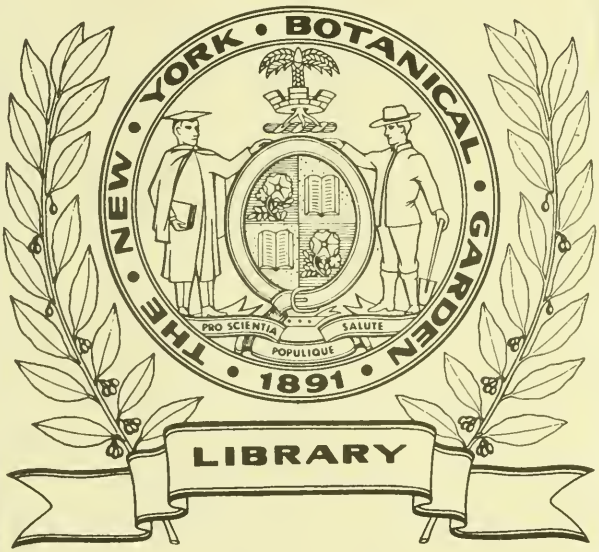

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CONTENTS

AGOSTINI, G., *Notes on Alismataceae* 1

MOLDENKE, H. N., *Additional notes on the Eriocaulaceae. XXX* 4

MOLDENKE, A. L., *Book reviews* 53

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NOTES ON ALISMATACEAE

Getulio Agostini
New York Botanical Garden

1. SAGITTARIA PLANITIANA Agostini, sp. nov.

Herba annua ut videtur. Folia emersa, late ovatis, 4.5-8.0 cm longis, 5.0-9.5 cm latis, basi truncatis vel subcordatis,apice rotundatis; petiolis 18-28 cm longis. Scapi simplices, 8.0-40.0 cm longis, floribus 2-verticillaribus, scapis infra crassis. Bracteae verticilli primi 1.5-3.0 cm longae, 0.5-1.4 cm latae, ad basim libris; bracteis verticilli secundi 1.0-2.3 cm longis, 0.5-1.0 cm latis, imbricatis, ad scapum adpressis. Pedicelli ca 1.5 cm longi,florum femineorum erecti et crassi;florum masculorum filiformi recurvati, 2.0-2.8 cm longi. Flores feminei: sepalis 1.4-1.5 cm longis, 2-3 cm latis,ad maturitatem receptaculo adpressis; petalis ca 2 cm longis, ca 0.9 cm latis, albis videtur, cum coronis staminibus functionalibus. Flores masculini: staminibus numerosis, filamentis linearibus, antheris ca 2.1 mm longis. Fructus: capitulis maturis 2-3 cm diam; acheniis laevis, 2.5-3.0 mm longis, 1.0-1.1 mm latis; rostris 0.4-0.5 mm longis.

Herb apparently annual. Leaves emersed, widely ovate, 4.5-8 cm long, 5-9.5 cm wide, base truncate to subcordate, the apex rounded, the petioles 18-28 cm long. Scapes simple, 8-40 cm long, with two whorls of flowers, thicker below the first whorl. Bracts of the first whorl 1.5-3 cm long, 0.6-1.4 cm wide, free at the base, the ones of the second whorl are 1-2.3 cm long and 0.5-1 cm wide, overlapping and appresed to scape.Pedicels ca. 1.5 cm long, erect and thick in the pistillate flowers; 2-2.8 cm long,recurved and filiform in the staminate flowers. Pistillate flowers with a ring of functional stamens; sepals 1.5-1.4 cm long, 3-2 cm wide, closely appresed to the receptacle at maturity; petals ca. 2 cm long, ca. 0.9 cm wide, apparently all white. Staminate flowers with numerous stamens, the filaments linear, the anthers ca. 2.1 mm long. Mature pistillate heads 2-3 cm in diameter; achenes 2.5-3 mm long, 1-1.1 mm wide, narrowly winged, ellipsoid or obovoid and laterally compressed, the faces smooth; the beak 0.4-0.5 mm long.

Type: VENEZUELA, Edo. Portuguesa: Marsh in llanos, just west of Guanare, alt. 180 m, August 25, 1966, Julian A. Steyermark & Marvin Rave 96484 (Holotype NY, Isotype VEN).

Paratype: VENEZUELA, Edo. Guárico: Lagoon of Mesa de El Sombrero, in mud, September 10, 1927, H. Pittier 12473 (NY).

S. rhombifolia seems to be the closest relative, from which S. planitiana differs mainly by the shape of the leaves, the number of whorls in the inflorescence, and the shape and size of the fruits. It is probable that this new species will prove to have a wider range of leaf shapes and sizes than the ones shown by the two collections at hand. The name comes from the fact that this species appears to be restricted to the Great Plains of Central Venezuela.

2. Key to the related species of Sagittaria growing in the Venezuelan llanos.

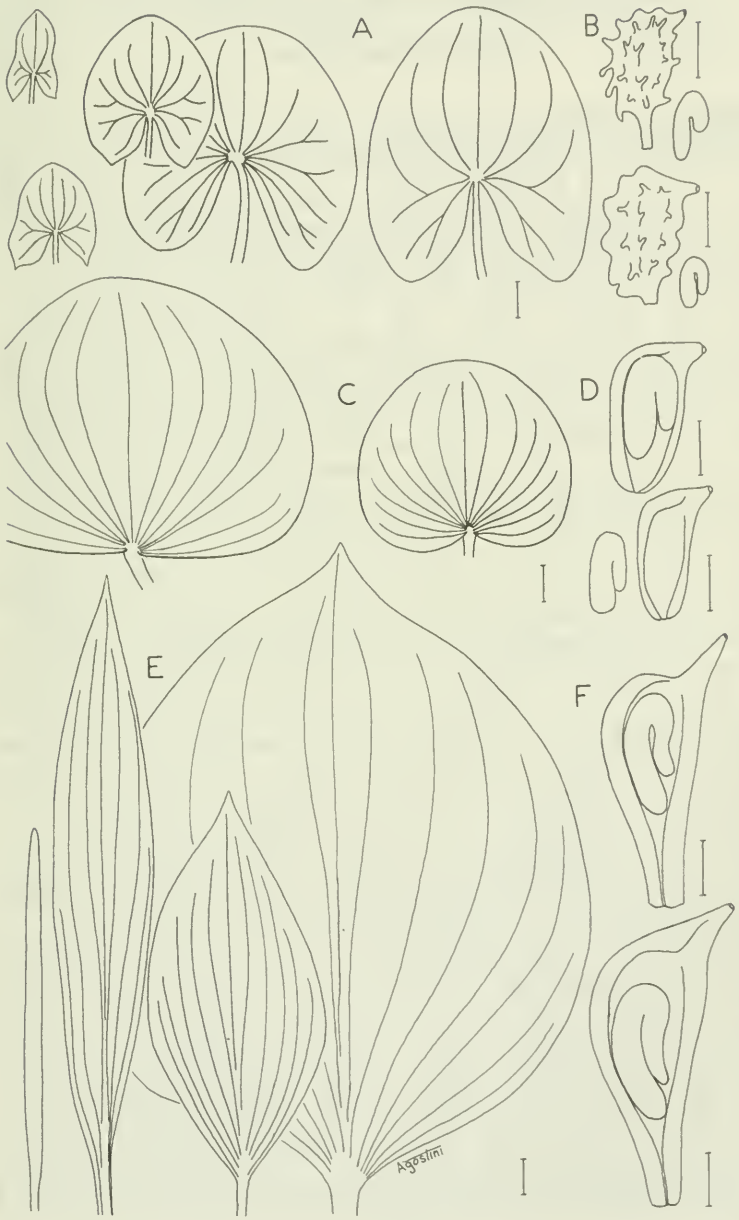
1. Leaf blades typically aerial and spreading; achenes with narrow and entire wings, 2.5-5.5 mm long
   2. Leaves widely ovate, base truncate or subcordate, apex rounded; inflorescences with 2 whorls of flowers; pistillate flowers lacking recurved pedicels; mature achenes 2.5-3 mm long — S. planitiana Agost. (Plate I, C & D)
   2. Leaves linear to ovate, base cuneate to obtuse, apex acute to acuminate; inflorescences with 3-10 whorls of flowers; pistillate flowers usually with recurved pedicels; mature achenes 3.5-5.5 mm long — S. rhombifolia Cham. (Plate I, E & F)
1. Leaf blades typically floating, base cordate; achenes crenate-winged, 1.5-3.5 mm long — S. guyanensis HBK. ssp. guyanensis. (Plate I, A & B)

3. Echinodorus fluitans Fassett, a new record for Venezuela. This species has been collected in the state of Falcón, south of Píritu (J. A. Steyermark 95514). It was previously known only from the type collection made in the Department of Magdalena in Colombia.

Plate I

A & B. Sagittaria guyanensis HBK. ssp. guyanensis
C & D. Sagittaria planitiana Agost.
E & F. Sagittaria rhombifolia Cham.
Scale shown for A,C & E equals 1 cm, and for B,D & F equals 1 mm.

Plate I



ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXX

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional & emended bibliography: Henckel, Nom. Bot. 68, 705, 776, & 812. 1797; Raeusch., Nom. Bot. 30 & 385. 1797; Pers., Syn. Pl. 1: 110--111 & 533. 1805; Steud., Nom. Bot. Phan., ed. 1, 312-313, 422, 550, & 839. 1821; Bong., Ess. Monog. Erioc. 1--74, pl. 1--19. 1831; Steud., Nom. Bot., ed. 2, 1: 585--586 (1840) and 2: 37, 184, 247, 532, & 654. 1841; Schomb., Reise Brit. Guian. 3: 1063--1064. 1848; Schomb., Vers. Fauna & Fl. Brit.-Guian. 3: 1063--1064. 1848; D. Dietr., Syn. Pl. 5: 259--268 & 579. 1852; Pritz., Icon. Ind. 2: 185. 1866; Körn., Abh. Naturw. Ver. Bremen 7: 34. 1880; N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 51--59, 776, 781, & 782. 1897; Post & Kuntze, Lexicon 219 & 544. 1904; Stapf in H. Johnson, Liberia 2, app. 4: 662. 1906; Pax in Engl., Bot. Jahrb. 39: 609. 1907; Robinson & Fern., Rhodora 11: 40. 1909; T. Fr. in R. E. Fr., Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped. 1911-12, 1: 218--219, pl. 16. 1916; W. E. Roth, Schomb. Travels 2: 3, 170, 176, 271, & 422. 1923; Sasaki, List Pl. Formos. 99 & 429. 1928; Stapf, Ind. Lond. 4: 22, 67, & 518--519. 1930; Moldenke, Phytologia 1: 309--336 & 343--364 (1939) and 2: 152--153. 1946; Terrac., Trav. Lab. Mat. Méd. 33 (3): 107. 1947; Moldenke, Phytologia 2: 220, 349--352, & 372--381 (1947), 2: 490--499 (1948), and 3: 79--80, 141--144, & 162--192. 1949; Duvigneaud, Lejeunia 16: 103. 1953; Seshagiri Rao, Journ. Bombay Nat. Hist. Soc. 55: 437. 1958; Standl. & Steyerm., Fieldiana Bot. 24: 374--380. 1958; Van der Veken, Bull. Soc. Roy. Bot. Belg. 91: 99--102. 1958; A. Robyns, Excerpt. Bot. A.1: 215. 1959; Jaques-Félix, Excerpt. Bot. A.1: 72. 1959; Hocking, Excerpt. Bot. A.4: 141 & 591--593 (1962) and A.5: 436. 1962; Anon., Excerpt. Bot. A.6: 458. 1963; K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Brunig, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 307 & 311. 1965; F. R. Fosberg, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 274 & 286. 1965; Jaeger, Lamotte, & Roy, Bull. Inst. Fond. Afr. Noire 28: 1160--1161, fig. 7. 1966; H. Weber in Fittkau, Illies, Klinge, Schwabe, & Sioli, Biogeogr. & Ecol. S. Am. 2: [Van Dye, Monog. Biol. 19:] 512. 1968; Lehr, Bull. Torr. Bot. Club 96: 721. 1969; Fassett, Man. Aquat. Pl., ed. 2, 169. 1969; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 1: 11 & 20. 1969; Eleuterius & Jones, Rhodora 71: 31. 1969; J. A. Steyerm., Act. Bot. Venez. 3: 88 & 96. 1969; Anon., Biol. Abstr. 50 (21): BASIC S.67 (1969) and 50 (24): BASIC S.68 & S.214. 1969; Moldenke, Biol. Abstr. 50: 12948 & 12949 (1969) and 51: 459. 1970; Anon., Biol. Abstr. 51 (1): BASIC S.73. 1970; Moldenke, Phytologia 19: 407--424, 440--496, & 508--512. 1970.

The misspelling Erocauloneae occurs in W. E. Roth, Schomb. Trav. 2: 271 (1923).

BLASTOCAULON ALBIDUM (Gardn.) Ruhl.

Additional & emended synonymy: Eriocaulon albidum Gardn. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 278 & 333. 1855. Eriocaulon albidum Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877, in syn. 1893.

Additional & emended bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 278 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 277, 293, 350--352, & 507. 1863; Moldenke, Phytologia 19: 322 & 407. 1970.

BLASTOCAULON RUPESTRE (Gardn.) Ruhl.

Additional & emended synonymy: Eriocaulon rupestre Gardn. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 278 & 334. 1855. Eriocaulon rupestre Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879, in syn. 1893.

Additional & emended bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 278 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 277, 293, 351, 352, & 507. 1863; Stapf, Ind. Lond. 4: 519. 1930; Moldenke, Phytologia 2: 494 (1948) and 19: 407. 1970.

Additional illustrations: Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 52, fig. 20. 1930.

Stapf (1930) asserts that this species is illustrated in Hook., Icon. Pl. 6: pl. 525 (1843), but the fact is that it is only described, not illustrated, there!

ERIOCAULON Gron.

Emended synonymy: Schoenocaulon Reichenb. ex Steud., Nom. Bot., ed. 2, 1: 585, in syn. 1840 [not Schoenocaulon A. Gray, 1837]. Eriaucolon L. ex Moldenke, Phytologia 2: 377, in syn. 1947.

Additional & emended bibliography: Raeusch., Nom. Bot. 30 & 385. 1797; Henckel, Nom. Bot. 68, 705, 776, & 812. 1797; Pers., Syn. Pl. 1: 110--111 & 533. 1805; Steud., Nom. Bot. Phan., ed. 1, 312--313, 422, & 550. 1821; Bong., Ess. Monog. Erioc. 1--74, pl. 1--19. 1831; Steud., Nom. Bot., ed. 2, 1: 585--586 (1840) and 2: 37, 184, 247, 532, & 654. 1841; Schomb., Reise Brit.-Guian. 3: 1064. 1848; Schomb., Vers. Fauna & Fl. Brit.-Guian. 3: 1064. 1848; D. Dietr., Syn. Pl. 5: 259--268 & 579. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 261, 267--283, 332--334, & 342. 1855; Körn., Linnaea 27: [561], 565, 571--573, 575, & 577--691. 1856; N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 51--59 & 776. 1897; Robinson & Fern., Rhodora 11: 40. 1909; W. E. Roth, Schomb. Travels 2: 170 & 176. 1923; Sasaki, List Pl. Formos. 99 & 429. 1928; Stapf, Ind. Lond. 4: 518. 1930; Moldenke, Phytologia 1: 311--328, 330, 331, 333, 336, 343, & 347--364 (1939), 2: 153 (1946), 2: 220 & 373--381 (1947), 2: 491--495 (1948), and 3: 80, 142--144, & 180--192. 1949; Standl. & Steyerm., Fieldiana Bot. 24: 374--377. 1958; Seshagiri Rao, Journ. Bombay Nat. Hist. Soc. 55: 437. 1958; Jaques-Félix, Excerpt. Bot. A.1: 72. 1959; Hocking, Excerpt. Bot. A.5: 436. 1962; Anon., Excerpt. Bot. A.6: 458. 1963; K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Brunig, Govt. Sarawak Sympos.

Ecol. Res. Humid Trop. Veg. 307 & 311. 1965; F. R. Fosberg, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 274 & 286. 1965; D. Walker, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 141. 1965; H. Weber in Fittkau, Illies, Klinge, Schwabe, & Sioli, Biogeogr. & Ecol. S. Am. 2: [Van Oye, Monog. Biol. 19:] 512. 1968; Fassett, Man. Aquat. Pl., ed. 2, 169. 1969; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 1: 11. 1969; Eleuterius & Jones, Rhodora 71: 31. 1969; J. A. Steyerm., Act. Bot. Venez. 3: 96. 1969; Anon., Biol. Abstr. 50 (21): BASIC S.67. 1969; Lehr, Bull. Torr. Bot. Club 96: 721. 1969; Moldenke, Biol. Abstr. 50: 12948 & 12949 (1969) and 51: 459. 1970; Moldenke, Phytologia 19: 407—424, 440—496, & 509. 1970.

The index in Henckel's work (1797) cites a page "86" for this genus, but this seems to be a typographic error for page 68.

ERIOCAULON ABYSSINICUM Hochst.

Additional bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 333. 1855; Körn., Linnaea 27: 579, 584, 612—613, 616, & 618. 1856; N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 53—54 & 776. 1897; Moldenke, Phytologia 19: 322, 412, & 489. 1970.

ERIOCAULON ACHITON Körn.

Additional & emended bibliography: Körn., Linnaea 27: 585 & 630—631. 1856; Körn. in Mart., Fl. Bras. 3 (1): 285. 1863; Moldenke, Phytologia 19: 322—323, 443, 464, & 477. 1970.

ERIOCAULON AFRICANUM Hochst.

Additional & emended bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 333. 1855; Körn., Linnaea 27: 585, 649—650, & 671. 1856; Körn. in Mart., Fl. Bras. 3 (1): 293 & 503. 1863; N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 53, 56—57, & 776. 1897; Moldenke, Phytologia 3: 143 & 181 (1949) and 19: 323, 465, & 466. 1970.

ERIOCAULON AUSTRALE R. Br.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 312 (1821) and ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 569 & 612. 1841; D. Dietr., Syn. Pl. 5: 265. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 333. 1855; Körn., Linnaea 27: 582, 586, 686—687, & 692. 1856; Körn. in Mart., Fl. Bras. 3 (1): 286 & 503. 1863; Moldenke, Phytologia 2: 376 (1947), 2: 494 (1948), and 19: 325 & 415. 1970.

ERIOCAULON BENTHAMI Kunth

Additional & emended bibliography: Kunth, Enum. Pl. 3: 545 & 612. 1841; D. Dietr., Syn. Pl. 5: 263. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 269 & 333. 1855; Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 490—492 & 508. 1863; Moldenke, Phytologia 1: 311, 350, 356, 357, & 359 (1939) and 19: 326. 1970.

ERIOCAULON BIFISTULOSUM Van Heurck & Muell.-Arg.

Additional & emended bibliography: Moldenke, Phytologia 2: 375

(1947), 3: 143 & 183 (1949), and 19: 326. 1970.

ERIOCAULON BILOBATUM Morong

Additional & emended bibliography: Standl. & Steyerm., Fieldiana Bot. 24: 375. 1958; Moldenke, Phytologia 1: 311—312, 350, & 360 (1939) and 19: 326. 1970.

ERIOCAULON BREVIPEDUNCULATUM Merr.

Additional bibliography: Moldenke, Phytologia 2: 377 (1947) and 19: 326, 410, & 480. 1970.

The E. acaule Fosberg previously regarded by me as a synonym of this taxon seems to belong, rather, to the synonymy of the recently proposed E. kinabaluense Van Royen.

ERIOCAULON BREVISCAPUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 586 & 676—677. 1856; Körn. in Mart., Fl. Bras. 3 (1): 293. 1863; Moldenke, Phytologia 19: 21. 1969.

The E. breviscapum Mart. is a synonym of Paepalanthus plantagineus (Bong.) Körn., which see.

ERIOCAULON BROWNIANUM Mart.

Additional & emended bibliography: Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 562 & 612. 1841; D. Dietr., Syn. Pl. 5: 265. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 271 & 333. 1855; Körn., Linnaea 27: 585 & 663—664. 1856; Körn. in Mart., Fl. Bras. 3 (1): 503. 1863; Moldenke, Phytologia 2: 379 (1947) and 19: 326—327, 490, & 491. 1970.

ERIOCAULON BRUNONIS Britten

Additional & emended bibliography: Steud., Nom. Bot., ed. 1, 313 (1821) and ed. 2, 1: 586. 1840; Kunth, Enum. Pl. 3: 571 & 614. 1841; Steud., Syn. Pl. Glum. 2: [Cyp.] 269 & 334. 1855; Körn., Linnaea 27: 583 & 586—587. 1856; Moldenke, Phytologia 19: 327. 1970.

ERIOCAULON CINEREUM R. Br.

Additional & emended synonymy: Eriocaulon setaceum Willd. ex Kunth, Enum. Pl. 3: 552 & 614, in syn. 1841 [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]. Eriocaulon cinereum Bong. ex Kunth, Enum. Pl. 3: 613, sphalm. 1841 [not E. cinereum Buch.-Ham., 1893, nor Hamilt., 1832]. Eriocaulon sieboldtianum Zucc. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 334. 1855.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 312 (1821) and ed. 2, 1: 585 & 586. 1840; Kunth, Enum. Pl. 3: 552, 571, 613, & 614. 1841; D. Dietr., Syn. Pl. 5: 266. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 272, 273, 333, & 334. 1855; Körn., Linnaea 27: 584, 613, & 618. 1856; Körn. in Mart., Fl.

Bras. 3 (1): 293. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Moldenke, Phytologia 2: 373, 376, & 379 (1947), 2: 493 (1948), and 3: 144 & 185. 1949; Moldenke, Biol. Abstr. 50: 12949. 1969; Moldenke, Phytologia 19: 328—329, 339, 350, 415, 420, 450, 464, 476, & 477. 1970.

Steudel (1840) places E. tenue Hamilt. in the synonymy of E. sexangulare L., but this is obviously done because of his erroneous interpretation of the latter species.

ERIOCAULON COMPRESSUM Lam.

Additional & emended synonymy: Eriocaulon cephalotes Poir. ex Steud., Nom. Bot. Phan., ed. 1, 312 & 313. 1821. Eriocaulon decangulare Lam. ex Steud., Nom. Bot. Phan., ed. 1, 312 & 313, in syn. 1821. Eriocaulon pubescens var. β Pers. ex Steud., Nom. Bot. Phan., ed. 1, 312, in syn. 1821. Eriocaulon gnaphaloides Michx. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 268. 1855. Eriaucolon gnaphalodes Michx. ex Moldenke, Phytologia 2: 377, in syn. 1947.

Additional & emended bibliography: Pers., Syn. Pl. 1: 111. 1805; Steud., Nom. Bot. Phan., ed. 1, 312 & 313. 1821; Bong., Ess. Monog. Erioc. 3, 4, 29, & 30. 1831; Steud., Nom. Bot., ed. 2, 1: 585 & 586. 1840; Kunth, Enum. Pl. 3: 497, 542, 575, & 613. 1841; D. Dietr., Syn. Pl. 5: 263. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 268 & 334. 1855; Körn., Linnaea 27: 584, 592--594, & 596. 1856; Körn. in Mart., Fl. Bras. 3 (1): 285 & 503. 1863; Moldenke, Phytologia 1: 312—313, 348—354, & 356 (1939), 2: 153 (1946), 2: 373, 377, & 378 (1947), 2: 491 & 495 (1948), and 3: 80, 142, & 186--189. 1949; Eleuterius & Jones, Rhodora 71: 31. 1969; Moldenke, Phytologia 19: 329—330, 342, 351, 460, & 461. 1970.

Steudel (1821) reduces E. decemangulare Humb. & Bonpl. to synonymy under the present taxon and also E. anceps Walt., but the latter with a question. The former actually is a synonym of E. humboldtii Kunth and the latter is Lachnocaulon anceps (Walt.) Morong. The same author (1840) reduces E. compressum, in part, at least, to the African E. pubescens Lam. [now known as Mesanthemum pubescens (Lam.) Körn.], a disposition which is entirely unjustified.

ERIOCAULON CRASSISCAPUM Bong.

Additional synonymy: Eriocaulon crassicarpum Bong. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 333, sphalm. 1855.

Additional & emended bibliography: Bong., Ess. Monog. Erioc. 28. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 574, 575, & 613. 1841; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 269 & 333. 1855; Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 486—487 & 507. 1863; Moldenke, Phytologia 2: 374 & 375 (1947) and 19: 330. 1970.

Steudel (1855) cites only P. Clausen 1180 from Minas Gerais, Brazil, as though this were the type collection. Bongard (1831)

gives us no collector's name or number, saying merely of the type collection "In paludibus inter as Prados et Barbacena".

ERIOCAULON CRISTATUM Mart.

Additional synonymy: Eriocaulon cristatum Mart. & Wall. ex D. Dietr., Syn. Pl. 5: 264. 1852.

Additional & emended bibliography: Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 559—560, 568, & 613. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 271 & 333. 1855; Körn., Linnaea 27: 579, 584, & 607—611. 1856; Körn. in Mart., Fl. Bras. 3 (1): 280 & 503. 1863; Moldenke, Phytologia 2: 376 & 378 (1947) and 19: 330—331, 334, 418, & 420. 1970.

ERIOCAULON DECANGULARE L.

Emended synonymy: Eriocaulon serotinum Walt. & Lam. ex Steud., Nom. Bot. Phan., ed. 1, 312, in syn. 1821. Eriocaulon gnaphalodes Bernhardi ex Kunth, Enum. Pl. 3: 543 & 613, in syn. 1841 [not E. gnaphalodes Beauv., 1959, nor Michx., 1803, nor C. Wright, 1900]. Eriocaulon villosum Willd. ex Kunth, Enum. Pl. 3: 543 & 614, in syn. 1841 [not E. villosum Ell., 1968, nor Michx., 1803, nor Salzm., 1855].

Additional & emended bibliography: Henckel, Nom. Bot. 68. 1797; Raeusch., Nom. Bot. 30. 1797; Pers., Syn. Pl. 1: 110. 1805; Steud., Nom. Bot. Phan., ed. 1, 312 & 313. 1821; Bong., Ess. Monog. Erioc. 2, 4, & 8. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 540, 543—544, 563, 580, 613, & 614. 1841; Schomb., Reise Brit.-Guian. 3: 1064. 1848; Schomb., Vers. Fauna & Fl. Brit.-Guian. 3: 1064. 1848; D. Dietr., Syn. Pl. 5: 263. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 268 & 333. 1855; Körn., Linnaea 27: 584, 589, 593, 596—598, & 667. 1856; Körn. in Mart., Fl. Bras. 3 (1): 280, 290, 474, 476, 491, 497, & 503. 1863; Moldenke, Phytologia 1: 314—316 & 348—363 (1939), 2: 153 (1946), 2: 378 & 379 (1947), 2: 491 & 494 (1948), and 3: 80, 142, & 190—192. 1949; Eleuterius & Jones, Rhodora 71: 31. 1969; Moldenke, Phytologia 19: 331—333, 460, 461, & 491. 1970.

The Lundells describe this plant as a "perennial herb, corolla yellow, anthers orange", flowering and fruiting in March.

Steudel (1841) reduces E. decemangulare Humb. & Bonpl. questionably to synonymy under E. decangulare L., but it actually belongs in the synonymy of E. humboldtii Kunth. The E. decangulare Lam., which he also lists, is a synonym of E. compressum Lam., while the homonym accredited to Humboldt & Bonpland by Bongard (1831) is E. humboldtii Kunth.

Additional citations: SOUTH CAROLINA: Hampton Co.: Wilbur & Webster 2833 (Mi). TEXAS: Hardin Co.: Lundell & Lundell 11902 (N).

ERIOCAULON DECANGULARE f. PARVICEPS Moldenke

Additional bibliography: Moldenke, Phytologia 19: 332, 333, 460, & 461. 1970.

Additional citations: TEXAS: Robertson Co.: Lonard 1956 (Mi).

ERIOCAULON DEPRESSUM R. Br.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 312 (1821) and ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 571 & 613. 1841; D. Dietr., Syn. Pl. 5: 266. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 269 & 333. 1855; Körn., Linnaea 27: 583, 587, & 588. 1856; Moldenke, Phytologia 19: 334. 1970.

ERIOCAULON DREGEI Hochst.

Additional bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 272 & 333. 1855; Körn., Linnaea 27: 586 & 671—674. 1856; Körn. in Mart., Fl. Bras. 3 (1): 300 & 503. 1863; N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 53, 55—56, & 776. 1897; Moldenke, Phytologia 19: 335. 1970.

ERIOCAULON ECHINULATUM Mart.

Synonymy: Eriocaulon echinulatum Mart. & Endl. ex D. Dietr., Syn. Pl. 5: 265. 1852.

Additional & emended bibliography: Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 568, 569, & 613. 1841; D. Dietr., Syn. Pl. 5: 265. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 272 & 333. 1855; Körn., Linnaea 27: 579, 584, 619—620, & 692. 1856; Körn. in Mart., Fl. Bras. 3 (1): 284—286, 291, & 475. 1863; Moldenke, Phytologia 19: 335 & 478. 1970.

ERIOCAULON EHRENBERGIANUM Klotzsch

Additional & emended bibliography: Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 491—492 & 508. 1863; Moldenke, Phytologia 1: 316, 350, 352—354, & 360—362. 1939; Standl. & Steyerm., Fieldiana Bot. 24: 375—376. 1958; Moldenke, Phytologia 19: 335 & 447. 1970.

This species was collected in flower and fruit by Matuda in October.

Additional citations: MEXICO: Morelos: Matuda 25602 (N).

ERIOCAULON ELICHRYSOIDES Bong.

Additional & emended synonymy: Eriocaulon pardimum A. Dietr. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 334, sphalm. 1855. Eriocaulon helichrysoides Bong. apud Körn. in Mart., Fl. Bras. 3 (1): 476, 483, & 507. 1863 [not E. helichrysoides Steud., 1903].

Additional & emended bibliography: Bong., Ess. Monog. Erioc. 31. 1831; Guill. in Deless., Icon. Sel. 3: 60. 1837; Kunth, Enum. Pl. 3: 546, 548, 577, & 613. 1841; Steud., Syn. Pl. Glum. 2: [Cyp.] 269, 283, 333, & 334. 1855; Körn., Linnaea 27: 599. 1856; Körn. in Mart., Fl. Bras. 3 (1): 476, 483, & 507. 1863; Moldenke, Phytologia 19: 336. 1970.

ERIOCAULON FASCICULARE L.

Bibliography: Raeusch., Nom. Bot. 30. 1797.

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

by Raeuschel (1797) as having been proposed by Linnaeus. It seems most probable that what Raeuschel intended to say was E. fasciculatum Lam., published in 1789 and now regarded as Paepalanthus lamarckii Kunth, which see.

ERIOCAULON FISTULOSUM R. Br.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 313 (1821) and ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 571 & 613. 1841; D. Dietr., Syn. Pl. 5: 266. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 269 & 334. 1855; Körn., Linnaea 27: 583 & 587. 1856; Moldenke, Phytologia 19: 336. 1970.

ERIOCAULON FULIGINOSUM C. Wright

Additional & emended bibliography: Moldenke, Phytologia 1: 317, 350, 352, 353, 355, 356, 358, 360, 361, & 363. 1939; Standl. & Steyerm., Fieldiana Bot. 24: 375 & 376. 1958; Moldenke, Phytologia 19: 336. 1970.

ERIOCAULON GIBBOSUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 293, 489—490, 500, & 507, pl. 61, fig. 1. 1863; Moldenke, Phytologia 2: 374 & 378. 1947; Moldenke, Biol. Abstr. 50: 12948. 1969; Moldenke, Phytologia 19: 336—337. 1970.

Additional citations: BRAZIL: Pará: Sick B.878a (Rf).

ERIOCAULON GOMPHRENOIDES Kunth

Additional & emended bibliography: Kunth, Enum. Pl. 3: 548 & 613. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 269—270 & 334. 1855; Körn., Linnaea 27: 599. 1856; Körn. in Mart., Fl. Bras. 3 (1): 481—482 & 506. 1863; Moldenke, Phytologia 19: 42. 1969.

ERIOCAULON GUYANENSE Körn.

Emended synonymy: Eriocaulon guianense Körn., Linnaea 27: 588. 1856 [not E. guianense A. Dietr., 1855].

Additional bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 269 & 334. 1855; Körn., Linnaea 27: 588. 1856; Körn. in Mart., Fl. Bras. 288, 291, 475, 478, & 507. 1863; Moldenke, Phytologia 2: 373 (1947) and 19: 337 & 447. 1970.

The E. guianense accredited to A. Dietrich is a synonym of E. humboldtii Kunth.

ERIOCAULON HAMILTONIANUM Mart.

Emended synonymy: Eriocaulon cinereum Hamilt. ex Wall., Numer. List 207, in syn. 1832 [not E. cinereum Bong., 1841, nor R. Br., 1810, nor Merr., 1940].

Additional & emended bibliography: Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 552 & 613. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270 & 334. 1855; Körn., Linnaea 27: 581—583, 586, 679—680, & 683. 1856;

Körn. in Mart., Fl. Bras. 3 (1): 285 & 480. 1863; Moldenke, Phytologia 19: 337 & 476. 1970.

ERIOCAULON HETEROLEPIS Steud.

Additional & emended bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 271 & 334. 1855; Körn., Linnaea 27: 581, 585, & 652. 1856; Moldenke, Phytologia 19: 338, 347, 418, 420, & 477. 1970.

ERIOCAULON HETEROMALLUM Bong.

Synonymy: Eriocaulon heteromallum Kunth ex Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855.

Additional & emended bibliography: Kunth, Enum. Pl. 3: 574 & 613. 1841; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855; Moldenke, Phytologia 18: 179. 1969.

ERIOCAULON HOOKERIANUM Stapf

Additional synonymy: Eriocaulon macrophyllum Ridl., Journ. Fed. Malay States Mus. 6: 191, in syn. 1915 [not E. macrophyllum Ruhl., 1903].

Additional bibliography: H. N. Ridl., Journ. Linn. Soc. Lond. Bot. 38: 332. 1908; K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 338, 416, 417, & 464. 1970.

ERIOCAULON HUMBOLDTII Kunth

Additional synonymy: Eriocaulon decangulare Humb. & Bonpl. ex Bong., Ess. Monog. Erioc. 8 & 30. 1831. Eriocaulon decemangulare Humb. & Kunth apud Kunth, Enum. Pl. 3: 544 & 613. 1841. Eriocaulon decemangulare Humb. & Bonpl. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 268 & 333. 1855. Eriocaulon guianense A. Dietr. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 269 & 333, in syn. 1855 [not E. guianense Körn., 1856].

Additional & emended bibliography: Bong., Ess. Monog. Erioc. 8 & 30. 1831; Kunth, Enum. Pl. 3: 544—545 & 613. 1841; Schomb., Reise Brit.-Guian. 3: 1064. 1848; Schomb., Vers. Fauna & Fl. Brit.-Guian. 3: 1064. 1848; D. Dietr., Syn. Pl. 5: 263. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 268, 269, 333, & 334. 1855; Körn., Linnaea 27: 601. 1856; Körn. in Mart., Fl. Bras. 3 (1): 476, 497, 498, & 507. 1863; Moldenke, Phytologia 2: 374. 1947; J. A. Steyerm., Act. Bot. Venez. 3: 96. 1969; Moldenke, Phytologia 19: 338—339 & 456. 1970.

ERIOCAULON INFIRMUM Steud.

Additional synonymy: Eriocaulon gracile Mart. & Wall. ex D. Dietr., Syn. Pl. 5: 264. 1852.

Additional & emended bibliography: Steud., Nom. Bot., ed. 2, 1: 575 & 586. 1840; Kunth, Enum. Pl. 3: 558—559 & 613. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 271 & 334. 1855; Körn., Linnaea 27: 581, 582, 585, 655—656, 658, 661, & 682. 1856; Körn. in Mart., Fl. Bras. 3 (1): 290, 292,

& 298. 1863; Moldenke, Phytologia 19: 337, 339—340, 478, & 491. 1970.

ERIOCAULON KINABALUENSE Van Royen

Additional synonymy: Eriocaulon acaule Fosberg, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 286, nom. nud. 1965 [not E. acaule Pennell, 1959].

Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; F. R. Fosberg, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 286. 1965; Moldenke, Phytologia 19: 341. 1970.

Eriocaulon acaule Fosberg was previously regarded by me as a synonym of E. brevipedunculatum Merr., but apparently this disposition was incorrect. Fosberg (1965) says of it "forming hard cushions on hard granite slopes with sparse vegetation, 12,000 feet on Kinabalou South or South Peak".

ERIOCAULON KINLOCHII Moldenke

Additional & emended bibliography: Moldenke, Phytologia 1: 318, 350, & 357. 1939; Standl. & Steyerm., Fieldiana Bot. 24: 375 & 376. 1958; Moldenke, Phytologia 18: 248—249. 1969.

ERIOCAULON LANCEOLATUM Miq.

Additional & emended bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 271--272 & 334. 1855; Körn., Linnaea 27: 581, 585, 656—658, & 661. 1856; Moldenke, Phytologia 19: 341 & 477. 1970.

ERIOCAULON LATIFOLIUM J. Sm.

Additional bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 334. 1855; Körn., Linnaea 27: 605 & 666--667. 1856; Moldenke, Phytologia 19: 324, 341—342, 445, 485, & 486. 1970.

ERIOCAULON LEPTOPHYLLUM Kunth

Additional & emended bibliography: Kunth, Enum. Pl. 3: 549 & 613. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270 & 334. 1855; Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 476, 494, & 506. 1863; Moldenke, Phytologia 2: 374, 375, 377, & 381 (1947) and 19: 73. 1969.

ERIOCAULON LEUCOMELAS Steud.

Additional synonymy: Eriocaulon nigrescens A. Dietr. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 272 & 334. 1855.

Additional & emended bibliography: Kunth, Enum. Pl. 3: 568 & 613. 1841; Steud., Syn. Pl. Glum. 2: [Cyp.] 272 & 334. 1855; Körn., Linnaea 27: 585, 647—649, 652, & 797. 1856; Körn. in Mart., Fl. Bras. 3 (1): 293. 1863; Moldenke, Phytologia 19: 342 & 464. 1970.

ERIOCAULON LIGULATUM (Vell.) L. B. Sm.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 482—484 & 507. 1863; Moldenke, Phytologia 3: 142 (1949) and

19: 342. 1970.
Additional citations: BRAZIL: Paraná: Hatschbach 11320 (Ac).

ERIOCAULON LINEARE Small
Additional & emended bibliography: Moldenke, Phytologia 1: 318--319, 349, 350, 352, 354, 356, 360, & 363 (1939), 2: 491 (1948), and 3: 80. 1949; Eleuterius & Jones, Rhodora 71: 31. 1969; Moldenke, Phytologia 19: 342 & 460. 1970.

ERIOCAULON LUZULAEFOLIUM Mart.
Additional & emended bibliography: Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 553--555 & 613. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270 & 334. 1855; Körn., Linnaea 27: 581, 585, & 636--637. 1856; Körn. in Mart., Fl. Bras. 3 (1): 503. 1863; Moldenke, Phytologia 2: 375 (1947) and 19: 342--343, 473, & 475--478. 1970.

ERIOCAULON MACROPHYLLUM Ruhl.
Additional & emended bibliography: H. N. Ridl., Journ. Linn. Soc. Lond. Bot. 38: 332. 1908; Moldenke, Phytologia 19: 77 (1969) and 19: 416 & 417. 1970.

ERIOCAULON MELANOCEPHALUM Kunth
Additional & emended bibliography: Kunth, Enum. Pl. 3: 549 & 613. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270 & 334. 1855; Körn., Linnaea 27: 578 & 601. 1856; Körn. in Mart., Fl. Bras. 3 (1): 298, 476, 498--501, & 506, pl. 63. 1863; Moldenke, Phytologia 1: 319, 351, 357, & 363 (1939), 2: 374 (1947), 3: 142 & 180 (1949), and 19: 346. 1970.

ERIOCAULON MICROCEPHALUM H.B.K.
Emended synonymy: Eriocaulon microcephalum Humb. & Kunth ex Kunth, Enum. Pl. 3: 548, 572, & 613. 1841 [not E. microcephalum Cham. & Schlecht., 1893, nor Hook. & Arn., 1854, nor Sellow, 1959].
Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 313 (1821) and ed. 2, 1: 585 & 586. 1840; Kunth, Enum. Pl. 3: 548, 572, 613, & 614. 1841; D. Dietr., Syn. Pl. 5: 263--264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 269 & 334. 1855; Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 470, 492, 502, 505, & 508. 1863; Moldenke, Phytologia 1: 316, 320, 350, 351, 357, 358, 360--362, & 364 (1939), 2: 134 & 491 (1948), and 19: 347. 1970.
It is of interest to note that Steudel (1840) lists E. triangulare L. both as a valid species (p. 586) and as a synonym of E. microcephalum (p. 585).

ERIOCAULON MINIMUM Lam.
Additional synonymy: Eriocaulon sexangulare Burm. ex Steud., Nom. Bot., ed. 2, 1: 585 & 586, in syn. 1840.
Additional bibliography: Steud., Nom. Bot. Phan., ed. 1, 313

(1821) and ed. 2, 1: 585 & 586. 1840; Kunth, Enum. Pl. 3: 551 & 613. 1841; Steud., Syn. Pl. Glum. 2: [Cyp.] 268 & 334. 1855; Körn., Linnaea 27: 585, 616, & 634—635. 1856; Körn. in Mart., Fl. Bras. 3 (1): 285. 1863; Moldenke, Phytologia 19: 339 & 347. 1970.

It is of interest to note that Steudel, in his 1821 work, reduces E. minimum to synonymy under E. sexangulare L., but in his 1840 work reinstates it as a valid species with "E. sexangulare Burm." as a synonym.

ERIOCAULON MODESTUM Kunth

Additional & emended bibliography: Kunth, Enum. Pl. 3: 547 & 613. 1841; D. Dietr., Syn. Pl. 5: 263. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 269, 280. & 334. 1855; Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 286, 476, 493, 500, & 507, pl. 62, fig. 2. 1863; Moldenke, Phytologia 2: 374 & 375 (1947), 3: 80 (1949), and 19: 347. 1970.

ERIOCAULON NANUM R. Br.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 313 (1821) and ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 571 & 613. 1841; D. Dietr., Syn. Pl. 5: 266. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 334. 1855; Körn., Linnaea 27: 580, 584, & 618. 1856; Körn. in Mart., Fl. Bras. 3 (1): 291. 1863; Moldenke, Phytologia 19: 348. 1970.

ERIOCAULON NEGLECTUM Ruhl.

Additional bibliography: Moldenke, Phytologia 18: 325. 1969.

Additional citations: BRAZIL: Mattogrosso: Hatschbach & Guimarães 21848 (Z).

ERIOCAULON NEPALENSE Prescott

Emended synonymy: Eriocaulon nepalense Bong. ex Steud., Nom. Bot., ed. 2, 1: 585. 1840. Eriocaulon quinquangulare Wall. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 270 & 334, in syn. 1855 [not E. quinquangulare Bojer, 1964, nor Heyne, 1832, nor L., 1743, nor Mart., 1854, nor Wight, 1832, nor Willd., 1959]. Eriocaulon nepalense Kunth ex Körn., Linnaea 27: 637, in syn. 1856. Eriocaulon viride Körn., Linnaea 27: 581, 585, & 637—639. 1856.

Additional & emended bibliography: Bong., Ess. Monog. Erioc. 10 & 13. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 554—555 & 613. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270 & 334. 1855; Körn., Linnaea 27: 581, 585, & 637—639. 1856; Körn. in Mart., Fl. Bras. 3 (1): 503. 1863; Körn. in Miq., Ann. Mus. Bot. Lugd. 3: 163. 1867; Moldenke, Phytologia 2: 493. 1948; Moldenke, Biol. Abstr. 50: 12949 (1969) and 51: 459. 1970; Moldenke, Phytologia 19: 348, 418, 420, & 476. 1970.

ERIOCAULON NILAGIRENSE Steud.

Additional synonymy: Eriocaulon nilagiricum Steud., Syn. Pl.

Glum. 2: [Cyp.] 334, sphalm. 1855.
Additional & emended bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 271 & 334. 1855; Körn., Linnaea 27: 585 & 661—663. 1856; Körn. in Mart., Fl. Bras. 3 (1): 505. 1863; Moldenke, Phytologia 2: 377 (1947) and 19: 348, 412, & 491. 1970.

