariel, Tinaja, Ekman 12869 (S). Mendoza, in forests at Boquerón, Ekman 18750 (BM, F, NY, S, US). Peninsula de Guanahacabibes, Ekman 18798 (S). Chorrera, León 5192 (NY). "Pare Real de Guane". Roig 1072 (NY).
Habana: Near Cojimar, León & Roca 6194 (NY type); León 7154 (GH, NY). Santa Fé, Ekman 13280 (S, US), 13647 (K, NY, S, UPS). Rio Almendares, Ekman 13476 (S), 13736 (NY, S, US); Regnell (Ekman) III-357 (S). Tarará, León 13317 (GH, IJ). Playa de Mariano, Britton & Cowell 10339 (NY).
Matanzas: Peninsula de Hicacos, Alain 5959 (IJ, US).
Las Villas: María Aguilar, Ekman 18898 (S).
Camagüey: Between Pastelillo and Tarafa, Ekman 15455 (GH, S).
Oriente: Sabanazo, near Mir, Ekman 6533 (BM, F, NY, S). Banes, Ekman 6592 (S). Manatí, Wright s. n. in 1865 (GH).

Local names: Guamá candelón, guamá jiquí.

Piscidia havanensis appears to be a derivative of P. piscipula but easily recognizable by its strongly reticulate, oblong to elliptic leaflets and smaller fruits. Flowering occurs in March and April when the plants are more or less leafless.

3. PISCIDIA EKMANII Rudd, sp. nov.

Frutex vel arbuscula P. havanensis affinis, a qua imprimis differt foliolis paucioribus, amplioribus, subtus tomentulosis, minus reticulatis; fructibus cum alis angustioribus; seminibus minoribus.

Shrub or small tree, 1-3 m. tall, sometimes sprawling; young stems fulvo-tomentulose, glabrescent; stipules obliquely-ovate, acute, about 3 mm. long, 2-3 mm. wide; leaves 5-9-foliolate; leaflets with blades ovate to elliptic or sometimes obovate, 3-8 cm. long, 2-6 cm. wide, obtuse, sometimes mucronulate, sometimes retuse, the upper surface puberulent, glabrescent, subnitid, the lower surface tomentulose, the secondary veins usually conspicuous, the tertiary veins inconspicuously reticulate because of the dense pubescence; bracts ovate, 1 mm. long and wide or less; bracteoles ovate to ovate-oblong, 2-3 mm. long, 1 mm. wide; inflorescences racemose, about 6-20 cm. long; flowers 12-15 mm. long; calyx fulvous, subsericeous, 4-5 mm. long, the tube 3-4 mm. long, 3-4 mm. in diameter, the lobes obtuse to subacute, about 1 mm. long, the vexillar pair adnate forming one broad, emarginate lobe; corolla with vexillum cream-colored to lavender, pubescent on the outer face; fruit medium to reddish-brown, commonly 3-8-seeded, 3-5 cm. long including stipe 3-5 mm. long, 1.5-2 cm. wide including wings 0.8-1 cm. wide, the body 2.5-3 mm. wide; seeds reddish-brown, about 3 mm. long and 2 mm. wide, the hilum suborbicular, about 0.5 mm. in diameter.

Type collected by E. L. Ekman, no. H. 4517, "Presqu'ile du Nord-Ouest, Baie de Henne, slope of Morne Chien, 2-300 m., Rep. Haiti," 9 July 1925. Holotype at S; isotypes at NY and US.

Distribution: Limestone areas of Hispaniola.

HAITI:

Nord Ouest: Baie de Henne, slope of Morne Chien, Ekman H. 4517 (NY, S type, US). Port de Paix to Jean Rabel, Ekman H. 3613 (S). Baie des Moustiques, W of Caberet, Leonard & Leonard 12034 (US).

Artibonite: Gonaïves, Buch 201 (IJ).

Ouest: Thomazeau, Morne à Cabrits, Ekman H. 995 (IJ, S). Morne à Cabrits, Holdridge 894 (MICH, NY, US). "Along road on ridge N of Cul de Sac plain," Holdridge 331 (NY).

The specimens cited above were all collected some years after Dr. Blake's revision of Ichthyomethia. On the US sheet of Ekman H. 4517 he noted, "Form of havanensis or n. sp. SFB '36."

According to Bro. Alain Liogier, Piscidia occurs in the vicinity of Santiago, Dominican Republic. He has seen it in the field and also has examined a specimen collected by Bertero in that same locality. Not having seen the material myself I cannot make a positive determination but should expect it to be P. ekmanii rather than P. piscipula, the other species known from Haiti.

4. PISCIDIA PISCIPULA (L.) Sarg. Gard. & For. 4: 436. 1891.
Erythrina piscipula L. Sp. Pl. 707. 1753. Type: Sloane, Jam. Hist. 2: t. 176, f. 4, 5. 1725. Typotype: Sloane s. n. Jamaica.
Piscidia erythrina L. Syst. Nat., ed. 10, 1155. 1759. Based on E. piscipula L.
Robinia alata Miller, Gard. Dict., ed. 8, Robinia no. 6. 1768. Based on E. piscipula L.
Piscidia inebrians Medikus, Vorl. Churpf. Phys.-Öken Ges. 2: 394. 1787. Based on P. erythrina L.
Piscidia toxicaria Salisbury, Prodr. 336. 1796. Based on P. erythrina L.
Ichthyomethia piscipula (L.) Hitchc. in Sarg. Gard. & For. 4: 472. 1891.
Ichthyomethia communis Blake, Jour. Wash. Acad. Sci. 9: 247. 1919. Type: Curtiss 685. Florida.
Piscidia communis (Blake) Harms, Verhandl. Bot. Ver. Brandenb. 65: 91. 1923.
Ichthyomethia piscipula var. typica Stehlé & Quentin, Fl. Guad. et Dépend. et Mart. 2(2): 123. 1948.

Tree or shrub, to about 20 m. tall; young stems fulvo-sericeous to strigillose, glabrescent; stipules obliquely reniform, 3-5 mm. long, 3-6 mm. wide; leaves 7-11-foliolate; leaflets with the blades ovate to elliptic, 4-17 cm. long, 2-11 cm. wide, obtuse to acute or acuminate, the terminal leaflet sometimes obovate, the base rounded to cuneate, the upper surface sericeous or minutely pilose, glabrescent, the lower surface micro-alveolate, sericeous or the hairs somewhat crispate, usually more abundant on the veinlets, sometimes glabrescent, the secondary veins evident, the tertiary veins relatively inconspicuous; bracts ovate to elliptic, obtuse, 1-1.5 mm. long, 1 mm. wide; bracteoles ovate to elliptic, acute, 2-3 mm. long, 1 mm. wide; flowers 12-15 mm. long, usually less than 15 mm.; calyx sericeous, 4-6 mm. long, the tube 3-4 mm. long, about 4 mm. in diameter, the lobes obtuse to subacute, 1-2 mm. long, the vexillar lobes somewhat adnate; corolla with petals white with pink or reddish markings, the vexillum pubescent on the outer face; fruits 4-10 cm. long including stipe 1-3 mm. long, 3-4.5 cm. wide including wings 1-2 cm. wide and body 3-4 mm. wide, commonly about 3-8-seeded; seeds reddish brown to dark brown, 4.5-6 mm. long, 2.5-3.5 mm. wide, the hilum orbicular, 1 mm. in diameter or less.