ERIOCAULON ODORATUM Dalz.
Additional & emended bibliography: Körn., Linnaea 27: 581, 583, 586, & 683—684. 1856; Körn. in Mart., Fl. Bras. 3 (1): 508. 1863; Moldenke, Phytologia 19: 349. 1970.

ERIOCAULON ORYZETORUM Mart.
Additional & emended bibliography: Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 552 & 613. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270 & 334. 1855; Körn., Linnaea 27: 583, 585, & 639—641. 1856; Körn. in Mart., Fl. Bras. 3 (1): 501 & 503. 1863; Moldenke, Phytologia 2: 493. 1948; Moldenke, Alph. List Cit. 2: 461 (1948) and 4: 1102. 1949; Moldenke, Phytologia 19: 85 & 91 (1969) and 19: 424 & 447. 1970.

ERIOCAULON PALLIDUM R. Br.
Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 313 (1821) and ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 570 & 613. 1841; D. Dietr., Syn. Pl. 5: 265. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 334. 1855; Körn., Linnaea 27: 581, 585, & 635. 1856; Körn. in Mart., Fl. Bras. 3 (1): 285, 286, & 291. 1863; Moldenke, Phytologia 19: 349. 1970.

ERIOCAULON PALUSTRE Salzm.
Additional & emended bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 280 & 334. 1855; Körn., Linnaea 27: 599. 1856; Körn. in Mart., Fl. Bras. 3 (1): 288, 291, 475, 480, 500, & 506, pl. 61, fig. 1. 1863; Moldenke, Phytologia 19: 349. 1970.

ERIOCAULON PANAMENSE Moldenke
Additional & emended bibliography: Moldenke, Phytologia 1: 321, 350, 357, & 363. 1939; Moldenke, Alph. List Cit. 1: 326 (1946), 2: 609 (1948), and 4: 1141. 1949; Moldenke, Phytologia 18: 366. 1969.

ERIOCAULON PARKERI B. L. Robinson
Additional & emended bibliography: Moldenke, Phytologia 1: 321, 348, 349, 353—360, 362, & 363 (1939), 2: 491 (1948), and 3: 80. 1949; Lehr, Bull. Torr. Bot. Club 96: 721. 1969; Moldenke, Phytologia 19: 349—350. 1970.
Additional citations: VIRGINIA: Nansemond Co.: Fernald, Long, & Clement 15238 (Mi).

ERIOCAULON PELLUCIDUM Michx.
Additional synonymy: Eriocaulon plukenetianum Bong. ex Körn. in

Mart., Fl. Bras. 3 (1): 474. 1863.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 313. 1821; Bong., Ess. Monog. Erioc. 4, 16, & 17. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 540, 541, 559, & 613. 1841; Steud., Syn. Pl. Glum. 2: [Cyp.] 268 & 334. 1855; Körn., Linnaea 27: 588—590. 1856; Körn. in Mart., Fl. Bras. 3 (1): 474. 1863; Robinson & Fern., Rhodora 11: 40. 1909; Fassett, Man. Aquat. Pl., ed. 2, 169. 1969; Moldenke, Phytologia 19: 409. 1970.

Gillet & Findlay describe this plant as common in floating bogs in Labrador, with white flowers, blooming there in July.

Additional citations: LABRADOR: Gillet & Findlay 5471 (N). QUEBEC: Pontiac Co.: Marie-Victorin, Rolland-Germain, & Blain 124 (Mi).

ERIOCAULON PLUMALE subsp. KINDIAE (H. Lecomte) Meikle

Additional bibliography: Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Biol. Abstr. 42: 1517. 1963; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1962: 29. 1963; Moldenke, Phytologia 19: 410. 1970.

Additional citations: REPUBLIC OF GUINEA: Boismare 385 [Herb. Chillou 3903] (An); Chillou 644 (An), 717 (Rf).

ERIOCAULON PUBIGERUM Bong.

Additional & emended bibliography: Bong., Ess. Monog. Erioc. 28. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 575 & 614. 1841; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855; Moldenke, Phytologia 18: 425. 1969.

ERIOCAULON PULCHELLUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 580, 585, & 621—624. 1856; Körn. in Mart., Fl. Bras. 3 (1): 283. 1863; Moldenke, Phytologia 19: 410 & 468. 1970.

ERIOCAULON PUSILLUM R. Br.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 313 (1821) and ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 571 & 614. 1841; D. Dietr., Syn. Pl. 5: 266. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 334. 1855; Körn., Linnaea 27: 580, 585, 616, 618, & 621. 1856; Körn. in Mart., Fl. Bras. 3 (1): 283. 1863; Moldenke, Phytologia 19: 410.1970.

ERIOCAULON PYGMAEUM Soland.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 313 (1821) and ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 570 & 613. 1841; D. Dietr., Syn. Pl. 5: 265--266. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 334. 1855; Körn., Linnaea 27: 584 & 617—618. 1856; Körn. in Mart., Fl. Bras. 3 (1): 286 & 291. 1863; Moldenke, Phytologia 19: 410. 1970.

ERIOCAULON QUINQUANGULARE L.

Additional & emended synonymy: Eriocaulon argyraeum Steud., Nom. Bot., ed. 2, 1: 585. 1840. Eriocaulon triangulare Bernhardi ex Kunth, Enum. Pl. 3: 557 & 614, in syn. 1841 [not E. triangulare L., 1762]. Eriocaulon argenteum Wight ex Kunth, Enum. Pl. 3: 557 & 612, in syn. 1841. Eriocaulon argenteum Mart. & Wall. ex D. Dietr., Syn. Pl. 5: 264. 1852. Eriocaulon quinquangulare e Nepalia Wall. ex Kunth, Enum. Pl. 3: 614, in syn. 1841.

Additional & emended bibliography: Henckel, Nom. Bot. 68. 1797; Raeusch., Nom. Bot. 30. 1797; Pers., Syn. Pl. 1: 110. 1805; Steud., Nom. Bot. Phan., ed. 1, 313. 1821; Bong., Ess. Monog. Eriоc. 2 & 8. 1831; Steud., Nom. Bot., ed. 2, 1: 585 & 586. 1840; Kunth, Enum. Pl. 3: 554, 556—558, 567, 612, & 614. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 271—272, 333, & 334. 1855; Körn., Linnaea 27: 581, 585, 638, 639, 641—645, 647, 648, & 652. 1856; Körn. in Mart.. Fl. Bras. 3 (1): 280, 283, 285, 501, 503, & 505. 1863; Seshagiri Rao, Journ. Bombay Nat. Hist. Soc. 55: 437. 1958; Moldenke, Phytologia 2: 377 (1947) and 19: 410—411, 418, 420, 440, 449, 462, 477, & 488. 1970.

Kunth (1841), on page 614 of his index, lists an "Eriocaulon quinquangulare e Nepalia Wall." and cites it to page 558, where it does not seem to appear, but apparently he intends it as a synonym of E. argenteum Mart., which is now regarded as E. quinquangulare L.

Steudel (1840) regarded E. striatum Lam. and E. trilobum Hamilt. as synonyms of E. quinquangulare L., but the former is a valid species and the latter is now known as E. sollyanum Royle.

ERIOCAULON QUINQUANGULARE var. MARTIANUM Wall.

Additional bibliography: Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 558 & 613. 1841; Steud., Syn. Pl. Glum. 2: [Cyp.] 271 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 285. 1863; Moldenke, Phytologia 18: 432, 435, & 447. 1969.

ERIOCAULON RAVENELII Chapm.

Additional & emended bibliography: Moldenke, Phytologia 1: 322, 349, 354, 360, & 362 (1939), 2: 491 & 494 (1948), 3: 80 (1949), and 19: 411. 1970.

ERIOCAULON ROBUSTIUS (Maxim.) Mak.

Additional bibliography: Moldenke, Phytologia 2: 375—377 & 379 (1947), 2: 493 (1948), 3: 143 & 144 (1949), and 19: 412 & 478. 1970.

ERIOCAULON ROBUSTUM Steud.

Additional & emended bibliography: Steud,, Syn. Pl. Glum. 2: [Cyp.] 271, 272, 333, & 334. 1855; Körn., Linnaea 27: 586, 658, & 674—676. 1856; Körn. in Mart., Fl. Bras. 3 (1): 508. 1863; Moldenke, Phytologia 19: 412. 1970.

ERIOCAULON ROSULATUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 298, 486—488, 500, & 507, pl. 61, fig. 3. 1863; Moldenke, Phytologia 19: 91. 1969.

ERIOCAULON ROUXIANUM Steud.

Additional & emended bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 270—271 & 334. 1855; Körn., Linnaea 27: 580, 585, & 626—627. 1856; Körn. in Mart., Fl. Bras. 3 (1): 285. 1863; Moldenke, Phytologia 19: 91. 1969.

ERIOCAULON SCARIOSUM R. Br.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 313 (1821) and ed. 2, 1: 586. 1840; Kunth, Enum. Pl. 3: 568—571 & 614. 1841; D. Dietr., Syn. Pl. 5: 265. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270, 273, & 334. 1855; Körn., Linnaea 27: 585 & 652—655. 1856; Körn. in Mart., Fl. Bras. 3 (1): 500 & 503. 1863; Moldenke, Phytologia 2: 493 & 494 (1948) and 19: 412—413. 1970; Moldenke, Biol. Abstr. 51: 459. 1970.

ERIOCAULON SCHIEDEANUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 492—493 & 508. 1863; Moldenke, Phytologia 1: 322—323, 350, 351, & 360 (1939) and 19: 413. 1970.

ERIOCAULON SCHIPPII Standl.

Additional & emended bibliography: Moldenke, Phytologia 1: 323, 350, & 361. 1939; Standl. & Steyerm., Fieldiana Bot. 24: 375—377. 1958; Moldenke, Phytologia 19: 413. 1970.

ERIOCAULON SELLOWIANUM Kunth

Emended synonymy: Eriocaulon sellowianum var. α Körn. in Mart., Fl. Bras. 3 (1): 485—486. 1863. Eriocaulon sellowianum var. β Körn. in Mart., Fl. Bras. 3 (1): 485—486. 1863.

Additional & emended bibliography: Kunth, Enum. Pl. 3: 545, 546, & 614. 1841; D. Dietr., Syn. Pl. 5: 263. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 269 & 334. 1855; Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 279, 280, 476, 483, 485—486, 493, 500, & 507, pl. 61, fig. 2. 1863; Moldenke, Phytologia 2: 375 (1947), 2: 494 (1948), and 19: 101—104. 1969.

ERIOCAULON SEPTANGULARE With.

Additional synonymy: Eriocaulon septangulare With. & Burm. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 334. 1855. Eriocaulon septangulare L. ex Körn. in Mart., Fl. Bras. 3 (1): 294. 1863.

Additional & emended bibliography: Steud., Nom. Bot. Phan., ed. 1, 313 & 550. 1821; Bong., Ess. Monog. Erioc. 4, 8, 9, 13, 16, & 17. 1831; Steud., Nom. Bot., ed. 2, 1: 585 & 586. 1840; Kunth, Enum. Pl. 3: 540—541, 557, 568, 613, & 614. 1841; D. Dietr., Syn. Pl. 5: 263. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 268 & 334.

1855; Körn., Linnaea 27: 584, 588—590, 592, & 596. 1856; Körn. in Mart., Fl. Bras. 3 (1): 280 & 502—505. 1863; Robinson & Fern., Rhodora 11: 40. 1909; Moldenke, Phytologia 1: 323—327 & 348—364 (1939), 2: 373, 377, & 379 (1947), 2: 491 & 494 (1948), and 3: 80 & 142. 1949; Fassett, Man. Aquat. Pl., ed. 2, 169. 1969; Moldenke, Phytologia 19: 413—414 & 460. 1970.

ERIOCAULON SETACEUM L.

Additional & emended bibliography: Henckel, Nom. Bot. 68. 1797; Raeusch., Nom. Bot. 30. 1797; Pers., Syn. Pl. 1: 110. 1805; Steud., Nom. Bot. Phan., ed. 1, 313. 1821; Bong., Ess. Monog. Erioc. 2 & 13. 1831; Steud., Nom. Bot., ed. 2, 1: 586. 1840; Kunth, Enum. Pl. 3: 549, 550, & 614. 1841; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270 & 334. 1855; Körn., Linnaea 27: 578, 584, & 601—604. 1856; Körn. in Mart., Fl. Bras. 3 (1): 476, 501, 505, & 508. 1863; Moldenke, Phytologia 19: 414. 1970.

ERIOCAULON SEXANGULARE L.

Additional synonymy: Eriocaulon quadrangulare L. ex Raeusch., Nom. Bot. 30, nom. nud. 1797. Eriocaulon hexangulare L. ex Raeusch., Nom. Bot. 30, nom. nud. 1797 [not E. hexangulare Kunth, 1893, nor Wall., 1937]. Eriocaulon nitidum Hort. ex Steud., Nom. Bot., ed. 2, 1: 585 & 586, in syn. 1840. Eriocaulon wallichianus Mart. & Wall. ex D. Dietr., Syn. Pl. 5: 265. 1852. Eriocaulon quinquangulare Lour. ex D. Dietr., Syn. Pl. 5: 265. 1852.

Additional & emended bibliography: Raeusch., Nom. Bot. 30. 1797; Henckel, Nom. Bot. 68. 1797; Pers., Syn. Pl. 1: 110. 1805; Steud., Nom. Bot. Phan., ed. 1, 313. 1821; Bong., Ess. Monog. Erioc. 2, 3, & 8. 1831; Steud., Nom. Bot., ed. 2, 1: 585 & 586 (1840) and 2: 37. 1841; Kunth, Enum. Pl. 3: 551—552, 557, 558, 563—567, 569, 613, & 614. 1841; D. Dietr., Syn. Pl. 5: 264 & 265. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270—272, 333, & 334. 1855; Körn., Linnaea 27: 578, 579, 583, 584, 586, 613—618, & 687—691. 1856; Körn. in Mart., Fl. Bras. 3 (1): 280, 286, 288, 289, 293, 475, 501, 503, 505, & 508. 1863; Moldenke, Phytologia 2: 378 (1947), 2: 493 & 494 (1948), 3: 143 (1949), and 19: 414—415, 443, 450, 451, 475—478, 484, & 491. 1970.

It is very probable that the E. quinquangulare Lour. listed by Dietrich (1852) and described by him as "culmo 5-angulari; fol. ensiformibus; capitulo globoso basi truncato albicante. In Cochinchina. ⓘ" is merely a misprint for E. quadrangulare Lour. and therefore belongs in the synonymy of E. sexangulare L.

Steudel (1840, 1841) gives E. tenue Hamilt. and Leucocephala spathacea Roxb. as synonyms of Eriocaulon sexangulare L., but these two names belong in the synonymy of E. cinereum R. Br. instead; in his 1821 work he lists E. striatum Lam. as another synonym, but this is regarded by me as a distinct and valid species.

ERIOCAULON SOLLYANUM Royle

Emended synonymy: Eriocaulon trilobum Ham. ex Körn., Linnaea 27: 581, 585, 645—647, & 652. 1856.

Additional & emended bibliography: Körn., Linnaea 27: 581, 585, 645—647, & 652. 1856; Körn. in Mart., Fl. Bras. 3 (1): 283, 501, 505, & 506. 1863; K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 440, 452, & 478. 1970.

ERIOCAULON SONDERIANUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 586 & 669—671. 1856; Körn. in Mart., Fl. Bras. 3 (1): 300 & 503. 1863; N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 53, 55, & 776. 1897; Moldenke, Phytologia 19: 423 & 457. 1970.

ERIOCAULON SPARGANIOIDES Bong.

Additional & emended bibliography: Körn., Linnaea 27: 601. 1856; Körn. in Mart., Fl. Bras. 3 (1): 499—500 & 508. 1863; Moldenke, Phytologia 19: 440. 1970.

ERIOCAULON SPRUCEANUM Körn.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 488--489 & 507. 1863; Moldenke, Biol. Abstr. 50: 12948. 1969; Moldenke, Phytologia 19: 440--442. 1970.

The Garcia-Barriga & Jaramillo Mejia 17128 collection cited below is a mixture with f. viviparum Moldenke.

Additional citations: COLOMBIA: Vaupés: Garcia-Barriga & Jaramillo Mejia 17128, in part (Ac).

ERIOCAULON SPRUCEANUM f. VIVIPARUM Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 50: 12948. 1969; Moldenke, Phytologia 19: 441 & 442. 1970.

The Garcia-Barriga & Jaramillo Mejia 17128 collection cited by me in a previous installment of these notes is actually a mixture with typical E. spruceanum Körn.

ERIOCAULON STELLULATUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 579, 584, 620—621, & 692. 1856; Körn. in Mart., Fl. Bras. 3 (1): 284 & 475. 1863; Moldenke, Phytologia 19: 442—443 & 464. 1970.

ERIOCAULON STRIATUM Lam.

Additional & emended bibliography: Körn., Linnaea 27: 272, 585, & 650—652. 1856; Körn. in Mart., Fl. Bras. 3 (1): 286 & 505. 1863; Moldenke, Phytologia 19: 447—449. 1970.

ERIOCAULON TENUIFOLIUM Klotzsch

Additional synonymy: Eriocaulon tenuifolium Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 489, sphalm. 1863.

Additional & emended bibliography: Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 489, 496, 498, & 507. 1863; Moldenke, Phytologia 2: 492 (1948) and 19: 454--456. 1970.

ERIOCAULON TEXENSE Körn.

Additional & emended bibliography: Körn., Linnaea 27: 584 & 594--596. 1856; Körn. in Mart., Fl. Bras. 3 (1): 476 & 503. 1863; Moldenke, Phytologia 1: 327, 350, 354, & 360 (1939), 2: 153 (1946), 2: 373 (1947), and 19: 459--461. 1970.

The Lonard 1956, distributed as E. texense, is actually E. decangulare f. parviceps Moldenke.

ERIOCAULON THUNBERGII Wikstr.

Additional & emended bibliography: Körn., Linnaea 27: 586 & 677--679. 1856; Körn. in Mart., Fl. Bras. 3 (1): 293. 1863; Moldenke, Phytologia 19: 462 & 486. 1970.

ERIOCAULON THWAITESII Körn.

Additional synonymy: Eriocaulon mariae Fyson, Kew Bull. Misc. Inf. 1914: 331. 1914.

Additional & emended bibliography: Körn., Linnaea 27: 580, 585, & 627--628. 1856; Körn. in Mart., Fl. Bras. 3 (1): 285. 1863; Moldenke, Phytologia 19: 443, 462--464, 476, 477, & 483. 1970.

ERIOCAULON TRANSVAALICUM N. E. Br.

Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 53, 54, & 776. 1897; Moldenke, Phytologia 19: 458, 466, 467, & 469--471. 1970.

ERIOCAULON TRUNCATUM Hamilt.

Additional & emended bibliography: Körn., Linnaea 27: 581, 585, & 630--631. 1856; Körn. in Mart., Fl. Bras. 3 (1): 283--287, 298, 503, & 505. 1863; Moldenke, Phytologia 2: 376 (1947) and 2: 493 & 494. 1948; Brunig, Govt. Sarawak Sympos. Ecol. Res. Humid Trop. Veg. 307 & 311. 1965; Moldenke, Phytologia 19: 464, 473--480, & 482. 1970.

ERIOCAULON WIGHTIANUM Mart.

Additional bibliography: Körn., Linnaea 27: 585, 658--661, 663, & 669. 1856; Körn. in Mart., Fl. Bras. 3 (1): 503. 1863; Moldenke, Biol. Abstr. 50: 12948. 1969; Moldenke, Phytologia 19: 490--492. 1970.

ERIOCAULON WILLDENOVIANUM Moldenke

Additional & emended bibliography: Körn., Linnaea 27: 578, 583, 584, 586, 598, & 690--691. 1856; Körn. in Mart., Fl. Bras. 3 (1): 288, 474, 505, & 506. 1863; Moldenke, Phytologia 2: 379 (1947), 2: 494 (1948), and 19: 492--496. 1970.

At the very beginning of his description Kunth (1841) states "E. longifolium Nees ab Esenb. in Willd. herb. no. 2369. (excl. frustulo dextro?). Folia subpedalia, 2 lineas lata. Vaginae 4--4 1/2 -pollicares. Pedunculi 12--15-pollicares. Bracteae, flores feminei (masculi a me haud visi) et semina prorsus ut in planta Chapelieriana infra descripta, nisi sepala interiora pilos-

iora et semina perspicuis et densius hirtella, praesertim humectata." This apparently is a different collection from the 2359 which he cites later in the description. It would appear that no. 2369 was labeled E. longifolium and no. 2359 was labeled E. sexangulare in the Willdenow herbarium. The Chapelier specimen seen by me in the Berlin herbarium and cited below, does not match well the majority of specimens ascribed to E. willdenovianum, since its leaves are short but narrow. Its label is inscribed "E. scariosum Br." and its flowers are described as "tetrandrous".

The type of E. sexangulare Willd. is "Willd. herb. no. 2359. fol. 1. (excl. frustulo dextro, quod certissime E. quinquangulare.)" according to Kunth (1841). The E. sexangulare of Linnaeus is, of course, a valid species, but the homonyms referred to in the synonymy of E. willdenovianum and attributed to "Auct." and to Martius are synonyms of E. cinereum R. Br., that credited to Burman is E. minimum Lam., and that credited to Heyne is E. infirmum Steud.

The Hooker (1893) reference in the bibliography of this species is often dated "1894", but actually pages 449—672 of this work appeared in 1893. Merrill (1921) cites the Hallier reference to volume "24" in error. The Erlandsson reference (1942) is sometimes cited as "1940", but the pages involved here actually were not issued until February 25, 1942. Erlandsson also unites what he calls E. longifolium Nees with E. sexangulare L.

Maximowicz (1893) says "E. longifolium Nees herb. in Kunth, Enum. III, 567. Koernicke in Linnaea, XXVII, 690, quod prostat e Hongkong (Fortune! n. 120), Malacca (Cuming!) et Ceylon!, ab E. Wallichiano distinctum dicitur floribus dimeris et bracteis acutiusculis nec breve acuminatis, sed in specimine Fortuneano horti bot. Petrop. video, cum Benthamio, flores trimeros dimeris vix rariores, bracteae autem mihi eaedem visae sunt."

Hochreutiner (1908) cites Guillot 20 from Madagascar, but this collection proves to be E. sexangulare L. and is so cited by me in this present series of notes. Hallier (1916) cites Cuming 2328 from the Philippine Islands, but this collection has also proved to be E. sexangulare. Merrill (1921) cites Hallier 1172, Korthals s.n., Schlechter 13209, and Teijsmann 11556 from Borneo and Clemens 9635 from Sabah. Van Royen (1959, 1965) cites Van Royen 4094, 4501, 4838, & 4909 from New Guinea.

Material of E. willdenovianum has been misidentified and distributed in herbaria as E. australe R. Br. On the other hand, the Afzelius s.n. [Tamatave, 26.7.1912], Cuming 2328, Fortune s.n. [Hongkong], Hosokawa 8820, Metcalf & Ging 5073, Schlieben 10780, L. Y. Tai 11618, and Yates 2486, all distributed as E. longifolium, are actually E. sexangulare L., H. Hallier 1172 is a mixture of E. sexangulare L. and E. truncatum Hamilt.; and Mjoberg 211 is E.

willdenovianum f. viviparum Moldenke.

Citations: MADAGASCAR: Alleizette s.n. (P); Chapelier s.n. (B); Decary 4780 (P), 5306 (P), 6457 (P), s.n. (P); Geay 7918 (P), 8163 (P); Humblot 348 (B, P); Petit-Thouars 2 (P); F. V. Thompson 150 (Br). CEYLON: Alston 1069 (Ca--360966, K); J. Fraser 55 (W--45306); G. W. Walker s.n. [Herb. Hook.] (Ut--416). THAILAND: Smitinand & Abbe 6158 [Herb. Roy. Forest Dept. 24384] (Z); Sørensen, Larsen, & Hansen 723 (S). MALAYA: Johore: Franck 389 (Cp). Malacca: Gaudichaud 100 (B); W. Griffith s.n. (B). Pahang: M. R. Henderson 24038 (N). Singapore: Kuntze 6063 (N); Schottmüller 116 (B). State undetermined: Burmann s.n. (V, V, V). INDONESIA: GREATER SUNDA ISLANDS: Balambangan: D. D. Wood 1725 (Ca--241564). Banka: Teijsmann 3464 H.B. (Ut--321). Celebes: Kjellberg 3797 (S, S). Sabah: Burbidge s.n. (D--824285). Sarawak: Clemens & Clemens 20822 [field no. 7450] (N). Sumatra: Rainer-Kesselitz s. n. [Feb. '85] (V--4653); Toroes 4285 (W--1680946). MELANESIA: NEW GUINEA: Dutch New Guinea: Van Royen 4501 (N). Papua: Brass 5751 (Ca--1157997, N), 5752 (Ca--1157996, N, W--1943115), 7603 (N), 7936 (N), 7951 (N), 8576 (N), 8638 (N). Sudest Island: Brass 28178 (W--2409103). LOCALITY OF COLLECTION UNDETERMINED: Herb. Hooker s.n. (K).

ERIOCAULON WILLDENOVIANUM f. VIVIPARUM (Moldenke) Moldenke

Synonymy: Eriocaulon longifolium f. viviparum Moldenke, Phytologia 7: 86. 1959.

Bibliography: Moldenke, Phytologia 7: 86. 1959; Moldenke, Résumé Suppl. 1: 13 & 25. 1959; Moldenke, Biol. Abstr. 35: 1688. 1960; Hocking, Excerpt. Bot. A.4: 592. 1962; Moldenke, Résumé Suppl. 17: 6. 1968.

Recent collectors describe this plant as an herb to 10 inches tall, growing on rocks below waterfalls, flowering and fruiting in February.

Citations: INDONESIA: GREATER SUNDA ISLANDS: Borneo: Mondi 278 (Ut--34211a--type). Sarawak: Mjoberg 211 (Ca--234172, N); Native collector 474 (W--1290539); Purseglove P.5568 (N).

ERIOCAULON WILLIAMSII Moldenke

Bibliography: Moldenke, N. Am. Fl. 19 (1): 20 & 36. 1937; Moldenke, Phytologia 1: 327--328, 350, 359, & 363. 1939; Moldenke, Carnegie Inst. Wash. Publ. 522: 141--142. 1940; Moldenke in Woodson & Schery, Ann. Mo. Bot. Gard. 31: 68. 1944; Moldenke, Alph. List Cit. 1: 326. 1946; Moldenke, Known Geogr. Distrib. Erioc. 4 & 42. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Alph. List Cit. 3: 736 (1949) and 4: 1133. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 36, 41, & 206. 1949; Standl. & Steyerm., Fieldiana Bot. 24: 375 & 377. 1958; Moldenke, Résumé 43, 48, & 484. 1959.

Emended citations: BRITISH HONDURAS: W. C. Meyer 134 (F—635926).

ERIOCAULON WOODII N. E. Br.

Synonymy: Eriocaulon natalense Schinz, Mém. Herb. Boiss. 10: 76. 1900. Eriocaulon latifolium Nees apud Schinz, Mém. Herb. Boiss. 10: 76, in syn. 1900 [not E. latifolium Arech., 1902, nor Bong., 1831, nor J. Sm., 1809].

Bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 53, 57, & 776. 1897; Ruhl. in Engl., Bot. Jahrb. 27: 70 & 77. 1899; Schinz, Mém. Herb. Boiss. 10: 76. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 61, 70, 71, 286, & 288, fig. 8. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 70. 1904; Engl. & Drude, Veget. Erde 9 (2): 263. 1908; Marlot, Fl. S. Afr. 4: 66. 1915; Stapf, Ind. Lond. 3: 91. 1930; Moldenke, Known Geogr. Distrib. Erioc. 22, 37, & 42. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 122, 206, & 207. 1949; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 150, 151, & 267, pl. 8, fig. 5. 1955; Moldenke, Résumé 153, 290, & 484. 1959; Moldenke, Résumé Suppl. 14: 3. 1966; Moldenke, Phytologia 19: 324, 342, 445, 446, & 466. 1970.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 71, fig. 8. 1903; Engl. & Drude, Veget. Erde 9 (2): 263. 1908; Marlot, Fl. S. Afr. 4: 66. 1915; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: pl. 8, fig. 5. 1955.

The type of this species is J. M. Wood 3053, collected in a swamp near Murchison, Natal, South Africa. Brown (1897) notes that "This appears to be an aquatic species. In the Kew specimens, the flower heads of which are somewhat malformed, the receptacle is flat and appears to be glabrous. The flowers may not have attained their normal development, but the remarkably flaccid, denticulate sepals well distinguish this from all other South African species."

The E. latifolium of Smith, referred to in the synonymy above, is a valid species, but the homonym accredited to Arechavaleta is a synonym of E. arechavaletae Moldenke, while that of Bongard belongs in the synonymy of Paepalanthus serralapensis Moldenke.

Hess (1955) suggests that E. woodii may be conspecific with E. stoloniferum Welw.; if so, then the Welwitsch epithet would have to be displaced by the older E. woodii.

Citations: MOUNTED ILLUSTRATIONS: Engl., Pflanzenreich 13 (4-30): 71, fig. 8 (B).

ERIOCAULON WOODII var. MINOR Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 70 & 288. 1903; Moldenke, Known Geogr. Distrib. Erioc. 22 & 42. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 122 & 207. 1949; Moldenke, Phytologia 3: 470. 1951; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 151. 1955; Moldenke, Résumé 153 & 484. 1959; Moldenke, Résumé Suppl. 14: 3. 1966; Moldenke, Phytologia 19: 446. 1970.

Wild describes this variety as stoloniferous, growing both on wet riverbanks and in the water itself. It has been found at altitudes of 500—1665 meters, flowering and fruiting in October. Rudatis 1420 in the Munich herbarium is inscribed "Eriocaulon woodii N. E. Br., nov. sp.", but this collection is not the type collection of E. woodii as designated by Brown. The type of E. woodii var. minor is J. M. Wood 524, deposited in the Berlin herbarium.

The comment by Wild, mentioned above, is of particular interest in view of the suggestion by Hess (1955) that E. woodii N. E. Br. and E. stoloniferum Welw. may be conspecific.

Additional citations: RHODESIA: Wild 5521 (Mi). SOUTH AFRICA: Natal: Rudatis 1420 (Mu—411, S, S); J. M. Wood 524 (B—type, Z—isotype).

ERIOCAULON WOODSONIANUM Moldenke

Bibliography: Moldenke in Woodson & Schery, Ann. Mo. Bot. Gard. 27: 268—269. 1940; Moldenke, Ann. Mo. Bot. Gard. 31: 67. 1944; Moldenke, Known Geogr. Distrib. Erioc. 4 & 42. 1946; Moldenke, Alph. List Cit. 1: 163. 1946; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Alph. List Cit. 2: 429. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 41 & 207. 1949; Moldenke, Phytologia 3: 470. 1951; Moldenke, Résumé 48 & 484. 1959.

Recent collectors describe this species as an herb with white flower-heads, growing in moist areas with standing water and mud, flowering in February.

Additional citations: PANAMA: Herrera: Stern, Eyde, & Ayensu 1701 (Mi, W—2490216).

ERIOCAULON XENOPODION Koyama

Synonymy: Eriocaulon xenopodium Koyama ex Moldenke, Résumé Suppl. 15: 20, in syn. 1967.

Bibliography: Koyama, Philip. Journ. Sci. 84: 374—375 & 377, pl. 4. 1956; Moldenke, Résumé 178 & 484. 1959; G. Taylor, Ind. Kew. Suppl. 13: 52. 1966; Moldenke, Résumé Suppl. 15: 20. 1967.

Illustrations: Koyama, Philip. Journ. Sci. 84: pl. 4. 1956.

The type of this distinctive bulbous species was collected by Bunzô Hayata at Nayak, Thailand, on December 16, 1921. Koyama (1956) notes that "This strange taxon is outwardly allied to E. ubonense by its heads. Seeing herbaria, I at first thought that the above sheets were mixture of some heads of Eriocaulon and vegetative parts of Xyris, so large and distinct tuber this species has." Larsen and his associates collected the species in sphagnum bogs at 1350 meters altitude. It has been collected in flower and fruit in July and December.

Citations: THAILAND: Hayata s.n. [Doi Step, 22/XII/1922] (Z); Larsen, Smitinand, & Warncke 2 (Ac, Rf).

ERIOCAULON XERANTHEMUM Mart.

Synonymy: Eriocaulon pygmaeum Dalz. in Hook., Kew Journ. 3:

281—282. 1851 [not E. pygmaeum Körn., 1863, nor Mart., 1841, nor Soland., 1809]. Eriocaulon xeranthemum Mart. & Wall. ex D. Dietr., Syn. Pl. 5: 264. 1852.

Bibliography: Mart. in Wall., Pl. Asiat. Rar. 3: 29. 1832; Wall., Numer. List 208 ["207"]. 1832; Royle, Illustr. Bot. Himal. 409. 1840; Steud., Nom. Bot., ed. 2, 1: 586. 1840; Kunth, Enum. Pl. 3: 555 & 614. 1841; Dalz. in Hook., Kew Journ. 3: 281—282. 1851; D. Dietr., Syn. Pl. 5: 264. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 270 & 334. 1855; Körn., Linnaea 27: 580, 585, & 624—626. 1856; C. Müll. in Walp., Ann. 5: 926 & 935—936 (1860) and 6: 1171. 1861; Dalz. & Gibs., Bomb. Fl. 280. 1861; Körn. in Mart., Fl. Bras. 3 (1): 283 & 503. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 24. 1888; Hook. f., Fl. Brit. Ind. 6: 584—585. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 & 880. 1893; Prain, Bengal Pl., ed. 1, 1127. 1903; Ruhl. in Engl., Pflanzenreich 13 (4-30): 65, 96, 287, & 288. 1903; E. D. Merr., Bibl. Enum. Born. Pl. 111. 1921; Fyson, Journ. Indian Bot. 2: 200, 201, & 317. 1921; Haines, Bot. Bihar & Orissa 6: 1067 & 1070. 1924; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 1, 9: 1614 & 1620. 1931; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 & 880. 1946; Moldenke, Known Geogr. Distrib. Erioc. 23, 24, 26, 27, 39, & 42. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 125, 127, 129, 139, 145, & 207. 1949; Moldenke, Phytologia 3: 470. 1951; C. E. C. Fischer in Gamble, Fl. Presid. Madras, ed. 2, 8 [3]: 1124, 1127—1128, & 1333. 1956; Moldenke, Résumé 159, 160, 163, 165, 180, 192, 291, & 484. 1959; Moldenke, Résumé Suppl. 1: 11. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 & 880. 1960; Prain, Bengal Pl., ed. 2, 2: 849. 1963; Subramanyam & Henry, Bull. Bot. Surv. India 8: 214. 1966; Sebastine & Ramamurthy, Bull. Bot. Surv. India 8: 176. 1966; Moldenke, Résumé Suppl. 15: 8 (1967) and 16: 9. 1968; Moldenke, Phytologia 18: 122, 250, 310, & 428 (1969), 19: 36 (1969), and 19: 348, 468, 476, & 477. 1970.

Illustrations: Fyson, Journ. Indian Bot. 2: 201. 1921.

Eriocaulon xeranthemum is based on W. Gomez 5 & 6, which were distributed as Wallich 6081a & 6081c, from Nepal and from Tavoy [the latter locality being in Tenasserim, Burma], respectively, although Martius' original description (1832) says "Crescit in Napalia (N. Wallich 1821); in Tavoy (W. Gomez)" — the "1821" appears to be the year when the collection was made, rather than a number. The W. Gomez 6 sheet in the herbarium of the Jardin Botanique de l'Etat at Brussels has a letter attached from Wallich to Martius, dated January 17, 1832. Wallich (1832) actually cites three collections under this name: "6081a Napalia 1821; 6081b Silhet hD; 6081c Tavoy W. Gom."

The E. pygmaeum of Solander, referred to in the synonymy above, is a valid species, but the homonym attributed to Körnicke is a synonym of E. koernickei Britten, while that attributed to Martius is in the synonymy of Paepalanthus bifidus (Schrad.) Kunth.

It should be noted that Hooker (1893) places E. xeranthemoides Van Heurck & Muell.-Arg. in the synonymy of E. xeranthemum Mart., but this name belongs more properly in the synonymy of E. togoënse Moldenke, an African plant.

The description and discussion of E. xeranthemum by Fyson (1921) are worth quoting here: "Leaves 2/3 — 1/2 in. Scapes slightly longer or shorter. Disc of head 1/10 — 1/8 in. Involucral bracts much longer, glistening white. Receptacle globose, floral bracts broadly obovate truncate, hairy at the tip. Female sepals narrow 3 equal or unequal or 2 only.....Central Himalayas, Nepal; Assam, Khasia, Peninsular India, Malabar, Cochin, etc. Hooker in F. B. I. describes the receptacle as hairy, but wrongly. Martius.....says the hairiness is the only real reason for distinguishing E. xeranthemoides from this species. Hooker also gives the sepals as 2. Koernicke.....gives them as 3, but unequal. I find both the petals and sepals of the female flowers very in size among themselves and one sepal may be linear or absent."

The species has been found growing in swampy ground among grasses, at altitudes of 50 to 4000 feet, flowering and fruiting in July and September. Prain (1903) records it from Chota Nagpur and refers to it as "An annual, terrestrial, tufted herb". Sebastine & Ramamurthy (1966) report it as "abundant" in Kerala and cite their no. 14361, while Subramanyam & Henry (1966) cite their no. 8658 from Madhya Pradesh. Merrill (1921) cites Gibbs 3077 from Sabah. The initial letter of the specific epithet of both scientific binomials involved is often uppercased by some authors, but without any valid reason.

Material of this taxon has been misidentified and distributed in herbaria as E. minutum Hook. f. On the other hand, the Stocks, Law, &c. s.n. [Malabar, Concan &c.], distributed as E. xeranthemum, is actually E. heterolepis Steud., while Herb. Bot. Surv. India s.n. [27.9.56] is E. truncatum Hamilt.

Additional citations: NEPAL: W. Gomez 5 (Br--cotype); Wallich 6081 (Mu--265--cotype), 6081a (M--cotype). INDIA: Bombay: Santapau 2928 (N, Xa); Stocks, Law, &c. 15 (B). Khasi States: Hooker & Thomson s.n. [Mont. Khasia. 4000 ped.] (Br, M, Mu--264, S, Ut--9361lb). Mysore: S. N. Ramaswamy 12 (Z). BURMA: Tenasserim: W. Gomez 6 (Br--cotype, N--photo of cotype, Z--photo of cotype); Rhind 231 (N); Wallich 6081c (B--cotype).

ERIOCAULON YAOSHANENSE Ruhl.

Bibliography: Ruhl., Notizbl. Bot. Gart. Berlin 10: 1043—1044. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 87. 1933; Moldenke, Known Geogr. Distrib. Erioc. 25 & 42. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 132 & 207. 1949; Moldenke, Résumé 170 & 484. 1959.

ERIOCAULON YOSHINOI Nakai

Bibliography: Nakai, Bull. Géogr. Bot. 21: 139. 1911; Prain, Ind. Kew. Suppl. 5, pr. 1, 97. 1921; Nakai & Honda, Nov. Pl. Jap. 6: 12 & 87. 1940; Moldenke, Known Geogr. Distrib. Erioc. 26. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 207. 1949; Moldenke, Résumé 173 & 484. 1959; Prain, Ind. Kew. Suppl. 5, pr. 2, 97. 1960.

ERIOCAULON YUNNANENSE Moldenke

Bibliography: Moldenke, Phytologia 2: 221, 376, & 379. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 132 & 207. 1949; Moldenke, Phytologia 3: 470--471. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 88. 1953; Moldenke, Résumé 170 & 484. 1959; E. H. Walker, Bibl. East. Asiat. Bot. Suppl. 1: 235. 1960.

ERIOCAULON ZAMBESIENSE Ruhl.

Synonymy: Eriocaulon zambesiana Ruhl. ex Moldenke, Résumé Suppl. 3: 32, in syn. 1962.

Bibliography: Ruhl. in Engl., Bot. Jahrb. 27: 70 & 75--76. 1899; Ruhl. in Engl., Pflanzenreich 13 (4-30): 61, 73, & 288. 1903; H. Lecomte, Bull. Soc. Bot. France 55: 571, & 572 (1908) and 55: 648. 1909; Moldenke, Known Geogr. Distrib. Erioc. 21, 22, & 42. 1946; J. Hutchinson, Botanist South. Afr. 499. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 113, 119, 120, & 207. 1949; Moldenke, Résumé 138, 149, & 484. 1959; Moldenke, Résumé Suppl. 3: 16 & 32. 1962; Moldenke, Phytologia 18: 259. 1969.

Hutchinson (1946) cites his no. 3648. The Herb. Inst. Fr. Afr. Noire 10358, distributed as E. zambesiense, is actually the type collection of E. latifolium f. proliferum Moldenke, while Bojer 79 is E. sollyanum Royle.

Citations: TANZANIA: Tanganyika: Stolz 2326 (S). MALAWI: Whyte s.n. [Mt. Zomba] (B--cotype, Z--cotype).

ERIOCAULON ZOLLINGERIANUM Körn.

Synonymy: Eriocaulon alatum H. Lecomte, Journ. de Bot. 21: 104. 1908.

Bibliography: Körn., Linnaea 27: 583, 586, & 682--683. 1856; C. Müll. in Walp., Ann. 5: 926 & 945 (1860) and 6: 1171. 1861; Körn. in Mart., Fl. Bras. 3 (1): 289. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 880. 1893; Ruhl. in Engl., Pflanzenreich 13 (4-30): 66, 99, & 288. 1903; H. Lecomte, Journ. de Bot. 21: 104, 105, & 132, fig. 1 & 2. 1908; E. D. Merr., Philip. Journ. Sci. 7: 232. 1912; E. D. Merr., Fl. Manila 136. 1912; H. Lecomte, Fl. Gén. Indo-chin. 7: 18, fig. 2. 1912; E. D. Merr., Enum. Philip. Flow. Pl. 1: 192. 1912; Prain, Ind. Kew. Suppl. 4, pr. 1, 82. 1913; Fyson, Journ. Indian Bot. 2: 320. 1921; Prain, Ind. Kew. Suppl. 4, pr. 2, 82. 1938; Moldenke, Known Geogr. Distrib. Erioc. 26, 27, 42, & 61. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 880. 1946; Moldenke, Phytologia 2: 377.

1947; Moldenke, Alph. List Cit. 2: 462 (1948) and 3: 840. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 144 & 207. 1949; Moldenke, Phytologia 3: 181 (1949) and 4: 339. 1953; Van Royen, Nov. Guin., new ser., 10: 22, 36, 38, & 43—44, fig. 4 T. 1959; Moldenke, Résumé 175, 184, 190, 201, 479, & 484. 1959; Moldenke, Résumé Suppl. 1: 13. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 880. 1960; Moldenke, Résumé Suppl. 3: 20, 23, & 24. 1962; Van Royen, Nov. Guin. Bot. 14: 467. 1965; Thanikaimoni, Pollen & Spores 7: 183. 1965; Backer & Bakh., Fl. Java 3: 25—26. 1968; Moldenke, Phytologia 17: 385 (1968), 19: 13—14, 43, 65, 86, & 91 (1969), and 19: 329. 1970.

Illustrations: H. Lecomte, Journ. de Bot. 21: 105 & 132, fig. 1 & 2. 1908; H. Lecomte, Fl. Gén. Indo-chin. 7: 18, fig. 2. 1912; Van Royen, Nov. Guin., new ser., 10: 36, fig. 4 T. 1959.

Backer & Bakhuizen van den Brink (1968) give a partial description of this species: "Interfloral bracts acuminate or cuspidate, cuneate-obovate; receptacle more or less pubescent; basal bract of peduncles firmly appressed, with an obtuse, entire mouth; heads ovoid-globose, 4—5.5 mm. by 2.5—4 mm; involucral bracts ovate, obtuse; ♂: sepals 3; connate into a unilaterally split sheath, entirely pale; petals 3, unequal, ciliate, below the top with a gland; ♀: sepals 3, two of them navicular with a keeled-winged back, the 3rd rudimentary, linear, caducous; petals 3, rather obtuse, glandless. Leaves linear, obtusely acuminate, 6—8 cm by 2—3 1/4 mm. 0.12—0.30. Long ago collected near Tijikoya (W) on the mud of a wood-brook, afterwards never found again."