Distribution: On calcareous soil in Florida, Bahama Islands, Cuba, Haiti, Jamaica, eastern and southern Mexico, British Honduras, Guatemala, coastal islands of northern Honduras. It has also been introduced in Puerto Rico and Hawaii.

UNITED STATES: Florida: Palm Cape, Chapman 34 (US).

Lee Co.: Punta Rassa, Hitchcock 76 (F, GH, MO, NY, US); J. Standley 257 (F, GH, MO, POM, US); Eaton 1106 (A); Harshberger s. n. (NY). Coconut, Moldenke 5779 (NY).

Collier Co.: Marco, Standley 12732 (US), 57660 (F); Steyermark 63274 (F).

Dade Co.: Miami, Garber s. n. in 1877 (A, F, GH, NY, US); Britton 77 (F, NY); Small & Wilson 1658 (NY). Buena Vista, Eaton 456 (A). Between Miami and Cocoanut Grove, Small & Small 4797 (MO, NY). Brickell Hammock, near Miami, Caldwell 8756 (MO, NY, US); Duckett 232 (A, F, POM, US); Small & Carter 2563 (NY). Sands Key, Small 7370 (NY, S).

Monroe Co.: Key Largo, Curtiss s. n. (US); Small & Carter 3053 (NY). Joe Kemp's Key, Small 8012 (NY). Tavernier Key, Duckett 204 (A, F, NY, POM, S, US). Long Island, Small 3890 (NY). No Name Key Curtiss s. n. (A). Upper Matecumbe Key, Miller 1686 (US); Brass 20458 (US). Lower Matecumbe Key, Thorne 15225 (IJ, US). Big Pine Key, Small 10505 (GH, NY); Small, Carter, & Small 3531 (NY); Killip 31420 (US), 31461 (US), 42081 (US), 44274 (F, US); Killip & Swallen 40412 (US); Brizicky & Stern 186 (A, US); Stern 1506 (US) Cooley, et al. 6216 (GH, NY, US). Ramrod Key [flowers], Jewfish Key [fruits], Curtiss 685 (A, BM, F, GH, MO, NY, US type of I. communis). Torch Key, Killip 31612 (US). Cudjoe Key, Killip 31376 (F, US). Boca Chica Key, Small & Small 4989 (NY). Key West, Rugel 155 (BM, GH, NY); Blodgett s. n. (NY); "Herb. Nuttall" (BM); Curtiss 5656 (GH, MO, NY, POM, US); Palmer 130 in 1874 (F, MO, NY); Small 8165 (NY, S, US); Lansing 2035 (NY). East Cape, Simpson s. n. (A). Flamingo, near Cape Sable, Simpson s. n. (A). Middle Cape Sable, Robertson 248 (GH). Cooks Island, Newfound Harbour Key, Killip 31391 (US).

MEXICO:

Tamaulipas: Tampico, Palmer 510 in 1910 (BM, F, GH, MO, NY, US); Fisher 46115 (F, S). Zaragoza, Martin 101 (MICH). Chamal, Martin 111 (MICH). Between Ciudad del Maíz and Antigua Morelos, Johnston & Crutchfield 5669 (MEXU, MICH). Morón, LeSueur 265 (F). Between Victoria and Ciudad Mante, Moore & Wood 3626 (MEXU).

San Luis Potosí: Rascón, Pringle 4110 (A, BM, F, GH, MEXU, MO, NY, S, UC, US). Tamazunchale, Lundell & Lundell 7152 (MEXU, MICH, NY). Ciudad Valles, Vines 3312 (US). 30 mi. E of Ciudad del Maíz, Manning & Manning (53575 (GH).

Veracruz: Papantla, Schiede & Deppe 1332 (F fragm. ex LE); Liebmann 4542 (F); "Herb. Liebmann" s. n. (O). Near Tantoyuca, Ervendberg 9 (GH). Pueblo Viejo, Palmer 541 in 1910 (A, BM, F, GH, MO, NY). Jalapa, C. L. Smith 1565 (F). Cuitláhuac, Matuda 1439 (A, MEXU, MO, NY). Along route 150, about 26 mi. E of Cuitláhuac, King 2685 (DS, MICH, NY). Between Yecuatla and Colipa, Manuel Martínez 2-1 (A, MEXU). San Lorenzo Tenochtitlan, Chavelas, Esparza, & Aceves ES-2640 (MEXU), ES-2788 (MEXU). Campo experimental de Cotaxtla, Brigada Dioscóreas 7428 (MEXU), 7469 (MEXU), 7500 (MEXU). Gutiérrez Zamora, Miranda 8442 (MEXU). Laguna Encantada, Los Tuxtlas, Sousa 2140 (MEXU).

MEXICO:

Puebla: Villa Juárez, Cottam 10566 (US). "Bosque Ajenjihe", Bravo 5 (MEXU), 194 (MEXU).

Oaxaca: Temascal, Janzen s. n. (MICH, UC); Sousa 1033 (MEXU); Comisión Dioscóreas 6865 (MEXU). Km. 19 carretera La Granja a Temazcal, Brigada Dioscóreas 6613 (MEXU).

Chiapas: Ocozocoautla, Miranda 6265 (MEXU, US). Cintalapa, Miranda 7121 (MEXU, US). E of San Nicolás, near Cupía, Miranda 6057 (MEXU, US).

Tabasco: Mercedes, Balancán, Matuda 3012 (A, F, MEXU, MICH, NY). Isla del Carmen, Barlow 7/1C (MEXU); West 7/1 (GH).

Campeche: Konchen, Lundell 1397 (F, MICH). Ciudad del Carmen, Mell 2005 (NY, US). Between Ceibaplaya and Champoton, Miranda 8009 (MEXU). Santa Rosa, E of Campeche, Miranda 7962 (US). Campo Eperimental Forestal Tropical "El Tormento", between Escárcega and Candelaria, Chavelas & Pérez ES-810 (MICH).

Yucatan: Without exact locality, Gaumer 524 (A, BM, DS, F, GH, MICH, MO, NY, S, UC, UPS, US), 23946 (F, GH, MO, UC, US). Merida, Schott 260 (F, US). Sisal, Gaumer 23219 (A, F, GH, MO, NY, US). Izamal, Gaumer s. n. (F). Kancabconat, Gaumer 23854 (F, GH, POM, S, US), 23855 (F, GH, MO, POM, S). Chichankanab, Gaumer 1882 (F); Miranda 8080 (MEXU). Santa Rosa, Miranda 7962 (MEXU). Celestun, Enríquez 447 (MEXU). Xtum, Miranda 8033 (MEXU). Chichen Itza, Bruff 1462 (MEXU).