Lecomte (1908) says of it "Se rapproche de E. sexangulare L., mais n'a que deux sepales au lieu de trois à la fleur femelle" and cites Thorel s.n. from Bassac, in Indochina, as the type of E. alatum. He also notes "Nous l'avons aussi recontrée dans l'herbier de Pierre, comme venant de la Cochinchine du Sud".

Van Royen (1959) was the first botanist to unite E. alatum with the older E. zollingerianum and his composite description is therefore of particular importance: "Herb up to 30 cm. Leaves linear-ensiform, 2—8 by 0.2—0.4 cm, acuminate, 7—11-nerved, fenestrate, glabrous. Peduncles up to 30 cm long, 5-ribbed, twisted, glabrous, sheath 2.5—5 cm long, glabrous. Heads ovoid-oblong or ovoid-globose, 2.5—6 by 4—5.5 mm, involucral bracts obovate or oblong, c. 1.5 by 1 mm, rounded, glabrous, the inner bracts subacute, floral bracts broadly ovate or obovate-cuneate, c. 1.6 by 1.5 mm, indistinctly acuminate-cuspidate, glabrous; receptaculum with long white hairs. ♂ Flowers: sepals 3, tubuliformly united, but the two lateral ones united only up to a half, c. 1.7 mm long, rounded, irregularly serrate, glabrous or with a few hairs on the crest of the lateral sepals; petals 3, tubuliformly united, c. 1.2 mm long, the free lobes unequal, obtuse, fimbriate or entire at apex; stamens 6, unequal, anthers black. ♀ Flowers: sepals 3, lateral ones boatshaped, c. 1.2 by 1 mm, acute, broadly crested, crest at apex irregularly serrate, the abaxial wing broader than the

adaxial wing, with long white hairs at inside, median sepal linear, 0.7 mm long, obtuse, glabrous, often soon caducous; petals 3, free, oblanceolate, c. 1.2 by 0.2 mm, acute, slightly fimbriate near apex; ovary 3-celled; style 1 with 3 branches. Seeds ellipsoid, c. 0.2 mm long, pale yellow, hairy. Distribution. Indo China, Java, Luzon, Celebes, New Guinea." He cites Van Royen 3601 & 3970 in the Leiden herbarium, N.G.F. 6172 & Womersley 3658 at Lae, and Brass 7844 in the herbarium of Arnold Arboretum and at Leiden, all from New Guinea. He dates Körnicke's work as "1854", but 1856 was the actual date of its appearance.

Fyson (1921) says "E. alatum (in Herb. Calc. Coll. Col. Pirie Cochin China;) with glistening ovoid heads and female sepals as in E. cuspidatum Dalz. There are also in Herb. Calc. two other sheets one Coll. Loher. No. 1602 in Philippines is very similar to the E. alatum (above) but the wings of the female sepals are coarsely toothed. The other has a label 'ex herb. hort. Kew' and a number 1168, but no other identification mark. Two of the female sepals are crested, one not deeply boat-shaped and not crested."

Recent collectors have encountered this plant on high plateaus from 200 to 400 meters in altitude, flowering and fruiting in January, April, August to October, and December, and record the vernacular name "chuk nok yung". Brass describes the heads as brown and says the plant is common on wet grass plains in New Guinea; Schmid found it in "terrain sableux en bordure d'une rivière". I have personally found the glistening stramineous ovoid flowering heads of this species most characteristic and helpfully distinctive.

Material has been misidentified and distributed in herbaria as E. merrillii Ruhl. and E. truncatum Hamilt. On the other hand, the Loher 1602, cited below, is a mixture with something in the Cyperaceae and Loher 6987 is a mixture with E. cinereum R. Br.

Citations: THAILAND: Bunnal 571b [Roy. Forest Dept. 18264] (Bk); Larsen 8425 (Z); Sørensen, Larsen, & Hansen 784 (Cp), 8070 (S). INDOCHINA: Annam: Schmid 79a (N). Cochinchina: Pierre s.n. [Cochinchina] (N). WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Luzon: Loher 1602, in part (Mu—379, W—389001); M. Ramos s.n. [Herb. Philip. Bur. Sci. 1831] (N, W—626710); Reillo s.n. [Herb. Philip. Bur. Sci. 19270] (N). Island undetermined: Loher 6987, in part (Mu—406, W—713809). INDONESIA: GREATER SUNDA ISLANDS: Celebes: Eyma 3383 (Ut—11518b), 3996 (Ut—11514b). Java: Zollinger 333 (B—type, Z—isotype). Sumatra: H. H. Bartlett 7456 (Mi, W—1552242). MELANESIA: NEW GUINEA: Papua: Brass 7821 (N), 7884 (N).

ERIOCAULON ZYOTANII Satake

Bibliography: Satake, Bot. Mag. Tokyo 51: 287—288 [Shib. Comm. Art. 17: 105—106], fig. 2. 1937; Honda, Nom. Pl. Jap. 463.

1939; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6, 12, 25, 78, & 87, fig. 1 H & 9. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] 16—17, pl. 11, fig. 3. 1940; Hill & Salisb., Ind. Kew. Suppl. 10: 86. 1947; Moldenke, Phytologia 2: 493 & 495. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 134 & 207. 1949; Moldenke, Résumé 173 & 484. 1959; Moldenke, Résumé Suppl. 3: 18 & 19. 1962; Koyama in Kitamura, Murata, & Koyama, Col. Illustr. Herb. Pl. Japan 3: 178 & 430. 1964.

Illustrations: Satake, Bot. Mag. Tokyo 51: [Shib. Comm. Art. 17: 105] 287, fig. 2. 1937; Satake in Nakai & Honda, Nov. Fl. Jap. 6: 6 & 25, fig. 1 H & 9. 1940; Satake, Bull. Tokyo Sci. Mus. 4: [Rev. Jap. Erioc.] pl. 11, fig. 3. 1940.

Satake (1937) records the vernacular name "izunosima-hosikusa" for this plant. The species is based on Y. Zyôtani s.n., collected on the island of Kôzusima, province of Izu, Honshu, Japan, in July, 1936, and deposited in the herbarium of Tokyo University. Thus far the species appears to be known only from the original collection and is presumed to be endemic at the type locality.

LACHNOCAULON Kunth

Synonymy: Sacnocaulon Cuthbert ex Moldenke, Phytologia 3: 471, in syn. 1951.

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This small genus of 11 species and varieties is entirely North American, if Cuba is regarded as an integral part of that continent. The type species is Eriocaulon villosum Michx. [=Lachnocaulon anceps (Walt.) Morong]. The generic name is derived from the Greek, λαχνος and καυλος, meaning "woolly stem", in allusion to the white-woolly peduncles of the type species in its typical form. Vernacular names for members of the genus are "bog-buttons" and "hairy-pipeworts".

Radford, Ahles, & Bell (1964) key the Carolinian species apart as follows:

1. Mature seeds smooth.....L. beyrichianum.
1a. Mature seeds cancellate or striate.
2. Heads 4 mm. or less broad; seeds 0.5 mm. long.....L. minus.
2a. Heads 5 mm. or more broad; seeds 0.8 mm. long.....L. anceps.

Kral (1966) recognizes only 5 species from continental North America and separates them as follows:

1. Trichomes of the apices of the receptacular bractlets and perianth parts congested with a milk-white substance, this imparting a pale gray or whitish color to the heads; plants very often long-lived, forming large convex mats of hairy-leaved rosettes, each rosette terminating an elongate-ascending, scaly stem; scapes hairy.
2. Leaves narrowly linear; mature heads seldom broader than 4 mm.; seeds dark reddish-brown, very lustrous, the longitudinal ribs obscure.....L. beyrichianum.
2a. Leaves linear; mature heads seldom as narrow as 4 mm. and usually paler than the above; seeds not as lustrous, the longitudinal ribs evident.....L. anceps.
1a. Trichomes of the apices of the receptacular bractlets and perianth parts not congested with a milk-white substance, thus translucent so that the brown bractlets and/or perianth parts impart their own color to the heads; the plants either relatively short-lived and short-stemmed or, if long-stemmed, with diminutive Polytrichum-like leaves.
3. Scapes with ascending hairs; heads a dull gray-brown, the hairs of the receptacle and of the flowers so copious as to at least partly obscure the florets (old heads may lose some of the hairs).....L. minus.
3a. Scapes smooth; heads either chocolate-brown or dull-brown, but, if dull-brown, with female sepals yellowish-white and

hardly obscured by the receptacular hairs and with the gynoecium 2-carpellary.

4. Heads dark chocolate-brown or reddish-brown, usually oblong by seeding time; gynoecium 3-carpellary; leaves seldom shorter than 2 cm.; the sheaths of the scapes shorter than to about the length of the leaves..... L. engleri.

4a. Heads pale-brown, usually globose by seeding time; gynoecium 2-carpellary; leaves seldom as long as 2 cm.; the sheaths of the scapes longer than the leaves or at least rising above them.....L. digynum.

His discussion of the genus as a whole is extremely interesting and well worth repeating here for the benefit of workers without access to the journal in which it was published: "Dr. Moldenke (1937) treats 8 species for the United States. However, species such as L. floridanum Small, L. glabrum Korn., and L. eciliatum Small are based on such intrapopulation variables as sepal length (accrescense is here suspected), peduncular trichomes, and amount of pubescence on bracts and sepals. Therefore, in this work, such entities are treated as extremes of either L. anceps or L. minus which appear to be the two nuclei for all these variants.

"In the United States Lachnocaulon may be distinguished readily from either Eriocaulon or Syngonanthus by its fine, evidently branched root system in contrast to the relatively unbranched-septate systems of Eriocaulon and the unbranched and fleshy systems of Syngonanthus. Lachnocaulons of the United States may be divided into two groups on the basis of habitat. One, comprised of L. engleri and L. minus, is usually found in such ephemeral habitats as fluctuating lake and pondshores, roadbank seepage, borrow pits, ditches, spoilage, and geologically recent sandy sloughs, particularly along the seacoast. Thus such species tend to be aspect dominant one summer in a given locale, seemingly absent the next. It would appear in such case that their seeds must have to remain viable over extended periods of time, for some of the ephemeral Florida lakes about which they often abound are periodically bone dry. The other group, comprised of L. anceps, L. beyrichianum, and L. digynum, appears in more stable situations inland within the coastal plain province as well as along the coast and on disturbed situations. They usually are on what appears to be much more acid substrata such as those provided by hillside bogs in the longleaf pine hills, peaty savannas, pine-palmetto flatwoods, and sphagnous bogs. Both L. beyrichianum and L. anceps have a wider range of tolerance to soil moisture in that they may be found on quite dry sandy sites, sometimes even in association with turkey oak (Quercus laevis)."

The A. Chase 10365, distributed as Lachnocaulon sp., is actually Paepalanthus incanus (Bong.) Körn., while Hood 4267, at least insofar as the University of Illinois specimen is concerned, is

Gyrotheca tinctoria (Walt.) Salisb.

LACHNOCAULON ANCEPS (Walt.) Morong Figure 6

Additional & emended synonymy: Eriocaulon anceps Walt., Fl. Carol. 83. 1788. Eriocaulon villosum Michx., Fl. Bor.-Am. 2: 166. 1803 [not E. villosum Salzm., 1855, nor Willd., 1856]. Eriocaulon pubigerum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 628, pl. 42. 1831. Lachnocaulon michauxii Kunth, Enum. Pl. 3: 497. 1841. Lachnocaulon michauxi Kunth apud Benth. & Hook. f., Gen. Pl. 3 (2): 1024. 1883. Lachnocaulon anceps Morong apud Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 55. 1930. Lachnanthes michauxii Kunth ex Moldenke, Phytologia 3: 471, in syn. 1951. Sacnocaulon auceps Cuthbert ex Moldenke, Phytologia 3: 471, in syn. 1951. Lachnocaulon villosum Kunth ex Moldenke, Résumé Suppl. 1: 18, in syn. 1959. Eriocaulon anceps (Walt.) Morong ex Moldenke, Résumé Suppl. 4: 11, in syn. 1962. Lachnocaulon anceps (Wahl.) Morong ex Moldenke, Résumé Suppl. 4: 11, in syn. 1962 [not L. anceps Benth. & Hook. f., 1903]. Lachnocaulon anceps (Walt.) Ell. ex Moldenke, Résumé Suppl. 4: 11, in syn. 1962. Eriocaulon villosum El. ex Moldenke, Résumé Suppl. 17: 11, in syn. 1968. Lachnocaulon anceps Walt., in herb. Lachnocaulon anceps (Walt.) Moray, in herb.

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It should be noted here that L. anceps Benth. & Hook. f. is a synonym of L. digynum Körn., Eriocaulon villosum Salzm. (mentioned also in the synonymy above) is a synonym of Paepalanthus bifidus (Schrad.) Kunth, and E. villosum Willd. belongs in the synonymy of Eriocaulon decangulare L. Steudel (1821, 1840) reduces E. anceps Walt. to synonymy both under E. compressum Lam. [as "E. gnaphalioides Michx."] and what he calls "E. villosum Michx."

Recent collectors describe this plant as having the flowering heads white or bluish-white, the leaves short, and the peduncles 3 times as long as the leaves, to 1.5 dm. tall. They have found it growing in bogs, open bogs, and shrub bogs, swamps, savannas, grassy open acid savannas, Sphagnum bogs, creek bottoms, peat-sedge bogs, and in argillaceous and siliceous boggy depressions, on seepage slopes in pinelands, wet sandy or gravelly slopes, and sandy-peaty ditch banks, along railroad tracks, and among young pines. It has been found growing in sandy peat of flatwood bogs, in hardwood forests, roadside clearings and ditches, sandy bottoms, moist ground of savannas, and in low ground and moist sandy soil in general, in sandy openings in Pinus taeda woods, in black

mucky soil of low marshy open areas, and in fine sandy soil of open pastures with grass, small scattered pines, etc. Lakela found it on low seasonally wet and weedy roadsides with Typha, Thalia, Hibiscus, Teucrium, Polygala, grasses, and sedges, bordered by open grazed pinelands. Fernald & Long describe it as forming a continuous turf in Sphagnum bogs.

Cory reports that the species forms mats in wet sandy places in open woods; Correll & Johnston say that it forms large clumps on seepage slopes in savanna areas; Kral found it forming frequent clumps on moist sand of roadside ditches; while Bell encountered it along wet roadsides and in burned-over shrub savannas. Other collectors have found it in moist sand of roadside ditches, in low flat areas, on dry sandy pond margins, in moist grassy areas, roadside clearings, low longleaf pine woods, and low marshy areas in coniferous woods, in ditches, low wet or sandy ditches, and wet drainage ditches, in peaty excavated areas on savannas, in savanna-like grassy areas, by pineland pools, in seepage bogs and springheads, pineland savannas, moist cutover pinelands, low or wet open pinewoods, moist or moist peaty pinelands, and in pocosins. It grows in low Sphagnum bogs, pine flatwoods, the low borders of sandhills, and low ditches in pine barrens, in the coastal flatwoods, especially in the moist sand of such flatwoods, and in the turkey oak community, at altitude up to 1100 feet, flowering and fruiting from March to September. Iltis 1253, from Caroline County, Virginia, bears a notation "northernmost station for the species". Buell 1934 is obviously very immature, while Chapman C.430 is labeled "Lachnocaulon n. sp.?" Recorded vernacular names for the plant are "hat-pin" and "hairy pipewort".

Radford, Ahles, & Bell (1964) state that in the Carolinas it blooms from May to October and is found in "Bogs, savannas, ditches, low pinelands; chiefly cp. [Coastal Plain]." Harper (1906) records it from Berrien, Coffee, Colquitt, Decatur, Emanuel, Irwin, Montgomery, and Tattnall Counties, Georgia. The initial letter of the specific epithet of Michaux's binomial is sometimes uppercased for no valid reason.

The white pistillate florets of this plant mingled with the brown staminate ones impart a mixed gray and dark appearance to the flower heads. The overall distribution of the species is on the Coastal Plain from southeastern Pennsylvania (?) and Virginia to Florida, west along the Gulf Coast to eastern Texas, and south to the Isle of Pines. Thorne (1954) reports it as "frequent" in "Wet sand of moist pinelands, seepage slopes, and bogs". McDaniel describes it as "common" in Sphagnum-Hypericum bogs surrounded by longleaf pines in Forrest County, Mississippi, but only "local" in longleaf pine woods in Stone and "locally common" near pinewoods in Harrison County of the same state.

Kral (1966) reduces L. glabrum Körn. and L. floridanum Small to synonymy under L. anceps, but in this disposition I do not follow him. He describes the habitat of the species as "Moist to fairly dry sands, sandy peats or peat of pine flatwoods, savannas,

upper edge of pinelands, pond margins, ditchbanks, lakeshores, and bogs, Florida north to New Jersey, west to eastern Texas." Personally, in my forty years of work on the group, I have seen no material of this species from New Jersey, and Kral does not cite the New Jersey collection on which he bases his statement. Similarly, I am not at all certain that the Schweinitz specimen, cited below as from Pennsylvania, actually was collected in that state. If it was, the locality is probably destroyed now. The type of the species was gathered by Thomas Walter in "Carolina" [probably South Carolina].

Kral (1966) discusses this species as follows: "There are difficulties in distinguishing smaller-headed versions of L. anceps from L. minus or from L. beyrichianum. These, however, will have the clavate-whitened, hair on the bracts and sepals to distinguish them from the former, and a definitely ridged-and-striate seed to distinguish them from the latter. Also, none of the other Lachnocaulons have, in their older, 'seeding' heads, the property of well-exserted bracts and female sepals. This imparts a 'chaffy' look to late summer inflorescences.

"J. K. Small (1903) described L. floridanum as a species distinct from L. anceps on the basis of its glabrous scapes and smaller, grayer, heads. Examination of specimens so identified as well as the type ('Fla. Lake Co.: lake, Eustis, Nash 1981') together with a field study of populations of south Florida Lachnocaulon have served to convince me that such differences are not consistent, in that they may vary broadly within a single population. Such is the case in populations of these in Manatee, Martin, Sarasota, St. Lucie, De Soto and Charlotte counties in peninsular Florida. The type specimen is itself an immature example, hence the anther measurements which are used as one basis for distinguishing the species are of young, accrescent, structure. The glabrous peduncles which are supposed to distinguish L. glabrum from L. anceps are not consistently glabrous in the above mentioned counties of Florida."

Material of L. anceps has been misidentified and distributed in herbaria under the names Duptaya flavidula (Michx.) Kuntze, Eriocaulon compressum Lam., E. decangulare L., E. gnaphaloides Michx., E. körnickianum Van Heurck & Muell.-Arg., E. ravenelii Chapm., E. revenelii Chapm., E. septangulare With., E. texense Körn., Lachnocaulon digynum Holm, L. glabrum Körn., L. minus (Chapm,) Small, and Syngonanthus flavidulus (Michx.) Ruhl.

On the other hand, the S. M. Tracy 7586, distributed as L. anceps, is actually the type collection of L. anceps f. glabrescens Moldenke, Beyrich s.n. [Ebenezer, 8/7/1833], Fox & Boyce 3780, M. C. Reynolds s.n. [Mar.—June 1875], and B. W. Wells s.n. [Burgaw, 6/7/1945] are L. beyrichianum Sporleder, Curtiss 6201 and F. H. Sargent s.n. [June 19, 1950] are L. minus (Chapm.) Small, C. Owens 154 and A. Ruth s.n. [De Soto Falls, July 1898]

are Eriocaulon lineare Small, Tharp 44343 is E. texense Körn., and S. B. Jones s.n. [8 May 1960] is Syngonanthus flavidulus (Michx.) Ruhl. Schallert 16912 is a mixture of Lachnocaulon anceps and Syngonanthus flavidulus.

Additional citations: PENNSYLVANIA: County undetermined: Schweinitz s.n. [e Pensylvania] (Mu--321). VIRGINIA: Caroline Co.: Iltis 1253 (Ws). Greensville Co.: J. T. Baldwin Jr. 14808 (N); Fernald & Long 8630 (Ok, S); Mikula 3425 (N), 8687 (N); Smith & Hodgdon s.n. [Plant. Exsicc. Gray. 1028] (Ca--717803, Hi--21934, Hi--54013, Ms--83593, Ok, S, Se--201223, Ut--69802b, Ws). King & Queen Co.: Mikula 5748 (N). Nansemond Co.. Fernald, Long, & Clement 15239 (N). Prince George Co.: Fernald, Long, & Smart 5698 (S). Southampton Co.: Mikula 8009 (N). Sussex Co.: Fernald & Long 8181 (Mi). NORTH CAROLINA: Beaufort Co.: Fox, Whitford, & Price 260 (No--14249); Wood & Clement 6939 (St), 6969 (Hi--51164). Bladen Co.: Ahles 456/48 (Ur); Ahles & Haesloop 29106 (Hi--135330); Davis & Davis 10498 (We); A. R. Moldenke 462 (Fg); Oosting 3555 (Hi). Brunswick Co.: C. R. Bell 13282 (Hi--135340); R. K. Godfrey 48391 (No--17465). Chowan Co.: Ahles & Duke 47911 (Hi--135337). Columbus Co.: C. R. Bell 12712 (Hi--135339); A. E. Radford 4095 (Hi--47813). Craven Co.: A. E. Radford 37642 (Hi--135343). Cumberland Co.: C. R. Bell 219 (Hi--33704); Fox & Godfrey 2616 (N); Radford & Stewart s.n. [Oct. 8, 1939] (Hi--13477); Ripley & Barneby 7326 (N). Duplin Co.: A. C. Mathews s.n. [June 6, 1932] (Hi). Greene Co.: A. E. Radford 36643 (Hi--135328). Harnett Co.: Fox & Godfrey 2557 (N); H. Laing 1454 (Hi--118261); A. E. Radford 42769 (Hi--136140). Hoke Co.: Ahles & Neuber 25046 (Hi--118263). Iredell Co.: M. E. Hyams s.n. [Statesville] (Dt, Dt). Johnston Co.: Houten & Schoenmakers 978 (Ut--52777a); A. E. Radford 27884 (Hi--118264). Jones Co.: A. E. Radford 36927 (Hi--135335, Hi--135336). Lee Co.: S. Stewart 835 (Hi--135338). Lenoir Co.: A. E. Radford 25628 (Hi--118265); Randolph & Randolph 785 (Vi). Martin Co.: J. A. Drushel 10812 (Ur), s.n. [5/29/35] (No--20636); A. E. Radford 38323 (Hi--135331). Montgomery Co.: A. E. Radford 19499 (Hi--135323). Moore Co.: Blankinship s.n. [Southern Pines, July 18, 1895] (Lb--20644). New Hanover Co.: B. W. Wells s.n. [June 2, 1924] (No--2638). Onslow Co.: Ahles & Haesloop 28131 (Hi--135327). Pamlico Co.: R. K. Godfrey 48295 (No--17467); A. E. Radford 35806 (Hi--135333). Pender Co.: Ahles & Haesloop 27941 (Hi--135326); A. E. Radford 5149 (Hi--50209). Pitt Co.: M. C. Helms 1011 (Hi--170130). Richmond Co.: A. E. Radford 14423 (Hi--118266). Robeson Co.: Blomquist & Wilbur 15183 (N); Britt 2297 (Hi--167120); Terrell 3066 (Hi--118267). Sampson Co.: Ahles & Haesloop 30030 (Hi--135329). Scotland Co.:

Ahles & Hammond 24910 (Hi--118269); Radford & Stewart 455 (Hi--21284). Wake Co.: Buell 1934 (No--2646); R. K. Godfrey 3989 (No-2640); Morris s.n. [Raleigh] (Ca--379008). Washington Co.: A. E. Radford 38849 (Hi--137367); Wood & Clement 6939 (Hi--51188). Wayne Co.: Duke 2637 (Hi--134742); A. E. Radford 25471 (Hi--127339). Wilson Co.: A. E. Radford 35596 (Hi--135332), 38101 (Hi--135334), 44406 (Ms--47415). County undetermined: Collector undetermined s.n. (S); G. McCarthy s.n. [Julio 1885] (Hi). SOUTH CAROLINA: Aiken Co.: Eggert s.n. [25 May 1899] (Ut--799b). Allendale Co.: Ahles & Bell 12573 (Hi--137393). Bamberg Co.: Ahles & Haesloop 26059 (Hi--118253). Barnwell Co.: Batson & Kelley 35 (Hi--140172, Hi--140173), s.n. [June 13, 1952] (Hi--140171), s.n. [June 27, 1952] (Hi--140174), s.n. [July 1, 1957] (Hi--140175). Berkeley Co.: Ahles & Haesloop 26428 (Hi--118254, Se--199100); Ravenel s.n. [Santee Canal, July] (Ms--15492). Charleston Co.: Ahles & Haesloop 25665 (Hi--118256); Cabanis s.n. [near Charleston] (B). Chesterfield Co.: A. E. Radford 12435 (Hi--118255). Clarendon Co.: A. E. Radford 24510 (Hi--135342). Colleton Co.: C. R. Bell 2284 (Hi--133982). Darlington Co.: W. C. Coker s.n. [July 5, 1909] (Hi); J. B. Norton s.n. [July 8, 1920] (Hi), s.n. [Apr. 26, 1921] (Hi); Radford & Stewart 401 (Hi--15971, N); B. E. Smith s.n. [5/25/32] (Hi--77050). Dillon Co.: Ahles & Haesloop 27843 (Hi--135325). Dorchester Co.: Ahles & Haesloop 26318 (Hi--118257). Edgefield Co.: A. E. Radford 26527 (Hi--118258). Florence Co.: C. R. Bell 7568 (Hi--118259); Ravenel s.n. [Florence, July 1879] (Br). Georgetown Co.: Godfrey & Tryon 51 (Ca--957182); A. E. Radford 24968 (Hi--118260). Hampton Co.: C. R. Bell 2531 (Hi--133980). Horry Co.: C. R. Bell 7784 (Hi--118262); Houten & Schoenmakers 1042 (Ut--52776a). Kershaw Co.: H. D. House 2644 (E). Lexington Co.: A. E. Radford 23344 (Hi--133981). Marion Co.: C. R. Bell s.n. [July 2, 1958] (Hi--135341). Marlboro Co.: A. E. Radford 12544 (Hi--118268, N). Orangeburg Co.: Ahles & Haesloop 25434 (Hi--139435). Sumter Co.: A. E. Radford 23847 (Hi--135324). Williamsburg Co.: A. E. Radford 24720 (Hi--118270). County undetermined: Beyrich s.n. [Carolina] (B); Bosc s.n. [Carolina, 1807] (B); Herb. Durand s.n. (Ms--15494). GEORGIA: Calhoun Co.: R. F. Thorne 3589 (N), 4571 (Vi), 4684 (Ca--906388). Clay Co.: R. F. Thorne 3669 (We). Clinch Co.: R. Kral 24289 (N). Dodge Co.: Biltmore Herb. 2755d (S). Douglas Co.: Cronquist 5424 (Ca--777561, Mi, N). Glynn Co.: Harmer 881 (S). Grady Co.: A. R. Moldenke 303 (Fg). Jeff Davis Co.: A. R. Moldenke 351 (Fg). Lowndes Co.: A. R. Moldenke 317 (Fg, S). Miller Co.: R. F. Thorne 4196 (Mi), 4217 (Mi, We), 4426 (Ca--906389, N, Vi). Pierce Co.: R. Kral 24150 (N). Screven Co.: A.

R. Moldenke 414 (Fg). Sumter Co.: R. M. Harper 443 (Ms--15496). Ware Co.: A. R. Moldenke 341 (Fg). County undetermined: Ellis s. n. [Georgia] (Ws). FLORIDA: Bay Co.: R. F. Martin 1708 (N). Bradford Co.: Meebold 28103 (Mu). Clay Co.: W. M. Canby s.n. [Hibernia, March 1869] (Dt), s.n. [Hibernia, 1869] (Ca--216804). Dixie Co.: R. K. Godfrey 59650 (Hi--155059), Duval Co.: Curtiss 3021 (Ca--2423, Ms--15495, Mu--373, Vi), 4139 (Ca--59416), 4861 (Ca--115161); Lighthipe 173 [Herb. Umbach 10992] (Ws), s.n. [So. Jacksonville, Apr. 13, '97] (S). Franklin Co.: R. K. Godfrey 55718 (Hi--102375, Vi); Godfrey, Reese, & Redfearn 53425 (Hi--157561, N); A. R. Moldenke 293 (Fg). Gulf Co.: R. K. Godfrey 57102 (Ca--112499). Highlands Co.: Meebold 28104 (Mu). Hillsborough Co.: Lakela 25369 (N). Lake Co.: G. V. Nash 1942 (Mm--7954). Levy Co.: Godfrey & Lindsey 56981 (Ca--112547); Kral & Kral 6918 (N). Liberty Co.: Chapman C.430 (W--936872); A. R. Moldenke 280 (Fg), 285 (Fg). Manatee Co.: Perdue 1765 (Ca--49688, Rf, Ur, Ut--61198b). Marion Co.: Meebold 28098 (Mu); P. O. Schallert 5447 (Mu). Okeechobee Co.: R. Kral 20478 (N). Osceola Co.: R. Kral 20468 (N); Schallert 16912, in part (Ut--89890b); Singletary s.n. [Feb. 29, 1936] (No--2633). Pasco Co.: Armstrong & Armstrong s.n. [Crystal Spring, July 10, 1922] (E--911458); P. Wiegand 7784 (St). Saint Johns Co.: Godfrey & Lindsey 56960 (Ca--112476); M. C. Reynolds s.n. [Mar.--June 1875] (Ms--15493). Santa Rosa Co.: Kral & Redfearn 2934 (Hi--111314). Sumter Co.: R. Kral 6854 (Hi--132224, N). Volusia Co.: R. Kral 20443 (N), 20453 (N). County undetermined: Bory de St. Vincent s.n. [Fla. or Miss.] (V, V); Herb. Chapman s.n. [Florida] (Ok). ALABAMA: Baldwin Co.: S. B. Jones s.n. [7 May 1960] (Hi--210888); W. Wolf s.n. [Elberta, July 5, 1926] (Ca--841813). Duval Co.: Curtiss 3021 (Mm--7952), 4861 (Mm--7953). Escambia Co.: X. M. Gaines 165 (N). Mobile Co.: G. L. Fisher s.n. [Mobile, May 12, 1928] (Ew). Montgomery Co.: Olds s.n. [Montgomery, 3.20.94] (Ws). County undetermined: Buckley s.n. [Alabama, July 1840] (Br, Br), s.n. (E). MISSISSIPPI: Forrest Co.: S. McDaniel 3162 (N), 3237 (N). George Co.: Ahles & Bell 7720 (Ur); Demaree 33388 (Z). Hancock Co.: Demaree 35223 (Ss). Harrison Co.: S. McDaniel 3122 (N); Woodson & Anderson 1515 (E--934599). Jackson Co.: Demaree 28670 (N), 30716 (N), 32035 (Le), 35061 (Ss); Diener 180 (Ur); H. J. Jacob 1294 (Hi--196296); S. M. Tracy 5031 (Hi--24867). Lamar Co.: Jones & Reynolds 12324 (N). Pearl River Co.: Jones & Reynolds 11957 (N), 11960 (N); R. Kral 17332 (N); S. McDaniel 3220 (N). Stone Co.: S. McDaniel 3111 (N). LOUISIANA: Beauregard Par.: Ewan 21065 (Ac); R. Kral 20156 (N), 20197 (N); Kral & Ricks 16991 (N). Rapides Par.: R. Kral 20069 (N). Vernon Par.: Gregory

& Eiten 23 (N); R. Kral 20039 (N); R. McVaugh 8457 (Mi). TEXAS: Angelina Co.: Correll & Edwin 16499 (Rf); Correll & Wasshausen 27518 (Ld). Hardin Co.: Cory 52778 (N, Rf, Se--127154), 57125 (Gg); R. L. Crockett 560 (Ld); Lundell & Lundell 11152 (Ld); Tharp & Tyson s.n. [June 27, 1952] (St). Jasper Co.: D. S. Correll 27411 (Ld); Correll & Correll 12522 (Rf); Correll & Johnston 19643 (Rf); Correll, Ogden, & Svenson 28113 (Ld); F. W. Gould 5838 (Ca--978706). Newton Co.: Correll, Johnston, & Edwin 22288 (Ld); Tharp 44346 (S). Tyler Co.: D. S. Correll 37248 (Mi); Tharp, Turner, & Johnston 54955 (Ld, St). ISLA DE PINOS: Ekman 12410 (S). LOCALITY OF COLLECTION UNDETERMINED: Hooker s.n. [s. States] (B). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LACHNOCAULON ANCEPS f. GLABRESCENS Moldenke

Bibliography: Moldenke, Phytologia 8: 160. 1962; Moldenke, Résumé Suppl. 3: 3. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Résumé Suppl. 16: [1]. 1968; Moldenke, Phytologia 20: 41. 1970.

Kral says of his collection, cited below: "a mixed population of smooth and hairy scape", found in moist sandy peat of slash pine and saw palmetto flatwoods ditchbank, with the flowering heads "gray-white". Material of this form has been misidentified and distributed in herbaria under the name L. digynum Holm.

Citations: FLORIDA: Manatee Co.: S. M. Tracy 7586 (B--isotype, Ca--181776--isotype, Mi--isotype, N--type, S--isotype, Ws--isotype). Martin Co.: R. Kral 20420 (N).

LACHNOCAULON BEYRICHIANUM Sporleder

Bibliography: Körn., Linnaea 27: 567--568. 1856; C. Müll. in Walp., Ann. 5: 920 (1860) and 6: 1203. 1861; Körn. in Mart., Fl. Bras. 3 (1): 295. 1863; Benth. & Hook. f., Gen. Pl. 3 (2): 1024. 1883; Morong, Bull. Torr. Bot. Club 18: 361 & 362. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 19. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 240 & 288. 1903; J. K. Small, Fl. Southeast. U. S., ed. 1, 234 & 235 (1903) and ed. 2, 234, & 235. 1913; J. K. Small, Man. Southeast. Fl. 256. 1933; Moldenke, N. Am. Fl. 19 (1): 46 & 49. 1937; Moldenke, Phytologia 1: 329, 349, 356, & 360. 1939; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 19. 1946; Moldenke, Alph. List Cit. 1: 257. 1946; Moldenke, Known Geogr. Distrib. Erioc. 2, 3, & 42. 1946; Moldenke, Alph. List Cit. 3: 850. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 8, 9, & 207. 1949; Moldenke, Phytologia 3: 493. 1951; Moldenke, Résumé 10--12 & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 19. 1960; Moldenke, Résumé Suppl. 4: 2. 1962; Radford, Ahles, & Bell, Guide Vasc. Fl. Carol. 106 & 107. 1964; R. Kral, Sida 2: 317--319 & 331. 1966; Shinners, Sida 2: 443. 1966; Moldenke, Résumé Suppl. 16: [1]. 1968.

Illustrations: R. Kral, Sida 2: 318. 1966.

Recent collectors have found this plant growing on sand hills,

in sand on back dunes, at the open edges of bogs, in turkey oak communities, in dry sandy pinelands, and in moist coarse sand, flowering and fruiting in June and July. Kral says of his Saint Lucie County (Florida) collection: "frequent on rather dry sands of slash pine - saw palmetto flatwoods with L. anceps and L. minus nearby", and of his Volusia County collection: "in large tufts, nearby are L. minus and L. anceps but these are more abundant on disturbed sands". In his 1966 work he says of L. beyrichianum: "Sands, sandy peats and peat of pine flatwoods, moist pineland savannas, pineland pond margins, lakeshores and rather dry oak-pine barrens, central Florida north to southern North Carolina (Bladen Co.).....The affinities of this species to L. anceps are at once evidenced by its habit, habitat, leaf and scape indument and, especially by its white-clavate perianth trichomes. Yet the leaves of L. beyrichianum are consistently narrower, and its seeds comparatively smooth and lustrous. Such differences, though seemingly minor, appear to hold even in mixed populations of the two."

Radford, Ahles & Bell (1964) state that in the Carolinas the species flowers from May to September and is found in "Sandy shores of pools, very rare". They record it from Alabama, but cite no collection to back up this claim. In forty years I have seen no material of it from Alabama. They distinguish it from the other Carolina species by its mature seeds being smooth, not cancellate or striate.

The type of the species was collected by Heinrich Carl Beyrich at the edges of a swamp near Ebenezer, Effingham County, Georgia, on July 8, 1833. The isotype specimen in the Berlin herbarium was annotated as L. anceps by Ruhland in 1900. Jackson (1894) reduces L. beyrichianum to synonymy under what he called L. michauxii Kunth, which is what we now know as L. anceps (Walt.) Morong.

Material of L. beyrichianum has been misidentified and distributed in herbaria under the names L. anceps (Walt.) Morong, L. glabrum Körn., L. michauxii Kunth, and L. minus (Chapm.) Small. On the other hand, the R. Kral 20418, distributed as L. beyrichianum, is actually L. glabrum Körn., while G. V. Nash 148, 1295, & 1855 are L. minus (Chapm.) Small.

Additional citations: NORTH CAROLINA: Bladen Co.: Buell & West 1742 (No--2643); Fox & Boyce 3780 (N, No--29707); R. K. Godfrey s.n. [White Lake, 6-20-1937] (No--2639). New Hanover Co.: R. K. Godfrey 4680 (No--2647). Pender Co.: A. C. Martin s.n. [Burgaw, 5/17/1925] (No--2642); B. W. Wells s.n. [Rowes Bridge, Burgaw, 7/13/1927] (No--2641), s.n. [Rowes Bridge, Burgaw, 6/9/1929] (No--2637), s.n. [Burgaw, 6/7/1945] (No--2636). SOUTH CAROLINA: Horry Co.: W. C. Coker s.n. [Myrtle Beach, June 23, 1931] (Hi--24072). GEORGIA: Effingham Co.: Beyrich s.n. [Ebenezer, 8/7/1833] (B--isotype). FLORIDA: Saint Johns Co.: M. C. Reynolds s.n. [Mar.--

June 1875] (Ca--2424). Saint Lucie Co.: R. Kral 20378 (N). Volusia Co.: R. Kral 20441 (N); Tomlinson 10-6-63 D (Ft--272). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LACHNOCAULON CUBENSE Ruhl.

Bibliography: Ruhl. in Fedde, Repert. Spec. Nov. 22: 34. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 133. 1929; Moldenke, N. Am. Fl. 19 (1): 46 & 48. 1937; Moldenke, Phytologia 1: 329, 351, & 355. 1939; Moldenke, Known Geogr. Distrib. Erioc. 5 & 42. 1946; León, Fl. Cub. 1: 284 & 426. 1946; Moldenke, Alph. List Cit. 1: 187. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 44 & 207. 1949; Moldenke, Résumé 52 & 484. 1959.

Additional citations: CUBA: Las Villas: Ekman 17118 (S--type).

LACHNOCAULON DIGYNUM Körn.

Additional & emended synonymy: Lachnocaulon anceps Benth. & Hook. f. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 242 & 288, in syn. 1903 [not L. anceps (Wahl.) Morong, 1962, nor (Walt.) Ell., 1962, nor (Walt.) Moray, 1970, nor (Walt.) Morong, 1891]. Eriocaulon digynum Körn. ex Moldenke, Alph. List Cit. 3: 806, sphalm. 1949. Lachnocaulon digynum Holm ex Moldenke, Résumé Suppl. 1: 18, in syn. 1959.

Bibliography: Körn., Linnaea 27: 570--571. 1856; C. Müll. in Walp., Ann. 5: 921 (1860) and 6: 1203. 1861; Körn. in Mart., Fl. Bras. 3 (1): 286, 288, & 294. 1863; Van Heurck & Muell.-Arg. in Van Heurck, Obs. Bot. 1: 108. 1870; Benth. & Hook. f., Gen. Pl. 3 (2): 1024. 1883; Morong, Bull. Torr. Bot. Club 18: 362. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 19. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 13, 16, 240, 242, & 288. 1903; J. K. Small, Fl. Southeast. U. S., ed. 1, 234 & 235 (1903) and ed. 2, 234 & 235. 1913; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 55. 1930; J. K. Small, Man. Southeast. Fl. 256. 1933; Moldenke, N. Am. Fl. 19 (1): 46 & 48--49. 1937; Moldenke, Phytologia 1: 329, 350, 358, & 360. 1939; Moldenke, Known Geogr. Distrib. Erioc. 3 & 42. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 19. 1946; Moldenke, Phytologia 2: 491. 1948; Moldenke, Alph. List Cit. 2: 460 (1948) and 3: 806. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 9, 11, & 207. 1949; Moldenke, Phytologia 3: 493--494. 1951; Moldenke, Résumé 12, 14, 302, & 484. 1959; Moldenke, Résumé Suppl. 1: 18. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 19. 1960; Moldenke, Résumé Suppl. 3: 3. 1962; R. Kral, Sida 2: 315--317 & 325--327. 1966; Shinners, Sida 2: 443. 1966; Moldenke, Résumé Suppl. 16: [1]. 1968.

Illustrations: R. Kral, Sida 2: 326. 1966.

The L. anceps (Walt.) Morong, referred to in the synonymy above, is, of course, a valid species of which the various variants in accredition there listed are synonyms. Morong (1891) says of L. digynum "I have not seen specimens of this. Körnicke attributes it to Alabama, from whence it was sent by Bentham....It is regarded by Benth. and Hook. l. c. as probably a depauperate form

of L. anceps, with heads not yet well developed, but it appears to me to come much nearer to L. Beyrichianum. Fresh specimens are very desirable."

On the labels of his collections, cited below, Kral says that he found this plant growing "on exposed wet sands of seepage bogs", "on bulldozed sandy peaty pineland pond margin", and "on wet sandy peat of seepage by pine flatwoods pond". He describes the "heads dull gray-brown" and notes that the "plants have leaves startlingly short and Polytrichum-like". In his 1966 work he describes its habitat as "Wet acid exposed sands and sandy peats or seepage bogs, pineland pond margins, ditches and roadbanks, coastal plain, northwestern Florida west to southern Mississippi. Type. Alabama. This species, which is particularly abundant in the wet pine flatwoods country about Pensacola, Florida, has the smallest leaves of all the Lachnocaulon of the United States. The small rosettes, densely aggregated on slender ascending rhizomes into bright green, convex tufts of sometimes hundreds of individuals, remind one of some of the larger Polytrichums. The 2-carpellate condition of the gynoecium is consistent throughout all samples of this species so far examined, there being no evidence at all of any aborted third carpel either in the ovulary or in the style branching. The only other species of Lachnocaulon which I have found in association with this one is L. anceps, from which it is readily distinguished in the field by its glabrous or almost glabrous scapes, its shorter stature, and its darker, smaller heads." It has been collected in flower and fruit from July to September.

The S. M. Tracy 7586, distributed as L. digynum, is actually the type collection of L. anceps f. glabrescens Moldenke.

Additional citations: ALABAMA: Baldwin Co.: W. Wolf s.n. [Elberta, Aug. 21, 1925] (Ca--841814). FLORIDA: Bay Co.: R. Kral 15667 (N). Escambia Co.: R. Kral 17634 (N), 23169 (N). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LACHNOCAULON ECILIATUM Small

Bibliography: J. K. Small, Fl. Southeast. U. S., ed. 1, 234, 235, & 1328. 1903; Prain, Ind. Kew. Suppl. 3: 99. 1908; J. K. Small, Fl. Southeast. U. S., ed. 2, 234 & 235. 1913; J. K. Small, Man. Southeast. Fl. 256--257. 1933; Moldenke, N. Am. Fl. 19 (1): 46 & 49. 1937; Moldenke, Phytologia 1: 330, 349, 352, 354, & 356. 1939; Moldenke, Known Geogr. Distrib. Erioc. 3 & 42. 1946; Moldenke, Alph. List Cit. 1: 42, 138, & 257. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 9 & 207. 1949; Moldenke, Phytologia 3: 494. 1951; Moldenke, Résumé 12 & 484. 1959; R. Kral, Sida 2: 315 & 321. 1966; Shinners, Sida 2: 443. 1966; Moldenke, Phytologia 18: 437. 1969.

Recent collectors have found this plant growing on the sandy shores of small lakes, flowering and fruiting in January and June. Material of it has been misidentified and distributed in herbaria as L. glabrum Körn. and Eriocaulon ravenelii Chapm. The

R. M. Harper 8, cited below, is a mixture with L. engleri Ruhl.

Kral (1966) reduces L. eciliatum to synonymy under L. minus (Chapm.) Small, which see in these series of notes for his discussion of his reasons for so doing. However, on the label of Kral 17747 from Walton County, Florida, he suggests that L. eciliatum may be a natural hybrid between L. engleri and L. minus.