Quintana Roo: Cozumel, Gaumer 16107 (F).

BRITISH HONDURAS:

Belize: Gracie Rock, Sibun R., Gentle 1640 (MO).

El Cayo: El Cayo, Bartlett 13014 (A, F); Chanek 79 (BM, F).

All Pines: In sandy places along sea beach, Schipp 795 (A, BM, F, GH, MICH, MO, NY, S, UC), 798 (A, BM, F, GH, MICH, MO, NY, S).

GUATEMALA:

Peten: Tikal, between Yaxmuxan and Yaxha, Cook & Martin 218 (US). La Libertad, Lundell 2817 (BM, F, MICH, US), 3075 (F, MICH, S). Uaxactum, Bartlett 12573 (A).

HONDURAS: Isla Roatán, Gaumer 105 (F). Swan Isl., G. Nelson 123 (GH).

BAHAMAS: Without exact locality, Swainson s. n. (CGE). South Bimini, Howard & Howard 10161 (A, GH, NY, S, US). Acklin, Brace 4437 (F, NY). Great Bahama, Pinder's Point, Britton & Millspaugh 2541 (F, NY). Anguilla, Wilson 8004 (F, MO, NY), 8058 (F, MO, NY). Andros, Northrop 588 (A, F, GH, NY). New Providence, Brace 251 (F), 252 (F); Roe s. n. (MICH); Saunders s. n. (MO). Eleuthera, Coker 327 (NY).

PUERTO RICO: Mayagüez, introduced, Moore 3344 (US).

HAITI: Sud: Miragoane, Ekman 6538 (IJ, S, US), 7959 (S).

CUBA:
Pinar del Río: Peninsula de Guanahacabibes, between Remates and Yayales, Ekman 18773 (S).
Habana: Isla de Pinos, Ekman 12477 (S); Killip 41282 (US), 44197 (US); Morton 10278 (US); Britton & Wilson 14848 (NY); Britton, Wilson, & Selby 14523 (NY).
Oriente: Cabo Cruz, Santiago, Ekman 1481 (S, US), 7795 (S). Santiago de Cuba, between Cabaña and Punta de Sal, Ekman 9479 (BM, F, S, UPS). Corojo, Ekman 7298 (S). El Cuero, Britton & Cowell 12722 (NY). Manzanillo, Ekman 5638 (POM, S); Shafer 12349 (F, MO, NY, US). Rioja, E of Mir, Ekman 4907 (A, S). Cabañas Bay, Britton & Cowell 12808 (NY). Renté, Santiago, Bro. Clemente 3012 (GH); León, Clement, & Roca 9801 (GH).

GRAND CAYMAN: 1 mi. SE of Georgetown, Kings GC 318 (BM, MO).

JAMAICA: Without exact locality, Sloane s. n. (BM); Eggers 131 (MICH); Swartz s. n (S, UPS); Alexander [Prior] s. n. (O).
St. Mary: 1 mi. E of Rio Nuevo, Proctor 29298 (IJ, US). Oracabessa, Roe s. n. (MICH).
St. Andrew: Long Mountain, Skudamore 12 (IJ); Yuncker 18756 (F, MO, MICH). S of Knutsford Park, Barry s. n. (IJ). Antrim, Mountain View, von der Porten s. n. (IJ). Gordon Town, Hart 580 (US). Kingston, Brown 364 (A, NY). Hope Garden, Maxon & Killip 1703 (GH, US); Harris 8518 (A, NY). Berwick Hill, Harris 7708 (F, NY, US). Morant Bay, Alexander [Prior] s. n. (NY).
St. Catherine: Little Goat Island, Proctor 28590 (IJ, US). Great Goat Island, Harris 9221 (A, NY, US). Pigeon Island, Proctor 11657 (IJ). Fresh River, Caymanas sugar estate, Facey s. n. (IJ). Port Henderson, Barry s. n. (IJ); Bengry s. n. (IJ); Harris & Lawrence C15591 (US).
St. James: Ironshore, Proctor 28865 (IJ).
St. Elizabeth: Lewistown, 1 mi. S of Brompton, Proctor 28631 (IJ).
Hanover: 6 mi. W of Lucea, Proctor 28562 (IJ, US).
Manchester: Spur Tree Hill, near Eglington, Proctor 28753 (IJ, US).

HAWAII: Oahu: Honolulu, introduced, Klawe & Vann 1613 (US).

Local names: Borrego, borrego de cerro, borrego prieto (Mexico: Oaxaca); chichol, chijol (Mexico: Tamaulipas, Veracruz); dogwood (Florida, Jamaica); fish-fuddle tree (Florida); guamá, guamá candelón (Cuba); haabin, habim, habin, jabin (Mexico: Veracruz, Campeche, Yucatan); Jamaica dogwood (Florida); Maytree of the Creoles (British Honduras).

This species of Piscidia is one of the two with a relatively wide distribution. As the first known to Europeans, its name has often been misapplied to other species, particularly to P. carthagenensis.

Hypothetically, P. piscipula originated on the ancient land mass of southern Mexico and northern Central America. Its principal route of migration would have been eastward along the Antillean geanticline and over whatever islands existed at the time. As igneous activity increased, especially in the Pleiocene, edaphic conditions over much of the range, notably in central Mexico and western Central America, must have become unsuitable for calciphilous species such as P. piscipula. Later, however, in Pleistocene time, the species was able to spread over the newly emerged limestone areas of the Yucatan Peninsula, Florida, and the Bahamas, resulting in the present pattern of distribution.

5. PISCIDIA CARTHAGENENSIS Jacq. Enum. Pl. Carib. 27. 1760; Select. Stirp. Amer. Hist. 210. 1763. Type: Jacquin s. n. Colombia.

Piscidia americana Sessé & Moc. La Naturaleza ser. 2 (1), append. 116. 1889. Type: Sessé & Moc. 1913. Mexico.

Ichthyomethia americana (Sessé & Moc.) Blake, Journ. Wash. Acad. Sci. 9: 248. 1919.

Ichthyomethia acuminata Blake, Journ. Wash. Acad. Sci. 9: 249. 1919. Type: Rose, Fitch, & Russell 3419. Antigua, West Indies.

Piscidia acuminata (Blake) I. M. Johnston, Contr. Gray Herb. n. s. 70: 71. 1924.

Lonchocarpus guaricensis Pittier, Trab. Mus. Com. Venezuela 4: 231. 1928; Arbol y arbust. Legum. 3: 301. 1928. Type: Pittier 11455. Venezuela.

Piscidia guaricensis (Pittier) Pittier, Mesa Guanipa 49. 1942.

Ichthyomethia piscipula var. acuminata (Blake) Stehlé & Quentin, Fl. Guad. et Dépend. et Mart. 2 (2): 124. 1948.

Tree, to about 15 m. tall; young stems puberulent, glabrescent; stipules obliquely ovate, 3-5 mm. long, 3-5 mm. broad; leaves 5-15-foliolate; leaflets with blades ovate or obovate to elliptic, about 4-20 cm. long, 2-10.5 cm. wide, obtuse to acute or breviacuminate, the base rounded, glabrous or nearly so above, the lower surface sparsely to densely pubescent with short, appressed hairs, or some hairs lax to patent, the secondary veins evident, the tertiary veins usually inconspicuous; bracts ovate, 1 mm. long and 1 mm. wide or less; bracteoles ovate-oblong, obtuse to subacute, 1.5-2 mm. long, 1-1.2 mm. wide; flowers pink, 13-18 mm. long, usually more than 15 mm.; standard pubescent on the outer face; calyx sericeous, 5-8 mm. long, the tube 4-6 mm. long and 4-6 mm. in diameter, the lobes 1-2 mm. long, acute to acuminate, often strongly imbricate; fruit 1-8-seeded, 3-11 cm. long including stipe 6-20 mm. long, 3-4.5 cm. broad including wings 1-2 cm. wide and body 4-6 (-7) mm. wide, sometimes glabrescent; seeds reddish-brown, 5-8 mm. long, 3-4 mm. wide, the hilum elliptic, 2 mm. long and 1 mm. wide.

Distribution: Mexico, Lesser Antilles, southward to Venezuela and northern Peru, in dry woods at elevations of 50-1000 meters.

MEXICO:

Mexico: Temascaltepec, Guayabal, Hinton 3578 (A, MEXU, US), 7524 (NY, US).

Michoacán: [Apatzingán ?], Sessé & Mociño 1913 (F, MA presumably type of P. americana). Apatzingán, Leavenworth & Hoogstral 1491 (GH, MO, NY), 1762 (F, MO). Coahuayula, Emrick 47 (F). Hacienda Guadalupe, near Rio Balsas, E. Nelson 6969 (GH, NY, US). Huetama, Hinton 5626 (A, BM, F), 5803 (A, BM), 11802 (DS, GH, MICH, NY, US).

Guerrero: Acapulco, Howell 8512 (A, F, US). La Junta, near La Unión, E. Nelson 6991 (GH, NY, US). Mina, Placeres, Hinton 9995 (BM, F, GH, MO, NY, US), 10008 (BM, F, GH, MEXU, MO, NY, US). Nuxco, Langlassé 936 (GH, MEXU, US). Temixco, Reko 5119 (US).

Oaxaca: Plain of Tehuantepec, Alexander 217 (F, MO, NY, US).

Chiapas: Barranca de Pishtimbak, N of Tuxtla Gutiérrez, Miranda 5233 (MEXU, US). "Altos carretera a S. Fernando (N. O. Tuxtla G.)", Miranda 5595 (MEXU). Pijijiapan, Mell s. n. (US). Paderón, Tonala, Matuda 16319 (US). Near Tuxtla Gutiérrez, Breedlove 9564 (F, NY), 9575 (F, MEXU).

GUATEMALA:

Escuintla: Naranjo, J. D. Smith 2815 (GH, NY, US).

Chiquimula: Near Chiquimula, Sasmo, Mt. Tojás, Steyermark 30223 (F).

Huehuetenango: Sierra de los Cuchamatanes, between Santa Ana Huista and woods of Rancho Lucas, Steyermark 51359 (F, US).

EL SALVADOR:

San Vicente: San Vicente, Standley 21651 (GH, NY, US). Apastepeque, Allen 7272 (F, GH, NY, US).

Sonsonate: Acajutla, Calderón 1669 (NY, US).

HONDURAS:

Copán: Between Santa Rosa and Copán, Molina 11719 (F, NY, US).

Comayagua: Between El Agua Salada and Comayagua, Molina 13697 (F, NY, US).

Santa Bárbara: Near Jutiapa, Standley & Linderlie 7297 (F).

COSTA RICA:

Guanacaste: Orillas del Río Corobici, Jiménez 3099 (F). Finca Taboga, Las Cañas, Madriz 54 (F).

PANAMA:

Canal Zone: Near Madden Dam, Allen 4315 (F, GH, NY, S, US).

Darién: Thorn forest near Punta Garachine, Duke 10500 (2)(US).

CUBA: Las Villas: Cienfuegos, Soledad, probably introduced, Atchison 139 (GH, US).

PUERTO RICO: Cabo Rojo, Sintenis 662 (GH, S, US); Alain 9371 (LJ) Fajardo, Britton & Shafer 1575 (NY, US); Sintenis 1627 (BM, US). Punta Guaniquilla, Britton, Cowell, & Brown 4576 (F, MO, NY, US). Isla Culebra, Britton & Wheeler 62 (F, NY, US). Aguirre, Earle 7076 (NY). Isla Vieques, Shafer 2912 (NY, US).

LESSER ANTILLES:

St. Croix: Britton, Britton, & Kemp 47 (NY, US); Rose, Fitch, & Russell 3579 (US); Ricksecker 296 (F, MO), 320 (F, GH, MO, NY, US).

St. Thomas: Eggers 361 (GH), s. n. (US); Morrow 118 (US); Archer 2227 (US); Holdridge 125 (NY).

St. John: Caneel Bay, Woodworth 215 (F); Holdridge 125 (A).

St. Jan: Britton & Shafer 336 (NY, US).

Tortola: Fishlock 41 (NY, US); Britton & Shafer 684 (NY, US); D'Arcy 4 (A), 5 (A).

St. Martin: Rijgersmaa 117 (S), s. n. (S); Goodwin & Goodwin 1 (NY, US).

Jost Van Dyke: Little 21939 (BM).

St. Barthélemy: Forsström s. n. (S, UPS); Euphrasen (S, UPS); von Goës s. n. (S); Questel 222 (US).

St. Kitts: Proctor 19628 (BM, IJ, US).

"St. Christopher": Euphrasen s. n. (UPS).

Antigua: Gregory s. n. (BM); Rose, Fitch, & Russell 3419 (GH, NY, US type of I. acuminata); A. C. Smith 10471 (A, IJ, S, US); Box 1446 (US); Beard 276 (A, MO, NY).

Montserrat: Shafer 462 (F, NY, US).

Guadeloupe: Duss 2662 (F, NY, US); Questel 578 (US), 482 (US); Stehlé 1564 (A, US), 5594 (US).

Martinique: Botanical Garden, cultivated, Duss 120 B (NY).

St. Lucia: Horne s. n. in 1782 (BM); Proctor 17657 (IJ, US).

St. Vincent: "From Hooker, 1831" (GH); H. H. & G. W. Smith 1632 (BM, GH, NY).

Barbados: Waby 83 (US), s. n. in 1895 (F).

Cannouan Isl.: Fairchild 2790 (A, US).

Grenada: Howard 10860 (GH, IJ, NY).

TOBAGO: Broadway 4808 (GH, MO, S, US), s. n. (BM, F, GH, NY, US).

VENEZUELA:

Nueva Esparta: Isla Margarita, Macanao, Ginés 2818 (US); Bernardi 2386 (NY, US).

Monagas: San Félix, Pursell 8374 (US), 8443 (US).