Additional citations: FLORIDA: Lake Co.: Bright 3842 (Ws). Putnam Co.: R. M. Harper 7 (W--513490), 8, in part (W--513491). Walton Co.: Curtiss 3022 (Ca--189378--isotype, Mu--374--isotype).

LACHNOCAULON EKMANNII Ruhl.

Synonymy: Lachnocaulon ekmanii Ruhl. apud A. W. Hill, Ind. Kew. Suppl. 7: 133. 1929.

Bibliography: Ruhl. in Fedde, Repert. Spec. Nov. 22: 34. 1925; A. W. Hill, Ind. Kew. Suppl. 7: 133. 1929; Moldenke, N. Am. Fl. 19 (1): 46 & 47. 1937; Moldenke, Phytologia 1: 317, 330, 351, 355, & 360. 1939; Moldenke, Known Geogr. Distrib. Erioc. 5 & 42. 1946; León, Fl. Cub. 1: 284 & 426. 1946; Moldenke, Alph. List Cit. 1: 91, 92, & 187 (1946) and 3: 930. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 44 & 207. 1949; Moldenke, Phytologia 3: 494. 1951; Moldenke, Résumé 52 & 484. 1959; Moldenke, Résumé Suppl. 18: 12. 1969.

As pointed out by me previously [Phytologia 1: 330. 1939], Ruhland apparently spelled the specific epithet of this taxon "ekmannii" purposely and I see no valid reason for "correcting" it. The so-called "correction" of the original spellings of scientific names is most highly undesirable and should be avoided wherever and whenever possible since various "experts" often "correct" spellings differently and this can lead to almost endless confusion. There is practically no end to the number of names that could and would be "corrected" if this practice were to become established.

Additional citations: CUBA: Pinar del Río: Ekman 18132 (S), 18757 (N--photo of type, S--type, Z--photo of type).

LACHNOCAULON ENGLERI Ruhl.

Emended synonymy: Eriocaulon maritimum Chapm. ex Moldenke, Phytologia 1: 330, in syn. 1939. Lachnocaulon glabrum Chapm. ex Moldenke, Phytologia 1: 330, in syn. 1939 [not L. glabrum Körn., 1856]. Lachnocaulon maritimum Torr. ex Moldenke, Phytologia 1: 330, in syn. 1939.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 240, 241, & 288. 1903; J. K. Small, Fl. Southeast. U. S., ed. 1, 234 & 235. 1903; Prain, Ind. Kew. Suppl. 3: 99. 1908; J. K. Small, Fl. Southeast. U. S., ed. 2, 234 & 235. 1913; J. K. Small, Man. Southeast. Fl. 256. 1933; Moldenke, N. Am. Fl. 19 (1): 46 & 47. 1937; Moldenke, Phytologia 1: 330, 349, 353, 356, 357, 359, & 360. 1939; Worsdell, Ind. Lond. Suppl. 2: 28. 1941; Moldenke, Known Geogr. Distrib. Erioc. 3 & 42. 1946; Moldenke, Alph. List Cit. 1: 25, 59, 98, 99, 116, & 257. 1946; Hill & Salisb., Ind. Kew. Suppl. 10:

86 & 126. 1947; Moldenke, Phytologia 2: 491 & 494. 1948; Moldenke, Alph. List Cit. 2: 460, 461, 507, 508, & 512 (1948), 3: 760, 777, 778, 808, & 813 (1949), and 4: 1117, 1187, & 1201. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 9 & 207. 1949; Moldenke, Phytologia 3: 142 (1949) and 3: 494--495. 1951; Moldenke, Résumé 12, 287, 291, & 484. 1959; Moldenke, Résumé Suppl. 3: 3 (1962) and 10: [1]. 1964; R. Kral, Sida 2: 316, 317, & 323--325. 1966; Shinners, Sida 2: 443. 1966; Moldenke, Résumé Suppl. 16: [1] (1968), 17: 10 (1968), and 18: 12. 1969; Moldenke, Phytologia 18: 376, 425, 426, & 437. 1969.

Illustrations: J. K. Small, Man. Southeast. Fl. 256. 1933; R. Kral, Sida 2: 324. 1966.

Recent collectors have found this species growing on sand beaches and in brackish sand, flowering and fruiting from June to September and in December. Kral describes his collection from Walton County, Florida, in these words: "heads chocolate-brown, mixed with dull brown ones of L. minus". He further avers that the plant is "a weed in sandy peat of ditchbank through slash pine - saw palmetto flatwoods" and "growing in sandy peaty margin of small lake in longleaf pine - turkey oak hills, mixed with L. minus". Hawkes describes it as "a common tufted herb in wet sandy pinewoods". Curtiss found the plant "spreading flat on moist cultivated ground" in Volusia County, identified it as Paepalanthus pilulifer Körn., and regarded it as "native to Brazil" and therefore merely introduced in Florida. In this identification he was, of course, quite in error. Tomlinson found L. engleri "in wet sand at margin of lake, not inundated and forming a more or less continuous peripheral zone".

Kral (1966) describes the habitat of L. engleri as "Moist sands, sandy-peats or peat-muck of pineland pond margins, lakeshores, and mildly acid marshes along the seacoast, coastal plain, the lower Pleistocene terraces, Florida. Type. Ditches and lakeshores in the vicinity of Eustis, Lake Co., Florida, Nash 1184. The dark brown inflorescence, glabrous scape, and deep-brown, lustrous seed of this species distinguish it from all others of the genus that have been found in Florida.

"The almost 'spontaneous' development of large numbers of this species on recently disturbed wet sands or upon the drying peat left by fluctuating lake and pond margins in Florida makes one wonder whether any habitat of relative permanence is occupied by this species. Certainly its seed must have an inherent capacity to remain dormant for such extended periods of times as necessary for such ephemeral habitats to recur. A similar behavior is noted for L. minus, a species with which L. engleri most frequently is found."

Material has been misidentified and distributed in herbaria under the names L. glabrum Körn., Eriocaulon ravenelii Chapm., and Paepalanthus pilulifer Körn. The R. M. Harper 8, cited below, is a mixture with L. eciliatum Small.

Additional citations: FLORIDA: Highlands Co.: McFarlin 9599

(N); W. S. Phillips 2304 (Tu--79290); Tomlinson 10-6-63 L (Ft--271). Lake Co.: Goodale s.n. [Mt. Dora, April 7, 1933] (Ms--69816); G. V. Nash 1184 (B--type, Ca--115164--isotype, Mm--7951--isotype, Ms--15502--isotype). Martin Co.: R. Kral 18235 (N), 20386 (N). Orange Co.: A. D. Hawkes 676 (Ca--1216531). Polk Co.: McFarlin 3256 (Mi), 3262 (Mi). Putnam Co.: R. M. Harper 8, in part (W--513491). Santa Rosa Island [Santa Rosa Co.]: Fassett 19914 (Ws). Volusia Co.: Curtiss 6894, in part (Ca--142526); R. Kral 18426 (N). Walton Co.: R. Kral 17746 (N).

LACHNOCAULON FLORIDANUM Small

Bibliography: J. K. Small, Fl. Southeast. U. S., ed. 1, 234, 235, & 1328. 1903; Prain, Ind. Kew. Suppl. 3: 99. 1908; J. K. Small, Fl. Southeast. U. S., ed. 2, 234 & 235. 1913; J. K. Small, Man. Southeast. Fl. 256. 1933; Moldenke, N. Am. Fl. 19 (1): 46--48. 1937; Moldenke, Phytologia 1: 330, 349, & 359. 1939; Moldenke, Known Geogr. Distrib. Erioc. 3 & 42. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 9 & 207. 1949; Moldenke, Alph. List Cit. 3: 760. 1949; Moldenke, Phytologia 3: 495. 1951; Moldenke, Résumé 12 & 484. 1959; R. Kral, Sida 2: 315, 319, & 321. 1966; Shinners, Sida 2: 443. 1966.

Kral (1966) feels that this species should be reduced to synonymy under L. anceps (Walt.) Morong. Material of it has been misidentified and distributed in herbaria as L. glabrum Körn.

Additional citations: FLORIDA: Lake Co.: G. V. Nash 1981 (Ms--15501--isotype).

LACHNOCAULON GLABRUM Körn.

Bibliography: Körn., Linnaea 27: 568--569. 1856; C. Müll. in Walp., Ann. 5: 920--921. 1860; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 1, 504. 1860; C. Müll. in Walp., Ann. 6: 1203. 1861; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 2, 504 (1865), pr. 3, 504 (1872), ed. 2, pr. 1, 504 (1883), pr. 2, 504 (1884), pr. 3, 504 (1887), and pr. 4, 504. 1889; Morong, Bull. Torr. Bot. Club 18: 361. 1891; A. W. Chapm., Fl. South. U. S., ed. 2, pr. 5, 504. 1892; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 19. 1894; A. W. Chapm., Fl. South. U. S., ed. 3, 531. 1897; Ruhl. in Engl., Pflanzenreich 13 (4-30): 240, 242, & 288. 1903; J. K. Small, Fl. Southeast. U. S., ed. 1, 234 & 235 (1903) and ed. 2, 234 & 235. 1913; J. K. Small, Fl. Miami 37. 1913; J. K. Small, Man. Southeast. Fl. 256. 1933; Moldenke, N. Am. Fl. 19 (1): 46 & 48. 1937; Moldenke, Phytologia 1: 331, 349, 357, & 362. 1939; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 19. 1946; Moldenke, Known Geogr. Distrib. Erioc. 3 & 42. 1946; Moldenke, Phytologia 2: 491. 1948; Moldenke, Alph. List Cit. 2: 412, 461, 475, 524, & 548 (1948), 3: 753, 877, 941, 942, 944, & 958 (1949), and 4: 1192, 1201, & 1216. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 9, 11, & 207. 1949; Phytologia 3: 80 (1949) and 3: 495. 1951; Moldenke, Résumé 12, 14, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 19. 1960; Thanikaimoni, Pollen &

Spores 7: 183 & 186, tab. 1. 1965; R. Kral, Sida 2: 315, 319, & 321. 1966; Moldenke, Résumé Suppl. 16: [1]. 1968; Moldenke, Phytologia 17: 490 (1968), 18: 437 (1969), and 19: 75. 1969.

Illustrations: Thanikaimoni, Pollen & Spores 7: 183, tab. 1. 1965.

Collectors have found this plant growing along trails and in moist pinelands, flowering and fruiting in March, May, and December. Tomlinson found it on "sandy prairies, forming small tufts closely appressed to the ground" and "along roadside in sandy scrub".

Kral (1966) reduces this species to synonymy under L. anceps (Walt.) Morong and on the labels of his collections, cited below, tells of finding the plant "in sandy peat of slash pine - palmetto flatwoods bog", "in sandy peat of bank of ditch through slash pine - saw palmetto flatwoods, mixed with a population of L. anceps", "in sandy peaty clearing in pine-palmetto savanna flatwoods: in this area most have glabrous scapes but grade north into more and more pubescent scapes", "scapes ranging from smooth to hairy", and "most of the population in this area with smooth scapes, but not consistently so". In view of these field observations it might be advisable to reduce L. glabrum to the rank of variety or form under L. anceps, but I feel that certainly some nomenclatural recognition should be given it.

Material of L. glabrum has been misidentified and distributed in herbaria as L. beyrichianum Sporleder and as Eriocaulon ravenelii Chapm. On the other hand, the A. C. Martin s.n. [Burgaw, 5/17/1925], distributed as L. glabrum, is actually L. beyrichianum Sporleder; Curtiss 3022 is the type collection of L. sciliatum Small; G. V. Nash 1184 is the type collection of L. engleri Ruhl.; G. V. Nash 1981 is the type collection of L. floridanum Small; Curtiss 5911 is L. minus (Chapm.) Small; P. O. Schallert 16912 is a mixture of L. anceps (Walt.) Morong and Syngonanthus flavidulus (Michx.) Ruhl.; G. Een s.n. [25.3.1951] is Eriocaulon compressum Lam.; A. P. Garber s.n. [S. Florida, 1877] is E. ravenelii Chapm.; and P. O. Schallert 16312 is Syngonanthus flavidulus (Michx.) Ruhl. Meebold 28099, cited below, is a mixture with Syngonanthus flavidulus.

Additional citations: ALABAMA: Escambia Co.: X. M. Gaines 249 (N). FLORIDA: Broward Co.: Tomlinson 15.XII.63 A (Ft--277). Charlotte Co.: R. Kral 18048 (N). Collier Co.: Tomlinson 31-3-63 A (Ft--270, Ft, Ft). Dade Co.: A. A. Eaton s.n. [Orange Glade, Dec. 7, 1903] (Rf); Small, Mosier, & Small 6912 (S). Lee Co.: R. Kral 18012 (N); P. C. Standley 18889 (W--1028668). Marion Co.: Meebold 28102 (Mu). Martin Co.: R. Kral 18288 (N), 20418 (N). Palm Beach Co.: W. B. Fox s.n. [May 10, 1945] (No--15818), s.n. [Delray Beach, May 27, 1945] (We); Meebold 28101 (Mu). Polk Co.: Meebold 28099, in part (Mu). Saint Lucie Co.: R. Kral 20424 (N).

BOOK REVIEWS

Alma L. Moldenke

"FLORA OF THE ROCKY MOUNTAINS AND ADJACENT PLAINS", by P. A. Rydberg, xii & 1144 pp., facsimile of the second edition of 1922. Hafner Publishing Co., New York, N. Y. 10003. 1969. $17.50.

The reprinting of this classic work will add to the ever increasing school, library, botanical institute, botanist's, and skilled amateur naturalist's shelves a still highly valued book that has had to be scrounged for at second-hand dealers for all too many years.

Many of the taxonomic changes of the last half century will be found in William A. Weber's "Rocky Mountain Flora" of 1967, but his work is of more limited scope geographically, covering only the southern Rocky Mountains from Pike's Peak to the Rocky Mountain National Park and from the plains to the Continental Divide, while Dr. Rydberg's flora covers all of Colorado, Utah, Wyoming, Idaho, Montana, Saskatchewan and Alberta, along with adjacent parts of Nebraska, South Dakota, North Dakota and British Columbia.

"EVOLUTION AND THE GENETICS OF POPULATIONS", Volume I, "GENETIC AND BIOMETRIC FOUNDATIONS" by Sewall Wright, vii & 469 pp., illus., University of Chicago Press, Chicago, Illinois 60637, and London W.C.1. 1968. $15.00.

This first treatise in a projected three-volume series is outstanding for its scholarship leading to "the deduction of the consequences for populations of the firmly established principles of the genetics of individuals, and the comparison of these deductions with observed properties of experimental and natural populations. The most important applications are to animal and plant breeding, to eugenics, and to interpretation of a phase of evolution."

The first five chapters consist of a succinct review of ideas on the origin of species, of modes of reproductive cycles, genic and nongenic heredity, and genes and character expressions as postulates for population genetics. The remaining nine chapters deal with statistical or biometric methods with special reference to the classification, description and interpretation of biological single variables and systems of correlated variables. Special emphasis is given to path analysis dealing with linear systems, - the specialization of the renowned author-geneticist-biometrician.

There is a final chapter on conclusions in which Dr. Sewall checks the early through modern concepts of evolution against his and other carefully compiled quantitative studies and con-

cludes that "Natural selection of small, favorable genetic variations, the occurrence of major mutations -- now identified with chromosomal aberrations -- and isolation remain as valid factors, the roles of which in evolution are to be interpreted in the light of [this] new data."

The type is relatively clean, but Nepeta on p. 47 and descendant on p. 17 are misspelled and at least one negative sign is omitted from an equation.

For all advanced students and workers in population genetics and for the genetically and biometrically aware biologists interested in evolution this study will surely prove to be an invaluable source and reference book.

"THE PLASMODIOPHORALES" by John S. Karling, 2nd revised edition, xiii & 256 pp., illus., Hafner Publishing Co., New York, N. Y. 10003. 1968. $17.50.

As in the 1942 first edition, half of this book is devoted to a monographic treatment of this order and half to the economic importance of its pathogens. It continues to have its dual appeal to those interested in the systematics and cytology of fungi and/or other lower organisms and to those interested in plant pathology.

As revised, this order includes only one family, 9 genera and 35 species with different physiological races that are parasitic in algae, fungi and higher plants. The members have complex life cycles including sequentially cysts, primary zoospores, sporangial plasmodia, sporangiosori, zoosporangia, secondary zoospores, cystogeneous plasmodia and cystosori where known; are believed by the author to have been derived from distant proteomyxean ancestors; and are placed temporarily in a separate division or class of fungi at the bottom of the so-called biflagellate series of Phycomycetes. The zoosporangia and zoospores indicate that the group is more fungus-like than animal-like.

Plasmodiophora brassicae which causes the serious club-root disease of crucifers, Spongospora subterranea var. subterranea which causes powdery scab in potatoes and tomatoes, Spongospora subterranea var. nasturtii which causes crook-root of water cress and Polymyxa betae which limits the growth of young sugar beets are all discussed as to etiology, host stages and reactions, entrance, dissemination, environmental factors, and controls.

There is a detailed host index which includes literature references and degree of infection. There are excellent illustrations but only made from the standard compound microscope. There is a comprehensive bibliography which gives titles of all articles in English.

The book is well printed even though a few spelling errors were not checked, as "earlier" on p. v, "inception" on p. xi, "Colhoun" on p. 177 and "subterranea" on p. 181.

The original edition of the book was highly valued; this one will be even more so.

"LIFE: AN INTRODUCTION TO BIOLOGY" Shorter Edition by George Gaylord Simpson & William S. Beck, xiii & 546 pp., illus., Harcourt, Brace & World, Inc., New York, N. Y. 10017, Chicago, San Francisco & Atlanta. 1969. $8.95.

This text is an abridged revision of the second edition of the famous and wonderful text of the same title for which it fortunately is not planned as a replacement.

Such shorter editions are usually aimed at semester or quarter courses, non-biology major students, or schools where most of the students have financial difficulty in purchasing texts. If chosen for either of the first two of these reasons, thus reviewer hopes for a good high school biology training as background, otherwise the student may not be able to appreciate fully the text and the scope and nature of biology to which it is to give him entré. If chosen for the last reason, this reviewer feels that a little less of the Simpson approach is better than none.

The text emphasizes the organization in all life, with ample survey of the whole field and with special development of the evolutionary concept.

There are copious, helpful illustrations. There are no falsely colored ones, as green epidermis, etc., found in some other texts — just fine black and white photographs and diagrams and the treat of some beautiful color photographs of some living plants and animals. A slide illustration of a primary root is labeled Zea only: it would have been helpful to students to have the species and common names added.

"LIFE IN THE LABORATORY" -- Shorter Edition -- by Donald G. Humphrey, Henry Van Dyke & David L. Willis, viii & 209 pp., illus., Harcourt, Brace & World, Inc., New York, N. Y. 10017, Chicago, San Francisco & Atlanta. 1969. $3.50 paper-back.

This stimulating, carefully thought out lab manual is planned to accompany the previously reviewed book and is adaptable to several other texts. It is entirely free of the stultifying "cook book" approach. Because of ample, but not defeating, material, it is adaptable to either the 2-hour or 3-hour lab session and to individual enrichment.

The initial sections are not a rehash of high school biology, but they do provide the necessary review.

An appropriate quote appears at the top of each exercise. For cellular reproduction there is Bateson's "When I look at a dividing cell, I feel as an astronomer might if he beheld the formation of a double star; that an original act of creation is taking place before me."

"VIRUSES, VECTORS, AND VEGETATION" edited by Karl Maramorosch, xii & 666 pp., illus., Interscience Publishers of John Wiley & Sons, New York, N. Y. 10016, London, Sydney & Toronto. 1969. $29.95.

This excellent book is an outgrowth of a U. S.-Japan conference on "Interactions between Arthropods and Plant-Pathogenic Viruses" in 1965 with the conference papers carefully updated as well as with the addition of others "from wherever in the world significant work is being carried out." Actually 14 authors are from the United States, 8 from Japan, 13 from assorted British Commonwealth nations and 1 from Brazil.

Even though there is a great range in topics, there is also considerable depth in treatment. Detailed information is given about many viruses and their many proven vectors such as dodder plants, nematodes, fungi which may also be hosts, mites, beetles, thrips, mealybugs, whiteflies, aphids and leafhoppers. For plant virus diseases 80 percent of the vectors are homopterans. Viruses are propagative or non-propagative and therefore not multiplying within the vectors. They are persistent with or without propagating within the vector, or non-persistent and so lasting only a short time on the vector's stylet. If persistent and often propagative, they become vector-circulative, entering the bug's stylet to its gut, through the gut wall to the hemolymph and from there more commonly to the salivary glands where they can enter a new host through the stylets or in some few forms to the ovarioles and so to the eggs and the next generation of these insects. Stylet-borne viruses either effect pierced susceptible epidermis or pierced phloem (only done by aphids) and so become host-circulative. The present and future of control techniques are considered.

The interesting topic of cross protection is discussed in which a leafhopper first acquiring one strain of virus is unable to transmit another, with possible causes running anywhere from lack of space to antagonistic interactions.

Each paper has appended its own bibliography. For the whole book there is an author index and a scanty subject index.

Sufficient care was not taken in proof reading to check several spelling errors, such as arthropod on p. 2, necessarily on p. 18, viruses on p. 199, together on p. 213, stylet on p. 215 and transportation on p. 434. The title on p. 95 includes "White Flies", but the text from that page onwards usually uses "whiteflies". Such lapses as these are lamentable since the scientific work has been done so carefully.

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CONTENTS

GOODLAND, R. J. A., *Plants of the cerrado vegetation of Brasil* 57

MOLDENKE, H. N., *Notes on new and noteworthy plants. -LII* 78

MOLDENKE, H. N., *Additional notes on the Eriocaulaceae. XXXI* 81

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PLANTS OF THE CERRADO VEGETATION OF BRASIL

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Universidade de Brasília, Brasília, Brasil.

ABSTRACT

A list of all angiosperms collected in the 100 x 150 km. Triângulo Mineiro cerrado of Brasil is presented with ecological and phytogeographical annotations. Cerrado is a floristically fairly uniform vegetation grading from grassy scrub through 'orchard savanna', almost to forest, and occupies most of Central Brasil. The rich flora of this small area is composed of over 600 species belonging to 336 genera in 83 families. Principal families (Leguminosae, Gramineae, Compositae, Rubiaceae, Palmae, Cyperaceae), well represented families (Bignoniaceae, Vochysiaceae, Malpighiaceae, Annonaceae, Melastomataceae), and characteristic families (Caryocaraceae, Chochlospermaceae, Proteaceae, Opiliaceae) are discussed.

INTRODUCTION

Cerrado is arguably the most widespread vegetation in Brasil, yet its flora is poorly known. Due to its curious ecological conditions, its vast agricultural potential and its enormity, there is increasing interest in the cerrado (Ferri 1963, Labouriau 1966). This paper provides information on the floristic composition of the vegetation hopefully of use to future workers.

There is only one list of cerrado plants in general. This is the list of Rizzini (1963) which deals with woody plants only, from the whole extent of cerrado, compiled from several herbaria. There is another list of plants collected from a single, small, intensively worked area of cerrado compiled by Warming (1892) together with the best description to date of the vegetation. Apart from these two, there are lists of new species and early travelogs such as those of Pohl (1827-1831, 1832-1837), Warming (1867-1893), Taubert (1896), Pilger (1901), Moore (1895), Ule (1896) and Glaziou (1905) containing shorter lists from many different areas. The extensive phytogeographical studies of Sampaio (1916a,b, 1938), Hoehne (1923) and Veloso (1946, 1948a,b, 1963) provide useful lists of the more conspicuous species. Other useful sources include Mendes-Magalhaes (1955, 1962, 1964), Kuhlmann (1954, 1960), Faissol (1953), Mello-Barreto (1956), Azevedo (1959), Eiten (1963), and Hueck (1966). Finally, there are

some taxonomic works dealing with restricted taxa of mainly cerrado plants such as Fries (1905) on the Annonaceae, Malme on Bauhinia (1905a), on Vochysiaceae (1905b), on Leguminosae (1924, 1931a) and on Compositae (1931b); Stafleu on Vochysiaceae (1948, 1952, 1953) and Smith on Dyckia (1961). The illustrated series started by Ferri (1969) provides an invaluable starting place to learn the cerrado plants.

The present list was collected from a small (100 by 150 km.) but representative area of cerrado within a region called the Triângulo Mineiro. This is the western extension of the state of Minas Gerais between the Paranaíba and Grande Rivers before their confluence to become the Paraná. The 110 collection localities are located within 48° to 49°40'W. and 18°40' to 20°S. At each locality a minimum of three to four hectares were intensively worked. Only the commonest type of vegetation, cerrado, was treated; forest, sedge meadow, palm marsh, riparian and ruderal communities were omitted. Cerrado is the Brasilian name given to a floristically fairly uniform vegetational gradient ranging from grassy scrub through 'orchard savanna' almost to forest. This physiognomic gradient is arbitrarily divided into four intergrading kinds called: campo sujo (mainly herbaceous vegetation with scattered shrubs), campo cerrado (sparse 'orchard' vegetation), cerrado (dense 'orchard' vegetation) and cerradão (almost forest). This paper applies to the studied area only, and not to the entire 150 million hectare extent of cerrado (Alvim & Araujo 1952), which occurs from north of the Amazon to south of the southern tropic.

STATISTICS

In this study (Goodland 1969), approximately 600 species of angiosperms were collected, belonging to over 300 genera in 83 families. Warming (1892) lists over 700 species belonging to 77 families in the Lagoa Santa cerrado. Rizzini (1963) lists 600 species of woody plants alone, belonging to 242 genera, from the entire cerrado area. As Brasil has one of the richest floras of the world and one of the least completely known, these figures and taxa, particularly at the species level, are approximate. The localities were visited only once, and all collections were made in the dry season. Trees are probably represented more fully than herbs, as there are fewer trees and they are more easily distinguishable from each other.

Some taxa are 'lumped'. This applies particularly to the families Myrtaceae, Palmae, Cyperaceae, Gramineae, and to the genera Ouratea, Alibertia, Cassia, Mimosa, Centrosema, Eriosema, Stylosanthes and possibly others. The entire collection was compared with material in the

Table 1. The Principal Families and Genera in the Triângulo Mineiro Cerrado.

Principal Families (Total: 83)	Number of Genera (Total: 336)	Number of Species (Total: 600)
Leguminosae	44	107
Caesalpinioideae	(8)	(30)
Mimosoideae	(5)	(12)
Papilionoideae	(25)	(52)
Indeterminata	(6)	(13)
Gramineae	31	73
Compositae	36	69
Rubiaceae	17	30
Palmae	13	22
Cyperaceae	8	24
Bignoniaceae	7	22
Vochysiaceae	3	16
Apocynaceae	7	15
Euphorbiaceae	10	14
Malpighiaceae	8	14
Labiatae	5	13
Melastomataceae	7	11
Annonaceae	5	11

Principal Genera	Number of Species
Cassia	16
Vernonia	14
Paspalum	11
Vochysia	11
Tabebuia	10
Hyptis	9
Eriosema	9
Panicum	9
Annona	7
Aspidosperma	7
Bulbostylis	6
Bauhinia	6
Axonopus	6
Jacaranda	6
Rhynchospora	5
Erythroxylum	5
Andropogon	5
Borreria	5
Psidium	5
Byrsonima	5
Baccharis	5

University of Brasília herbarium by the author. Grateful acknowledgment is made to the then Curator, Dr. Graziela M. Barroso for the use of the herbarium, for determinations of Compositae and Leguminosae, and for examining all the vegetative unknowns. Drs. George and Liene Eiten of the Instituto de Botânica of São Paulo, and Drs. Carlos Toledo Rizzini and Aparício Pereira Duarte of the Botanic Gardens in Rio, kindly gave great help with other doubtful material.

PRINCIPAL FAMILIES

The families best represented in this flora are listed in Table 1. There are 16 families with 5 or more genera and with more than 10 species. These fall into two groups. Eleven of these families are large on the world scale, and are similarly large in the cerrado. The remaining five families are not large by world standards and so are 'over represented' in the cerrado and are thereby more characteristic of it. These are the Bignoniaceae, Vochysiaceae, Malpighiaceae, Annonaceae and Melastomataceae.

The Bignoniaceae is large due to the neotropical tree genera Tabebuia (including Tecoma) and Jacaranda. The Vochysiaceae is perhaps the most characteristic family of cerrado vegetation. It is essentially a small, neotropical family of 6 genera. Salvertia never occurs away from the cerrado, while the genera Vochysia, Qualea, and Callisthene occur mainly in cerrado but also in adjacent forests. Qualea grandiflora and Q. parviflora are the dominant trees in most of the sites visited.

Similarly the Malpighiaceae is mainly a small neotropical family, well represented in the cerrado. The genus Byrsonima is an important component of cerrado vegetation, occurring in every locality and dominating some. Byrsonima provides three species among the twenty most important trees.

The Annonaceae is a small tropical family mainly of forest stragglers in the palaeotropics, but of small trees in savannas and cerrado in the neotropics.

The four largest terrestrial families in the world are also the best represented in this study, i.e. Leguminosae, Compositae, Gramineae, and Rubiaceae. Nearly all the families in Table 1 are also among the largest in the world and so do not indicate much about the flora, but are important in cerrado.

The Leguminosae is important in the vegetation as well as in the flora. The fourth most abundant tree

is a legume, Bowdichia, as are the abundant trees Sweetia (2 spp.), Machaerium (4 spp.), Stryphnodendron (2 spp.), Dimorphandra and Dalbergia. Pterodon, Andira, Hymenaea, Vatairea, Plathymenia, Sclerolobium and Copaifera are also fairly common cerrado trees. Many genera of small shrublets or herbs which do not contribute greatly to the vegetation are also legumes such as Eriosema, Centrosema, Desmodium, Clitoria, Phaseolus, Indigofera, Crotalaria, Galactia, Stylosanthes, Rhynchosia, Zornia, Mimosa, Bauhinia and Cassia. The last three genera have many cerrado species each but only the pantropical Bauhinia is at all abundant in the vegetation. Several cerrado legumes are being evaluated agriculturally for nitrogen fixing ability, and the family as a whole may be of great significance in the nitrogen balance of the senile cerrado soils. The Leguminosae is perhaps the second most important family in the vegetation, mainly in the tree layer.

The Compositae is the second or third largest family in cerrado, but is possibly more important in the vegetation than its rival the Gramineae. The second largest cerrado genus, Vernonia, is the largest genus of angiosperms in Brasil, although pantropical in distribution with over 1000 species. At least 14 species occur in cerrado with a great variety of habit. V.ferruginea occurs in more than half the sites, mainly in campo sujo and is a small tree; few are small herbaceous perennials. Most Vernonia species are robust woody herbs or subshrubs up to 1 m. in height and rough in texture, e.g. V.bardanoides and V.herbacea. Some are delicate, sub-autotomous and broom-like above ground with large woody organs beneath, e.g. V.brevifolia, V.grandiflora. This xero-, oligotrophico- or pyromorphic lifeform is characteristic of the cerrado, giving rise to 'subterranean trees' (Rizzini & Heringer 1961, 1962, Rizzini 1965a,b, Rachid 1947, Rachid-Edwards 1956), xylopodia, cormophytes etc. (vide Malme 1940). This genus is often associated with grassy places and is characteristic of the cerrado; V.ruficoma, V.elegans, V.bardanoides being the most common.

The genus Baccharis is similar to Vernonia in several ways. Most of the 400 species of Baccharis are restricted to neotropical savannas and are characteristic of cerrado. They are mainly herbs with woody bases or rootstocks, but some are woody shrubs, e.g. B.dracuniculifolia. Some Baccharis species are leafless xeromorphs with a flanged or broom-like stem, e.g. B.gracilis. B.humilis is common in cerrado but at a low level of abundance.

The 1200 species of Eupatorium are largely neotropical. The three cerrado species are woody herbs or shrubs, and do not contribute much to the vegetation. The 2000-3000 cosmopolitan species of Senecio make it the world's largest genus, but it is not important in cerrado. Senecio brasiliensis is an occasional woody herb or shrub attaining 1 m. in some areas of cerrado.

The dominant composite is the very common tree Piptocarpha rotundifolia. This occasionally dominates the vegetation and actually achieves the maximum "Importance Value" (Curtis and Cottam 1962) of any tree in the cerrado. It is the ninth most important tree and occurs in two thirds of the sites. Apart from Vernonia ferruginea, there are two other uncommon cerrado composite tree genera: Vanillosmopsis erythropappa, and Eremanthus glomerata. These are both small genera restricted to Brasil and very characteristic of cerrado but not abundant in it. The other two Eremanthus species, E.glomerulata and E.sphaerocephala are conspicuous but uncommon subshrubs.

The huge family Rubiaceae has only 17 genera in this cerrado and is the fourth largest. The pantropical genus Borreria is the largest genus of cerrado Rubiaceae and occurs as small erect herbs often woody at the base. The genus Alibertia has at least three cerrado species and is more abundant than Borreria. Alibertia is a small neotropical genus varying from almost acaulescent suffrutices to large shrubs. The genus is fairly abundant in cerrado vegetation, mainly in campo sujo. Psychotria and Rudgia are the only common rubiaceous trees, but neither is abundant, and both are restricted to cerradão. All the remaining rubiaceous genera are occasional herbs, except for the uncommon cerradão trees Guettarda, Genipa and Tocoyena.

No family characterises the tropics better than the Palmae. Palms are immediately recognizable to family but further identification is difficult, particularly as nearly all the cerrado palms belong to the same subfamily, the Cocoideae (Corner 1966). Apart from tropical sandy beaches, the area best characterised by palms is adjacent to the cerrado in the dry North-Eastern part of Brasil where Orbignya (Babaçu) and Copernicia (Carnaúba wax palm) cover vast areas. These also enter parts of the cerrado. Within areas of cerrado, nearly every watercourse and lake is surrounded by Mauritia vinifera (Buritĺ) but this is never a component of cerrado vegetation. A few palms occur

as rare trees in cerradão, e.g. Acrocomia sclerocarpa, but most are short acaulescent xeromorphs of campo sujo -campo cerrado. Acanthococos and Attalaea are the most common, followed by Syagrus, Butia and Allagoptera (=Diplothemium). These are mainly small, well localized, neotropical plants, each forming course, spiny tufts, 50-150 cm. high, occasionally becoming abundant.

Although cerrado appears to be a dry rather than a wet type of vegetation, the family Cyperaceae is a conspicuous element. The graminoid habit in general is xeromorphic; doubtless creeping rhizomes, cespitoseness and the perennial habit contribute to the abundance of this family in cerrado. In general, their root systems are poorly developed. Most of the 6-8 cerrado sedge genera have a few hundred neotropical species. These genera are common in many neotropical savannas and on occasion dominate the grasses. Sedges are much more abundant in campo sujo -campo cerrado than in cerradão.

The large family Melastomataceae is well represented in Brasil and in cerrado. The essentially neotropical genus Miconia is by far the most abundant melastome. Rizzini (1963) lists 11 species, but only one is common in the Triangle. Miconia argentea is a common cerrado tree, occasionally becoming abundant in cerradão and is even the dominant tree in one site. It is absent from campo sujo.

THE GRASSES

The cerrado gradient as a whole cannot be considered grassland. However, grasses are fairly prominent in most kinds of cerrado, except cerradão, thus the Gramineae is the largest herbaceous family in this vegetation. There are only six genera in cerrado with more than a couple of species. The largest genus, Paspalum, is fairly characteristic of neotropical grasslands, although it is pantropical. The other large cerrado genera: Panicum, Andropogon, Aristida and Eragrostis, are large and widespread genera in the world flora. Only Axonopus of the large cerrado genera is typical of neotropical grassland.

There are four small cerrado genera restricted to the neotropics: Gymnopogon, Echinolaena, Thrasya and Leptocoryphium. This last genus is monotypic, L.lanatum occurring in natural grasslands mainly from Venezuela and the West Indies to Brasil, but is not abundant in cerrado. Gymnopogon and Thrasya are widespread in cerrado, but at a low level of abundance. Echinolaena inflexa is the most

widespread and abundant grass in this cerrado and is more or less restricted to it. It is a small genus of five species in Central and South America and one in Madagascar. Although E.inflexa is so abundant, it is a small but conspicuous grass, rarely exceeding 50 cm. in height and is rarely cespitose.

There are two small genera occurring in both the American and the African tropics: Trachypogon and Tristachya. Both these genera are widespread in cerrado vegetation with Trachypogon fairly abundant and Tristachya very abundant. They are both tall, conspicuous grasses, Tristachya leiostachya is the tallest cerrado grass, sometimes exceeding three meters in height and becoming woody at the base. T.chrysothrix is more abundant than T.leiostachya, but not as tall. They are both characteristic species of the cerrado. Trachypogon is not as important in the cerrado as it is in the Llanos of Colombia (Blydenstein 1967) and Venezuela (Lasser 1955, Blydenstein 1962), and in the savannas of the Guianas (Donselaar 1968, Heyligers 1963, Goodland 1965, 1966, Beard 1953) where Trachypogon, often T.plumosus, is frequently the main component of the sward. In the Triangle, T.mollis occurred, but T.plumosus, T.vestitus and T.canescens are common in other cerrado areas.

There are only five other cerrado grass genera of any importance; these are the large genera of tropical and warm temperate grasslands: Chloris, Setaria, Melinis, Hyparrhenia and Rhynchelytrum. They are frequently used as pasture grasses in warm countries and the last two were introduced to the neotropics. Rhynchelytrum is more a ruderal and is common on roadsides. Hyparrhenia rufa (Jaragua grass) is tall and so woody that it must be fired annually to provide pasture. Melinis minutiflora (Molasses grass) is, however, sensitive to fire, hence is more abundant in cerradão than in campo sujo. It is mainly an African genus and it is not certain whether M.minutiflora is native to the neotropics or naturalized. It is encouraged in cerrado and provides good grazing, but it is unpleasantly sticky to walk through when dense. The genera Chloris and Setaria are fairly common.

Only in campo sujo are the grasses more prominent than the trees. But even then, grass does not obscure all the woody components. The flowering culms of Tristachya leiostachya, Hyparrhenia rufa, and Axonopus pressus are occasionally taller than the observer. Several grasses reach 1 m. in height but as single plants rather than as tufts or dense stands. Most grasses in this area are less

than 50 cm. in height. The cespitose habit is not common and grasses rarely form a dense sward in the cerrado. Thus, though grasses are common and occasionally conspicuous, they are rarely dominant in the vegetation as a whole.

MINOR FAMILIES

Almost one third of the 83 families occur in this area of cerrado with only one genus and often only one species. These 24 families fall into three almost equal groups. Ten are mainly from forest, but occur as rare species in cerradão. Seven families are so occasional that not much about the cerrado can be learned from them, and the remaining seven are mainly monotypic and either endemic or very characteristic of the cerrado. The ten rare families of cerradão with their genera are Aquifoliaceae (Ilex), Araliaceae (Schefflera), Icacinaceae (Emmotum), Myristicaceae (Virola), Polygonaceae (Coccoloba), Symplocaceae (Symplocos), Tiliaceae (Luehea), Balanophoraceae (Langsdorffia), Commelinaceae (Commelina) and Marantaceae (Maranta). They are mainly medium sized tropical families having one rare species in the cerradão. The first seven are trees the last two are herbs.

Schefflera (=Didymopanax) is the most important tree in this group. Ilex, Schefflera, Coccoloba, and Luehea are more abundant in seasonal forest. Emmotum occurs mainly in seasonal and riparian forests, and Virola in Amazonian forests. Symplocos and Luehea are more abundant in other cerrado areas than the Triangle. Langsdorffia is a curious tree-root parasite only found in cerradão. Commelina and Maranta are allegedly aquatic plants or plants associated with wet places. Even in cerradão they are rare, but their presence suggests that cerradão may be moister than other cerrado types.

The seven 'occasional' families are mainly herbaceous and are not restricted to the tropics. They are: Aristolochiaceae (Aristolochia), Cucurbitaceae (Cayaponia), Loranthaceae (Phoradendron), Scrophulariaceae (Buchnera), Solanaceae (Solanum), Umbelliferae (Eryngium) and Caryophyllaceae (Polycarpaea). The most important member of this group is the common but not abundant Solanum lycocarpum. This tree is partly ruderal and occurs mainly in campo sujo. Aristolochia and Cayaponia are vines or trailers, a life form uncommon in cerrado. Both have enormous woody underground organs. Buchnera and Phoradendron respectively are occasional terrestrial and epiphytic semi-parasites. Buchnera is principally palaeotropical in distribution. Umbelliferae and

Caryophyllaceae are temperate families, poorly represented in Brasil. Eryngium is a prickly herb. Polycarpaea is a tiny ephemeral occurring in many savannas from Mexico through Brasil.

CHARACTERISTIC FAMILIES

The mainly monotypic, characteristic or endemic families with their cerrado genera are: Caryocaraceae (Caryocar), Cochlospermaceae (Cochlospermum), Ebenaceae (Diospyros), Guttiferae (Kielmeyera), Malvaceae (Sida), Proteaceae (Roupala) and Opiliaceae (Agonandra). These are mainly small tropical families providing one important cerrado genus each. They are all trees except Sida which is a ruderal herb of warm countries, especially America, common in neotropical savannas. The genus Cochlospermum is always woody, but in the cerrado it is usually a somewhat fleshy sub-shrub. It is very characteristic of cerrado but some species occur as trees in neotropical seasonal forests. Agonandra is a rare tree in this area and may be more common in some other type of vegetation. Its family, Opiliaceae, occurs in tropical Asia as small trees, parasitic on roots, with just the one small genus in Brasil.

Species of the remaining four families are important tree components of cerrado vegetation. Caryocar is a small neotropical tree genus with delicious drupes. One species, C.brasiliense, is the fifth most abundant tree in this cerrado. It occurs in more than two thirds of the sites, and is the leading dominant in five of them, becoming more abundant in cerradão.

The next most important tree in this series is Diospyros hispida, which is almost as important in the vegetation as Caryocar. Diospyros is the eleventh most abundant tree, occurring in more than two thirds of the sites, and dominating four. It is a fairly small, but wide ranging tree becoming more abundant in campo sujo. Although the family Ebenaceae is mainly tropical, the genus Diospyros is widespread in many warm countries.

Kielmeyera is one of the most characteristic genera of the cerrado. It is a small genus of about 20 species largely restricted to the cerrado of Brasil. Rizzini (1963) lists four woody species from his area. Only one is at all important in the Triangle, K.coriacea, occurring in nearly three quarters of the localities. This gracile tree is occasionally the leading dominant, is very widespread and is in the top twenty important trees.

One other smaller species, K.rosea, is occasionally present.

Finally in this series is the morphologically variable tree genus Roupala. Appropriately belonging to the Proteaceae, this tree has entire or serrate, simple or compound leaves on the same plant or on different plants of the same species. Roupala occurs in half the sites but more in cerradão. The Proteaceae as a whole is xeromorphic and characteristic of areas with a long dry season. Roupala has coriaceous, waxy leaves; some have a puberulent indumentum.

ENDEMISM

It is not particularly meaningful to discuss endemism with respect to such a poorly investigated flora, but some comment can be made on 'characteristic' taxa. Brasil is considered rich in Compositae, Orchidaceae, Euphorbiaceae, Leguminosae, Asclepiadaceae, Bignoniaceae, and Melastomataceae. The Orchidaceae occurs mainly as epiphytes on forest trees and so is not well represented. All the others are well represented in cerrado.

The following taxa are endemic to the Brasilian region and occur in the Triangle cerrado: Eremanthus, Hoehnephytum, Kielmeyera, Antonia, Barjonia, Nautonia, Ananas, Hancornia, Magonia, Riedeliella, Diptychandra and Torresea. Barjonia and Nautonia are occasional asclepiads of the campo sujo-campo cerrado. The cultivated pineapple is a variety of Ananas comosus which occurs naturally in the region. Another terrestrial bromeliad, Dyckia, has most species in an adjacent area of cerrado (Smith 1961). Hancornia speciosa and Magonia pubescens are occasional trees of cerrado-cerradão. The genus Manihot has speciated copiously in cerrado although it is not abundant. Characteristic of Brasil, but not restricted to it is the genus Jacaranda, represented by perhaps six species in cerrado. Most are rare cerradão trees but others live mainly underground with a few sprouts above, on occasion becoming abundant in campo sujo. The small, rare leguminous tree genera Riedeliella, Diptychandra and Torresea provide one species each in cerradão but are poorly known.

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LIST OF THE CERRADO PLANTS OF THE TRIÂNGULO MINEIRO

ACANTHACEAE
Justicia sp.
Ruellia geminiflora

AMARANTHACEAE
Alternanthera sp.
Comphrena graminea
officinalis
virgata
Iresine sp.
Pfaffia jubata
sericea

ANACARDIACEAE
Anacardium humile
nanum
Anacardium sp.
Astronium fraxinifolium
urundeuva
Lithraea aroeirinha
Tapirira guianensis

ANNONACEAE
Annona campestris
coriacea
crassiflora
monticola
pygmaea
tomentosa
Annona sp.
Cardiopetalum calophyllum
Duguetia furfuracea
Guatteria silvicola
Xylopia grandiflora

APOCYNACEAE
Aspidosperma camporum
dasycarpon
macrocarpon
tomentosum
Aspidosperma spp.3
Hancornia speciosa
Himatanthus articulatus
Macrosiphonia longiflora
velame
Mandevilla illustris
Odontadenia spp.
Rhodocalyx rotundifolium

AQUIFOLIACEAE
Ilex sp.

ARALIACEAE
Schefflera (=Didymopanax)
macrocarpum

ARISTOLOCHIACEAE
Aristolochia goleata

ASCLEPIADACEAE
Barjonia obtusifolia
Ditassa sp.
Nautonia nummularia

BALANOPHORACEAE
Langsdorffia hypogaea

BIGNONIACEAE
Anemopaegma arvense

Arrabidaea brachypoda
platyphylla
Cybistax antisyphilitica
Jacaranda acutifolia
brasiliana
caroba
decurrens
Jacaranda spp.
Memora nodosa
Tabebuia avellandeae
caraiba
leucoxylon
longiflora
ochreacea
odonthodiscus
umbellata
Tabebuia spp.3
Zeyhera montana

BOMBACACEAE
Bombax cyathophorum
tomentosum
Eriotheca gracilipes
Eriotheca sp.

BORAGINACEAE
Cordia axillaris
Tournefortia elegans

BROMELIACEAE
Bromeliaceae sp.
Ananas comosus
Bromelia sp.
Dyckia spp.
Nidularium sp.

BURSERACEAE
Bursera sp.
Protium heptophyllum
Protium sp.

CACTACEAE
Phyllocactus acuminatus
Rhipsalis spp.

CARYOCARACEAE
Caryocar brasiliense

CARYOPHYLLACEAE
Polycarpaea corymbosa

CELASTRACEAE
Maytenus alaternoides
Maytenus sp.
Plenckia populnea
Salacia cempestris

CHRYSOBALANACEAE
Couepia grandiflora
Hirtella sp.
Licania humilis
Licania sp.
Parinari obtusifolia

COCHLOSPERMACEAE
Cochlospermum regium

COMBRETACEAE
Combretaceae sp.
Combretum sp.
Terminalia argentea

COMMELINACEAE
Commelina sp.

COMPOSITAE
Compositae spp.14
Achyrocline sp.
Agaratum conyzoides
Aspilia elliptica
foliacea
Aspilia sp.
Aster camporum
Baccharis desertorum
dracuniculifolia
gracilis
humilis
Baccharis sp.
Bidens pilosa
Calea cuneifolia
platylepis
Chaptalia integrifolia
Oasyphyllum sp.
Oimerostemma sp.
Eupatorium amygdalinum
harminoides
maximiliana
Elephantopus mollis
Eremanthus glomeratus
glomerulatus
sphaerocephalus

Hoehnephytum trixoides
Hoehnephytum sp.
Icthyothere agrestis
terminalia
Isostigma peucedanifolium
Kanima implexa
Mikania hirsutissima
Piptocarpha rotundifolia
Porophyllum ruderale
Pterocaulon sp.
Riencourtia oblongifolia
Spilanthes arnicoides
Trichocline sp.
Trixis glutinosa
Vanillosmopsis erythropappa
Vernonia barbata
bardanoides
brevifolia
elegans
ferruginea
grandifolia
herbacea
holosericeus
lingulata
onopordoides
polyanthes
ruficoma
Vernonia sp.
Viguiera hassleriana
Wedelia puberula

CONNARACEAE
Connaraceae sp.
Connarus fulvus
suberosus
Rourea induta

CONVOLVULACEAE
Evolvulus pterocaulon
Evolvulus sp.
Ipomoea sp.
Jacquemontia sp.

CUCURBITACEAE
Cayaponia espelina

CYPERACEAE
Cyperaceae spp.3
Bulbostylis capillacea
spadicea
Bulbostylis spp.4
Cyperus diffusus
flavus
Dichromena ciliata
Fimbristylis diphylla
junciformis
Fimbristylis spp.
Rhynchospora cyperioides
tenuis
Rhynchospora spp.3
Scleria geniculata
Scleria spp.

DILLENIACEAE
Curatella americana
Davilla elliptica

EBENACEAE
Diospyros hispida

ERYTHROXYLACEAE
Erythroxylum campestre
deciduum
suberosum
testaceum
tortuosum

EUPHORBIACEAE
Bernardia sp.
Croton antisyphilitica
Croton sp.
Dalechampia humilis
Euphorbia setosa
Julocroton sp.
Manihot gracilis
Manihot spp.3
Maprounea brasiliensis
Phyllanthus niruri
Phyllanthus sp.
Sebastiana corniculata

FLACOURTIACEAE
Casearia sylvestris
Casearia sp.
Xylosma sp.

GENTIANACEAE
Calolisianthus speciosus
Dejanira erubescens
nervosa

Dejanira pallescens

GRAMINEAE
Gramineae spp.7
Andropogon bicornis
condensatus
lateralis
selloanus
Andropogon sp.
Aristida adscencionis
capillacea
implexa
megapotamica
Aristida pallens
Aristida sp.
Axonopus capillaris
pressus
Axonopus spp.4
Chloris polydactyla
Ctenium sp.
Diectomis fastigiata
Echinolaena inflexa
Elionurus sp.
Eragrostis maypurensis
Eragrostis spp.3
Gymnopogon foliosus
spicatus
Hackelochloa sp.
Hyparrhenia rufa
Ichnanthus sp.
Lasiacis sp.
Leptocoryphium lanatum
Melinis minutiflora
Mesosetum sp.
Olyra latifolia
Oplismenus hirtellus
Panicum campestre
cervicatum
Panicum spp.7
Paspalum carinatum
plicatulum
pulchellum
stellatum
Paspalum spp.7
Pennisetum setosum
Rhynchelytrum roseum
Sataria geniculata
Setaria sp.
Sporobolus cubense
Thrasya paspaloides
Trachypogon mollis
Tristachya chrysothrix
leiostachya

GUTTIFERAE
Kielmeyera coriacea
rosea

ICACINACEAE
Emmotum nitens

IRIDACEAE
Cipura sp.
Sisyrinchium vaginatum
Trimezia juncifolia

LABIATAE
Labiatae sp.4
Eriope crassipes
Clechoma sp.
Hyptis cana
coccinea
crinita
glauca
nudicaulis
virgata
Hyptis spp.3
Peltodon sp.

LAURACEAE
Cassytha americana
Nectandra sp.
Ocotea sp.

LEGUMINOSAE
Leguminosae spp.13
CAESALPINIOIDEAE
Bauhinia burchellii
bongardii
tenella
rufa
Bauhinia spp.
Dimorphandra mollis
Diptychandra glabra
Cassia basifolia
cathartica
cotinifolia
cultrifolia

Cassia flexuosa
langsdorffia
patellaria
pilifera
rotundifolia
rugosa
Cassia spp.6
Copaifera langsdorffii
Enterolobium ellipticum
Hymenaea stigonocarpa
stilbocarpa
Hymenaea sp.
Sclerolobium aureum
Sclerolobium sp.

MIMOSOIDEAE
Inga sp.
Mimosa laticifera
platyphylla
Mimosa spp.3
Piptadenia falcata
macrocarpa
perigrina
Plathymenia reticulata
Stryphnodendron adstringens
obovatum

PAPILIONOIDEAE
Aeschynomene paucifolia
Andira humilis
nanum
paniculata
Andira sp.
Bowdichia virgiloides
Centrosema sp.
Clitoria guyanensis
Clitoria sp.
Crotalaria anagyroides
retusa
Crotalaria sp.
Dalbergia violacea
Desmodium canum
Desmodium sp.
Dipteryx alata
Eriosema crinitum
Eriosema spp.8
Erythrina spp.
Galactia spp.
Harpalyce brasiliana
Indigofera gracilis
Machaerium aculeatum
acutifolium
lanatum
opacum
Ormosia sp.
Periandra mediterranea
Phaseolus filinus
Platypodium elegans
Pterodon pubescens
Rhynchosia sp.
Riedeliella graciliflora
Stylosanthes guyanensis
montevidensis
viscosa
Sweetia dasycarpa
pseudoelegans
Torresea cearense
Vatairea macrocarpa
Zornia diphylla
latifolia
reticulata

LILIACEAE
Hereria sp.
Smilax spp.

LOGANIACEAE
Antonia ovata
Antonia sp.
Strychnos pseudoquina
Strychnos sp.

LORANTHACEAE
Phoradendron sp.

LYTHRACEAE
Cuphea linariodes
Lafoensia densiflora
pacari

MALPIGHIACEAE
Banisteria intermedia
Banisteria sp.
Banisteriopsis sp.
Byrsonima basiloba
coccolobifolia

Byrsonima crassifolia
intermedia
verbascifolia
Camarea affinis
Heteropteris affinis
Peixotoa hirta
Peixotoa sp.
Pterandra sp.
Tetrapteris jussieuana

MALVACEAE
Sida acutifolia
cordifolia
macrodon

MARANTACEAE
Maranta arundinacea

MELASTOMATACEAE
Melastomataceae spp.6
Acisanthera sp.
Miconia argentea
Miconia sp.
Leandra sp.
Tibouchina sp.

MELIACEAE
Cabralea spp.
Guarea sp.
Trichilia sp.

MENISPERMACEAE
Menispermaceae spp.
Cissampelos ovalifolia
Cissampelos sp.

MORACEAE
Brosimum gaudichaudii
Cecropia sp.
Ficus sp.
Sorocea illicifolia

MYRISTICACEAE
Virola sebifera

MYRSINACEAE
Myrsine umbellata
Myrsine sp.

Rapanea guianensis

MYRTACEAE
Myrtaceae spp.
Campomanesia crenata
Campomanesia spp.
Eugenia bimarginata
klotzschiana
Eugenia spp.
Myrcia intermedia
longipes
rostrata
Psidium spp.5

NYCTAGINACEAE
Neea theifera
Pisonia sp.

OCHNACEAE
Ouratea castaneifolia
floribunda
nana
Ouratea sp.
Sauvagesia sp.

ONAGRACEAE
Ludwigia sp.

OPILIACEAE
Agonandra brasiliensis

ORCHIDACEAE
Orchidaceae spp.
Stenorhynchus coccineus
Vanilla sp.

OXALIDACEAE
Oxalis densifolia
hirsutissima

PALMAE
Palmae spp.15
Acanthococos emenensis
Acrocomia sclerocarpa
Acrocomia sp.
Allagoptera campestre
Attalea exigua
Butia sp.

Syagrus sp.

POLYGALACEAE
Bredmeyera floribunda
Polygala angulata
Polygala sp.

POLYGONACEAE
Coccoloba sp.

PROTEACEAE
Roupala brasiliensis
montana
Roupala sp.

RHAMNACEAE
Crumenaria coluteoides
Rhamnidium elaeocarpum

RUBIACEAE
Alibertia edulis
obtusa
Alibertia sp.
Borreria capitata
latifolia
suaveolens
viburnoides
Borreria sp.
Declieuxia sp.
Diodia rosmarinifolia
Genipa sp.
Guettarda angelica
Hemidiodia ocimifolia
Mitracarpus frigidus
Mitracarpus sp.
Palicourea rigida
xanthophylla
(aff.coriacea)
Palicourea spp.
Psychotria involucrata
Randia spp.
Relbunium sp.
Richardia scabra
Rudgia viburnoides
Sabicea cana
Sipanea spp.
Tocoyena formosa

RUTACEAE
Fagara sp.
Hortia brasiliana

SAPINDACEAE
Cupania spp.
Dilodendron bipinnatum
Magonia pubescens
Matayba guianensis
Serjania erecta
grandiflora

SAPOTACEAE
Chrysophyllum soboliferum
Chrysophyllum sp.
Pouteria torta

SIMARUBACEAE
Simaba suffruticosa
Simaruba amara

SCROPHULARIACEAE
Buchnera virgata

SOLANACEAE
Solanum balbisii
lycocarpum
(aff.crinitum)
horridus
Solanum spp.

STERCULIACEAE
Byttneria oblongata
sagittifolia
Helicteres sacarolha
Helicteres sp.
Waltheria americana
communis

SYMPLOCACEAE
Symplocos nitens

STYRACACEAE
Styrax ferrugineum

TILIACEAE
Luehea speciosa

UMBELLIFERAE
Eryngium pristis

VERBENACEAE
Aegiphila lhotzkyana
verticillata
Amasonia sp.
Lantana lasiocarycina
Lantana spp.
Lippia lupulina
Lippia sp.
Stachytarpheta sp.
Vitex sp.

VOCHYSIACEAE
Qualea grandiflora
multiflora
parviflora
Salvertia convallariodora
Vochysia elliptica
elongata
pruinosa
rufa
thyrsoidea
Vochysia spp.6

NOTES ON NEW AND NOTEWORTHY PLANTS. LII

Harold N. Moldenke

HYMENOPYRAMIS PUBESCENS Moldenke, sp. nov.

Frutex scandens (?); ramulis tetragonis dense adpresso-puberulentibus; foliis oppositis; petiolis ca. 1 cm. longis densissime adpresso-pubescentibus; laminis obovato-ellipticis 7—11 cm. longis 3.5—7.5 cm. latis acutis integris ad basin juventute acutis maturitate truncatis, supra densissime puberulis, subtus densissime breviterque pubescentibus glanduliferis; utriculis ovatis usque ad 1.5 cm. longis 1 cm. latis ubique densissime puberulis.

Probably a climbing shrub; branches and branchlets obtusely tetragonal, the younger portions densely appressed-puberulent, the youngest parts more spreading-pubescent; leaves decussate-opposite; petioles about 1 cm. long, very densely appressed-pubescent; leaf-blades chartaceous, obovate-elliptic, 7—11 cm. long, 3.5—7.5 cm. wide, apparently acute at the apex, entire along the margins, acute at the base when immature but rounded-truncate when mature, very densely puberulent above (under a hand-lens), plainly and very densely short-pubescent with fulvous hairs beneath, more densely so on the larger venation; inflorescences axillary at the terminations of the branchlets, forming a leafy panicle, the branches diverging at right angles to the rachis, very densely appressed-pubescent with fulvous-cinereous hairs throughout; utricles membranous, ovate, apparently to 1.5 cm. long and 1 cm. wide, very densely puberulent throughout with yellowish hairs.

The type of this species was collected by Kai Larsen, T. Santisuk, and E. Warncke (no. 3409) at Nakhon Nayok, Sarika Falls, at an altitude of 300 meters, in central Thailand, on August 14, 1968, and is deposited in the herbarium of Aarhus Universitet, Aarhus, Denmark.

LIPPIA ALBA var. GLOBIFLORA (L'Hér.) Moldenke, comb. nov.
Verbena globiflora L'Hér., Stirp. Nov. 1: 22—23, pl. 12. 1786.

LIPPIA RONDONENSIS Moldenke, sp. nov.

Suffruticosa, caulibus ramulisque brunneo-stramineis nitidis parcissime albido-pilosis demum subglabrescentibus 4-jugosis medullosis subteretibus vel subtetragonis; foliis decussato-oppositis; petiolis brevibus; laminis tenuiter membranaceis ovalibus argute serratis ad apicem basimque acutis utrinque sparsissime pilosulis; inflorescentiis axillaribus perbrevissimis.

Subshrub, trailing; stems and branches brownish-stramineous, shiny, subterete or subtetragonal, 4-ridged on the angles, medullose, very sparsely scattered-pilose with whitish hairs of various lengths mostly visible only under a hand-lens, glabrescent in age; principal internodes apparently quite elongate, 4—6 cm. long; nodes not annullate; leaves decussate-opposite, dark-green on both surfaces; petioles short, 3--10 mm. long, antrorsely white-pilose with long appressed hairs; leaf-blades thin-membranous, oval, 5—7 cm. long, 2—2.8 cm. wide, acute at the apex and the base, short-dentate from the apex almost to the base with more or less antrorse teeth, very sparsely scattered-pilosulous above, more densely so beneath; inflorescence axillary, solitary, much shorter than the subtending leaf, 2--2.5 cm. long, capitate; peduncles slender, 1—1.7 cm. long, rather densely long-pilose with whitish antrorse hairs; heads subglobose or oblong, rather many-flowered; bractlets lanceolate, about 5 mm. long and 3 mm. wide, long-attenuate to the apex, rather densely white-strigose and antrorsely ciliate; corolla hypocrateriform, purple, the tube equaling the subtending bractlet.

The type of this species was collected by G. T. Prance, E. Forero, B. L. Wrigley, J. F. Ramos, and L. G. Farias (no. 6761) on the riverbank of Rio Pacaás Novos 4 km. above its mouth, in the basin of the Rio Madeira, Rondônia, Brazil, on August 3, 1968, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species is obviously related to the widespread and highly variable L. alba (Mill.) N. E. Br.

STACHYTARPHETA STRIGOSA var. ALAINII Moldenke, var. nov.

Haec varietas a forma typica speciei pilis ramorum foliorumque spicarumque multoties brevioribus sparsioribusque et rhachidibus multo gracilioribus recedit.

This variety differs from the typical form of the species in having the hairs on the stems, branches, leaves, and spikes much shorter and more sparse and the rachis much more slender when mature. The leaf-blades are also in general narrower and much longer-attenuate into the petiole at the base.

The type of this variety was collected by Brother Alain H. Liogier (no. 15340) — in whose honor it is named — in grassy places along the wayside on the plateau at Jaiquí Picado, in the limestone hills, at an altitude of 300—400 meters, 20 miles west of Santiago, Dominican Republic, on May 23, 1968, and is deposited in the Britton Herbarium at the New York Botanical Garden.

SYNGONANTHUS GRÃO-MOGOLENSIS var. DETONSUS Moldenke, var. nov.

Haec varietas a forma typica speciei tomentis in axillis foliorum nullis recedit.

This variety differs from the typical form of the species in having the tuft of hairs lacking in the leaf-axils of the stem and in having the peduncles glabrous.

The type of this variety was collected by H. S. Irwin, R. Reis dos Santos, R. Souza, and S. F. de Fonseca (no. 23354) in cerrado interspersed with wet rocky campo about 8 km. west of Grão Mogol, at an elevation of 950 meters, Minas Gerais, Brazil, on February 16, 1969, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as an erect herb about 40 cm. tall, with white flower-heads, growing in the wet campo.

SYNGONANTHUS UMBELLATUS var. PRANCEI Moldenke, var. nov.

Haec varietas a forma typica speciei pedunculis primariis brevibus et pedunculis secundariis densissime longeque albovillosis recedit.

This variety differs from the typical form of the species in having its primary peduncles only 1.5--3.5 cm. long and its secondary peduncles very densely white-villous with long and wide-spreading or subreflexed silky hairs.

The type of the variety was collected by G. T. Prance and N. T. Silva (no. 58471) beside a small stream, where it is said to have been common, 2--6 km. north of Miracema do Norte, in northern Goiás, Brazil, on July 29, 1964, and is deposited in the Britton Herbarium at the New York Botanical Garden.

VERBENA LITORALIS var. CONGESTA Moldenke, var. nov.

Haec varietas a forma typica speciei spicis maturis valde abbreviatis congestisque 1--2 cm. longis recedit.

This variety differs from the typical form of the species in having its mature inflorescence spikes very conspicuously abbreviated and congested, being only 1--2 cm. long in fruit.

The type of the variety was collected by D. E. Breedlove and F. S. Kawahara (no. 16735) on a slope with Quercus urbani, Q. epileuca, Pinus lumholzii, P. ayacahuite, and Arbutus xalapensis, along a small stream, at an altitude of 5800 feet, half a mile north of Los Ornos, in the municipality of Badiraguato, in the Sierra Surutto, Sinaloa, Mexico, on November 1, 1969, and is deposited in my personal herbarium at Plainfield, New Jersey. The inflorescences of this plant are so distinctive that, if future collections indicate this to be a constant character, it may deserve specific rank.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXXI

Harold N. Moldenke

LACHNOCAULON GLABRUM Körn.

Additional bibliography: Moldenke, Phytologia 20: 36, 40, 41, 46, & 48--52. 1970.

Additional citations: FLORIDA: County undetermined: Cabanis s. n. [Florida] (B--type). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LACHNOCAULON MINUS (Chapm.) Small

Bibliography: A. W. Chapm., Fl. South. U. S., ed. 3, 531. 1897; J. K. Small, Fl. Southeast. U. S., ed. 1, 234, 235, & 1328. 1903; Prain, Ind. Kew. Suppl. 3: 99. 1908; J. K. Small, Fl. Southeast. U. S., ed. 2, 234 & 235. 1913; J. K. Small, Man. Southeast. Fl. 257. 1933; Moldenke, N. Am. Fl. 19 (1): 47 & 49--50. 1937; Moldenke, Phytologia 1: 331, 349, 352--354, 356, 357, 362, & 363. 1939; A. C. Martin, Am. Midl. Nat. 36: 533, pl. 4. 1946; Moldenke, Alph. List Cit. 1: 37, 90, 139, 240, 257, 283, 284, 287, & 290. 1946; Moldenke, Known Geogr. Distrib. Erioc. 2, 3, & 42. 1946; Moldenke, Phytologia 2: 373 (1947) and 2: 491. 1948; Moldenke, Alph. List Cit. 2: 459--461, 478, 480, 508, & 631 (1948), 3: 760, 772, 777, 822, 841, 899, & 942 (1949), and 4: 1114, 1118, 1125, 1126, 1135, 1175, 1177, 1191, & 1296. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 7--9 & 207. 1949; Moldenke, Phytologia 3: 80 & 142 (1949) and 3: 495--496. 1951; Thorne, Am. Midl. Nat. 52: 282. 1954; Moldenke, Résumé 10, 11, 13, 302, & 484. 1959; Moldenke, Résumé Suppl. 1: 2 (1959) and 4: 2 & 4. 1962; Radford, Ahles, & Bell, Vasc. Fl. Carol. 106 & 107. 1964; R. Kral, Sida 2: 315, 316, 321--323, 325, & 331. 1966; Shinners, Sida 2: 443. 1966; Moldenke, Résumé Suppl. 16: [1]. 1968; Eleuterius & Jones, Rhodora 71: 31. 1969; Moldenke, Phytologia 18: 381 (1969), 19: 232 (1970), and 20: 35, 36, 41, 46, 49, 50, & 52. 1970.

Illustrations: A. C. Martin, Am. Midl. Nat. 36: pl. 4. 1946; R. Kral, Sida 2: 322. 1966.

Radford, Ahles, & Bell (1964) say that in the Carolinas this species flowers from May to October and is found in "Bogs, ditches, savannahs, low pinelands" on the coastal plain. In Georgia Thorne (1954) states that it is infrequent on the margins of ponds and open grassy of boggy areas. Other collectors have found it in low grassy meadows, sandy-peaty pond margins, moist soil at edge of lily ponds, damp pine barrens, the edges of limestone sinks, sandy oak woods, and pond margins in general, flowering and fruiting from May to September and November. Harper says that it is "common around edges of small lakes among high sandy hills"; Godfrey found it on "shores of pond" and on "sandy-peaty shores of sinkhole lake"; Godfrey & Fox found it "very abundant on sandy pond margins"; while Webster avers that it is "common in low sandy areas bordering de-

pressions on dunes of white sand with low scrub of Quercus, Persea, Bumelia, Befaria, etc. Curtiss found it "spreading flat" on moist cultivated ground and thought that it had been introduced, identifying it as Paepalanthus pilulifer Körn. and noting that it was supposedly native to Brazil. Tomlinson encountered it "in wet sand at margin of lake, not inundated and forming a more or less continuous peripheral zone".

Kral, on the labels of his collections, describes the plant as tufted and the inflorescence-head dull or dull gray-brown. He found the plant "in sandy peat of roadbank seepage in longleaf pine flatwoods", "on sandy-peaty shore of small lake in longleaf pine - turkey oak hills, mixed with L. engleri", "in wet sands of borrow pit in pine flatwoods", "in moist sandy peat of bank of pine - saw palmetto flatwoods pond", and "very abundant on sandy upper margin of pineland limesinks". Most important, however, are his comments on the label accompanying Kral 17747, where he says "on sandy shore of small lake forming a brown 'fuzz' along the upper shore; this mixed with chocolate heads of L. engleri; this is the plant Small called L. eciliatum and it may be that hybrids between L. minus and L. engleri do fit Small's description".

In his 1966 work Kral states that L. minus grows in "Sands, sandy-peats and peatmuck of margins of pineland woods, ditchbanks, lakeshores, or moist exposed sands of mildly acid seepage areas and mildly acid marshes along the seacoast, coastal plain, Florida, n. to North Carolina. Type. 'low pine barrens, Bristol, Liberty Co., Florida, Chapman'. At NY. This species may occur in mixed populations with L. anceps or L. engleri. It is distinguished from the former by its smaller stature, smaller, darker heads, and by the translucent rather than white-opaque, clavate trichomes on bracts and sepals. It is distinguished from the latter by its paler-brown heads and by its usually hairy scapes. L. minus appears to require more moisture than L. anceps; I have yet to find it in drier flatwoods localities in which L. anceps may abound. Examination by this writer of the type of L. eciliatum Small (Curtiss, N. A. Pl.. no. 3022) resulted in a decision to treat such material as L. minus, in that the only difference appears to be one of degree of pubescence on bracts and sepals of female flowers together with slight differences in length of parts (all of which are accrescent in Eriocaulaceae)."

Chapman's original (1897) description of this taxon is "Scapes 2'--3' high, heads 1 1/2" wide. -- Low pine barrens, Bristol, Florida, May--July." Material has been misidentified and distributed in herbaria under the names L. beyrichianum Sporleder, L. glabrum Körn., L. michauxii Kunth, and Eriocaulon septangulare With. On the other hand, the Ahles 456/48, J. A. Drushel 10812, S. B. Jones s.n. [7 May 1960], Kral & Kral 6918, Meebold 28098, 28103, & 28104, Oosting 3555, A. E. Radford 4095, Radford & Stew-

art 401 & 455, P. O. Schallert 5447, and Singletary s.n. [Feb. 29, 1936], distributed as L. minus, are all L. anceps (Walt.) Morong, while Buell & West 1742 and R. K. Godfrey 4680 are L. beyrichianum Sporleder.

Additional citations: NORTH CAROLINA: Bladen Co.: Davis & Davis 10498 (Se—162560); Fox & Godfrey 2644 (N); A. A. Heller 14102 (Se—88012). Brunswick Co.: Blomquist 15295 (Ca—946476); Blomquist, Godfrey, & Wilbur 15295 (N); Bradley & Stevenson 3306 (N, Se—230947); R. K. Godfrey 49350 (No—17449), 49390 (No—16390); Godfrey & Fox 49742 [South. Appal. Bot. Club Distrib. 9: 822] (Hi—149069, N, No—18856, No—24446, We, We). Cumberland Co.: Fox & Godfrey 2592 (N). New Hanover Co.: C. R. Bell 12973 (Hi—134739); R. K. Godfrey s.n. [Plant. Exsicc. Gray. 926] (Ca—741292, Hi—22050, Hi—53894, Ms—80430, N, Ok, S, St, Ws); McCarthy s.n. [Wilmington, June 1892] (Ca—202402). Onslow Co.: R. Kral 22472 (N). Pender Co.: Ahles & Leisner 32488 (Hi—134746). SOUTH CAROLINA: Bamberg Co.: Ahles & Haesloop 30588 (Hi—134741, N). Berkeley Co.: Ahles & Haesloop 30793 (Hi—136139). Georgetown Co.: R. Kral 19018 (N). Jasper Co.: Ahles & Bell 18090 (Hi—97134). GEORGIA: Baker Co.: R. F. Thorne 4363 (N, Vi), 5047 (Mi, We), 5066 (Ca—906390). FLORIDA: Duval Co.: Curtiss 6201 (Hi, S). Franklin Co.: R. Kral 2818 (N). Highlands Co.: Tomlinson 10-6-63 K (Ft—271); G. L. Webster 4179 (N). Lake Co.: R. M. Harper 42 (W—513523); G. V. Nash 148 (Ca—115162, Mm—7950, Ms—15407), 1295 (Ca—115163, Mm—7949, Ms—15498), 1855 (Ms—15499). Leon Co.: R. K. Godfrey 53502 (N), 62896 (Ft—273), 63238 (Ft—274); Kral & Godfrey s.n. [15 Aug. 1962] (N). Orange Co.: P. O. Schallert S. 447 (Se—201764); Wilbur & Webster 2645 (Mi, N). Pasco Co.: Wiegand 7784 (S). Polk Co.: McFarlin 6060 (Mi); P. O. Schallert s.n. [April 30, 1941] (Ca—841817). Seminole Co.: R. Kral 20457 (N); P. O. Schallert 5447 (Ut—89778b). Volusia Co.: Curtiss 6894, in part (S, W—394791); R. Kral 18427 (N). Wakulla Co.: R. K. Godfrey 55667 (N). Walton Co.: Curtiss 5911 (Ca—144667, Dt, Hi, S); R. Kral 17747 (N); F. H. Sargent s.n. [June 19, 1950] (Ws).

LEIOTHRIX Ruhl.

Synonymy: Stephanophyllum Guill. in Deless., Icon. Sel. 3: 61, nom. provis. 1837. Leiothryx Ruhl. apud Beauverd, Bull. Herb. Boiss., sér. 2, 8: 298, sphalm. 1908. Eriocaulon Auct. (in part) apud Stapf, Ind. Lond. 3: 90, in syn. 1930 [not Eriocaulon Gron., 1743, nor (Gron.) L., 1908, nor Juss., 1810, nor L., 1816, nor Mart., 1959]. Leithrix Angely, Liv. Gen. Bot. Bras. 48a, sphalm. 1960. Leothrix Barkley, List Ord. Fam. Anthoph., ed. 2, 113 & 179, in syn. sphalm. 1965. Leiotrhix Moldenke ex J. A. Steyerm., Act. Bot. Venez. 1: 98, sphalm. 1966. Stephanophyllum Pouls., in

herb.

Bibliography: Wikstr., Svensk. Vet. Acad. Handl. Stockh., ser. 2, 1820: 79, pl. 4. 1820; Roem. & Schult. in L., Mant. 2: 468. 1824; Spreng. in L., Syst. Veg., ed. 16, 3: 776. 1826; Bong., Ess. Monog. Erioc. 5, 8, 26—28, 32, & 34. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 626—628, 632, & 634, pl. 45 & 47 (1831) and 2 (3): 234—236, pl. 19. 1832; Bong., Ess. Monog. Erioc. 71—74. 1832; A. St. Hil., Voy. Distr. Diam. 1: 391. 1833; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 3: 553, pl. 24 & 26. 1835; Guill. in Deless., Icon. Sel. 3: 60—61 & 67, pl. 98. 1837; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 5: 13, pl. 24, 28, 28a, 29, & 35. 1839; Steud., Nom. Bot., ed. 2, 1: 585 & 586. 1840; Mart., Flora 24, Beibl. 2: 58. 1841; Kunth, Enum. Pl. 3: 522—524, 526, 530, 538, 539, 572, 574, 575, 577, & 578. 1841; Lindl., Veg. Kingd., ed. 1, 122 (1846) and ed. 2, 122. 1847; Klotzsch in Schomb., Faun. & Fl. Br. Guian. 1064. 1848; Steud., Syn. Pl. Glum. 2: [Cyp.] 276—281, 333, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 278, 282, 294—297, 308, 309, 415, 417—429, 463, 500, 502, & 505—508, pl. 53—55. 1863; V. A. Pouls., Vidensk. Medd. Kjøbenh. 224 & 350. 1888; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888; Wawra, Itin. Princ. Saxo-Coburg. 2: 97, pl. 13. 1888; Kuntze, Rev. Gen. Pl. 2: 745 & 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877—879 (1893), 2: 401 & 402 (1894), and 2: 992. 1895; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 2, 3, 14—16, 19—22, 25—30, 121, 165, 225—239, & 285—288, fig. 33 & 34. 1903; Durand. & Jacks., Ind. Kew. Suppl. 1, pr. 1, 310 (1903) and 483. 1906; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Serr. Min. 68—69, pl. 26 & 27. 1908; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 296—299, fig. 12 B & C. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 138. 1913; Lützelburg, Estud. Bot. Nordéste 3: 147, 148, & 150. 1924; Herzog in Fedde, Repert. Spec. Nov. 20: 88. 1924; Alv. Silv., Fl. Mont. 1: 276—307, 398—400, & Ind. [1]—2, pl. 182—195. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 135. 1929; Stapf, Ind. Lond. 3: 90 & 91 (1930) and 4: 67, 518, & 519. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40, 41, 43, 45, 46, 48, 49, 53, & 54, fig. 21. 1930; Herter, Florula 44. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 133 (1933) and 9: 156. 1938; Nakai & Honda, Nov. Fl. Jap. 6: 4 & 87. 1940; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145, 310, & 483. 1941; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 76 & 104. 1945; Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: [311] & 321. 1946; Moldenke, Known Geogr. Distrib. Erioc. 6, 8, 9, 20, 28—37, 39—45, 47—56, & 60. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877—879 (1946) and 2: 401, 402, & 992. 1946; Moldenke, Alph. List Cit. 1: 105, 222, 224, 250, & 412. 1946; Moldenke, Phytologia 2: 374 & 379 (1947) and 2: 492, 495, 496, & 499. 1948; Moldenke, Alph. List Cit. 3: 671, 710, 731, 781, 814, 855, 935, 975, & 976 (1949) and 4: 1134, 1176, 1297, 1301, & 1302. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 63, 66, 78, 79, 97, 100, & 207. 1949; Moldenke, Phytologia 3: 311

& 313--314 (1950) and 3: 496--500. 1951; Moldenke, Fieldiana 28: 118--120. 1951; Moacyr do Amaral Lisboa, Revist. Esc. Minas 9. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 133. 1953; Herter, Rev. Sudam. Bot. 9: 188. 1954; Rambo, Sellowia 6: 130. 1954; F. C. Hoehne, Pl. Aquat. 88. 1955; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234, 266--267, 276--277, & 303. 1956; Reitz, Sellowia 7: 124. 1956; Angely, Cat. Estat. 10: [2]. 1956; Angely, Fl. Paran. 10: 6, 8, 9, 11, 12, & 14. 1957; Moldenke, Mem. N. Y. Bot. Gard. 9: 278--279. 1957; Moldenke in J. A. Steyerm., Fieldiana 28: 824. 1957; J. A. Steyerm., Fieldiana 28: 1157. 1957; Prain, Ind. Kew. Suppl. 4, pr. 2, 138. 1958; Reitz, Sellowia 11: 31 & 112. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145, 310, & 483. 1959; G. Taylor, Ind. Kew. Suppl. 12: 79. 1959; Moldenke, Résumé 71, 75, 91, 92, 114, 119, 279--282, 286--293, 309, 318, 323--329, 355, 395--398, 402, 484, & 485. 1959; Moldenke, Résumé Suppl. 1: 6, 17, & 20--23 (1959) and 2: 5. 1960; Angely, Liv. Gen. Bot. Bras. 19 & 48a. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877--879 (1960) and 2: 401, 402, & 992. 1960; Moldenke, Bol. Mus. Para. Goeldi, new ser., Bot. 3: 1. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Angely, Fl. Paran. 15: 14 (1960), 16: 59 (1960), and 17: 24. 1961; Reitz, Sellowia 13: 52, 53, 72, & 90. 1961; Angely, Fl. Bacia Paran. 22: 31. 1962; Moldenke, Biol. Abstr. 37: 2453. 1962; Hocking, Excerpt. Bot. A.24: 284. 1962; Moldenke, Phytologia 8: 162. 1962; Moldenke, Résumé Suppl. 3: 12, 13, & 33 (1962) and 7: 4. 1963; Hegnauer, Chemotax. Pfl. 2: 153. 1963; Hocking, Excerpt. Bot. A.6: 455. 1963; Angely, Bibl. Veg. Paran. 253. 1964; Melchior in Engl., Syllab. Pfl., ed. 12, 2: 556. 1964; Thanikaimoni, Pollen & Spores 7: 182, 183, 185, 186, & 190, tab. 1. 1965; F. A. Barkley, List Ord. Fam. Anthoph., ed. 2, 113 & 179. 1965; Thanikaimoni, Mém. Mus. Nat. Hist. Nat. Paris, new ser., B.14: 9--38. 1965; Angely, Fl. Anal. Paran., ed. 1, 201. 1965; Moldenke, Résumé Suppl. 12: 3, 4, 10, & 11 (1965), 13: 3 (1966), and 14: 9. 1966; Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 633 & 1074. 1966; J. A. Steyerm., Act. Bot. Venez. 1 (3/4): 15, 22, 69, & 98. 1966; Thanikaimoni, Biol. Abstr. 47: 4169. 1966; G. Taylor, Ind. Kew. Suppl. 13: 78. 1966; Moldenke, Biol. Abstr. 47: 6792. 1966; Moldenke, Phytologia 13: 218 (1966) and 17: 495 & 509. 1968; Moldenke, Résumé Suppl. 16: 23 (1968), 17: 3 & 9--11 (1968), and 18: 13. 1969; Moldenke, Phytologia 18: 366 & 507 (1969) and 19: 102. 1969; Angely, Fl. Anal. & Fitogeogr. Est. S. Paulo, ed. 1, 1: 11. 1969.

Gleason, in his unpublished Flora of British Guiana, describes this genus as follows: "Flowers 3-merous; sepals distinct; petals of the staminate flowers 3, connate nearly to the middle into a funnel-shaped, 3-lobed tube; petals of the pistillate flowers free; style long, bearing 3 appendages inserted conspicuously below its summit; stigmas 3, apical, short, simple. Acaulescent herbs with linear, cespitose leaves; peduncles erect, sheathed at base; heads subglobose (28 species, in tropical America)."

The generic name is derived from the Greek, λεῖος, smooth, and θριξ hairs, since the hairs are not granulated nor tuberculate.

Herter (1954) claimed that the genus had 30 species, while Angely (1956) gives the number as 82. In his 1957 work he says that 74 species occur in Brazil -- 2 in Pernambuco, 1 in Alagoas, 1 in Goiás, 8 in Bahia, 64 in Minas Gerais, 4 in Rio de Janeiro, 3 in São Paulo, and 2 in Paraná. Actually, as of the present writing, the genus comprises 88 valid taxa of both specific and subspecific rank, of which 68 occur in Minas Gerais, 10 in Bahia, 8 in Rio de Janeiro, 4 in São Paulo, 3 in Guanabara, 2 each in Paraná and Santa Catarina, and 1 each in Alagoas, Goiás, Pará, Paraíba, Pernambuco, and Rio Branco.

Stephanophyllum Guill. is obviously the older name for this genus, but under the present unfortunate edition of the International Rules of Botanical Nomenclature it must be rejected as not having been adopted definitely and unequivocally by its author when proposed. A strict application of this rule would actually invalidate scores of presently accepted names in the plant kingdom. The original publication by Guillemin (1837) reads as follows and is given in the discussion of his new species, Eriocaulon flagellare Guill.: "Obs. Inter species proliferas à cl. Bongard (Mem. Acad. imp. Petersb., 6^{e} série, 1, p. 632) evulgatas, Eriocaulon flagellare nostrum adnumerandum est, ipisque (E. viviparum et E. proliferum) quae tantùm phrasi specificâ mihi notae sunt, valdè affine, nonnisi glabritie, vaginarumque brevitate ab iis differre videtur. In stirpibus proliferis florum fabrica à caeteris Eriocaulis paulò diversa, simul ac habitus peculiaris, characteres afferunt setis distinctos ut indè genus novum inter Eriocaulon et Toninam collocandum constituatur, cui nomen Stephanophyllum imponendum erit." He does not actually make the new combinations in Stephanophyllum accredited to him at this bibliographic reference by Jackson in the "Index Kewensis" (1895), nor does the new generic name even occur in the index to Guillemin's work!

It is worth noting here that that, for some reason unknown to me, Airy Shaw (1966) places the generic name Stephanophyllum Guill. in the synonymy of Paepalanthus instead of Leiothrix. There is absolutely no possible reason for placing it anywhere except under Leiothrix since the only three species mentioned in the original publication of it are all typical members of the latter genus.

LEIOTHRIX AFFINIS Alv. Silv.

Synonymy: Leiothrix afinis Alv. Silv., Fl, Mont. 1: 398, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 286 & 398. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 8 & 42. 1946; Moldenke, Phytologia 2: 495. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Résumé 91, 309, & 484. 1959.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 677) in fields near Barauna, Minas Gerais, Brazil,

in April, 1918, and is deposited in the Silveira Herbarium. This distinguished worker, in his 1928 publication, says of this species "A L. temuifolia Alv. Silv. foliis rigidioribus (non membranaceis), pedunculis glabris tortisque, sepalis quam petala brevioribus et appendicibus basin stigmatum superantibus differt".

LEIOTHRIX AMAZONICA Moldenke

Bibliography: Moldenke, Résumé 91 & 484. 1959; Moldenke, Bol. Mus. Para. Goeldi, new ser., Bot. 3: 1. 1960; Hocking, Excerpt. Bot. A.4: 284. 1962; Moldenke, Biol. Abstr. 37: 2453. 1962; G. Taylor, Ind. Kew. Suppl. 13: 78. 1966.

Citations: BRAZIL: Pará: Murça Pires, Black, Wurdack, & Silva 6097 (N--type).

LEIOTHRIX ANGUSTIFOLIA (Körn.) Ruhl.

Synonymy: Paepalanthus angustifolius Körn. in Mart., Fl. Bras. 3 (1): 424. 1863. Dupatya angustifolia (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya angustifolia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix angustifolia Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 424--425 & 506. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 231, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 8, 28, 42, & 44. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 401. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Résumé 91, 279, 323, & 484. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 401. 1960; Moldenke, Résumé Suppl. 12: 10. 1965.

Ruhland (1903) cites as the type collection of this taxon, Blanchet 3820, from São Thomé, Bahia, Brazil, and thus far the species is known only from this collection.

Citations: BRAZIL: Bahia: Blanchet 3820 [Macbride photos 10665] (B--isotype, Br--isotype, Mi--isotype, N--isotype, N--photo of type, W--photo of type).

LEIOTHRIX ARAXAËNSIS Alv. Silv.

Synonymy: Leiothrix araxaensis Alv. Silv., Fl. Mont. 1: 398. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 307--308 & 398, pl. 195. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 8 & 42. 1946; Moldenke, Phytologia 2: 495. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Résumé 91, 309, & 484. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 195. 1928.

The type and only known specimen of this species was collected

by Dr. J. Michaeli in fields near Araxá, Minas Gerais, Brazil, in April of [1919 or] 1920, and is no. 714 in the Silveira Herbarium. The author on page 308 of his work (1928) gives the year of collection as "1920", but on page 398 gives it as "1919".

LEIOTHRIX ARECHAVALETAE Ruhl.

Synonymy: Paepalanthus arechavaletae Ruhl. ex Moldenke, Known Geogr. Distrib. Erioc. 45, in syn. 1946. Leiothrix arechavaletae (Körn.) Ruhl. apud Herter, Rev. Sudam. Bot. 9: 188. 1954. Paepalanthus arechavaletae Körn. ex Moldenke, Résumé 323, in syn. 1959.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 235, 238--239, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 54. 1930; Herter, Florula 44. 1930; Moldenke, Known Geogr. Distrib. Erioc. 20, 43, & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 100 & 207. 1949; Moldenke, Alph. List Cit. 3: 671 & 781 (1949) and 4: 1302. 1949; Moldenke, Phytologia 3: 496--497. 1951; Herter, Rev. Sudam. Bot. 9: 188. 1954; Moldenke, Résumé 119, 323, & 484. 1959.