Guárico: Carretera Pariaguán- El Sombrero, near Pariaguán, Aristeguieta 3009 (US, VEN). Between El Socorro and Valle de la Pascua, Pittier 14731 (US, VEN). El Sombrero, Pittier 11455 (US, VEN type of L. guaricensis), 11796 (US). El Sombrero-Chaguaramas, Tamayo 3522 (VEN). Altagracia de Orituco-Chaguaramas, Aristeguieta 6007 (VEN).

Anzoátegui: Cantaura, F. D. Smith 6 (US), 43 (US), 212 (US). Barcelona, Karsten s. n. (US photo no. 1865 ex W).

Portuguesa: Sta. Rosalía, Turén, Aristeguieta 1527 (VEN).

COLOMBIA:

Atlántico: Between Penedera and Palmar, Dugand 285 (US). Finca "El Paraíso", near Río Magdalena, region of Palmar-Ponedera, Dugand 4-b (US). Los Pendales, Dugand 1125 (F, GH, US). Arroyo León, Dugand 637 (F).

Bolívar: Cartagena, Jacquin s. n. (BM type). Sincé, Romero-Casteñeda 9650 (NY).

ECUADOR:

Guayas: Between Guayaquil and Salinas, Mexia 6760 (F, GH, K, NY, US). Guayaquil, Anthony & Tate 78 (US); Little 6593 (US); 6774 (US); Mille 863 (F); Valverde 546 (US); Asplund 17576 (K, NY, UPS); Fagerlind & Wibom 78 (S, UPS). Río Macará, Townsend 849 (US). Durán, Rose & Rose 23596 (GH, NY, US). E of Chongón, Fagerlind & Wibom 277 (S, UPS). Isidro Ayora, Asplund 17608 (F, NY).

Islas Galápagos: Santa Cruz (Indefatigable): Chapin 1112 (NY); Colinvaux 434 (DS), 511 (DS); Fagerlind & Wibom 3052 (S); Fosberg 44729 (US); Harling 5214 (S), 5223 (S); Itow 37 (DS); Rorud 4 (O) Stewart 1605 (CAS, GH, US), 1606 (CAS, GH), 1607 (CAS, GH). Von Hagen 99 (BM, NY); Wiggins 18734 (DS, US); Wiggins & Porter 697 (US). San Cristóbal (Chatham): Darwin s. n. (CGE); Snodgrass & Heller 503 (DS, GH); Stewart 1608 (CAS, GH, US); Wiggins & Porter 372 (CAS, US).

PERU: Tumbes: Hualtaco, Vargas 47 (F).

Local names: Arepo (Colombia); barbasco, barbasco blanco, barbasco de agua dulce (Venezuela, Peru); cachimbo (Costa Rica); cahuirica (Mexico); cuchiván (Venezuela); frijolillo (Mexico); matapez (Mexico, Colombia); tatzungo (Mexico); palo santo (Ecuador); ventura (Puerto Rico); zopilocuavo (El Salvador).

After examining specimens of P. carthagenensis, P. acuminata, P. americana, and P. guaricensis, including the types, I can see no satisfactory criteria for separating them. Having arrived at this conclusion, I was pleased to note Blake's comment (op. cit. 243) that his I. acuminata and P. carthagenensis might prove to be identical. I was further encouraged to discover in the herbarium at NY, a letter from Dr. Blake to N. L. Britton, dated Sept. 25, 1919, stating, "I can now make a belated reply to your letter of 28 July referring to the Ichthyomethia collected by Dr. Rose (23596) in Ecuador. It is identical, so far as I can tell from the fruiting specimen, with my I. acuminata from the Lesser Antilles. I have little doubt that Jacquin's Piscidia carthagenensis will prove to be an earlier name for the same thing."

There are small differences to be found in different parts of the range. For example, the calyx lobes of the specimens from central Mexico are more strongly imbricate, those from the Lesser Antilles more acuminate with a stronger costa; the leaflets of the collections from the Galápagos Islands and some from Venezuela have lax to patent hairs on the undersurface instead of the more common short, appressed hairs in other parts of the range.

I should have considered maintaining P. guaricensis as a separate species, or variety, had I not found that some of the Venezuelan leaflets have both appressed and patent hairs, together. No other characters were evident to warrant segregation.

Piscidia carthagenensis is the most widespread species of the genus. Like P. piscipula, it probably originated in Mexico or northern Central America but instead of migrating eastward toward Cuba and Jamaica, it spread southward to dry areas of Colombia, Ecuador, and Peru, and then eastward across the Venezuelan llanos to the Lesser Antilles and northward as far as Puerto Rico. Soil data are lacking for almost all collections of this species, the few exceptions citing marl as the substrate. It would be interesting to have comparative soil analyses from habitats of P. carthagenensis and P. piscipula. It appears that the former has a greater tolerance of lower soil pH, such as might result from proximity to volcanic activity.

6. PISCIDIA MOLLIS Rose, Contr. U. S. Nat. Herb. 1: 98. 1891.
Type: Palmer 355 in 1890. Mexico.
Ichthyomethia mollis (Rose) Blake, Jour. Wash. Acad. Sci. 9: 246. 1919.

Tree, to about 16 m. tall; young stems silvery-velutinous; stipules suborbicular, obtuse, 2.5-3 mm. long, 2.5-4 mm. wide; leaves 5-13-foliolate; leaflets predominantly ovate, sometimes elliptic, 2-9 cm. long, (1-) 2-5 cm. wide, acute to obtuse, mucronulate, rounded to subcordate at the base, the terminal leaflet sometimes obovate, the upper surface subsericeous, glabrescent, the lower surface silvery-sericeous or subsericeous, sometimes glabrescent, the secondary veins prominent, the tertiary veins inconspicuous because of pubescence; inflorescences racemose, about 6-15 cm. long; bracts ovate, about 1 mm. long, 2.5-3 mm. wide; bracteoles ovate-elliptic, 3-4 mm. long, 2.5-3 mm. wide; flowers 15-17 mm. long; calyx silvery-sericeous, 6-7 mm. long, the tube about 5 mm. long, 3-5 mm. in diameter, the lobes rounded, 1-2 mm. long, the vexillar lobes adnate in part; corolla white with pink or reddish markings, the standard pubescent on the outer face; fruit pubescent, commonly about 2-4-seeded, about 3-6 cm. long including stipe 4-5 mm. long, 3-5.5 cm. wide including wings 1.5-2.5 mm. wide, the body about 4-5 mm. wide; seeds tan to reddish-brown, 8-10 mm. long, 4-5 mm. wide, the hilum suborbicular, about 1 mm. long and 0.8 mm. wide.

Distribution: In dry, open woods, Sonora and Sinaloa, Mexico at elevations of about 200-2000 m., on sandy, granitic alluvium.