Ruhland (1903) cites for this taxon only the type collection, Arechavaleta 2561, from Uruguay. The species appears to be endemic to that country, where it has been collected in swamps and in sandy soil by sweet water at altitudes of 2--4 meters, flowering and fruiting in April and from November to January. Herter (1954) says that it is frequent in the southern portion of Uruguay and cites Herter 1774, 1774a, & 1774b.

Additional citations: URUGUAY: Arechavaleta 2561 (B--type), s. n. [Bañado de Tranqueras, Nov.] (S), s.n. [prope Carrasco; Macbride photos 25163] (N--photo, W--photo); Herter 1774 [Herb. Herter 95663] (B, Mu, Mu, S, Ut--30971a, W--1934817), 1774b [Herb. Herter 99863] (N, S); Osten 7051 (S), 22207 (Er, S). MOUNTED ILLUSTRATIONS: Herter, Fl. Urug. fig. 768 (Mu).

LEIOTHRIX ARETIOIDES Ruhl.

Bibliography: Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41. 1930.

This name, published without diagnosis, is probably a synonym of Paepalanthus aretioides Ruhl.

LEIOTHRIX ARGENTEA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 296 & 398. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 8 & 43. 1946; Moldenke, Alph. List Cit. 1: 412 (1946) and 3: 935. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Phytologia 3: 497. 1951; Moldenke, Résumé 91 & 484. 1959.

Mrs. Chase found this plant growing in a colony in damp sand among rocks on the open summit of a mountain, at 1400 meters altitude, flowering and fruiting in December. Material has been

misidentified and distributed in herbaria as Syngonanthus pallens Alv. Silv.

The type of the species was collected by Álvaro Adolpho da Silveira (no. 533) in sandy wet fields in the Serra dos Crystaes, near Diamantina, Minas Gerais, Brazil, in April, 1908, and is deposited in the Silveira Herbarium. Silveira (1928) says of the species: "Species ab omnibus generis distinctissima".

Additional citations: BRAZIL: Minas Gerais: M. A. Chase 10360 (Mi, W--1495692); A. Silveira 533 [Herb. Marie-Victorin 12424] (N--photo of isotype).

LEIOTHRIX ARGYRODERMA Ruhl.

Synonymy: Leiothryx argyroderma Ruhl. apud Beauverd, Bull. Herb. Boiss., sér. 2, 8: 298, sphalm. 1908.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 226, 227, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 298. 1908; Alv. Silv., Fl. Mont. 1: 398. 1928; Moldenke, Known Geogr. Distrib. Erioc. 8 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Résumé 91 & 484. 1959; Moldenke, Résumé Suppl. 1: 6. 1959.

Ruhland (1903) cites only the type collection of this species, Ule 3769, from Santa Catarina, Brazil. More recent collectors have found the plant growing in wet soil, at 2000—2500 meters altitude, flowering and fruiting from January to March and in May and July. Silveira (1928) cites his no. 417, collected at Serra da Mantiqueira, Minas Gerais, in 1897.

Citations: BRAZIL: Rio de Janeiro: Castellanos 25664 [Herb. Cent. Pesq. Florest. 4346] (Ac); Dusén 252 (S); Hemmendorff 579 1/2 (S); Segadas-Vianna 800 (Ja), 5031 [Brade 20367] (Sm); Segadas-Vianna, Dau, Ormond, & Machline 1424 (Z); L. B. Smith 1695 (N, S). Santa Catarina: Ule 3769 [Macbride photos 10666] (B—type, B—isotype, N—photo of isotype, N--photo of isotype, W—photo of isotype, Z--isotype).

LEIOTHRIX ARGYRODERMA var. BREVIPES Moldenke

Bibliography: Moldenke, Phytologia 8: 162. 1962; Moldenke, Résumé Suppl. 3: 13. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963.

It is worth noting here that the isotype of this variety deposited in the herbarium of the Muséum National d'Histoire Naturelle at Paris bears a label which is inscribed "Province de Rio de Janeiro", but what the evidence is on which this statement is made remains obscure.

Citations: BRAZIL: Minas Gerais: Glaziou 9000 [U. S. Nat. Herb. photo 5889] (N--photo of type, P—type, P—isotype, Z—isotype).

LEIOTHRIX ARRECTA Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 235—236 & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv.,

Fl. Mont. 1: 304 & 306. 1928; Moldenke, Known Geogr. Distrib. Erioc. 8 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Phytologia 3: 497. 1951; Moldenke, Résumé 91 & 484. 1959.

Ruhland (1903) cites only the type collection of this species, Glaziou 17303, from Minas Gerais, Brazil. Silveira (1928) comments that, in his opinion, L. arrecta is closely related to L. dubia Alv. Silv. and to L. michaelii Alv. Silv.

Additional citations: BRAZIL: Minas Gerais: Glaziou 17303 [Macbride photos 10667] (B--type, Br--isotype, N--isotype, N--photo of type, W--photo of type); Maguire, Mendes Magalhães, & Maguire 49065 (N).

LEIOTHRIX ARRECTA var. SENAEANA Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 236 & 288. 1903; Moldenke, Known Geogr. Distrib. Erioc. 8 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Résumé 91 & 484. 1959.

Ruhland (1903) cites only two cotype collections, actually gathered by Sena, but distributed as Herb. Schwacke 14571 & 14575, and from Minas Gerais, Brazil. Ruhland notes that "Differt a forma typica pedunculis brevissime pilis patentibus sparsius pilosis, robustioribus". Recent collectors describe the plant as "acaulescent" and found it growing in wet campos, campo slopes, and sandstone outcrops, at 1250 meters altitude.

Citations: BRAZIL: Minas Gerais: Irwin, Maxwell, & Wasshausen 20481 (Z); Sena s.n. [Herb. Schwacke 14571] (B--cotype), s.n. [Herb. Schwacke 14575] (B--cotype, Z--cotype).

LEIOTHRIX BARREIRENSIS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 283--284 & 398. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 8 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Résumé 91 & 484. 1959.

The type and only known collection of this species was gathered by Dr. J. Michaeli in sandy fields near Barreiras, Minas Gerais, Brazil, in November, 1923, and is his no. 732, deposited in the Silveira Herbarium. Silveira (1928) says of it: "Species a L. curvifolia (Bong.) Ruhl. foliis latioribus facile distinguenda; a L. graminea (Bong.) Ruhl. ob statura majorem, vaginas pubescentes et stylum triplo germine longiorem differt".

LEIOTHRIX BECKII (Szysz.) Ruhl.

Additional synonymy: Paepalanthus beckii Szysz. ex Wawra, Itin. Princ. Saxo-Coburg. 2: 97. 1888. Paepalanthus itatiaiae Körn. ex V. A. Pouls., Vidensk. Medd. Kjøbenh. 1888: 224. 1888. Leiothrix beckii Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Wawra, Itin. Princ. Saxo-Coburg. 2: 97, pl. 13.

1888; V. A. Pouls., Vidensk. Medd. Kjøbenh. 1888: 224 & 350. 1888; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 310. 1903; Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 226--227, 236, & 288. 1903; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 296 & 297. 1908; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 398. 1928; Stapf, Ind. Lond. 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 310. 1941; Moldenke, Known Geogr. Distrib. Erioc. 8, 43, 45, & 50. 1946; Moldenke, Phytologia 2: 495. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Phytologia 3: 497. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 310. 1959; Moldenke, Résumé 91, 318, 323, 325, & 484. 1959.

Illustrations: Wawra, Itin. Princ. Saxo-Coburg. pl. 13. 1888.

Ruhland (1903) cites for this species Glaziou 6741 & 17313, Magalhães 1366, Prince von Sachsen-Coburg II.502, and Ule 3506, all from Minas Gerais, Brazil. Silveira (1928) cites A. Silveira 271, collected at Serra do Ibitipoca, Minas Gerais, in 1896.

The species has been found growing in turf, at altitudes of 2000 to 2600 meters, flowering and fruiting in January and May. The Williams & Assis 6924, distributed as L. beckii, is actually L. nubigena (Kunth) Ruhl.

Additional citations: BRAZIL: Minas Gerais: Glaziou 6741 [Macbride photos 22283] (N--photo, W--photo), 17313 (B); Prince von Sachsen-Coburg s.n. [Itatiaia] (B); Ule 3506 (B), 61-2194 [Herb. Mus. Nac. Rio Jan. 56] (N, S). Rio de Janeiro: Castellanos 25666 [Herb. Cent. Pesq. Florest. 4341] (Ac); Glaziou 5713 (P); Segadas-Vianna 5029 [Brade 20369] (Ja), 5033 [Brade 20368] (Ja, Z); L. B. Smith 1752 (S, W--1730732).

LEIOTHRIX BECKII var. FALCIFOLIA Beauverd

Synonymy: Leiothrix beckii falcifolia P. Beauv. apud Stapf, Ind. Lond. 4: 67. 1930. Leiothrix beckii var. falcifolius Beauverd ex Moldenke, Known Geogr. Distrib. Erioc. 8 & 43, sphalm. 1946.

Bibliography: Beauverd, Bull. Herb. Boiss., sér. 2, 8: 296--298, fig. 12 B. 1908; Stapf, Ind. Lond. 4: 67. 1930; Moldenke, Known Geogr. Distrib. Erioc. 8 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Résumé 91 & 484. 1959.

Illustrations: Beauverd, Bull. Herb. Boiss., sér. 2, 8: 296, fig. 12 B. 1908.

How Stapf (1930) could possibly have accredited this trinomial to Ambroise Marie François Joseph de Beauvois (1752--1820) instead of to Gustave Beauverd (1867--1942) is inexplicable to me. He has, however, done this in several instances.

LEIOTHRIX CELIAE Moldenke

Bibliography: Moldenke, Mem. N. Y. Bot. Gard. 9: 278--279. 1957; Moldenke, Résumé 71 & 484. 1959; G. Taylor, Ind. Kew. Suppl. 13: 78. 1966.

Citations: VENEZUELA: Amazonas: Maguire & Maguire 35314 (N--type).

LEIOTHRIX CRASSIFOLIA (Bong.) Ruhl.

Synonymy: Eriocaulon crassifolium Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 634. 1831. Paepalanthus crassifolius (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 420. 1863. Dupatya crassifolia (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Paepalanthus crassifolius Körn. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894. Dupatya crassifolia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix crassifolia Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Bong., Ess. Monog. Erioc. 34. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 634 (1831) and 5: pl. 29. 1839; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 577, 578, & 613. 1841; D. Dietr., Syn. Pl. Glum. 2: [Cyp.] 280 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 296, 420, 507, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 10, 227--229, & 285. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 398. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 8, 29, 33, 43, & 47. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 401. 1946; Moldenke, Alph. List Cit. 1: 412 (1946) and 3: 935. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Phytologia 3: 497. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 91, 279, 287, 324, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 401. 1960.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 5: pl. 29. 1839.

The type of this species was collected "In glareosis Meia da Serra da Lapa", Minas Gerais, Brazil, according to Bongard (1831), but Ruhland (1903) cites only L. Riedel 1413, which apparently is the type collection, since Bongard consistently failed to cite collection numbers. Recent collectors have found this species in wet places and describe it as actually "common" on moist hillsides, in white sand, and on sandy campos with outcrops. They refer to it as "acaulescent, the inflorescence 5--7 cm. tall, heads white, flowers cream", growing at 1200 meters altitude, flowering and fruiting in February. Silveira (1928) cites A. Silveira 337 [or "387"?] from Serra do Cipó, Minas Gerais, collected in 1905.

Additional citations: BRAZIL: Minas Gerais: A. P. Duarte 7799 (Bd--27769); Heringer & Castellanos 6174 (B); Irwin, Maxwell, & Wasshausen 20054 (Ac, N), 20073 (N, Rf); Macedo 2958 (N, S); Murça Pires & Black 3345 (Z); L. Riedel 1413 (B--isotype); Segadas-Vianna 6002 (Z); A. Silveira 337 [Herb. Marie-Victorin 12423] (N--photo,

Z--photo); L. B. Smith 6848 (W--2120217, Z). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LEIOTHRIX CURVIFOLIA (Bong.) Ruhl.

Synonymy: Eriocaulon curvifolium Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 627. 1831. Eriocaulon calocephalum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 628. 1831. Paepalanthus ? curvifolius (Bong.) Kunth, Enum. Pl. 3: 522 & 624. 1841. Paepalanthus curvifolius Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 426, 427, & 507. 1863. Paepalanthus curvifolius var. α Körn. in Mart., Fl. Bras. 3 (1): 427. 1863. Dupatya curvifolia (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya curvifolia Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix curvifolia Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908. Paepalanthus calocephalus Körn. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Paepalanthus curvifolium Kunth ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Eriocaulon calocephalon Bong. ex Moldenke, Résumé Suppl. 17: 9, in syn. 1968. Eriocaulon ocreatus Mart., in herb.

Bibliography: Bong., Ess. Monog. Erioc. 27 & 28. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 627 & 628 (1831) and 3 (2): 553, pl. 24. 1835; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 522, 574, 575, 612, 613, & 624. 1841; D. Dietr., Syn. Pl. 5: 261 & 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 426, 427, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 & 878 (1893) and 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 233--234, 285, & 288. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 483. 1906; Prain, Ind. Kew. Suppl. 3: 101. 1908; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 298. 1908; Alv. Silv., Fl. Mont. 1: 284 & 398. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145 & 483. 1941; Moldenke, Known Geogr. Distrib. Erioc. 8, 33, 36, 43, 47, 50, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 & 878 (1946) and 2: 401. 1946; Moldenke, Alph. List Cit. 1: 412. 1946; Moldenke, Phytologia 2: 492 & 495. 1948; Moldenke, Alph. List Cit. 3: 710, 731, 855, & 935 (1949) and 4: 1297. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Phytologia 3: 497. 1951; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234, 266--267, & 276--277. 1956; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145 & 483. 1959; Moldenke, Résumé 91, 286, 287, 324, & 484. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 & 878 (1960) and 2: 401. 1960; Moldenke, Résumé Suppl. 17: 9. 1968; Moldenke, Phytologia 17: 495 (1968) and 18: 366. 1969.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér.

6, 3 (2): pl. 24. 1835.

The type of this species was collected by Ludwig Riedel "In arenosis et glareosis Meia da Serra da Lapa", Minas Gerais, Brazil, and is deposited in the Leningrad herbarium. The type of Eriocaulon calocephalum was also collected by Riedel "In pratis humidis Serra da Lapa" — the L. Riedel 5, 1031, and s.n., cited below, very probably are part of this latter collection. Bongard is said to have illustrated E. calocephalum on "t. 47" of his 1831 work, but, according to Kunth (1841), this illustration was never actually published. It does not accompany the reprint of the work in the New York Botanical Garden library; possibly the original may be deposited in the Leningrad library or herbarium.

Because of the difficulty of finding copies of the original works in most libraries, it is probably worth repeating the original diagnoses here as taken from the 1831 reprint: "Eriocaulon curvifolium — acaule: foliis dense confertis linearibus mucronulatis curvatis longe-pilosis; pedunculis fasciculatis pubescentibus; vaginis brevibus pilosis. Tab. XXIV. Habitat in arenosis et glareosis Meia da Serra da Lapa. Floret Januario. Obs. Distinguitur a praecedente, cui affine: statura altiore (E. mucronatum est plantula bipollicaris); foliis pilosioribus, pedunculis longioribus, capitulisque majoribus". "Eriocaulon calocephalum — acaule: foliis caespitosis rigidis elongatis pilosiusculis; vaginis pilosis bifidis. Tab. XLVII. Habitat in pratis humidis Serra da Lapa. Floret Novembri."

Eriocaulon ocreatum appears to be based on P. Clausen 169 from Minas Gerais, deposited in the herbarium of the Jardin Botanique de l'Etat at Brussels.

Collectors have found L. curvifolia, in its typical form, in flower in January, from June to September, and in November. Irwin and his associates found it growing in sand-filled crevices of steep rocky slopes, at 1370 meters altitude, and describe it as "cespitose". Silveira (1928) avers that it is closely related to L. barreirensis Alv. Silv. Ruhland (1903) cites for it, in its typical form, P. Clausen 169, Glaziou 20005, Martius 893, L. Riedel 1031, and Schwacke 8491, 8497, & 14549, all from Minas Gerais, Brazil. The Martius 893 collection, however, seems to be a mixture with L. curvifolia var. lanuginosa (Bong.) Ruhl., while L. Riedel 1031 in the Utrecht herbarium seems to be Eriocaulon palustre Salzm.; L. Riedel 1038 is obviously a mixture with var. lanuginosa and with Eriocaulon crassiscapum Bong.; P. Clausen 203 is a mixture with L. curvifolia var. glabrescens Ruhl. and Syngonanthus nitens (Bong.) Ruhl.; and Martius s.n. [Serra de Itambé] is L. curvifolia var. plantago (Mart.) Ruhl. Silveira (1928) cites A. Silveira 211, collected at Serra do Itacolomi de Ouro Preto, Minas Gerais, in 1896.

The Damazio s.n. [Herb. Rio Jan. 63779], distributed as L. curvifolia, actually is L. curvifolia var. setacea Ruhl., while Mello

Barreto 2559 [Herb. Jard. Bot. Belo Horiz. 5926] is L. curvifolia var. microphylla Alv. Silv. and Herb. Marie-Victorin 12426 is var. plantago (Mart.) Ruhl. F. C. Hoehne 5068, annotated by Herzog as "Leiothrix spec. curvifoliae (Bong.) affinis anne var. nov. fimbriata?", is actually Syngonanthus caespitosus (Wikstr.) Ruhl.

Material of typical L. curvifolia has been misidentified and distributed in herbaria under the names L. curvifolia var. lanuginosa (Bong.) Ruhl. and Eriocaulon filiformis Bong.

Additional citations: BRAZIL: Minas Gerais: P. Clausen 4 (Br), 169 (Br, N--photo, Z--photo), 203, in part (Br), 204 (Br, N--photo, Z--photo); Irwin, Santos, Souza, & Fonseca 22230 (Rf); Martius 893, in part (B, Br, N), s.n. (Mu--51); L. Riedel 5 (N--photo, Z--photo), 1031, in part (B, Mu--162, S), 1038, in part (M, Ut--336), s.n. [Derra da Lapa] (Br); Sampaio 6707 (S). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (N); Mart., Fl. Bras. 16, no. 158 (B).

LEIOTHRIX CURVIFOLIA var. GLABRESCENS Ruhl.

Synonymy: Paepalanthus curvifolius var. β Körn. in Mart., Fl. Bras. 3 (1): 427. 1863.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 427. 1863; Ruhl. in Engl., Pflanzenreich 14 (4-30): 233 & 288. 1903; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 298--299. 1908; Moldenke, Known Geogr. Distrib. Erioc. 8, 43, & 47. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78 & 207. 1949; Moldenke, Résumé 91, 324, & 484. 1959.

The type of this variety was collected by Peter Clausen (no. 9) in Minas Gerais, Brazil, and is deposited in the herbarium of the Botanisches Museum at Berlin. Ruhland (1903) describes the taxon as follows: "Differt a forma typica foliis subcaespitosis, primum pilis brevibus densiuscule puberulis, cito calvis", and cites from Minas Gerais P. Clausen 9, Schwacke 12051, and A. Silveira 1508. Material has been misidentified and distributed in herbaria under the name Eriocaulon curvifolium Bong. P. Clausen 203 appears to be a mixture with typical L. curvifolia (Bong.) Ruhl. and Syngonanthus nitens (Bong.) Ruhl.

Citations: BRAZIL: Minas Gerais: Black & Magalhães 51-11919 (Be--69743); P. Clausen 9 (B--type, Z--isotype), 203, in part (P), s.n. (Br, N); Mello Barreto 2556 [Herb. Jard. Bot. Belo Horiz. 4796] (N); Mendes Magalhães 1385 [Herb. Jard. Bot. Belo Horiz. 40086] (N).

LEIOTHRIX CURVIFOLIA var. LANUGINOSA (Bong.) Ruhl.

Synonymy: Eriocaulon lanuginosum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 627. 1831. Paepalanthus lanuginosus (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 428. 1863. Paepalanthus lanuginosus Körn. in Mart., Fl. Bras. 3 (1): 507 & 508. 1863.

Dupatya lanuginosa (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya lanuginosa Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix lanuginosa Bong. ex Alv. Silv., Fl. Mont. 1: 399. 1928. Leiothrix lanuginosa Ruhl. ex Moldenke, Known Geogr. Distrib. Erioc. 43, in syn. 1946. Paepalanthus lanuginosa Körn. ex Moldenke, Phytologia 3: 497, in syn. 1951. Eriocaulon lanigerum Bong., in herb. [not E. lanigerum H. Lecomte, 1908].

Bibliography: Bong., Ess. Monog. Erioc. 27. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 627 (1831) and 2: 236—237, pl. 19, fig. 1—4. 1832; Bong., Ess. Monog. Erioc. 73—74. 1832; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 574 & 613. 1841; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 428, 507, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 234, 286, & 288. 1903; Alv. Silv., Fl. Mont. 1: 399. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 8, 36, 43, & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 402. 1946; Moldenke, Alph. List Cit. 1: 412. 1946; Moldenke, Phytologia 2: 495. 1948; Moldenke, Alph. List Cit. 3: 855 & 935. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 497. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 91, 289, 309, 326, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 402. 1960; Moldenke, Phytologia 17: 495. 1968.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 2: pl. 19. 1832.

The type of this variety appears to be L. Riedel 1038, which was collected "In pratis humidis paludibusque Serra da Lapa", Minas Gerais, Brazil, and is deposited in the Leningrad herbarium. Ruhland (1903) says of the variety "Differt a forma typica foliis dense rosulatis, medio lana densissima, albida villoso-velatis; pedunculis hirsutis" and cites Glaziou 20006, 20007, & 20008, L. Riedel 1038, and Schwacke 8482, 8487, & 8497a, all from Minas Gerais. Silveira (1928) cites A. Silveira 338 from Serra do Cipó, Minas Gerais, collected in 1905. Martius 893 appears to be a mixture with typical L. curvifolia (Bong.) Ruhl. Variety lanuginosa has been collected in flower and fruit in June.

Additional & emended citations: BRAZIL: Minas Gerais: Brade 13602 [Herb. Jard. Rio Jan. 25385] (B); Glaziou 20009, in part (Br); Martius 893, in part (Mu—161, T); Mello Barreto 2527 [Herb. Jard. Bot. Rio Jan. 10678] (N), 9536 [Herb. Jard. Bot. Rio Jan. 24425] (N); L. Riedel 1038, in part (B—isotype, Br—isotype, N—photo of isotype, S—isotype, Z—photo of isotype); A. Silveira

338 (N--photo).

LEIOTHRIX CURVIFOLIA var. MICROPHYLLA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 296 & 398. 1928; Moldenke, Phytologia 2: 492 & 495. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 91 & 484. 1959.

Silveira (1928) describes this variety as "A forma typica foliis rosulatis angustis glabris, 6--10 mm longis 1/3 -- 1/2 mm latis et pedunculis patenti vel retrorso-pilosis differt". The type of the variety is A. Silveira 525, collected "In campis prope Itacambira", Minas Gerais, Brazil, in 1906, deposited in the Silveira Herbarium. It is the only collection cited by him.

Recent collectors describe the plant as a tufted herb, the inflorescence to 5 cm. tall, the heads gray, growing in sandy soil, on wet sandy slopes, and on sandy campos with outcrops, at altitudes of 1200 to 1295 meters, flowering and fruiting in January, February, and November. Material has been misidentified and distributed in herbaria as typical L. curvifolia (Bong.) Ruhl. and under the name Paepalanthus barbigerus Alv. Silv.

Citations: BRAZIL: Minas Gerais: Eainio s.n. [IV.1885] (S); Heringer & Castellanos 6098 (B); Irwin, Maxwell, & Wasshausen 20074 (N, Rf); Macedo 2933 (N), 2953 (S), 2977 (N, S); Mello Barreto 2559 [Herb. Jard. Bot. Belo Horiz. 5925] (N); Mendes Magalhães 18942 (N); Murça Pires & Black 2827 (N, Z), 2970 (N); Segadas-Vianna 6004 (Z); L. B. Smith 6832 (W--2120207); Tryon & Tryon 6777 (Ac).

LEIOTHRIX CURVIFOLIA var. PLANTAGO (Mart.) Ruhl.

Synonymy: Paepalanthus plantago Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 426. 1863. Dupatya plantago (Mart.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya plantago Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1904.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 426. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 234 & 288. 1903; Alv. Silv., Fl. Mont. 1: 398. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 8, 43, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2:402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Alph. List Cit. 4: 1297. 1949; Moldenke, Phytologia 3: 497. 1951; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234. 1956; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 91, 327, & 484. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960.

The type of this variety was collected by Carl Friedrich Philipp von Martius at Serro Frio, Minas Gerais, Brazil, in May,

1818, and is deposited in the herbarium of the Botanische Staatssammlung at Munich. Ruhland (1903) describes the variety as follows: "Differt a forma typica foliis angustissimè linearibus, apice recurvatis, utrinque longe pilosis; pedunculis longe albovillosis; vaginis cito calvescentibus" and cites only the type collection. Silveira (1928) cites only A. Silveira 733, collected in the Serra do Cipó, Minas Gerais, in 1905.

Recent collectors describe the plant as having inflorescences to 15 cm. tall, the heads white, growing on wet campo slopes, at altitudes of 1400--1800 meters, flowering and fruiting in February, from June to August, in October, and in December. Mrs. Chase found it "in wettish sand by [a] tiny streamlet near open summit of serra".

Material has been misidentified and distributed in herbaria as Syngonanthus arenarius (Gardn.) Ruhl. Ruhland annotated the Martius s.n. [Serra de Itambé] collection, cited below, in the Munich herbarium as typical L. curvifolia (Bong.) Ruhl., but does not cite it as that in his monograph (1903). The Segadas-Vianna & Lorêdo 1065, distributed as var. plantago, is actually L. curvifolia var. setacea Ruhl.

Additional citations: BRAZIL: Minas Gerais: Archer 3678 (W--1705664); M. A. Chase 10357 (W--1495689); Duarte & Barroso 7877 (Bd--27775), s.n. [A. P. Duarte 7942] (Bd--27767); G. Gardner 5277 (V--270466); Herb. Marie-Victorin 12426 (N--photo, Z--photo); Irwin, Maxwell, & Wasshausen 20311 (N, Z); Martius s.n. [Serro Frio, Maio 1818; Macbride photos 18734] (Mu--171--type, N--photo of type, W--photo of type), s.n. [Serra de Itambé] (Mu--160); Mello Barreto 2562 [Herb. Jard. Bot. Belo Horiz. 7863] (N), 2570 [U. S. Nat. Arb. 236390] (W--2109994); Mendes Magalhães 2366 [Herb. Jard. Bot. Belo Horiz. 43437] (N); L. B. Smith 6840 (N, Z).

LEIOTHRIX CURVIFOLIA var. PROLIFICA Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 234 & 288. 1903; Moldenke, Known Geogr. Distrib. Erioc. 8 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 91 & 484. 1959.

Ruhland (1903) says of this variety "Differt a forma typica capitulis saepius folia parva, dense villosa proliferentibus, globosis, duris; foliis cito glabris" and cites only the type collection, Sena s.n., from Minas Gerais, deposited in the herbarium of the Botanisches Museum at Berlin.

Citations: BRAZIL: Minas Gerais: Sena s.n. [Herb. Schwacke 14548] (B--type, Z--isotype).

LEIOTHRIX CURVIFOLIA var. SETACEA Ruhl.

Synonymy: Leiothrix curvifolia var. setacea (Bong.) Ruhl. apud Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234, sphalm. 1956.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 234 & 288. 1903; Alv. Silv., Fl. Mont. 1: 398. 1928; Moldenke, Known Geogr. Distrib. Erioc. 8 & 43. 1946; Moldenke, Alph. List Cit. 3: 731. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 497. 1951; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234. 1956; Moldenke, Résumé 91 & 484. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Ruhland (1903) distinguishes this variety as "Differt a forma typica foliis angustissime setaceis, persistenter mucronatis, pilis longiusculis sparse pilosulis; vaginis cito glabrescentibus, folia paullo superantibus, plus minus rufo-fuscis.....Foliorum longitudo valde variabilis, pili eorum vix dimidium illorum formae typicae attingunt et multo sparsius quam in illa distant. Fortasse Eriocaulon curvifolium Bong. illius synonymon est." He cites as cotypes Glaziou 15542 & 15543 and Magalhães Gomes 3886 from Minas Gerais. Silveira (1928) cites only A. Silveira 524 from Ouro Preto, also in Minas Gerais.

Recent collectors describe the plant as cespitose, the inflorescence 8--15 cm. tall, and the flower-heads cream-color or light-gray, growing in campos or wet campos, at altitudes of 1200 to 1245 meters, flowering and fruiting in February, May, and October. Mrs. Mexia describes it as a perennial herb "growing in small clumps, common, near stream; flowers white".

Material has been misidentified and distributed in herbaria as typical L. curvifolia (Bong.) Ruhl. and as L. curvifolia var. plantago (Mart.) Ruhl.

Additional citations: BRAZIL: Minas Gerais: Archer & Mello Barreto 4945 [U. S. Nat. Arb. 177442] (W--2121755); P. Clausen 271 (S); Damazio s.n. [Herb. Rio Jan. 63779] (N); Glaziou 15542 (Br--cotype, N--cotype, N--photo of cotype, Z--photo of cotype), 15543 (N--cotype); Heringer & Castellanos 6105 (Rf); Irwin, Maxwell, & Wasshausen 20798 (Ac, N), 21002 (N, Rf); Magalhães Gomes 944 [Herb. Jard. Bot. Belo Horiz. 26616] (N), 2720 [Herb. Jard. Bot. Belo Horiz. 26616] (N); Mello Barreto 10124 [Herb. Jard. Bot. Belo Horiz. 24164] (N); Mendes Magalhães 1385 (Be--14260), 2543 [Herb. Jard. Bot. Belo Horiz. 43825] (N), 3886 [Herb. Jard. Bot. Belo Horiz. 26622] (N); Mexia 5799 (Go, Mi, N, S, Ut--50250a, W--1571907); Sagadas-Vianna & Lorêdo 1065 (N, Z); Schwacke 8491 [Herb. Magalhães Gomes 2981; Herb. Jard. Bot. Belo Horiz. 26621] (N).

LEIOTHRIX CURVIFOLIA var. SUBGLAUCESCENS Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 233--234 & 288. 1903; Alv. Silv., Fl. Mont. 1: 398. 1928; Moldenke, Known Geogr. Distrib. Erioc. 8 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 91 & 484. 1959.

Ruhland (1903) says of this variety "Differt a forma typica foliis longis, dense caespitoso-rosulatis, glaucescentibus, juven-

tute pilis brevibus dense pubescentibus, persistentibus vel demum subdeciduis; pedunculis persistenter arrecto-puberulis; vaginis quam folia saepe dimidio brevioribus, hirto-puberulis...Vaginis brevibus L. gramineae similis. Specimina Schwackeana medio rosulae sublanuginosa sunt et transitum ad varietatem lanuginosam faciunt". He cites Glaziou 19983 & 20002, Magalhães Gomes 2721, Schwacke 8490, and Sena s.n. [Herb. Schwacke 12828a], all from Minas Gerais, Brazil. From his comments it would appear, however, that only the Glaziou and Magalhães Gomes collections are to be regarded as cotypes of the variety. Silveira (1928) cites A. Silveira 339 from the Serra do Cipó, Minas Gerais, collected in 1905.

Citations: BRAZIL: Minas Gerais: Glaziou 20002 (Br--cotype, N--cotype, N--photo of cotype, Z--photo of cotype); Schwacke 8490 [Herb. Magalhães 3928; Herb. Jard. Bot. Belo Horiz. 26623] (N).

LEIOTHRIX CUSCUTOIDES Alv. Silv.

Bibliography: Alv. Silv., Fl. Serr. Min. 71, pl. 27. 1908; Alv. Silv., Fl. Mont. 1: 399, pl. 188. 1928; Stapf, Ind. Lond. 4: 67. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 133. 1933; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Phytologia 2: 374 & 379. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 91 & 484. 1959.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 27. 1908; Alv. Silv., Fl. Mont. 1: pl. 188. 1928.

Recent collectors describe the inflorescence of this plant as growing to 30 cm. tall, grayish in color, and found the plant growing on wet slopes and on high campo slopes with outcrops and at creek margins, at an altitude of 1400 meters, flowering and fruiting in February. Silveira (1928), author of the name for this taxon, cites only the type, A. Silveira 375, from the Serra do Cipó, Minas Gerais, Brazil, collected in 1905 and deposited in his personal herbarium.

Citations: BRAZIL: Minas Gerais: Irwin, Maxwell, & Wasshausen 20314 (N, Z); A. Silveira 375 (B--isotype, Z--isotype).

LEIOTHRIX DIELSII Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 231--232, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 399. 1928; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Phytologia 2: 492. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 91 & 484. 1959; Moldenke, Résumé Suppl. 12: 4. 1965.

Collectors have found this plant growing in sandy soil, in restinga, turf, and sphagnum, at lakesides, and on beaches, flowering and fruiting from April to July. Ruhland (1903) cites for it Glaziou 13498 and Schwacke 3087 from Rio de Janeiro as cotypes. The Glaziou 3087 [could this perhaps be the "Schwacke" 3087 which he cites?] in the Paris herbarium bears striking superficial resemblance to L. rufula (A. St. Hil.) Ruhl. Silveira (1928) cites

A. Silveira 624, collected as S. Anna, São Paulo, in 1912.

Material of L. dielsii has been misidentified and distributed in herbaria as Syngonanthus gracilis (Körn.) Ruhl.

Citations: BRAZIL: Guanabara: B. Lutz 668 (Ac, Ja--28893, Ja). Rio de Janeiro: Alston & Lutz 33 (Ja--113695, Ja); Duarte & Pereira s.n. [A. P. Duarte 5802; Herb. Brad. 15382] (Lw); Glaziou 3087 (P), 13498 [Macbride photos 10668] (B--cotype, Br--cotype, N--cotype, N--photo of cotype, W--photo of cotype); Mello Mattos s.n. [Agosto de 1897] (Ja--4834, Ja, Ja); Netto, Glaziou, & Schwacke s.n. [Cabo Frio] (Ja--4835); Segadas-Vianna 4012 (Sm), 4283 (Sm); Segadas-Vianna, Dau, Ormond, Machline, & Lorêdo 136 (Sm), 137 (Sm), 138 (Sm), 140 (Ja), 150 (Sm), 152 (Sm), 154 (Sm), 155 (Sm), 156 (Z), 157 (Sm), 158 (Sm), 159 (Sm), 162 (Sm), 163 (Sm), 164 (Sm), 442 (Sm); Saldanha 5951 (Ja--47867); Ule s.n. [24 Sept. 1895] (Ja--74).

LEIOTHRIX DISTICHOCLADA Herzog

Bibliography: Lützelburg, Estud. Bot. Nordéste 3: 147 & 150. 1923; Herzog in Fedde, Repert. Sp. Nov. 20: 88. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 135. 1929; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 497--498. 1951; Moldenke, Résumé 91 & 484. 1959; Moldenke, Résumé Suppl. 17: 3 & 11. 1968.

Although the original description of this species (1924) cites both Lützelburg 85 and 277, it appears that only the former is intended to represent the typical form of the species and alone should be regarded as its type. The latter collection, no. 277, is labeled "f. bracteosa Herzog" in Herzog's own handwriting and must be regarded as the type of that subspecific taxon.

In a letter received by me in September, 1968, the librarian of the Gray Herbarium of Harvard University at Cambridge, Massachusetts, states of Lützelburg's work: "vol. 3 was published in late 1923 (introduction is dated December 1923). On p. 147 an unknown person has written in the date 1924 after both names [L. distichoclada and its f. bracteosa]" -- I assume, however, that this is not taken to indicate that Lützelburg's work, nor even merely that part of it, did not appear in print until 1924, but rather is taken to indicate that the names were not formally published by Herzog until 1924 in Fedde's Repertorium, volume 20. The Gray Herbarium's Card Index says "Leiothrix distichoclada Herzog, Fedde, Rep. Spec. Nov. 20: 88. 1924 -- Brazil", ignoring the earlier publication, albeit without formal description, by Lützelburg.

Citations: BRAZIL: Bahia: Lützelburg 85 [Macbride photos 18735] (Mu--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype).

LEIOTHRIX DISTICHOCLADA f. BRACTEOSA Herzog

Synonymy: Leiothrix distichoclada f. bracteata Herzog ex Lützelburg, Estud. Bot. Nordéste 3: 147 & 150. 1923.

Bibliography: Lützelburg, Estud. Bot. Nordéste 3: 147 & 150. 1923; Herzog in Fedde, Repert. Sp. Nov. 20: 88. 1924; Moldenke, Phytologia 3: 498. 1951; Moldenke, Résumé 91 & 484. 1959; Moldenke, Résumé Suppl. 17: 3 & 11. 1968.

The type of this form is obviously Lützelburg 277 from wet carrasco at Bom Jesus, altitude 1000 meters, Bahia, Brazil, collected in July, 1914, and deposited in the herbarium of the Botanische Staatssammlung at Munich, even though this collection number is cited in the original publication under typical L. distichoclada. In the Munich herbarium some unknown hand has added the letters "a" and "b" after the numbers on the two specimens deposited there, but this addition was very obviously made at a later date and the two specimens are very certainly from the same locality and collection. Herzog describes the form as "pedunculis flexuosis longioribus magis tortis". The trinomial is for some reason not accounted for in the Gray Herbarium's Card Index as of this writing.

Even though the original spelling of the form name of this taxon by Lützelburg was "bracteata" and was thus accredited to Herzog by him, the first valid publication under the present edition of the International Rules of Botanical Nomenclature (by Herzog himself the following year) was "bracteosa" and so the latter spelling is the one that must be adopted.

Citations: BRAZIL: Bahia: Lützelburg 277 (N--isotype), 277a (Mu--type), 277b (Mu--isotype, Z--isotype).

LEIOTHRIX DISTICHOCLADA var. GLANDULOSA Herzog

Synonymy: Leiothrix distichoclada f. glandulosa Herzog ex Moldenke, Résumé 309, in syn. 1959.

Bibliography: Herzog in Fedde, Repert. Sp. Nov. 20: 88. 1924; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 91, 309, & 484. 1959.

The original description (1924) of this variety is "Habitu similis, minus compressa, flavescens nec olivaceo-nigricans, foliis, pedunculis vaginisque dense glanduligeris, bracteis stipantibus angustioribus differt. An species propria?" The final phrase would probably lead some experts on nomenclature to claim that the name was not validly published. It is based on Lützelburg 310 from Bom Jesus, Bahia, Brazil.

Citations: BRAZIL: Bahia: Lützelburg 310 (Mu--type, Mu--isotype, Z--isotype).

LEIOTHRIX DISTICHOPHYLLA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 287--288 & 399. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verben-

ac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 91 & 484. 1959.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 412) "in campis humidis, locis nigro-argillosis, prope Quartel, in via ad Diamantina, Minas Geraes", Brazil, in April, 1908, and is deposited in the Silveira herbarium. Silveira comments (1928) "Species propter folia disticha ab affinibus valde distincta". On page 399 of his above-mentioned work he gives "1905" as the date of collection of the type.

LEIOTHRIX DUBIA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 306 & 399, pl. 193. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 91 & 484. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 193. 1928.

Recent collectors describe this plant as a cespitose herb, the inflorescences to 15 cm. tall but bending over and the outermost ones touching the ground, the inner ones shorter, growing in sandy campos at the base of a ridge of sandstone, at 1200 meters altitude, flowering and fruiting in February.

The type of the species is A. Silveira 529 from "In campis prope Diamantina, Minas" Gerais, Brazil, collected in April, 1908, and deposited in the Silveira herbarium. Silveira notes (1928) "Ab affine L. arrecta Ruhl. praecipue indumento pedunculorum differt" and on page 399 of the same work gives "1905" as the date of collection of the type.

Citations: BRAZIL: Minas Gerais: Irwin, Maxwell, & Wasshausen 20979 (N, Rf); E. Pereira 2830 [Pabst 3466 & 3666; Herb. Brade 3845] (Lw, Z).

LEIOTHRIX ECHINOCEPHALA Ruhl.

Synonymy: Paepalanthus echinocephalus Ruhl. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 232, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 399. 1928; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Alph. List Cit. 1: 412 (1946) and 3: 935. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 498. 1951; Moldenke, Résumé 91 & 484. 1959; Moldenke, Résumé Suppl. 1: 20. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Ruhland (1903) cites only Glaziou 20001 and Schwacke 8489 as cotypes of this species from Minas Gerais, Brazil. Silveira (1928) cites A. Silveira 209, collected at Diamantina, also in Minas Gerais, in 1908. The M. A. Chase 9714, distributed as L. echinocephala, is actually Paepalanthus sphaerocephalus Ruhl.

Additional citations: BRAZIL: Minas Gerais: Glaziou 20001 (B--cotype); Schwacke 8489 [Herb. Jard. Bot. Belo Horiz. 26662; Macbride photos 10669] (B--cotype, N--cotype, N--photo of cotype, W--

photo of cotype); A. Silveira 209 (N—photo, Z--photo).

LEIOTHRIX EDWALLII Alv. Silv.

Synonymy: Paepalanthus edwallii Alv. Silv., Fl. Mont. 1: 282. 1928.

Bibliography: Alv. Silv., Fl. Serr. Min. 70. 1908; Alv. Silv., Fl. Mont. 1: 282 & 399. 1928; A. W. Hill, Ind. Kew. Suppl. 8: 133. 1933; Moldenke, Phytologia 2: 374 & 379 (1947) and 2: 496. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 498. 1951; Moldenke, Résumé 91, 324, & 484. 1959.

Silveira (1928) cites only the type collection of this species, A. Silveira 420, collected at Campo Grande, São Paulo, Brazil, in 1892.

LEIOTHRIX FLAGELLARIS (Guill.) Ruhl.

Synonymy: Eriocaulon flagellare Guill. in Deless., Icon. Sel. 3: 60—61, pl. 98. 1837. Paepalanthus flagellaris (Guill.) Kunth, Enum. Pl. 3: 526. 1841. Paepalanthus flagellaris Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 282, 417, & 507. 1863. Dupatya flagellaris (Guill.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Stephanophyllum flagellaris Guill. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 992. 1895. Dupatya flagellaris Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix flagellaris Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Guill. in Deless., Icon. Sel. 3: 60—61 & 67, pl. 98. 1837; Kunth, Enum. Pl. 3: 526, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 262. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 280 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 282, 417, & 507. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893), 2: 402 (1894), and 2: 992. 1895; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 225, 237, 285, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 399. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 29, 34, 43, & 48. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 402 & 992. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92, 280, 288, 325, & 484. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé Suppl. 1: 23. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 402 & 992. 1960; Moldenke, Phytologia 17: 495. 1968; Moldenke, Résumé Suppl. 18: 13. 1969.

Illustrations: Guill. in Deless., Icon. Sel. 3: pl. 98. 1837.

The type of this species is Vauthier 65, deposited in the herbarium of the Muséum National d'Histoire Naturelle at Paris. Kunth (1841) quotes Guillemin "Eriocaulo viviparo et prolifero

Bong. valde affinis, nonnisi glabritie et vaginarum brevitate ab iis differre videtur. In stirpibus peculiaris, characteres afferunt satis distinctos, ut inde genus novum (Stephanophyllum) inter Eriocaulon et Toninam collocandum constituatur". Guillemin (1837) does not actually make the combination accredited to him by Jackson (1895), merely suggesting it [cfr. under the genus Leiothrix in general in this series of notes].

Ruhland (1903) cites Martius s.n., Sena s.n. [Herb. Schwacke 9357 & 14554], Vauthier s.n., and Wied-Neuwied s.n., all from Minas Gerais, Brazil. Silveira (1928) cites A. Silveira 530, collected at Serra da Raiz, near Diamantina, Minas Gerais, in 1908. Most recent collectors have found the plant growing on campos, flowering and fruiting in May and August. Material has been misidentified and distributed in herbaria under the names L. vivipara (Bong.) Ruhl. and Lagenocarpus brevifolius (Boeckl.) H. Pfeiff. On the other hand, the P. Clausen 8, distributed as L. flagellaris, is actually Eriocaulon crassiscapum Bong., while Williams & Assis 6910 is Leiothrix triangularis Alv. Silv.

Citations: BRAZIL: Minas Gerais: Archer 4108 (N, W--1705638); Glaziou s.n. (P); Martius s.n. [Diamantina, prope Tejuco, Maio 1808] (B, Mu--146); Mello Barreto 2513 [Herb. Jard. Bot. Belo Horiz. 8281] (N); Sena s.n. [Herb. Schwacke 9357] (B), s.n. [Herb. Schwacke 14554] (B, Z). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LEIOTHRIX FLAVESCENS (Bong.) Ruhl.

Synonymy: Eriocaulon flavescens Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 628. 1831. Paepalanthus eriocephala Klotzsch in Schomb., Vers. Fauna & Fl. Brit.-Guian. 1064. 1848. Paepalanthus flavescens (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 423. 1863. Eriocaulon falcatum Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 423, in syn. 1863 [not E. falcatum Bong., 1831]. Dupatya flavescens (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Paepalanthus flavescens Körn. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya flavescens Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus eriocephalus Klotzsch apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 290, in syn. 1903. Leiothrix flavescens Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908. Leiothrix flavescens (Körn.) Ruhl. ex Alv. Silv., Fl. Mont. 1: 399. 1928. Eriocaulon elongatum Brongn. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959 [not E. elongatum Bong., 1831]. Paepalanthus brevifolius Körn. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959. Paepalanthus elongatus Mart. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959 [not P. elongatus (Bong.) Körn., 1863, nor Körn., 1894]. Paepalanthus falcatus Mart. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959 [not P. falcatus (Bong.) Körn., 1863,

nor Körn., 1894]. Paepalanthus petrophilus Mart. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus xyrioides Mart. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959. Paepalanthus xyrioides St. Hil. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959. Paepalanthus xyrioides var. brevifolius Schreber ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959. Eriocaulon elongatum St. Hil., in herb. Paepalanthus xyridioides Mart., in herb. Paepalanthus xyridioides var. brevifolius Mart., in herb.

Bibliography: Bong., Ess. Monog. Erioc. 28. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 628 (1831) and 5: 29, pl. 35. 1839; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 575 & 613. 1841; Schomb., Vers. Faun. & Fl. Brit.-Guian. 1064. 1848; Schomb., Reise Brit.-Guian. 3: 1064. 1848; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 423, 502, 505, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 401 & 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 231, 285, 288, & 290. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Lützelburg, Estud. Bot. Nordéste 3: 148. 1923; Alv. Silv., Fl. Mont. 1: 399. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 54. 1930; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 6, 9, 29, 34, 43, & 48. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 401 & 402. 1946; Moldenke, Alph. List Cit. 1: 105, 224, 250, & 412. 1946; Moldenke, Phytologia 2: 374 (1947) and 2: 495. 1948; Moldenke, Alph. List Cit. 3: 710, 935, & 975 (1949) and 4: 1134, 1301, & 1304. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 63, 66, 79, 97, & 207. 1949; Moldenke, Phytologia 3: 498-499. 1951; Rambo, Sellowia 6: 130. 1954; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 266--267 & 276--277. 1956; Reitz, Sellowia 7: 124. 1956; Moldenke in J. A. Steyerm., Fieldiana 28: 824. 1957; Angely, Fl. Paran. 10: 14. 1957; Moldenke, Résumé 71, 75, 92, 114, 280, 288, 309, 324, 325, & 484. 1959; Reitz, Sellowia 11: 31 & 112. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé Suppl. 1: 17 & 20--22. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 401 & 402. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Angely, Fl. Paran. 16: 59 (1960) and 17: 24. 1961; Reitz, Sellowia 13: 52, 53, 72, & 90. 1961; Moldenke, Résumé Suppl. 7: 4 (1963) and 12: 3, 4, & 11. 1965; Angely, Fl. Anal. Paran., ed. 1, 201. 1965; J. A. Steyerm., Act. Bot. Venez. 1: 98. 1966; Moldenke, Phytologia 19: 102. 1969.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 5: pl. 35. 1839.

It should be noted here that the Eriocaulon falcatum Bong. and Paepalanthus falcatus (Bong.) Körn. and its orthographic variant, P. falcatus Körn., are all synonyms of Paepalanthus pedunculatus (Bong.) Ruhl., while Eriocaulon elongatum Bong. and Paepalanthus

elongatus Körn. are synonyms of Paepalanthus elongatus (Bong.) Körn., a valid species.

The type of Paepalanthus eriocephalus Klotzsch is probably Rich. Schomburgk 1011 from Guyana; that of Eriocaulon falcatum Mart. and Paepalanthus falcatus Mart. is Martius 882 from "in irriguis Serra da Lapa et M. Itacolumni" -- the former locality in Minas Gerais and the latter in São Paulo, Brazil; that of Paepalanthus petrophilus Mart. is Martius s.n. from Minas Novas, Minas Gerais, deposited in the Munich herbarium; that of Paepalanthus xyridioides var. brevifolius Mart. is Martius 954 from Minas Gerais, also deposited at Munich; and that of Eriocaulon elongatum St. Hil. and Paepalanthus elongatus Mart. is Houllet s.n., collected in São Paulo in 1839. The type of Leiothrix flavescens itself, is L. Riedel 1479, collected "In humidis montis Itacolumni", São Paulo. Silveira (1928) cites A. Silveira 210, collected in the Serra de Ibitipoca, Minas Gerais, in 1896.

Recent collectors describe this apparently common species as having soft, ascending, membranous, rich- or pale-green, pubescent leaves, the flower-heads chalk-white or powdery-white with grayish outer margins, and the involucre tawny-brown, growing on slopes and in marshy places, at altitudes of 1025--2400 meters, flowering and fruiting in February, April, July, September, and November, and known locally as "capim manso", "capi poatinga", "gravatá manso", and "semprevivas do campo" [this latter name is applied to many species of the family in Brazil]. Maguire & Fanshawe describe the species as "locally frequent in savannas" in Guyana, Wurdack calls it "locally abundant in seepage on rocky slopes" in Peru, and Steyermark says of it "plants solitary in small tufts in shelter at base of large rocks" in Venezuela.

Gleason, in his unpublished Flora of British Guiana, describes the species as follows: "Leaves basal, linear or narrowly lanceolate, 6--10 cm. long, 4--8 mm. wide, obtuse, thinly hirsute; peduncles 1—4, erect, 3--5 dm. high, glabrous or nearly so, twisted, their sheaths pubescent, exceeding the leaves; heads 8--10 mm. in diameter, densely woolly; bracts narrowly obovate, hirsute distally, shorter than the heads" and cites from the Roraima region of Guyana Im Thurn 60, Quelch & McConnell 9, 10, & 327, Rich. Schomburgk 1011, and G. H. H. Tate 330 & 333. Ruhland (1903) cites no specimens at all, but gives the geographic distribution of the species as from Venezuela and Guyana to the states of Goiás, Minas Gerais, Rio de Janeiro, and São Paulo, Brazil. According to Kunth (1841) the plate 35 of Bongard was never published, but it actually WAS published in 1839. This leads one to question Kunth's other statements about Bongard plates not ever having been published.

The Guillemin 521, cited below, was erroneously cited by me previously as Paepalanthus elongatus var. pubescens Alv. Silv.; Brade 5528 is a mixture with Syngonanthus caulescens (Poir.) Ruhl., and Dusén 7212 is a mixture with Eriocaulon sellowianum Kunth.

Material of Leiothrix flavescens has been misidentified and distributed in herbaria under the names Eriocaulon elongatum Bong., E. falcatum Bong., Paepalanthus centauroides Körn., P. elongatus var. pubescens Alv. Silv., Syngonanthus caulescens (Poir.) Ruhl., and S. centauroides (Bong.) Ruhl. On the other hand, the J. A. Steyermark 58849 and G. H. H. Tate 1109, distributed as typical Leiothrix flavescens, are actually its var. alpina Moldenke, Blanchet 2598 and Schüch s.n. [Sebastianopoli 1844] are L. hirsuta var. blanchetiana (Körn.) Ruhl., Williams & Assis 6925 is L. nubigena (Kunth) Ruhl., M. A. Chase 8009 is Paepalanthus albo-ciliatus Alv. Silv., and Sehnen 3005 is Syngonanthus chrysanthus (Bong.) Ruhl.

Additional & emended citations: VENEZUELA: Bolívar: Pannier & Schwabe s.n. [Auyantepui] (Ve); Phelps 380 (Ve); J. A. Steyermark 93201 (Lw, N), 93503 (Lw, N); Steyermark & Wurdack 400 (N). Trujillo: Funck & Schlim 810 (B, Br); Linden 810 (Br). GUYANA: Jenman 60 (W--303501); Maguire & Fanshawe 32537 (N); Rich. Schomburgk 1011 (B); G. H. H. Tate 330 (N), 333 (N). PERU: Amazonas: Wurdack 583 (W--2403671). Pasco: Vera 1567 (W--2413442). BRAZIL: Bahia: Lützelburg 276 (Mu, N). Guanabara: B. Lutz 667 (Ja--28892). Minas Gerais: A. Castellanos 24182 [Herb. Cent. Pesq. Florest. 2952] (Ac); P. Clausen 1 (N), 8 (P), 14 (Br), 49 [Martius 882] (B, Br, Br, Br, M, Mu--167, Mu--168, Mu--332, N--photo, S, Z--photo), 65 (B), 161 (B), s.n. [1840] (Br, S); Maguire, Mendes Magalhães, & Maguire 49248 (N); Martius 954 (Mu--163), s.n. [21/55] (B), s.n. [Minas Novas] (Mu--164, Mu--165); Mello Barreto 2544 [Herb. Jard. Bot. Belo Horiz. 10688; Herb. U. S. Nat. Arb. 236383] (W--2109992). Paraná: Dombrowski 1264 [Saito 1079; Herb. Inst. Def. Pat. Nat. 9451] (Ac), 2213 [Kuniyoshi 1951] (Rf); Dombrowski, Saito, & Pereira 825/615/209 (Ac); Dusén 2714 (S), 7212, in part (S), 7265 (S, S), 11027 (S), s.n. [Curityba, 24.2.1904] (S); Hatschbach 5131 (Sm), 5552 (Mm), 6907 (Mi), 8518 (Ca); Hatschbach & Lange 5297 (Sm); Lützelburg 6787 (Mu); Mattos 4266 (N); Reitz & Klein 17467 (Ac, N), 17908 (Ac); Smith, Klein, & Hatschbach 14564 (Ac). Rio Grande do Sul: Sellow s.n. [Rio des Pedras] (B, Br). Rio de Janeiro: G. Gardner 704 (M, N, S, W--937179, W--1066402); Glaziou 3619 (Br, W--1194909); Lützelburg 15505 (Mu). Santa Catarina: Rambo 31735 (S); Reitz 4921 [Herb. Barb. Rodr. 6340] (N, N); Reitz & Klein 5874 [Herb. Barb. Rodr. 16288] (N, S, Z). São Paulo: Brade 5528, in part (S), 6579 (Mu), 6589 (Mu), 12225 [Herb. Mus. Nac. Rio Jan. 30345] (S), 12229 [Herb. Mus. Nac. Rio Jan. 30341] (S); Burchell 3804 (Br), 4185 (Br); Guillemin 521 (B, Es, Ml, N, N, Qu, Ug, W--1112564, W--1473144); Herb. Hort. Oswaldo Cruz 4709 (Mu); Houllet s.n. [1839]

(Br); Lutz & Lutz 1218 [Herb. Lutz 1218] (Ja); Moldenke & Moldenke 19639 (Es, F, Lg, Mg, Mr, N, No, Ot, Qu, S, Sm, Ss); L. Riedel 1479 (B--isotype, M--isotype, Mu--166--isotype, N--photo of isotype, S--isotype, Ut--337--isotype, Z--photo of isotype); Segadas-Vianna 3075 (Ja), 3186 (Sm), 3187 (Sm); L. B. Smith 1992 (S). State undetermined: Glaziou 14358 (Br), 15535 (Br), 17312 (Br); Guillemin 239 (N, Qu); Martius s.n. (S); Schenck s.n. (B). BOLIVIA: La Paz: R. S. Williams 1487 (Ca--946334). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LEIOTHRIX FLAVESCENS var. ALPINA Moldenke

Bibliography: Moldenke, Mem. N. Y. Bot. Gard. 9: 279. 1957; Moldenke, Résumé 71, 75, & 484. 1959.

This variety differs from the typical form of the species in having its leaves only 1.4--7 cm. long, very obscurely puberulent or glabrous and shiny on both surfaces, and the sheaths very obscurely puberulent or glabrous and shiny.

The type of the variety was collected by George Henry Hamilton Tate (no. 1109) at an altitude of 2200 meters on Mount Auyán-tepui, Bolívar, Venezuela, and is deposited in the Britton Herbarium at the New York Botanical Garden. G. H. H. Tate 434 is a mixture with Paepalanthus fraternus N. E. Br. Material of this variety has been misidentified and distributed in herbaria as typical L. flavescens (Bong.) Ruhl.

Citations: VENEZUELA: Bolívar: Cardona 2294 (Ve, W--1903499); Pannier & Schwabe s.n. [Auyantepui] (Ve); J. A. Steyermark 58849 (N); G. H. H. Tate 1109 (N--type, N--isotype). GUYANA: G. H. H. Tate 434, in part (N).

LEIOTHRIX FLAVESCENS var. GLABRA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 291 & 399. 1928; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

Silveira (1928) describes this variety as follows: "Folia ab inicio glabra vel vix ciliolata" and names as the type a specimen collected by Dr. J. Michaeli "In cerro do Cipó", Minas Gerais, Brazil, in June, 1918, and no. 712 in the Silveira herbarium. On page 399 of the same work he gives "1908" as the date of collection of the type.

LEIOTHRIX FLEXUOSA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 302, 304, & 399, pl. 189. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 189. 1928.

Silveira (1928) avers that this species is closely related to

L. arrecta Ruhl. and to L. michaelii Alv. Silv. He cites A. Silveira 673, collected at Chapada do Couto, Minas Geraes, Brazil, in 1918.

Citations: BRAZIL: Minas Gerais: Mello Barreto 8545 [Herb. Jard. Bot. Belo Horiz. 29023] (N).

LEIOTHRIX FLUITANS (Mart.) Ruhl.

Synonymy: Paepalanthus fluitans Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 415, pl. 53, fig. 1. 1863. Dupatya fluitans (Mart.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya fluitans Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix fluitans Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908. Leiothrix aquatica Alv. Silv. ex Moldenke, Known Geogr. Distrib. Erioc. 8 & 42, nom. nud. 1946.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 415, 500, & 507, pl. 53, fig. 1. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 225—226 & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 399. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 54. 1930; Stapf, Ind. Lond. 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; A. Castell. in Descole, Gen. & Sp. Pl. Argent. 3: 76 & 104. 1945; Moldenke, Known Geogr. Distrib. Erioc. 8, 9, 29, 43, & 48. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Alph. List Cit. 1: 412 (1946) and 3: 935. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 78, 79, & 207. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 280, 325, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960.

Illustrations: Mart., Fl. Bras. 3 (1): pl. 53, fig. 1. 1863.

This taxon appears to be based on Wied-Neuwied s.n. and Martius s.n., both from Minas Gerais, Brazil -- the latter from "in rivis capidis ad fluv. S. Franc prope Salgado", doubtless deposited in the herbarium of the Staatsmuseum at Munich. Ruhland (1903) cites only these two original collections. The type of L. aquatica appears to be A. Silveira 549, also from Minas Gerais, deposited in the Marie-Victorin herbarium in the Montreal Botanical Garden, but the binomial does not appear ever to have been formally published by Silveira. In his 1928 work he cites A. Silveira 548, collected in the Serra do Cipó, Minas Gerais, in 1909, as L. fluitans.

Citations: BRAZIL: Minas Gerais: Martius s.n. [prope Salgado; Macbride photos 18736] (Mu—287—cotype, N—photo of cotype, W—photo of cotype); A. Silveira 549 (Mv—15837, N, Z—photo).

LEIOTHRIX FLUMINENSIS Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 230, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr.

Distrib. Verbenac., [ed. 2], 79. 1949; Moldenke, Résumé 92 & 484. 1959.

Ruhland (1903) cites only the type collection of this species, Glaziou 6745, from Rio de Janeiro, Brazil.

Citations: BRAZIL: Rio de Janeiro: Glaziou 5454 (B), 6745 [Macbride photos 10670] (B—type, N—photo of type, W—photo of type, Z—isotype); Segadas-Vianna, Dau, Ormond, Machline, & Lorêdo 927 (N), 941 (N), 950 (N).

LEIOTHRIX FLUMINENSIS var. PUBERULA Moldenke

Bibliography: Moldenke, Phytologia 8: 162. 1962; Moldenke, Résumé Suppl. 3: 13. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963.

This variety differs from the typical form of the species in having the leaves minutely puberulent throughout.

The type of the variety was collected by Jean Baptiste Antoine Guillemin (no. 239), who states that the plant was very abundant among Gaylussacia plants at Restinga de Tocaia [Rio de Janeiro? or São Paulo?], Brazil, and is deposited in the herbarium of the Muséum National d'Histoire Naturelle at Paris.

Citations: BRAZIL: State undetermined: Guillemin 239 [U. S. Nat. Herb. phot. distr. 5900] (N—photo of type, P—type).

LEIOTHRIX FULGIDA Ruhl.

Synonymy: Paepalanthus fulgidus Ruhl. ex Moldenke, Résumé Suppl. 1: 20, in syn. 1959.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 233, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 399. 1928; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Alph. List Cit. 3: 731. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 499. 1951; Moldenke, Résumé 92 & 484. 1959; Moldenke, Résumé Suppl. 1: 20. 1959.

Mexia found this plant growing in seepage among rocks at 1240 meters altitude, and says that it was abundant, with white inflorescences, flowering in May. Ruhland (1903) cites only the original type collection, Glaziou 20009, from Minas Gerais, Brazil. Silveira (1928) cites A. Silveira 532 from Diamantina, Minas Gerais, collected in 1908.

Additional citations: BRAZIL: Minas Gerais: Glaziou 20009, in part [Macbride photos 10671] (B—type, Br—isotype, N—isotype, N-photo of type, W—photo of type); Mexia 5882 (Er, Go, Mi, Qu, S, Ut—50249a, W—1571896).

LEIOTHRIX GLANDULIFERA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 294 & 399. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

Silveira (1928) cites the type collection of this taxon as "In campis humidis arenosisque prope Itambé do Serro, Minas; Alvado

da Silveira, Apr. 1918, n. 671 in herbario Silveira" and notes that "Species propter pedunculos fasciculatos et indumentum glanduliferum a L. trifida Alv. Silv. valde similis, sed petalis floris masculis facile distinguenda".

LEIOTHRIX GLAUCA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 279 & 399, pl. 185. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 185. 1928.

The type and only known specimen of this species was collected by Álvaro Adolpho da Silveira (no. 837) "In campis arenosis inter Serrinha et Itacambira", Minas Gerais, Brazil, in July, 1926, and is deposited in the Silveira herbarium. On page 399 of his work (1928) Silveira adds "(Grão Mogol)" after "Serrinha" as part of the locality of collection .

LEIOTHRIX GOMESII Alv. Silv.

Synonymy: Leiothrix hirsuta var. magalhãesii Alv. Silv., Fl. Serr. Min. 70. 1908.

Bibliography: Alv. Silv., Fl. Serr. Min. 70. 1908; Alv. Silv., Fl. Mont. 1: 289 & 399. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Phytologia 2: 374 & 379 (1947) and 2: 492 & 495. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moacyr do Amaral Lisboa, Revist. Esc. Minas 9. April 1951; Moldenke, Phytologia 3: 499. 1951; Moldenke, Résumé 92, 309, & 484. 1959.

The type of this species was collected by Francisco Magalhães Gomes (no. 827) -- in whose honor both this species' and its synonym's nomenclatural designations are derived -- "in campis in Serra do Capanema", Minas Gerais, Brazil, in March, 1893, and is deposited in the Magalhães Gomes herbarium. Silveira (1928) cites also A. Silveira 526 from "in campis altis inter Caraca et Capanema", collected in April, 1909, and deposited in the Silveira herbarium. He comments "Ob errorem provenientem ex descriptione speciminis differentis et infeliciter permutati, haec species distinctissima habet in opera Flora e Serras Mineiras cujus auctore sum, nomen quod ei non convenit". On page 399 of this same 1928 work he cites the second collection as "Serra do Capanema, n. 526, Mag. Gomes, 1906".

LEIOTHRIX GOUNELLEANA Beauverd

Synonymy: Leiothrix gounelleana P. Beauv. apud Stapf, Ind. Lond. 4: 67. 1930. Leiothrix gounelliana Beauverd ex Moldenke, Known Geogr. Distrib. Erioc. 43, sphalm. 1946.

Bibliography: Beauverd, Bull. Herb. Boiss., sér. 2, 8: 296 & 298, fig. 12 C. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 138.

1913; Stapf, Ind. Lond. 4: 67. 1930; Moldenke, Known Geogr. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Prain, Ind. Kew. Suppl. 4, pr. 2, 138. 1958; Moldenke, Résumé 92 & 484. 1959.

Illustrations: Beauverd, Bull. Herb. Boiss., sér. 2, 8: 296, fig. 12 C. 1908.

The abbreviation which Stapf (1930) employs for the author of this binomial is one usually used for Ambroise Marie François Joseph Palisot de Beauvois (1752--1820), whereas this binomial was actually proposed by Gustave Beauverd (1867--1942). How Stapf could have made this error in accredition is very difficult to comprehend.

LEIOTHRIX GRAMINEA (Bong.) Ruhl.

Synonymy: Eriocaulon gramineum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 627. 1831. Paepalanthus gramineus (Bong.) Kunth, Enum. Pl. 3: 523--524. 1841. Paepalanthus gramineus Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 428, 507, & 508. 1863. Dupatya graminea (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya graminea Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix graminea Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Bong., Ess. Monog. Erioc. 27. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 627 (1831) and 3: 557, pl. 26. 1835; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 523--524, 574, 575, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 262. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 295, 296, 428--429, 507, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 234, 285, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 284. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 30, 35, 43, & 49. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 280, 288, 325, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 402. 1960.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 3: pl. 26. 1835.

Kunth (1841) comments concerning this species "Conf. P. paludoso et nigro-niveo", taxa now known as Paepalanthus freyreysii (Thunb.) Körn. and P. tortilis (Bong.) Mart. Silveira (1928) informs us that, in his opinion, at least, L. graminea is closely related to L. barreirensis Alv. Silv. Ruhland (1903) cites only the original type collection, L. Riedel 1039, and Sena s.n. [Herb. Schwacke 14147], both from Minas Gerais, Brazil.

Citations: BRAZIL: Minas Gerais: L. Riedel 1039 (B--isotype, Z--isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LEIOTHRIX HETEROPHYLLA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 300 & 399, pl. 187. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 187. 1928.

Silveira (1928) tells us that the type collection of this species was found "Secus margines capoeiras prope Itacambira, Minas Geraes: Alvado da Silveira Jul. 1926, no. 849, in herbario Silveira. Species ob folia capitulorum albo-lanata certe distincta".

LEIOTHRIX HIRSUTA (Wikstr.) Ruhl.

Synonymy: Eriocaulon hirsutum Wikstr., Svensk. Vet. Acad. Handl., ser. 2, 1820: 79, pl. 4. 1820. Paepalanthus hirsutus (Wikstr.) Kunth, Enum. Pl. 3: 530. 1841. Eriocaulon hirsutum Wikstr. & Bong. apud Kunth, Enum. Pl. 3: 577, in syn. 1841. Eriocaulon separatum Steud., Syn. Pl. Glum. 2: [Cyp.] 280. 1855. Paepalanthus hirsutus Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 278, 295, 296, 421, & 507. 1863. Dupatya hirsuta (Wikstr.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya hirsuta Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix hirsuta Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908. Eriocaulon xyrioides St. Hil., in herb.

Bibliography: Wikstr., Svensk. Vet. Acad. Handl., ser. 2, 1820: 79, pl. 4. 1820; Roem. & Schult. in L., Mant. 2: 468. 1824; Spreng. in L., Syst. Veg., ed. 16, 3: 776. 1826; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 632. 1831; Bong., Ess. Monog. Erioc. 5 & 32. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 530, 577, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 262. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 280 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 278, 295, 296, 421--422, & 507, pl. 55, fig. 3. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 227, 229--230, & 286--288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Lützelburg, Estud. Bot. Nordéste 3: 147 & 150. 1923; Alv. Silv., Fl. Mont. 1: 399. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 28, 30, 35, 40, 43, 45, & 49. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and 2: 402. 1946; Moldenke, Phytologia 2: 374 & 379 (1947) and 2: 492 & 495. 1948; Moldenke, Alph. List Cit. 4: 1176. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 499. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Mol-

denke, Résumé 92, 280, 289, 292, 323, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and 2: 402. 1960.

Illustrations: Wikstr., Svensk. Vet. Acad. Handl., ser. 2, 1820: pl. 4. 1820.

Kunth (1841) cites for this taxon only specimens collected by Friedrich Sellow in "Brasilia meridionalis. (Inter Rio Haneiro et Campos et inter Vittoria et Bahia.....)", but actually the species is based on Freyreiss 3, deposited in the herbarium of the Naturhistoriska Riksmuseet at Stockholm and the label merely inscribed "Brasilia". Kunth notes "Specimen inter Vittoria et Bahia lectum paulo majus, folia 5—7-pollicaria, pedunculi 11—14-pollicares" as compares with the other material which he describes as "Folia 4—5-pollicaria.....Pedunculi 7—10-pollicares". Ruhland (1903) cites no material at all, but avers that the species grows in Bahia and Minas Gerais, Brazil. Silveira (1928) cites J. Michaeli 618, collected in Bahia in 1912.

Recent collectors have found the plant growing on grassy campos and the inner restinga, flowering and fruiting in May, July, and September.

Leiothrix hirsuta var. magalhaesii Alv. Silv. is now known as L. gomesii Alv. Silv., which see.

Material of L. hirsuta has been misidentified and distributed in herbaria as L. hirsuta var. blanchetiana Körn.) Ruhl.

Additional citations: BRAZIL: Bahia: A. P. Duarte 5937 [Herb. Brad. 15442] (Lw); Lützelburg 335 (Mu), 465 (Mu, N), 465a (Mu, W—1716262); Sellow s.n. [Vittoria] (B). Guanabara: N. Santos 5220 [234-1] (Ja), 5240 [235-1] (Ja, Ja, Ja), 5250 [235-1] (Ac, Ja), 5379 [244-1] (Ja, Ja, Ja, Ja), 5408 (Ac, Ja, Ja, Ja, Ja, Ja, Ja, Ja, Ja, Ja); Strang 327 [Herb. Cent. Pesq. Florest. 1093] (Ac). Minas Gerais: Martius s.n. [Va. Ricca -- Tejuco, prope fluv. Belmonte] (Mu—169). Rio de Janeiro: Houllet s.n. [Sebastianopoli 1839] (Br); H. F. Martins 96 [Herb. Cent. Pesq. Florest. 84] (Ac); L. Riedel 555 (B, S, Ut—338); Segadas-Vianna, Dau, Ormond, Machline, & Lorêdo 363 (Z), 921 (Sm); Sellow 110 (B). State undetermined: Collector undetermined 618 (S); Freyreiss 4 (F—photo of type, N—photo of type, S—type, Z—photo of type); J. E. Pohl s.n. (Mu—170). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LEIOTHRIX HIRSUTA var. BLANCHETIANA (Körn.) Ruhl.

Synonymy: Paepalanthus blanchetianus Körn. in Mart., Fl. Bras. 3 (1): 421—422, pl. 55, fig. 3. 1863. Dupatya blanchetiana (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya blanchetiana Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 278, 294, 297, 308, 422, 500, & 507, pl. 55, fig. 3. 1863; Kuntze, Rev. Gen. Pl.

2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 227, 230, & 288. 1903; Alv. Silv., Fl. Mont. 1: 399. 1928; Stapf, Ind. Lond. 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 28, 43, 45, & 49. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Phytologia 2: 495. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Alph. List Cit. 4: 1176. 1949; Moldenke, Phytologia 3: 499. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 279, 309, 323, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 55, fig. 3. 1863.

This variety is based on Blanchet 2598, collected in the Serra da Jacobina, Bahia, Brazil, and deposited in the herbarium of the Botanisches Museum at Berlin. Ruhland (1903) cites only the type collection. Silveira (1928) cites J. Michaeli 617, collected in Bahia in 1912.

Belem describes this plant as 20 cm. tall, with white inflorescence heads, flowering and fruiting in July. Material of the variety has been misidentified and distributed in herbaria under the name Paepalanthus xyrioides St. Hil. On the other hand, the Lützelburg 465 and L. Riedel 555, distributed as this variety, are actually typical L. hirsuta (Wikstr.) Ruhl.

Additional citations: BRAZIL: Bahia: Belem 3895 (N); Belem & Pinheiro 2432 (Z); Blanchet 2598 (B--type, Br--isotype, Mi--isotype, N--isotype, N--photo of isotype, Ut--422--isotype, Z--photo of isotype). Rio de Janeiro: Luschnath s.n. [Campos St. João, Martio 1834] (Br), s.n. [Playa Sernambativa, Martio 1834] (Br); Schüch s.n. [Sebastianopoli 1844] (Br). State undetermined: Houllet s.n. [Brasil 1842] (Br); Sellow s.n. (Br). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B, B).

LEIOTHRIX HIRSUTA var. OBTUSA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 291. 1928; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

Silveira (1928) describes this variety as "A forma typica differt foliis obtusis et vaginis 12--20 cm. longis, illa subaequantibus. In campis locis nigro-argillosis humidisque prope Quartel in via ad Diamantina: Alv. Silv. Apr. 1908; n. 612 in herbario Silveira". As of this writing, the taxon is known only from the original collection in Minas Gerais, Brazil.

LEIOTHRIX ITACAMBIRENSIS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 307 & 399, pl. 194. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind.

Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 194. 1928.

Silveira (1928) cites the type of this species as "In campis secus margines rivulorum inter Serrinha et Itambira, Minas Geraes, Alvaro da Silveira Jul. 1926; n. 835 in herbario Silveira". As of this writing, the species is known only from this original collection.

LEIOTHRIX LANIFERA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 295 & 399. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

The type and only known collection of this species is A. Silveira 738 from "In humidis prope Lagoa do Ferro", Minas Gerais, Brazil, collected in September, 1924, and deposited in the Silveira herbarium. Of it Silveira (1928) says "Species ab omnibus affinibus ob vestimenta basis foliorum valde distincta". On page 399 of his work he adds "(Patrocinio)" to his description of the locality of collection.

LEIOTHRIX LINEARIS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 298 & 399. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

The species is known thus far only from the original type collection, A. Silveira 544, from the Serra do Cipó in Minas Gerais, Brazil, and deposited in the Silveira herbarium.

LEIOTHRIX LONGIPES Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 303--304 & 400. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 499. 1951; Moldenke, Résumé 92 & 484. 1959; Renno, Levant. Herb. Inst. Agron. 69. 1960.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 190. 1928.

The type of this species was collected by Dr. J. Michaeli "In campis arenosis in Serra do Cipó", Minas Gerais, Brazil, in June, 1918, and is no. 228 in the Silveira herbarium. Silveira (1928) comments that "Species ab sectionibus Stephanophyllum Ruhl. facile distinguenda et valde insignis".

LEIOTHRIX LUXURIANS (Körn.) Ruhl.

Synonymy: Paepalanthus luxurians Körn. in Mart., Fl. Bras. 3 (1): 418, pl. 54. 1863. Dupatya luxurians (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya luxurians Kuntze apud Durand &

Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix luxurians Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 418, 419, 500, & 507, pl. 54. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 235—237 & 288, fig. 34. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41 & 54. 1930; Alv. Silv., Fl. Mont. 1: 400. 1928; Stapf, Ind. Lond. 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 40, 43, & 50. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 499. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 281, 326, & 484. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 54. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 236, fig. 34. 1903.

Ruhland (1903) cites only Martius s.n. from Minas Gerais, Brazil, for this species. Martius says of the habitat in which he found it "parsim locis editis siccioribus subinde inundatis". Silveira (1928) cites A. Silveira 634, collected at Diamantina, Minas Gerais, in 1916. Irwin and his associates describe the plant as a "rosette herb, the inflorescence to 5 cm. tall, in sandy campo, steep sandy slopes with sandy outcrops at summit", growing at an altitude of 1300 meters. Material has been misidentified and distributed in herbaria under the name Paepalanthus prolifer Körn.

Additional citations: BRAZIL: Minas Gerais: Archer & Mello Barreto 4955 [Herb. U. S. Nat. Arb. 177519] (W—2121760); Irwin, Maxwell, & Wasshausen 20168 (N, Z); Martius s.n. [Serro Frio] (Mu—148—cotype), s.n. (Mu—284—cotype, Mu—285—cotype, Mu—286—cotype); Mello Barreto 2512 [Herb. Jard. Bot. Belo Horiz. 8300] (N); Mendes Magalhães 2099 [Herb. Jard. Bot. Belo Horiz. 42504] (N, Ug), 2323 [Herb. Jard. Bot. Belo Horiz. 43373] (N); J. E. Pohl s.n. [in Brasilia] (Mu—147).

LEIOTHRIX MENDESII Moldenke

Bibliography: Moldenke, Phytologia 3: 313—314. 1950; E. J. Salisb., Ind. Kew. Suppl. 11: 133. 1953; Moldenke, Résumé 92 & 484. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Citations: BRAZIL: Minas Gerais: Mendes Magalhães 4345 [Herb. Jard. Bot. Belo Horiz. 45189] (N—type).

LEIOTHRIX MICHAELII Alv. Silv.

Synonymy: Leiothrix michellii Moldenke ex Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234, sphalm. 1956. Leiothrix

michaeli Alv. Silv. ex Moldenke, Résumé 309, in syn. 1959.

Bibliography: Alv. Silv., Fl. Mont. 1: 304 & 400, pl. 191. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Phytologia 2: 495. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234 & 303. 1956; Moldenke, Résumé 92, 309, & 484. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 191. 1928.

The type of this species was collected by Dr. J. Michaeli -- in whose honor it is named -- "In campis prope Araxa", Minas Geraes, Brazil, in 1919, and is no. 713 in the Silveira herbarium. Silveira (1928) says of the species "Ab affinibus L. flexuosa Alv. Silv. et L. arrecta Ruhl. Vaginis foliisque molliter denseque pubescentibus facile distinguenda".

LEIOTHRIX MICHAELII var. LONGIPILOSA Moldenke

Synonymy: Leiothrix michellii var. longipilosa Moldenke ex Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234 & 303, sphalm. 1956.

Bibliography: Moldenke, Phytologia 3: 311. 1950; Mendes Magalhães, Anais V Reun. Amual Soc. Bot. Bras. 234 & 303. 1956; Moldenke, Résumé 92, 309, & 484. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

This variety differs from the typical form of the species in having its peduncles densely long-pilose with hairs borne at right angles to the peduncles and grayish-flavidous in color. It has been collected in flower and fruit in August and thus far is known only from the original collection.

Citations: BRAZIL: Minas Gerais: Archer & Mello Barreto 4955 [Herb. Jard. Bot. Belo Horiz. 17520] (N--type).

LEIOTHRIX MILHO-VERDENSIS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 291--292 & 400. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

The type and only known collection of this species was made by Alvaro da Silveira (no. 754) "In campis siccis arenosisque prope Vilho Verde, in Serra Geral", Minas Gerais, Brazil, in June, 1925, and is deposited in the Silveira herbarium.

LEIOTHRIX MUCRONATA (Bong.) Ruhl.

Synonymy: Eriocaulon mucronatum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 626. 1831. Paepalanthus ? mucronatus (Bong.) Kunth, Enum. Pl. 3: 523. 1841. Paepalanthus ? mucronatus Kunth, Enum. Pl. 3: 574 & 625. 1841. Paepalanthus mucronatus Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 427, 463, 507, & 508. 1863. Dupatya mucronata (Bong.) Kuntze, Rev. Gen. Pl. 2: 746.

1891. Dupatya mucronata Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix mucronata Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Bong., Ess. Monog. Erioc. 26--27. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 626 & 627 (1831) and 2: 234--235, pl. 19, fig. 1--3. 1832; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 522, 523, 574, 613, & 625. 1841; D. Dietr., Syn. Pl. 5: 261--262. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 279 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 427--428, 463, 507, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 232--233, 286, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Stapf, Ind. Lond. 3: 91. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 30, 37, 43, & 51. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 499. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 281, 290, 326, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 402. 1960.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 2: pl. 19, fig. 1--3. 1832.

The type of this species was collected "In humidis, glareosis Meia da Serra da Lapa", Minas Gerais, Brazil, by Ludwig Riedel (no. 1411) and is deposited in the Leningrad herbarium. The species is said to be closely related to L. curvifolia (Bong.) Ruhl. Ruhland (1903) cites only the type collection, L. Riedel 1411, and Langsdorff s.n., both from Minas Gerais.

Material has been misidentified and distributed in herbaria under the name Eriocaulon saxatile Bong.

Citations: BRAZIL: Minas Gerais: P. Clausen s.n. [Aug.--April 1840] (Br), s.n. (Br, N).

LEIOTHRIX NUBIGENA (Kunth) Ruhl.

Synonymy: Paepalanthus nubigena Kunth, Enum. Pl. 3: 538--539 & 625. 1841. Eriocaulon nubigenum Kunth ex D. Dietr., Syn. Pl. 5: 263. 1852. Eriocaulon nubigerum Kunth ex Steud., Syn. Pl. Glum. 2: [Cyp.] 334, sphalm. 1855. Dupatya nubigena (Kunth) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Eriocaulon nubigemum Steud. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879. 1893. Dupatya nubigena Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix nubigena Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Kunth, Enum. Pl. 3: 538--539 & 625. 1841; D. Dietr., Syn. Pl. 5: 263. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 281 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 309, 420, 500, & 507, pl. 55, fig. 2. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891.

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CONTENTS

SMITH, L. B., *Notes on Bromeliaceae, XXXI* 121

ROBINSON, H., *A revision of the moss genus, Trichostomopsis* 184

PARKER, K. F., *Two new taxa in Texas Hymenoxys (Compositae)* 192

KING, R. M., & ROBINSON, H., *Studies in the Eupatorieae (Compositae). XXVIII. The genus Praxelis* 193

KING, R. M., & ROBINSON, H., *Studies in the Eupatorieae (Compositae). XXIX. The genus Chromolaena* 196

KING, R. M., & ROBINSON, H., *Studies in the Eupatorieae (Compositae). XXX. The genus Ayapana* 210

KING, R. M., & ROBINSON, H., *Studies in the Eupatorieae (Compositae). XXXI. A new genus, Polyanthina* 213

MOLDENKE, A. L., *Book reviews* 214

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NOTES ON BROMELIACEAE, XXXI

Lyman B. Smith

KEY TO TILLANDSIA AND SIMULATORS

The present revision aims to record all the changes that have taken place in Tillandsia since Mez's monograph in the Pflanzenreich in 1935 as well as a number that he missed because his work was in press. This will serve to prepare the ground for the second volume of my monograph in the Flora Neotropica, namely the subfamily Tillandsioideae. Everyone will have a chance to criticize and my final draft will be that much better.

In this key I have included a number of vrieseas that have been mistaken for Tillandsia or that easily might be and also some guzmanias with simple inflorescences for the same reason.

Although the key is frankly artificial and the species are listed alphabetically afterward, I have placed an estimate of its subgenus after each one. I am using the same subgenera as Mez, except that I have reduced Pityrophyllum to subgenus Tillandsia (Platystachys in Mez) and Aerobia to Anoplophytum.

1. Sepals asymmetric, free, oblong or broadest near apex, rarely over 10 mm long; flowers distichous, sometimes becoming secund.....Subkey XII (Tillandsia subgenus Pseudo-Catopsis)
1. Sepals symmetric, or if slightly asymmetric, then ovate or lanceolate, broadest near base.
 2. Leaf-blades narrowly triangular and tapering evenly from base to apex or linear and not over 2 mm wide.
  3. Flowers polystichous (more than 2-ranked); inflorescence simple.....Subkey VIII
  3. Flowers distichous (2-ranked) or solitary, sometimes turning secund at anthesis.
   4. Plants caulescent; stems evenly leafy, not rhizomatose; leaves not rosulate nor fasciculate; flowering shoot short or of medium height; inflorescence not more than bipinnate.....Subkey I
   4. Plant stemless, but sometimes bearing rhizomes; leaves rosulate or fasciculate.
    5. Lower primary bracts (exclusive of blades) equaling or exceeding the axillary branches.....Subkey VII
    5. Lower primary bracts shorter than the axillary branches or the inflorescence simple.
     6. Leaf-sheaths convergent at their apices, inflated and forming a pseudo-bulb, nearly concolorous with the blades to somewhat ferruginous.....Subkey VI
     6. Leaf-sheaths divergent and not forming a pseudo-bulb even if somewhat inflated (some species with sheaths subinflated but dark castaneous or purple).
      7. Floral bracts broad, densely imbricate and covering the rhachis at anthesis or flowers solitary.....Subkey II

7. Floral bracts spreading or so narrow as to expose the rhachis at anthesis; spikes lax to subdense.
8. Flowers (exclusive of petals) contiguous with each other or at least with the rhachis.
9. Floral bracts and flowers (exclusive of petals) imbricate, more than twice the length of the internodes; spikes subdense.....Subkey III
9. Floral bracts and flowers (exclusive of petals) less than twice the length of the internodes; spikes lax. Subkey IV
8. Flowers (exclusive of petals) not contiguous with each other nor with the fully exposed rhachis, divergent to spreading.....Subkey V
2. Leaf-blades ligulate or subligulate, never tapering evenly from base to apex; flowers distichous (2-ranked), if appearing polystichous (more than 2-ranked) then the 2 bracts below each flower indicating 1-flowered spikes.
10. Lower primary bracts (exclusive of blades) equaling or exceeding the axillary branches.....Subkey XI
10. Lower primary bracts (exclusive of blades) shorter than the axillary branches or the inflorescence simple.
11. Flowers contiguous; spikes dense or subdense.....Subkey IX
11. Flowers not contiguous; spikes lax.....Subkey X

Subkey I

1. Leaves distichous (2-ranked).
2. Floral bracts 4-5 cm long. Argentina.....T. diaguitensis
2. Floral bracts ca 2 cm long at most.
3. Stem several meters in length, exposed between alternating bunches of leaves. Southeastern United States to Argentina and Chile.....T. usneoides
3. Stem rarely over 2 dm long, wholly concealed by the imbricate leaf-sheaths.
4. Leaf-blades linear, usually obtuse, not over 2 mm in diameter.
5. Sepals connate posteriorly; scape without bracts or absent. Peru, Bolivia, Paraguay, Argentina, Chile. T. capillaris
5. Sepals free or equally short-connate.
6. Floral bracts glabrous or scantly lepidote, at most barely longer than the internodes. Bolivia, Paraguay, Argentina.....T. bandensis
6. Floral bracts densely lepidote, twice as long as the internodes or the inflorescence 1-flowered.
7. Sepals lepidote; 2 or 3 scape-bracts immediately below the first floral bract; stem to 2 dm long. Peru, Chile.....T. landbeckii
7. Sepals glabrous, or if lepidote, then only a single scape-bract immediately below the first floral bract.
8. Sepals 12.5 mm long; (petal-blades suborbicular, 6.5 mm broad, blue or violet). Brazil.....T. mallemontii

8. Sepals not more than 9 mm long, (much shorter within the range of T. mallemontii; petal-blades narrowly elliptic, pale violet or white). Southern United States to Argentina.....T. recurvata

4. Leaf-blades narrowly triangular, mucronate, usually well over 2 mm in diameter.

9. Leaves erect; sepals connate posteriorly; scape naked. Peru, Bolivia, Paraguay, Argentina, Chile..T. capillaris

9. Leaves spreading or recurved.

10. Leaves rarely more than 2 cm long; scape not over 4 cm.

11. Floral bracts and sepals prominently nerved; floral bracts densely lepidote. Argentina.....T. angulosa

11. Floral bracts and sepals nearly or quite even, not more than sparsely lepidote. Argentina.....T. rectangula

10. Leaves 2-30 cm long; scape often elongate.

12. Scape none; inflorescence 1-flowered; (petals red). Argentina.....T. albertiana

12. Scape evident; inflorescence usually more than 1-flowered.

13. Floral bracts glabrous.

14. Leaf-blades strongly angled; floral bracts and sepals even. Bolivia, Argentina.....T. funebris

14. Leaf-blades terete; floral bracts and sepals prominently nerved. Argentina.....T. castellanii

13. Floral bracts densely lepidote.

15. Leaf-scales with narrow spreading basal lobes that make the leaf tomentose. Bolivia, Brazil, Argentina, Uruguay.....T. crocata

15. Leaf-scales with broad basal lobes if any, broad and appressed or slightly divergent.

16. Stem 20 cm long, many times longer than the leaves; sepals connate posteriorly. Argentina.T. andicola

16. Stem not over 10 cm long, usually shorter than the leaves.

17. Leaf-blades laterally compressed; leaf-sheaths indistinct, but little broader than the blades, enfolding the stem only by their extreme bases. Peru, Bolivia, Argentina.....T. gilliesii

17. Leaf-blades terete; leaf-sheaths distinct, much broader than the blades, enfolding the stem for most of their length.