MEXICO:

Sonora: Alamos, Palmer 355 in 1890 (GH, US type); Rose, Standley, & Russell 12906 (F, GH, MO, NY, US); Gentry 2250 (A, F, MO, S, UC, US), 4780 (DS, F, GH, MICH, MO, NY). Between Misa and Mina San José, Wiggins 6309 (DS, US). N of Ures, Wiggins 7343 (A, DS,

MICH, US). Between Colorado and Mazatán, Wiggins & Rollins 322 (A, DS, MICH, MO, NY, UC, US). S of Cajeme, Miranda 8955 (MEXU). Ciudad Obregón, Gentry 305 M (DS, MICH, US). San Bernardo, near Río Mayo, Gentry 17725 (US); Gentry, Barclay, & Arguelles 19279 (US). Near Torres, Coville 1659 (F, US). Arroyo near Estación Moreno, Shreve 6091 (F). Between Navajoa and Alamos, Rudd 2092 (US). "Camino a San Bernardo," Cedillo Trigos 38 (MEXU).

Sinaloa: Without exact locality, González Ortega 3129 (US). Las Palmas, González Ortega 713 (MEXU), 4555 (US). Choix, Tasajera, González Ortega 703 (MEXU); Narváez Montes & Salazar 863 (US). Fuerte, Rose, Standley, & Russell 13515 (NY, US). NE of Los Mochis, Waterfall 12804 (GH, MICH, US).

Local names: Palo blanco, palo blanco duro.

This species, whose known range does not overlap with the others of the genus, is readily recognized by its silvery pubescence. It shows relationship both to P. piscipula and P. carthagenensis. At one time the range of the three species probably was continuous, but for some reason, presumably edaphic, there now is a disjunction. Exploration of eastern Sinaloa might yield additional localities for P. mollis.

7. PISCIDIA GRANDIFOLIA (Donn. Sm.) I. M. Johnston, Contr. Gray Herb. n. s. 70: 71. 1924. Lectotype: Heyde & Lux 3709. Guatemala. (Designated by Blake, l. c.).
Derris grandifolia Donn. Sm. Bot. Gaz. 56: 55. 1913.
Ichthyomethia grandifolia (Donn. Sm.) Blake, Jour. Wash. Acad. 9: 245. 1919.

Tree, to about 20 m. tall; young stems ferrugino- to fulvo-tomentulose, glabrescent; stipules obliquely ovate, acute, 7-8 mm. long, 4-6 mm. wide, caducous; leaves 9-27-foliolate; leaflets with blades elliptic to oblong, ovate or obovate, 4-20 cm. long, 2-13 cm. wide, obtuse to acute, sometimes mucronulate, the base rounded to subcuneate or cordate, the upper surface puberulent, often glabrescent, the secondary veins evident, the tertiary venation relatively inconspicuous; inflorescences racemose or long and spicate, about 15-20 cm. long; bracts caducous, lanceolate, about 2 mm. long, 1 mm. wide; bracteoles linear, 2-4 mm. long and less than 1 mm. wide; flowers 13-18 mm. long; calyx 5-8 mm. long, the tube about 4-6 mm. long, 5 mm. in diameter, the lobes deltoid acute, 1-2 mm. long, the two vexillar lobes somewhat adnate; petals white to pinkish, the vexillum glabrous on the outer face, the wings and keel petals somewhat pubescent along the margins; fruit dark brown, densely pubescent, commonly 2-6-seeded, 4-15 cm. long including stipe 5-15 mm. long, 1.5-6 cm. wide including wings 0.5-3 cm. wide and body (6-) 8-13 mm. wide; seeds reddish-brown, 12-13 mm. long, 6 mm. wide, the hilum white, orbicular, 1.5 mm. in diameter.

This species, with its three varieties, is notably different from all other known species of Piscidia in such characters as the glabrous vexillum and linear bracteoles. The fruits and leaflets are somewhat distinctive and usually can be recognized at a glance. In leaf or flower only, typical P. grandifolia is most likely to be confused with Lonchocarpus costaricensis (Donn. Sm) Pittier. With fruit, however, the difference is obvious. It is interesting to note that P. grandifolia, on the basis of a flowering specimen, was originally placed in Derris, sometimes considered congeneric with Lonchocarpus.

The locality of origin of P. grandifolia probably was in the same area as that of P. piscipula and P. carthagenensis, the ancient geologic nucleus of southern Mexico and northern Central America. It apparently is more tolerant of acidity than most other species of Piscidia since it is found in or near areas of volcanic activity. None of the collections of this species that I have seen bears specific soil data. Gentry, et al 20285, the type of var. gentryi, is cited as found "over limestone hills", and Hinton 14869, a collection of var. glabrescens, as on a "rocky slope in oak forest."

7a. PISCIDIA GRANDIFOLIA (Donn. Sm.) I. Johnst. var. GRANDIFOLIA

Tree, to about 20 m. tall. The vegetative parts of typical P. grandifolia are generally pubescent; the leaflets are fewer in number and average larger than those of the other varieties; the flowers tend to be larger; the fruits have narrower wings and are usually longer, with up to 7 (or more ?) seeds.

Distribution: in dry forest from Guatemala southward to Nicaragua at elevations of about 1000-3000 meters.

GUATEMALA: Without exact locality, Tejada 246 (US).
El Quiché: Near Sacapulas, Molina, Burger, & Wallenta 16428 (F, NY, US).
Baja Verapaz: Santa Rosa, von Tuerckheim II.2323 (US syntype).
Jalapa: Volcán Imay, Kellermann 8048 (F, NY, UC, US).
Amatitlán: Amatitlán, Morales Ruano 542 (US).
Sacatepéquez: Between Ciudad Vieja and Calderas, Breedlove 11437 (US). Near Antigua, Standley 58614 (A). Near Pastores, Standley 59901 (NY).
Santa Rosa: Cerro Gordo, Heyde & Lux 3709 (US lectotype).

EL SALVADOR: Without exact locality, Calderón 1090 (GH, US).
Ahuachapán: Without exact locality, Padilla 311 (US).
Sonsonate: Cerro Verde, Allen & van Severen 6932 (F, GH, NY, US).
La Libertad: Comasagua, Calderón 1396 (GH, NY, US). Finca Germania, near Comasagua, Carlson 208 (F, UC).
La Paz: Zacatecoluca, Calderón 326 (GH, NY, US).

HONDURAS:
Comayagua: Siguatepeque, Standley 55986 (A, F, US); Standley & Chacon 6070 (F); Edwards 487 (A, F, UC, US); Yuncker, Dawson, & Rouse 5605 (F, GH, MICH, MO, S, US).
Morazan: Suyapa, Williams & Molina 13447 (F, GH), 14352 (F, GH, MO, US); Molina 2783 (F, GH); Standley & Williams 93 (F), 1423 (F); Standley 26250 (F). Guimaca, Molina 2804 (F). Mont de la Flor, Tegucigalpa, von Hagen & von Hagen 1152 (F, NY).
Choluteca: Along Río Comalí, near Comolí, Williams & Molina 18972 (F). Vicinity of San Marcos de Colón, Standley 15848 (F).

NICARAGUA:
Jinotega: Tuma Lake, N of Jinotega, Williams, et al. 27400 (F, NY, US).
Siquia: El Recreo, Río Mico, White 5344 (F, MICH).

Local names: Capetillo, palo sope (Guatemala); palo de zope, zopilocuavo, zopilote (El Salvador).

According to collectors' notes, this species is "used for fuel" and is a "medicinal tree used for coffee shade."

7b. PISCIDIA GRANDIFOLIA var. GENTRYI Rudd, var. nov.

Arbor ad 15 m. alta, a varietate typica floribus brevioribus, fructibus cum alis amplioribus, foliolis circa 13-19, ellipticis vel ovatis, basi obtusis vel cordatis differt; floribus fructibusque ut in var. glabrescens sed foliolis subtus tomentosis.

As indicated in the key, this variety resembles the typical in the pubescence of the leaflets but its smaller flowers and shorter fruits, with the wings sometimes as much as 3 cm. broad, are more like those of var. glabrescens.

Type collected by H. S. Gentry, A. S. Barclay, and J. Arguelles, no. 20285, in Puebla, Mexico "near Acatepec along road to Huajuapan. Arid Thorn Forest over limestone hills; alt. about 6000 ft.", August 19, 1963. Holotype at US, no. 2451068.

Distribution: In dry forests of Oaxaca and Puebla at elevations of about 1000-2000 meters.

MEXICO:
Puebla: Near Acatepec, SW of Huajuapan, Gentry, Barclay, & Arguelles 20285 (US type). Acatepec, SW of Zapotitlán, Sousa 2667 (F, MEXU, US). Zapotitlán, Purpus "= 2648" (BM, F, GH, MO, NY, US).
Oaxaca: Jayacatlán, L. C. Smith 486 (GH, US). Dominguillo, E. Nelson 1826 (F, GH, US). Carrizal, Miranda 1043 (MEXU). Vicinity of Cerro Zempoatepetl, between Tlahuitoltepec and Santo Domingo Albarradas, Hallberg 1006 (MICH, US).

Local name: Pata de león (Puebla).

It would be interesting to know why there are no specimens of P. grandifolia, particularly var. gentryi or var. glabrescens, from Chiapas, since both P. piscipula and P. carthagenensis have been found there. Lack of collecting does not appear to be the complete answer.

7c. PISCIDIA GRANDIFOLIA var. GLABRESCENS Sandwith, Kew Bull. 1936: 3. 1936. Lectotype: Hinton 5419. Mexico. (Here designated).

Tree, to about 10 m. tall. Specimens of var. glabrescens are less pubescent in general than those of the other two varieties. The leaflets are essentially glabrous above and only moderately pubescent with lax hairs on the lower surface, usually glabrescent; they average somewhat smaller and more oblong than those of var. grandifolia or var. gentryi. The flowers, like those of var. gentryi, are a little smaller than those of var. grandifolia. The fruits of var. glabrescens are similar to those of var. gentryi, ie., shorter, commonly 1-4-seeded, and broader, the wings to as much as 3 cm., than those of the typical variety.

Distribution: Open, dry woods on rocky slopes in central and western Mexico at elevations of about 500-1600 meters.

MEXICO:

Morelos: El Parque, Martínez s. n., Nov. 1943 (F). Cañon de Lobos, near Yautepec, Miranda 1451 (MEXU); Rivera 5 (MEXU).

México: Temascaltepec, Chorrera, Hinton 1193 (A, BM, F, K syntype), 5419 (A, BM, F, K lectotype, US), 8079 (A, BM, F, GH, MO, NY, S, US), 8603 (A, BM, F, GH, MEXU, NY, S, US). Tonatico, Matuda 27508 (MEXU). Palmar Chico, Cerro de los Capulines, Matuda 31347 (MEXU).

Michoacán: Zitacuaro-La Florida, Hinton 13057 (DS, GH, MEXU, MICH, NY, US).

Colima: Colima, McVaugh & Koelz 1571 (MICH). S of Colima, toward Tecomán, Miranda 9113 (MEXU).

Guerrero: Mina, Hinton 10518 (GH, MEXU, MO, NY), 14869 (GH, NY).

Puebla: Matamoros, Miranda 2125 (MEXU).

Local names: Cahuirrica, cahirrica prieta.

Noted by the collector, Hinton 13057, "Flower white and sweet of smell. Wood used for making plows."

Sandwith designated Hinton 1193 as typis floris and Hinton 5419 as typis fructus. I have chosen the latter as lectotype because it is by the fruits that one most readily distinguishes Piscidia from the related genera.

The two specimens from Colima cited above, possibly from the same tree, have unusually thick pods. Examination of material from McVaugh & Koelz 1571 revealed an abnormal proliferation of tissue in place of the seeds.

Soil and habitat data are inadequate to explain the geographic distribution of this variety. From the label of only one collection, Miranda 9113, we have the information, "in cerros calizos y yesosos" (on limestone and gypsum hills). Other collectors have indicated the habitat as "steep hillside" and "rocky slope in oak forest."

## Species excluded from PISCIDIA

P. acutata Mart. ex Benth. Comm. Leg. Gen. 42. 1837 (preprint); Ann. Wien Mus. Nat. 2: 106. 1838. Nomen in synonymy under Phellocarpus acutus Benth. = PTEROCARPUS ANCYLOCALYX Benth.

P. corallodendrum Steud. Nom. ed. 2, 2: 344. 1841, nomen = ERYTHRINA CORALLODRENDRUM L. ?

P. erythrina sensu Vell. Fl. Flum. 303. 1825; Icon. 7: pl. 100. 1835, non L. = DAHLSTEDTIA PINNATA (Benth.) Malme.

P. florida Mart. ex Benth. Comm. Leg. Gen. 42. 1837 (preprint); Ann. Wien Mus. Nat. 2: 106. 1838 = PTEROCARPUS ROHRII Vahl.

P. longifolia (Cav.) Willd. Sp. Pl. 3: 920. 1803 = SESBANIA LONGIFOLIA (Cav.) DC.

P. ovalifolia Larrañaga, Escritos D. A. Larrañaga, Publ. Inst. Hist. Geogr. Uruguay 2: 235. 1923 = SESBANIA PUNICEA (Cav.) Benth.

P. ovalis Larrañaga (as "Piscidia (cisplatina) ovalis"), Escritos D. A. Larrañaga, Publ. Inst. Hist. Geogr. Uruguay, Atlas 1, Bot. pl. 95. 1927 = SESBANIA PUNICEA (Cav.) Benth.

P. punicea Cav. Icones 4: 8. 1797 = SESBANIA PUNICEA (Cav.) Benth.

P. sinaloensis Gentry, Brittonia 6: 316. 1948 = LONCHOCARPUS SINALOENSIS (Gentry) F. J. Hermann.

## New taxa

PISCIDIA EKMANII Rudd, sp. nov.

PISCIDIA GRANDIFOLIA var. GENTRYII Rudd, var. nov.

# A NEW SPECIES OF LANTANA FROM HISPANIOLA

Harold N. Moldenke

LANTANA ALAINII Moldenke, sp. nov.

Frutex 1.5 m. altus; ramulis tetragonis griseis dense pubescentibus; foliis decussato-oppositis valde aromaticis; petiolis elongatis teretibus usque ad 1 cm. longis densissime flavido-pubescentibus, pilis divergentibus; laminis foliorum chartaceis firmis subrotundo-ellipticis 2—3 cm. longis 1.2—2 cm. latis ad apicem basinque rotundatis, supra atroviridibus foveolento-subbullatis densissime breviterque pubescentibus, subtus densissime flavido-pubescentibus, utroque dense resinoso-granulatis; inflorescentiis axillaribus; pedunculis 1—5.5 cm. longis densissime flavido-pubescentibus, pilis divergentibus; capitulis parvis 5—10 mm. longis latisque subpaucifloris; bracteolis magnis ovatis densissime flavido-pubescentibus dense resinoso-granulosis; corollis parvis pallide purpureis.

Shrub, about 1.5 m. tall; branchlets conspicuously but obtusely tetragonal, gray, densely pubescent with yellowish divergent hairs, glabrescent in age; twigs very slender, conspicuously tetragonal, very densely yellowish-pubescent; leaves decussate-opposite; petioles conspicuous, comparatively elongate, slender, apparently terete, to 1 cm. long on mature leaves, very densely yellowish-pubescent like the twigs; blades firmly chartaceous, dark-green above, lighter beneath, subrotund-elliptic, 2—3 cm. long, 1.2—2 cm. wide, rounded at the apex and base, abundantly and regularly serrulate from apex to base with very small but uniform blunt teeth, conspicuously foveolate-subbullate and densely yellowish-pubescent above, very densely yellowish-pubescent beneath, abundantly resinous-granulate on both surfaces with glistening golden granules, the very abundant venation conspicuously impressed above and prominent beneath, forming a very dense and handsome reticulum; inflorescence axillary, varying from shorter than to equaling or surpassing the subtending leaves during anthesis; peduncles slender, ascending, 1—2 cm. long during anthesis, elongating to 5.5 cm. in fruit, very densely yellowish-pubescent like the twigs; heads small, 5—10 mm. long and wide, rather few-flowered; bractlets foliaceous, ovate, large, the lowermost about 5 mm. long and 3 mm. wide, very densely yellowish-pubescent and resinous-granulose on the back, subacute at the apex, conspicuously venose; corolla pale-purple, small, mostly shorter than and hidden by the bractlets; drupes purplish-red.

The type of this interesting and apparently endemic species was collected by Brother Alain H. Liogier (no. 13816) -- in whose honor it is named -- in dry thickets on limestone at about sealevel, between Cabo Rojo and Las Mercedes, Dominican Republic, on February 12, 1969, and is deposited in my personal herbarium at Plainfield, New Jersey. The foliage of this species reminds

one of L. involucrata L., but the flowering heads remind one of L. microcarpa Urb.

- - - - - - - - - - - - - - - -

## BOOK REVIEWS

Alma L. Moldenke

"THE FLORA OF NEW ENGLAND - A Manual for the Identification of all Vascular Plants, Including Ferns and Fern Allies and Flowering Plants Growing Without Cultivation in New England" by Frank Conkling Seymour, xvi & 596 pp., illus., Charles E. Tuttle Co., Rutland, Vermont 05701. 1969. $12.50.

This fine work will prove particularly useful to the serious amateurs and the botany students of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut who are beyond the picture book stage and who are not quite ready for Fernald's eighth edition of the Gray's Manual. In comparison with this classic for over a century, this newer book is intentionally written in simpler language based on only two pages of defined specialized terms, with easier keys, of more geographical limitation, and following the same Engler & Prantl order of families. Over 3,200 species have been reported for this area: the author excludes from treatment those only known from single reports. Physical features are well described, varieties and forms are treated, habitat, flowering and distribution data are given. Much local herbaria and field study was required to produce this book.

Additional entries and corrections appear on a bound page at the front of the book; they are therefore not likely to be overlooked or lost. The print is not easy on the eyes. Many abbreviations for authorities have been shortened, as "F." for the more usual "Fern." or "Fernald". In the foreword "striking", in the preface "enjoyment" and on the inner covers helpfully listing the counties "Franklin" in Vermont are misspelled.

Unfortunately the printing of the 390 photographs is so dark that they cannot show effectively what they are meant to show with the exception of leaf shapes as in Salix and Crataegus. Eriocaulon and Eriocaulaceae are omitted from the index.

"ORCHIDS OF EAST AFRICA" by Frank Piers, 2nd edition revised, viii & 304 pp., illus., Verlag von J. Cramer, D-3301 Lehre, Germany. 1968. 6 pounds, 10 sh., or $15.00.

This edition is a much enhanced improvement over the first of 1959. The author planned it as a "popular" book rather than a scientific treatise (which value it virtually also has) for the

naturalist, the nature-minded tourist, the orchid enthusiast and the botanist.

Anatomical details are intentionally bypassed in favor of excellent ecological material. The preface pleas for the preservation of these rare plants now threatened by man's changing of the earth's surface for the immediate needs of his exploding population. There are two pages of exquisite color plates, and there are 116 superb black-and-white photos mostly taken by the author. The printing is clean and easily readable, even if on page 8 "they" lost its "y".

Over 500 orchid species grow discontinuously in the following seven areas of East Africa: (1) the coastal strip with its scrub and dry forests, its mangrove swamps and open grasslands with few trees and palms, (2) miombo or dry open forests to 4,000 feet elevation in one-third of the area with several terrestrial orchids, (3) dry deciduous forests to 6,000 feet elevation on the slopes of the Rift Valley with many epiphytic orchids, (4) tropical rain or monsoon forests on the eastern slopes of mountains with West African orchids, (5) grassland and semi-desert plains from 3,000 to 5,000 feet altitude with only a few hardy orchids, (6) grassy plains and rolling downland from 6,000 to 8,000 feet altitude with many terrestrial orchids that appear in great numbers after the rains and with many epiphytes in the scattered trees, and (7) drier mountain forests with their Juniperus, bamboo (devoid of orchids) and Hagenia types above 9,000 feet altitude with their epiphytes. It is interesting to note that no orchids are found on the many trees that have been introduced from Australia and that none of the ladyslippers or Diandrae are found at all in Africa.

The author explains simply the taxonomy of the orchids, keys them well to genera and species, describes each of the latter, and gives the blooming times, habitat, often special item notes, and cultivation information.

The author proves that he knows his orchids well and loves them very much!

- - - - - - - - - - - - - - - -

Index to Authors in Volume Eighteen

Index to Supra-specific Scientific Names in Volume Eighteen

- - - - - - - - - - - - - - - -

Publication Dates for Volume Eighteen

No. 1 — December 30, 1968
No. 2 — February 10, 1969
No. 3 — March 18, 1969
No. 4 — April 25, 1969
No. 5 — June 16, 1969
No. 6 — August 14, 1969
No. 7 — September 4, 1969
No. 8 —