18. Sepals equally subfree; scape usually elongate. Bolivia, Argentina, Uruguay.....T. myosura

18. Sepals much connate posteriorly; scape 55 mm long at most. Argentina.....T. retorta

1. Leaves polystichous (in more than 2 ranks).

19. Scape in large part naked or else wholly lacking; inflorescence simple, 1-2-flowered.

20. Leaves not over 2 cm long.

21. Floral bract 1-nerved; leaves 4-9 mm long; leaf-sheaths 3-nerved. Peru, Bolivia, Argentina.....T. bryoides

.....

21. Floral bract several-nerved; leaves to 2 cm long; leaf-sheaths 4-many-nerved.
22. Leaves erect; inflorescence distinctly scapose in most cases. Argentina.....T. aizoides
22. Leaves spreading to recurved; inflorescence subsessile. Argentina.....T. angulosa
20. Leaves 4-6 cm long.
23. Scape lacking; inflorescence sessile.
24. Leaf-blades filiform-attenuate, 1-2 mm wide; sheaths narrow. Colombia, Venezuela.....T. andreana
24. Leaf-blades stout, 5 mm wide; sheaths ample. Mexico to Nicaragua.....T. ionantha
23. Scape developed.
25. Floral bracts densely appressed-lepidote; stem to 20 cm long. Argentina.....T. andicola
25. Floral bracts glabrous; stem not over 6 cm long.
26. Floral bracts prominently nerved; scape-bracts one or none. Argentina.....T. erecta
26. Floral bracts even; scape bracts 2. Bolivia, Argentina. T. funebris
19. Scape present and nearly or quite covered by its bracts (when very short, then the inflorescence compound or simple and more than 2-flowered).
27. Flowers divergent to spreading, not contiguous with nor covering the rhachis at anthesis.
28. Floral bracts carinate and incurved toward apex, 15-20 mm long; inflorescence normally compound.
29. Sepals more or less exserted. Peru.....T. purpurea
29. Sepals shorter than the floral bracts. Ecuador, Peru. T. straminea
28. Floral bracts convex, ecarinate (condition unknown in T. diaguitensis where they are 40-50 mm long).
30. Sepals about equaling or shorter than the floral bracts; inflorescence simple.
31. Floral bracts 15 mm long; leaf-blades 2 mm wide. Ecuador, Peru.....T. caerulea
31. Floral bracts 40-50 mm long.
32. Sepals subcoriaceous, subdensely lepidote. Peru. T. truxillana
32. Sepals membranous, glabrous. Paraguay, Argentina. T. diaguitensis
30. Sepals conspicuously exserted above the floral bracts.
33. Inflorescence simple; floral bracts to 21 mm long. Mexico.....T. albida
33. Inflorescence compound; floral bracts 13-15 mm long. Peru.
34. (Petal-blades purple when dry).....T. humilis
34. (Petal-blades yellow with brown spots; species otherwise indistinguishable, cf. case of T. funebris). T. aureo-brunnea
27. Flowers erect and contiguous with the rhachis and usually also with the floral bracts next above.

35. Floral bracts distinctly carinate toward apex.
36. Leaf-scales with narrow spreading basal lobes that make the leaf tomentose.
37. Inflorescence simple; floral bracts to 26 mm long. Mexico.....T. ehrenbergiana
37. Inflorescence densely digitate; floral bracts about 10 mm long. Ecuador, Peru.....T. tectorum
36. Leaf-scales with basal lobes if any, broad and appressed or slightly divergent.
38. Spikes 2-5-flowered; inflorescence very densely compound with the spikes pressed tightly together.
39. Leaf-blades subulate-attenuate, 10-12 mm wide at base. Peru, Bolivia.....T. calocephala
39. Leaf-blades filiform-attenuate, 7 mm wide at base. Peru.....T. heteromorpha
38. Spikes 5-many-flowered, their apices distinct from each other, or the inflorescence simple.
40. Floral bracts obtuse; scape slender, elongate Ecuador, Peru.....T. floribunda
40. Floral bracts acute; scape stout.
41. Leaves to 20 cm long; leaf-blades to 30 mm wide; inflorescence usually compound. Ecuador, Peru. T. latifolia
41. Leaves 6-7 cm long; leaf-blades 6 mm wide; inflorescence simple (perhaps only an extreme form of T. latifolia). Peru.....T. arenicola
35. Floral bracts evenly convex, ecarinate or very obscurely carinate.
42. Posterior and anterior sepals ecarinate and indistinguishable; floral bracts never more than 17 mm long.
43. Leaf-blades soon glabrous, contrasting with the very dark castaneous sheaths. Costa Rica, Panama. T. insignis
43. Leaf-blades wholly and persistently lepidote, concolorous with the sheaths.
44. Floral bracts 6-8 mm long; inflorescence almost always simple.
45. Spike linear, few-16-flowered; flowers lax, appressed to the strongly geniculate exposed rhachis. Peru, Bolivia, Paraguay, Brazil, Argentina, Uruguay T. loliacea
45. Spike narrowly lanceolate, 1-5-flowered; flowers subdense. Bolivia, Paraguay, Brazil, Argentina. T. tricholepis
44. Floral bracts 10-45 mm long.
46. Scales of the leaves appressed, subsymmetrical.
47. Floral bracts 45 mm long, much exceeding the sepals. Paraguay.....T. esseriana
47. Floral bracts 10-17 mm long, shorter than the sepals.
48. Leaf-blades stout, coiled; inflorescence mostly pinnately compound. Bolivia, Paraguay, Brazil, Argentina, Uruguay.....T. duratii

48. Leaf-blades slender, recurving but not coiled; inflorescence compactly bipinnate or simple. Bolivia, Argentina.....T. reichenbachii
46. Scales of the leaves with divergent basal lobes making the leaf shaggy or tomentose.
49. Plants short-caulescent; leaves much longer than the stem; inflorescence mostly digitately compound. Peru, Bolivia, Paraguay, Brazil.....T. streptocarpa
49. Plants long-caulescent; leaves mostly shorter than the stem.
50. Leaves strict. Paraguay.....T. arhiza
50. Leaves spreading. Colombia to Chile.....T. paleacea
42. Posterior sepals strongly carinate for most of their length, or if not (not verified in some species), then the floral bracts much more than 17 mm long.
51. Leaf-sheaths dark brown or castaneous and contrasting strongly with the blades.
52. Floral bracts 60-80 mm long; leaf-blades 30-50 mm wide at base; plants imperfectly known and doubtfully caulescent. Ecuador.
53. Scape erect; inflorescence simple.....T. petraea
53. Scape decurved; inflorescence compound.....T. cernua
52. Floral bracts 17-28 mm long; leaf-blades 10-30 mm wide.
54. Leaf-scales white, not masking the green of the leaf; blades not over 11 mm wide at base. Brazil..T. dura
54. Leaf-scales cinereous, completely masking the green of the leaf; blades to 30 mm wide at base.
55. Sepals lepidote. Colombia, Peru.....T. chartacea
55. Sepals glabrous. Ecuador.....T. queroensis
51. Leaf-sheaths pale and not contrasting with the blades.
56. Floral bracts orbicular, membranaceous, the lower ones long-apiculate. Cuba to Argentina.....T. tenuifolia
56. Floral bracts ovate or lanceolate, not (or very minutely) apiculate.
57. Spike terete, solitary, 1-few-flowered; floral bracts membranaceous, densely imbricate and concealing the rhachis.
58. Sepals glabrous; spike to 70 mm long. Mexico and the West Indies to Venezuela and Colombia. T. schiedeana
58. Sepals lepidote; spike not over 25 mm long, 1-2-flowered. Mexico.....T. ferrisiana
57. Spikes distinctly complanate.
59. Floral bracts densely and persistently lepidote.
60. Floral bracts ca 10 mm long; leaves tomentose-lepidote. Peru.....T. reducta
60. Floral bracts 20-45 mm long.
61. Sepals lepidote.
62. Scape elongate; scape-bracts elliptic; sepals ca 14 mm long. Colombia, Ecuador.....T. incarnata
62. Scape short; scape-bracts foliaceous; sepals to 20 mm long. Mexico.....T. lepidosepala

61. Sepals glabrous.
63. Sepals free, the posterior alate-carinate. Bolivia
T. boliviensis
63. Sepals posteriorly connate.
64. Leaves 3-4 cm long; scape very short or none. Peru.
T. macbrideana
64. Leaves to 16 cm long; scape evident. Mexico.
T. pueblensis
59. Floral bracts glabrous or nearly so; spike usually single.
65. Stem long and conspicuous, equaling or exceeding the leaves.
66. Spikes lax; floral bracts less than twice the internodes.
Argentina.....T. peiranoi
66. Spikes dense or subdense; floral bracts distinctly more than twice the internodes.
67. Floral bracts 40-50 mm long.
68. Scape (including bracts) nearly as stout as spike; leaves many-ranked, suberect. Chile.....T. werdermannii
68. Scape much more slender than spike; leaves few-ranked, spreading. Argentina.....T. diaguitensis
67. Floral bracts 15-25 mm long.
69. Leaf-blades many times longer than the sheaths, greenish. Peru, Bolivia.....T. caulescens
69. Leaf-blades less than 3 times as long as the barely distinct sheaths, cinereous.
70. Floral bracts prominently nerved. Peru.
71. Inflorescence scapose; (petals blue or violet).
T. cauligera
71. Inflorescence sessile; (petals rose).....T. macbrideana
70. Floral bracts nearly or quite even. Argentina.
T. friesii
65. Stem shorter than the leaves, relatively inconspicuous.
72. Leaves reflexed-tomentose with very fine elongate scales; blades 8 mm wide. Bolivia.....T. cardenasii
72. Leaves appressed- or coarsely divergent-lepidote with suborbicular scales.
73. Scales closely appressed.
74. Leaf-apices filiform-attenuate, soft; floral bracts 30-35 mm long.
75. Floral bracts acute, nerved, pied. Chile.....T. geissei
75. Floral bracts broadly obtuse, faintly nerved, lustrous. Peru.....T. micans
74. Leaf-apices narrowed to an abruptly acute pungent apex. Argentina.....T. argentina
73. Scales more or less divergent.
76. Blades involute, 10 mm wide. Mexico.....T. pueblensis
76. Blades mostly flat, to 20 mm wide.
77. Scape elongate, largely exposed.
78. Floral bracts 20-25 mm long, barely exceeding the sepals; (petal-blades elliptic). Bolivia, Paraguay, Brazil, Argentina.....T. lorentziana
78. Floral bracts 25-40 mm long, much exceeding the sepals; (petal-blades suborbicular). Uruguay....T. arequitae

77. Scape short, largely hidden by the leaves; floral bracts 25-70 mm long. Bolivia, Argentina, Uruguay. T. xiphioides

Subkey II

1. Inflorescence 1-3-flowered, simple; scape short or none.
2. Leaf-scales appressed, symmetrical; leaves ca 5 cm long. Colombia, Venezuela.....T. andreana
2. Leaf-scales more or less spreading, extended on one side.
3. Blades subulate, stout, 5 mm wide; leaves rarely over 6 cm long. Mexico to Nicaragua.....T. ionantha
3. Blades filiform-attenuate, setaceous; leaves 10-15 cm long. Mexico to Honduras.....T. magnusiana
1. Inflorescence much more than 3-flowered, simple or compound.
4. Leaf-blades linear-subulate to filiform.
5. Floral bracts membranaceous, nerved, red; inflorescence simple. Mexico.
6. Leaf-scales orbicular, closely appressed....T. chaetophylla
6. Leaf-scales linear, spreading.....T. ignesiae
5. Floral bracts coriaceous or subcoriaceous, even to nerved; inflorescence usually compound.
7. Spikes arching-recurved; floral bracts scarcely more than twice the internodes, usually nerved. West Indies, Mexico, Central America.....T. festucoides
7. Spikes straight, erect or suberect.
8. Inflorescence densely digitate.
9. Floral bracts soon glabrous; sepals to 13 mm long; (stamens included). Ecuador, Peru.....T. floribunda
9. Floral bracts densely lepidote; sepals 15-20 mm long; (stamens exserted). West Indies and Mexico to Venezuela and Bolivia.....T. juncea
8. Inflorescence laxly pinnate or simple.
10. Floral bracts glabrous, 20-25 mm long. Mexico. T. ortgiesiana
10. Floral bracts lepidote or if glabrous then much smaller.
11. Leaf-sheaths 15-20 mm wide; blades of the primary bracts generally exceeded by the axillary spikes. United States: Georgia, Florida; Mexico..T. bartramii
11. Leaf-sheaths smaller; blades of the primary bracts generally exceeding the axillary spikes.
12. Floral bracts densely appressed-lepidote at least when young, 8-14 (-19) mm long; (stamens exserted). South Carolina to Florida, West Indies and Mexico to Venezuela and northern Brazil.....T. setacea
12. Floral bracts sparsely lepidote, 10 mm long; (stamens included). Mexico, Guatemala, Salvador....T. remota
4. Leaf-blades definitely if narrowly triangular.
13. Floral bracts convex, ecarinate and without any extra thickening of the midnerve.
14. Posterior and anterior sepals all ecarinate and alike.
15. Sepals 27-40 mm long.

16. Spikes arching-decurved; inflorescence laxly bipinnate. Colombia.....T. racinae
16. Spikes erect or suberect, few or solitary.
17. Leaf-blades cinereous; sheaths large, dark castaneous.
18. Scape very short, hidden by the leaves; inflorescence digitate. Mexico.....T. carlsoniae
18. Scape elongate. Ecuador.
19. Inflorescence simple, erect.....T. petraea
19. Inflorescence compound, pendent.....T. cernua
17. Leaf-blades green.
20. Inflorescence subdigitate; sepals brown-lepidote. Colombia.....T. romeroi
20. Inflorescence simple; sepals glabrous. Ecuador, Peru, Bolivia.....T. walteri
15. Sepals 11-22 mm long.
21. Leaf-blades green. Brazil.....V. (13) triangularis
21. Leaf-blades cinereous.
22. Sepals 11 mm long; leaf-sheaths concolorous with the blades, inconspicuous. Bolivia, Paraguay, Argentina. T. vernicosa
22. Sepals 16-22 mm long.
23. Floral bracts strongly incurved, fleshy, minutely rugulose and blackish when dry; inflorescence simple. Panama, Colombia, Suriname, Brazil.....T. kegeliana
23. Floral bracts scarcely if at all incurved.
24. Scape straight, stout.
25. Inflorescence digitate; scape exceeding the leaves. Colombia, Venezuela.....V. (4) robusta
25. Inflorescence simple; scape shorter than the leaves. Ecuador.....V. (14) barclayana
24. Scape curved, slender.
26. Upper scape-bracts acute or obtuse. Costa Rica to Venezuela and Bolivia, Greater Antilles. V. (3a) incurva, Phytologia 16: 458.
26. Upper scape-bracts long-flagellate with contorted linear blades. Ecuador.....T. flagellata
14. Posterior sepals carinate toward apex, distinct from the anterior.
27. Leaf-blades green, not notably cinereous.
28. Floral bracts not over 20 mm long; leaf-sheaths inconspicuous. West Indies and Mexico to northern South America. T. polystachia
28. Floral bracts 30-50 mm long; leaf-sheaths conspicuous.
29. Inflorescence simple or rarely with a single lateral spike; scape short. Salvador, Honduras....T. cryptopoda
29. Inflorescence amply and densely bipinnate; scape elongate. Hispaniola.....T. baliophylla
27. Leaf-blades cinereous (at least beneath).
30. Sheaths brown, darker than the blades and contrasting with them; floral bracts glabrous or glabrescent.
31. Sepals 12-22 mm long; leaf-blades 6-30 mm wide.
.....

32. Inflorescence densely bipinnate, ellipsoid; spikes 25 mm long; sepals 12 mm long. Peru.....T. cerrateana
32. Inflorescence laxly subdigitate; spikes 11-13 cm long; sepals 22 mm long. Colombia, Peru.....T. chartacea
31. Sepals 28-35 mm long; leaf-blades 3-6 cm wide.
33. Sepals high-connate posteriorly; inflorescence bipinnate; scape-bracts and lower primary bracts with subulate blades. Mexico, Guatemala, Salvador....T. xerographica
33. Sepals free or equally subfree. Ecuador.
34. Inflorescence amply tripinnate; floral bracts 36 mm long T. indigofera
34. Inflorescence simple; floral bracts 60 mm long. T. petraea
30. Leaf-sheaths pale, merging with the blades.
35. Floral bracts densely lepidote.
36. Sepals exserted above the floral bracts, to 26 mm long. Mexico.....T. exserta
36. Sepals covered by the floral bracts.
37. Inflorescence 3-5 cm long, simple or with a single small lateral spike; sepals 20 mm long. Mexico. T. lepidosepala
37. Inflorescence 2 cm long, depauperately compound, dense; sepals 9 mm long. Peru.....T. reducta
35. Floral bracts glabrous or glabrescent.
38. Leaf-scales appressed.
39. Scape shorter than the leaves. Mexico..T. achyrostachys
39. Scape equaling or exceeding the leaves, to 4 dm long. Chile.....T. geissei
38. Leaf-scales more or less spreading.
40. Inflorescence densely digitate; scape decurved. Mexico. T. matudae
40. Inflorescence simple; scape erect. Bolivia, Argentina, Uruguay.....T. xiphioides
13. Floral bracts carinate or at least the midnerve with extra thickening.
41. Leaf-blades green, not notably cinereous or ferruginous.
42. Upper scape-bracts and lower primary bracts laminate.
43. Leaf-sheaths brown beneath, darker than the blades and contrasting with them.
44. Inflorescence subdigitate, digitate or simple.
45. Floral bracts broadly ovate, to 4 cm long. Mexico to Costa Rica, Suriname.....T. punctulata
45. Floral bracts linear-lanceolate, 6 cm long. Ecuador. V. (71) drewii
44. Inflorescence elongate, bipinnate or subtripinnate. Mexico.
46. Spikes 30-35 mm wide, thick; inflorescence broad with spreading spikes.....T. intumescens
46. Spikes 10-20 mm wide, strongly compressed; inflorescence narrow with suberect branches or spikes.
47. Spikes lance-ovate, 20 mm wide; inflorescence bipinnate T. mexicana

47. Spikes lanceolate or linear-lanceolate; inflorescence usually tripinnate at base.
48. Floral bracts densely and evenly appressed-lepidote. T. calothyrsus
48. Floral bracts glabrous.....T. rettigiana
43. Leaf-sheaths pale beneath, concolorous with the blades.
49. Floral bracts strongly nerved, shorter than the sepals. Virgin Islands and vicinity.....T. lineatispica
49. Floral bracts nearly or quite even.
50. Floral bracts 15-25 mm long.
51. Spikes linear, 1 cm wide; leaf-blades concolorous. West Indies and Mexico to Bolivia and Brazil. T. polystachia
51. Spikes lanceolate, to 2 cm wide; leaf-blades dark-mottled. Peru.....T. piurensis
50. Floral bracts 30-45 mm long.
52. Inflorescence subdigitate.
53. Posterior sepals obscurely carinate; floral bracts suborbicular, apiculate. Colombia.....T. romeroi
53. Posterior sepals distinctly carinate; floral bracts broadly elliptic, acute. Colombia, Ecuador. T. arcuans
52. Inflorescence elongate.
54. Spikes long-stipitate. Mexico.....T. roland-gosselinii
54. Spikes sessile. Colombia to Peru.....T. restrepoana
42. Upper scape-bracts acute or apiculate, but not laminate.
55. Leaf-sheaths dark, contrasting with the blades.
56. Scape elongate; leaf-blades much longer than the sheaths. Mexico to Costa Rica.....T. tricolor
56. Scape very short and hidden by the leaves; leaf-blades only about twice as long as the sheaths. Salvador, Honduras.....T. cryptopoda
55. Leaf-sheaths pale, concolorous with the blades.
57. Floral bracts prominently nerved.
58. Scape erect, elongate; spike many-flowered. Peru. T. lindenii
58. Scape ascending, short; spike few-flowered. Ecuador. T. umbellata
57. Floral bracts even or nearly so.
59. Sepals 45 mm long, the posterior carinate. Ecuador. T. pretiosa
59. Sepals 30-35 mm long.
60. Sepals in fruit not more than 4 mm wide, the posterior sharply carinate. Central America, Trinidad, northern South America.....T. anceps
60. Sepals in fruit 6 mm wide, the posterior very obtusely carinate if at all. Ecuador.....T. cyanea
41. Leaf-blades distinctly and densely cinereous- or ferruginous-lepidote (at least beneath).
61. Floral bracts densely lepidote.
62. Sepals 25-30 mm long. Mexico.
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63. Lower spikes several times as long as the sheaths of the primary bracts.....T. calothyrsus
63. Lower spikes less than twice as long as the sheaths of the primary bracts.
64. Floral bracts coriaceous.....T. bourgaei
64. Floral bracts membranaceous.....T. mexiae
62. Sepals 8-20 mm long.
65. Leaf-sheaths ample, dark castaneous, contrasting with the blades; inflorescence elongate.
66. Sepals 8-10 mm long.
67. Spikes much longer than the primary bracts. Venezuela to Bolivia.....V. (67) heterandra
67. Spikes (at least the lowest) less than twice as long as the primary bracts. Colombia, Ecuador.
V. (70) fragrans
66. Sepals 18-20 mm long.
68. Scape curved; primary bracts suborbicular. Colombia.
T. schultzei
68. Scape straight; primary bracts ovate. Mexico to Nicaragua.....T. vicentina
65. Leaf-sheaths small, pale, inconspicuous (sometimes purplish in T. latifolia); inflorescence short-pinnate.
69. Floral bracts distinctly nerved.
70. Spikes subsessile; inflorescence densely digitate. Mexico.....T. mauryana
70. Spikes with long bracteate sterile bases; inflorescence fan-shaped with all spikes in one plane. Bolivia, Paraguay, Brazil, Argentina.....T. didisticha
69. Floral bracts nearly or quite even or any nerves wholly obscured by a dense coat of scales.
71. Scales of the floral bracts suborbicular and scarcely lobed, dark-centered. Ecuador, Peru.....T. latifolia
71. Scales of the floral bracts filamentous-lacerate, pale-centered. Colombia, Venezuela, Trinidad, Brazil.
T. gardneri
61. Floral bracts glabrous or glabrescent.
72. Posterior and anterior sepals ecarinate, alike.
73. Floral bracts 9-10 cm long, narrowly oblong; sepals 40 mm long. Ecuador.....T. zarumensis
73. Floral bracts less than 4 cm long.
74. Sepals 10-13 mm long; floral bracts strongly nerved.
75. Spikes straight; inflorescence digitate. Colombia.
V. (65) crenulipetala
75. Spikes nearly all geniculate, spreading abruptly from the long erect sterile base. Mexico, West Indies, Venezuela, Colombia.....V. (69) didistichoides
74. Sepals 15-23 mm long; floral bracts even or faintly nerved
76. Inflorescence elongate.
77. Lower spikes much longer than the primary bracts. Peru.
V. (5) olmosana
77. Lower spikes less than twice as long as the primary bracts. Venezuela to Peru.....V. (10) tequendamae

76. Inflorescence subdigitate to simple.
78. Floral bracts equaling or exceeding the sepals; inflorescence simple. Ecuador.....V. (14) barclayana
78. Floral bracts exceeded by the sepals; inflorescence subdigitate. Colombia.....T. brevior
72. Posterior sepals sharply carinate, distinct from the anterior
79. Sepals 21-50 mm long.
80. Inflorescence subdigitate with the spikes longer than the axis, or simple.
81. Leaf-sheaths pale, concolorous with the blades. Mexico. T. concolor
81. Leaf-sheaths dark, brown or purple, contrasting with the blades.
82. Floral bracts thin and nerved when dry; scape very short and almost wholly hidden by the leaves. Salvador, Honduras.....T. cryptopoda
82. Floral bracts coriaceous, even or nearly so.
83. Leaf-sheaths purple. Mexico to Costa Rica. T. lampropoda
83. Leaf-sheaths ferruginous. Florida, West Indies and Mexico to northern South America.....T. fasciculata
80. Inflorescence elongate.
84. Spikes divergent to spreading; inflorescence lax to subdense.
85. Leaf-blades contorted; floral bracts but slightly carinate. Mexico to Honduras.....T. xerographica
85. Leaf-blades not contorted.
86. Sheaths pale, concolorous with the blades.
87. Sepals 30 mm long. Colombia.....T. restrepoana
87. Sepals 17-22 mm long. Colombia to Peru.....T. confinis
86. Sheaths ferruginous or castaneous, contrasting with the blades.
88. Lower primary bracts more than half as long as the spikes. Peru.....T. wurdackii
88. Lower primary bracts much shorter than the spikes.
89. Spikes thick; floral bracts verrucose when dry; posterior sepals alate-carinate. Mexico. T. intumescens
89. Spikes strongly complanate; floral bracts not verrucose.
90. Sepals equally subfree; spikes arching-decurved. Ecuador.....T. ampla
90. Sepals more or less connate posteriorly; spikes divergent. Florida, West Indies, and Mexico to Colombia and Guiana.....T. fasciculata
84. Spikes strict; inflorescence dense.
91. Lower primary bracts (without blades) about half as long as the axillary spikes or more.
92. Sepals 40-50 mm long. Mexico, Guatemala, Salvador. T. ponderosa
92. Sepals 21-30 mm long.
93. Floral bracts cucullate. Colombia.....T. suescana

93. Floral bracts straight toward apex. Mexico.
94. Sheaths of the primary bracts broadly ovate. T. bourgaei
94. Sheaths of the primary bracts lance-elliptic. T. mexicana
91. Lower primary bracts much shorter than the axillary spikes.
95. Sepals exserted; floral bracts lustrous. Mexico, Guatemala, Salvador.....T. polita
95. Sepals wholly covered by the floral bracts.
96. Spikes only slightly complanate. Bolivia..T. kuntzeana
96. Spikes strongly complanate.
97. Floral bracts with straight or only slightly curved apices. Mexico.....T. dugesii
97. Floral bracts cucullate. Guatemala...T. rodriguezíana
79. Sepals 20 mm long or less.
98. Spikes very thick, subterete or slightly complanate; inflorescence subdigitate to simple.
99. Posterior sepals not completely connate. Costa Rica. T. acostae
99. Posterior sepals completely connate. Colombia. T. rhomboidea
98. Spikes strongly complanate.
100. Floral bracts strongly nerved, thin.
101. Scape very short; spikes with long narrow sterile bases; leaf-sheaths pale. Guatemala, Salvador...T. flabellata
101. Scape well developed; spikes short-stipitate to subsessile; leaf-sheaths dark.
102. Sepals exserted at anthesis, 12 mm long; inflorescence ellipsoid, 6 cm long. Peru.....T. cerrateana
102. Sepals covered by the floral bracts.
103. Spikes 12 mm wide; sepals 11-13 mm long. Colombia. V. (65) crenulipetala
103. Spikes broader; sepals 13-20 mm long. Colombia, Venezuela.....T. turneri
100. Floral bracts even or nearly so, mostly coriaceous.
104. Primary bracts dark, ample, conspicuous. Colombia, Venezuela.....T. turneri
104. Primary bracts pale, mostly inconspicuous.
105. Leaf-sheaths some shade of brown beneath and contrasting with the blades.
106. Blades covered with closely appressed scales; sheaths ferruginous. Florida, West Indies and Mexico to Colombia and Guiana.....T. fasciculata
106. Blades covered with divergent scales; sheaths dark castaneous. Mexico to Nicaragua.....T. vicentina
105. Leaf-sheaths pale beneath and merging with the blades.or purplish.
107. Sheaths ample, 13-20 cm long; blades becoming glabrous above; spikes strongly complanate. Colombia to Peru. T. confinis

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107. Sheaths mostly inconspicuous; blades densely and persistently lepidote on both sides; spikes moderately complanate. Ecuador, Peru....T. latifolia

Subkey III

1. Posterior sepals sharply carinate for most of their length, distinguishable from the anterior.
2. Leaf-blades covered (at least beneath) with a solid coat of cinereous scales that completely mask any green coloration.
3. Floral bracts densely lepidote.
4. Sepals 8-15 mm long.
5. Floral bracts carinate.
6. Inflorescence fan-shaped with the spikes all in one plane Bolivia, Paraguay, Brazil, Argentina.....T. didisticha
6. Inflorescence densely cylindric, tripinnate. Ecuador. V. (66) appendiculata
5. Floral bracts convex, ecarinate.
7. Sepals lepidote; inflorescence simple or rarely of 2 or 3 spikes. Colombia, Ecuador.....T. incarnata
7. Sepals glabrous; inflorescence bipinnate from about 14 spikes. Peru, Bolivia.....T. rusbyi
4. Sepals 20-33 mm long.
8. Floral bracts exceeded by the sepals at anthesis. Mexico.
9. Inflorescence simple or subdigitate; spikes erect or suberect.....T. exserta
9. Inflorescence pinnate, its simple or divided branches spreading.....T. leucolepis
8. Floral bracts wholly covering the sepals.
10. Sepals lepidote. Mexico.....T. lepidosepala
10. Sepals glabrous.
11. Floral bracts coriaceous; sepals free. Bolivia. T. boliviensis
11. Floral bracts membranaceous; sepals connate posteriorly Mexico.....T. pueblensis
3. Floral bracts glabrous or glabrescent.
12. Leaf-sheaths brown to dark castaneous, contrasting with the blades
13. Sepals 16-22 mm long. Ecuador, Peru.....T. chartacea
13. Sepals 8-15 mm long.
14. Floral bracts carinate with the midnerve thickened.
15. Leaf-sheaths broadly ovate, 6-9 cm long, castaneous. Colombia.....T. archeri
15. Leaf-sheaths ovate, 3-6 cm long, brown. West Indies. T. canescens
14. Floral bracts ecarinate with nerves about equally developed.
16. Lower primary bracts lance-ovate, attenuate. Mexico. T. gymnobotrya
16. Lower primary bracts ample, caudate-acuminate. Ecuador, Peru.....T. oroyensis
12. Leaf-sheaths pale, concolorous and merging with the blades

17. Sepals to 42 mm long. Bolivia, Argentina, Uruguay. T. xiphioides
17. Sepals not over 18 mm long.
18. Floral bracts carinate; inflorescence fan-shaped with the spikes all in one plane. Bolivia, Paraguay, Brazil, Argentina.....T. didisticha
18. Floral bracts convex, ecarinate.
19. Floral bracts even except near apex; leaves gradually narrowed to an abruptly acute apex. Argentina. T. argentina
19. Floral bracts prominently nerved.
20. Leaf-scales more or less spreading; floral bracts about equaling the sepals. Paraguay, Bolivia, Brazil, Argentina.....T. lorentziana
20. Leaf-scales closely appressed; floral bracts much exceeding the sepals. Florida, West Indies and Mexico to Venezuela and Bolivia.....T. valenzuelana
2. Leaf-blades not notably cinereous, the green coloring showing on both sides.
21. Sepals 30-40 mm long; floral bracts 40-50 mm long.
22. Inflorescence bipinnate; leaf-blades 40 mm wide. Mexico. T. deppeana
22. Inflorescence simple or rarely of 2 spikes; leaf-blades 10-15 mm wide. Salvador, Honduras.....T. cryptopoda
21. Sepals 9-27 mm long.
23. Leaf-blades filiform-attenuate; leaves fasciculate; leaf-sheaths triangular.
24. Floral bracts thin, prominently and equally nerved throughout; inflorescence simple. Brazil...T. linearis
24. Floral bracts with the midnerve thickened apically but nearly or quite even basally.
25. Spikes arching-recurved; floral bracts scarcely more than twice as long as the internodes, usually much nerved. West Indies, Mexico, Central America. T. festucoides
25. Spikes straight, suberect, dense. Georgia, Florida. T. bartramii
23. Leaf-blades definitely if narrowly triangular; leaf-sheaths usually ovate or elliptic.
26. Sepals 21-27 mm long.
27. Inflorescence simple. Ecuador.....T. acosta-solisii
27. Inflorescence bipinnate, densely cylindric. Peru. T. sagasteguii
26. Sepals 9-15 mm long.
28. Floral bracts even or nearly so.
29. Leaf-sheaths dark, contrasting with the blades; sepals 9 mm long. Ecuador.....T. barbeyana
29. Leaf-sheaths pale, merging with the blades; sepals 10-15 mm long. Florida, West Indies and Mexico to Bolivia and Brazil.....T. polystachia
28. Floral bracts prominently nerved.

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30. Sepals exserted above the floral bracts. Guatemala, British Honduras.....T. chlorophylla
30. Sepals wholly covered by the floral bracts.
31. Lower primary bracts with long linear blades that exceed the axillary branches; floral bracts 15 mm long. Costa Rica, Colombia, Venezuela.....T. longifolia
31. Lower primary bracts bladeless or with short inconspicuous blades that do not exceed the axillary branches; floral bracts 18-20 mm long. Mexico and Jamaica to Peru and northern Brazil.....T. elongata

1. Posterior and anterior sepals ecarinate, indistinguishable.
32. Sepals 10-14 mm long.
33. Leaf-blades strongly recurving to spiraling; sheaths short, suborbicular; plants sometimes caulescent.
34. Scales of the leaves with divergent basal lobes making the leaf shaggy or tomentose. Peru, Bolivia, Paraguay, Brazil.....T. streptocarpa
34. Scales of the leaves appressed, subsymmetrical. Bolivia, Argentina.....T. reichenbachii
33. Leaf-blades straight or nearly so; sheaths definitely longer than wide.
35. Plant rhizomatous; inflorescence simple. Ecuador. V. (15a) espinosae, Phytologia 16: 163.
35. Plant not rhizomatous; inflorescence usually compound.
36. Floral bracts even, coriaceous. Bolivia, Paraguay, Argentina.....T. vernicosa
36. Floral bracts prominently nerved, thin.
37. Branches geniculate for the most part, spreading abruptly from the long erect sterile base.
38. Floral bracts distinctly and densely lepidote; spikes oblong or linear. Venezuela to Bolivia. V. (67) heterandra (including V. (68) lacera)
38. Floral bracts obscurely lepidote, appearing glabrous; spikes lanceolate. Mexico, West Indies, Venezuela, Colombia.....V. (69) didistichoides
37. Branches straight.
39. Inflorescence laxly pinnate. Peru.....T. gayi
39. Inflorescence digitate.
40. Scape little if any longer than the spikes. Nicaragua to Peru.....V. (64) chontalensis
40. Scape much longer than the spikes. Colombia. V. (65) crenulipetala
32. Sepals 15-30 mm long.
41. Lowest spikes less than twice as long as the primary bracts (exclusive of blades); inflorescence bipinnate.
42. Inflorescence pendulous. Venezuela to Peru. V. (10) tequendamae
42. Inflorescence erect.
43. Floral bracts carinate, 30-40 mm long. Peru. V. (7) harmsiana

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43. Floral bracts nearly all convex and ecarinate, not over . 25 mm long.
44. Floral bracts coriaceous, even, soon glabrous. Colombia to Peru.....V. (6) cylindrica
44. Floral bracts chartaceous, nerved, densely pale-lepidote. Peru.
V. (6a) sagasteguii, Phytologia 16: 82.
41. Lowest spikes several times longer than the primary bracts (exclusive of blades), or the inflorescence simple.
45. Inflorescence pinnate, the axis longer than the branches.
46. Floral bracts acute, even centrally. Mexico.
47. Leaf-blades appearing glabrous; floral bracts 2-3 times as long as the internodes.....T. kirchhoffiana
47. Leaf-blades densely pale-lepidote beneath; floral bracts 4-5 times as long as the internodes.....T. parryi
46. Floral bracts obtuse, nerved or rugose; rhachis prominently winged (excavated). Peru.
48. Spikes 15 mm wide; floral bracts 20 mm long, nerved.
T. extensa
48. Spikes 30 mm wide; floral bracts over 30 mm long, strongly rugose-sulcate when dry.....T. ferreyrae
45. Inflorescence subpinnate or digitate, the axis shorter than the branches or the inflorescence simple.
49. Sepals exserted above the floral bracts. Ecuador, Peru.
V. (1) hitchcockiana
49. Sepals covered by the floral bracts.
50. Leaf-blades green with scales obscure or lacking. Peru.
T. lindenii
50. Leaf-blades cinereous from a dense coat of scales.
51. Floral bracts over 3 times as long as the internodes, glabrous.
52. Floral bracts 4-5 times as long as the internodes. Colombia, Venezuela.....V. (4) robusta
52. Floral bracts 3-4 times as long as the internodes. Ecuador, Peru.....V. (15) patula
51. Floral bracts only 2-3 times as long as the internodes.
53. Leaf-sheaths merging with the blades, castaneous only near base; sepals 20-25 mm long. Peru.
V. (3) cereicola
53. Leaf-sheaths contracted at junction with blades, almost wholly castaneous; sepals 15-20 mm long.
54. Floral bracts densely cinereous-lepidote. Colombia, Peru.....V. (11) pereziana
54. Floral bracts glabrous to subdensely lepidote. Costa Rica to Venezuela and Bolivia, Greater Antilles.
V. (3a) incurva, Phytologia 16: 458.

Subkey IV

1. Sepals shorter than the floral bracts and enfolded by them.
2. Floral bracts to 50 mm long. Colombia, Venezuela, Suriname, Peru, Amazonian Brazil.....T. adpressiflora

2. Floral bracts not over 30 mm long.
3. Inflorescence simple; floral bracts glabrous. Ecuador.
T. acosta-solisii
3. Inflorescence compound.
4. Floral bracts red and glabrous except near apex. Peru.
V. (2) rauhii
4. Floral bracts completely covered with cinereous scales.
Mexico.....T. socialis
1. Sepals equaling or exceeding the floral bracts.
5. Leaves not over 7.5 cm long; sepals 9-15 mm long.
6. Floral bracts glabrous, 12 mm long. Argentina...T. peiranoi
6. Floral bracts densely lepidote.
7. Leaf-blades 3-5 mm wide; floral bracts 8 mm long. Peru, Bolivia, Paraguay, Brazil, Argentina.....T. loliacea
7. Leaf-blades 15 mm wide; floral bracts 14 mm long. Peru.
T. aurea
5. Leaves 15-100 cm long; sepals 14-30 mm long.
8. Leaves covered with coarse cinereous spreading scales, 15-20 cm long; inflorescence few-branched. Mexico.
T. karwinskyana
8. Leaves covered with minute pale appressed or subappressed scales, to 100 cm long.
9. Branches nearly or quite straight, slender, sterile for about half their length from base. Hispaniola.
T. paniculata
9. Branches distinctly flexuous or geniculate.
10. Floral bracts even or at most faintly nerved near margin; branches usually geniculate. Mexico to Honduras.
T. dasyliriifolia
10. Floral bracts prominently nerved throughout; branches merely flexuous in most cases.
11. Sepals lepidote; leaf-scales subspreading. Jamaica.
T. calcicola
11. Sepals glabrous; leaf-scales closely appressed.
12. Rhachis slender; sepals 14-18 mm long. Georgia, Florida, West Indies, Mexico, British Honduras, Venezuela.....T. utriculata
12. Rhachis stout; sepals 25-30 mm long. Mexico, Central America.....T. makoyana

Subkey V

1. Leaf-blades not more than 2 mm wide at base, filiform.
2. Inflorescence compound; sepals 7-8 mm long. Mexico, Central America.....T. filifolia
2. Inflorescence simple; sepals to 14 mm long. Mexico, Guatemala, Cuba, Jamaica.....T. argentea
1. Leaf-blades much more than 2 mm wide at base, definitely if very narrowly triangular.
3. Leaf-scales produced on one side, spreading or subspreading, making the leaf-blade wholly pruinose; sepals 10-18 mm long.

4. Floral bracts ecarinate, slightly to much shorter than the sepals. Peru.
5. Inflorescence simple; floral bracts slightly shorter than the sepals.....T. aurea
5. Inflorescence compound; floral bracts much shorter than the sepals.
6. (Petal-blades purple when dry).....T. humilis
6. (Petal-blades yellow with brown spots; species otherwise indistinguishable; cf. case of T. funebris).
T. aureo-brunnea
4. Floral bracts carinate toward apex, nearly equaling to exceeding the sepals; inflorescence usually compound.
7. Sepals more or less exserted. Peru.....T. purpurea
7. Sepals covered by the floral bracts.
8. Floral bracts nearly straight. Ecuador, Peru.
T. straminea
8. Floral bracts strongly incurved. Peru.....T. cacticola
3, Leaf-scales not produced, symmetrical, appressed, wholly or partly covering the leaf-blade.
9. Flowers strongly deflexed-secund at anthesis; inflorescence amply and laxly compound (cf. Vriesea for other species).
10. Floral bracts about equaling the internodes, 20-25 mm long. Colombia, Ecuador.....T. mima
10. Floral bracts about twice as long as the internodes, 30-35 mm long. Ecuador.....T. secunda
9. Flowers not secund (sometimes appearing non-secund in Vriesea goniorachis with a simple inflorescence).
11. Internodes of the rhachis 20-30 mm long, about equaling the floral bracts; leaf-sheaths concolorous and merging gradually with the blades. Florida, West Indies, Panama, northern South America.....T. flexuosa
11. Internodes of the rhachis not more than 15 mm long.
12. Inflorescence compound.
13. Sepals not more than 13 mm long.
14. Flowers less than twice the internodes; inflorescence amply tripinnate. Bolivia.....T. marantoidea
14. Flowers more than twice the internodes; inflorescence bipinnate or at base slightly tripinnate. Ecuador, Peru.....T. oroyensis
13. Sepals 16-30 mm long; inflorescence not more than bipinnate.
15. Posterior sepals carinate, distinct from the anterior.
16. Floral bracts lepidote, equaling or exceeding the sepals. Honduras.....T. steiropoda
16. Floral bracts glabrous, distinctly exceeded by the sepals. Jamaica, Guadeloupe.....T. antillana
15. Posterior and anterior sepals ecarinate, similar.
17. Floral bracts 3 times as long as the internodes. Mexico.....T. parryi
17. Floral bracts not more than twice as long as the internodes. Brazil.....V. (12) lubbersii
12. Inflorescence simple.

18. Sepals 22-45 mm long.
19. Posterior sepals carinate, distinct from the anterior.
20. Sepals 22 mm long. Ecuador.....T. acosta-solisii
20. Sepals 45 mm long. Ecuador.....T. pretiosa
19. Posterior and anterior sepals ecarinate, similar.
21. Rhachis 7 mm thick; sepals very broadly rounded, subtruncate. Brazil.....V. (73) goniorachis
21. Rhachis much more slender.
22. Leaf-blades green, obscurely lepidote. Brazil. V. (13) triangularis
22. Leaf-blades cinereous from a complete coat of coarse scales. Ecuador, Peru.....V. (15) patula
18. Sepals not more than about 16 mm long.
23. Floral bracts exceeding the sepals; flowers only divergent. Ecuador.....T. triglochinoides
23. Floral bracts equaling or shorter than the sepals; flowers mostly spreading.
24. Flowers divergent at anthesis; floral bracts ecarinate Ecuador.....T. cornuta
24. Flowers spreading at anthesis.
25. Rhachis alate (excavated). Central America, Trinidad, northern South America.....T. monadelpha
25. Rhachis merely angled. Ecuador.
26. Floral bracts only about twice as long as the slender internodes, barely carinate. T. narthecioides
26. Floral bracts about 4 times as long as the stout internodes, sharply carinate.....T. scaligera

Subkey VI

1. Sepals exserted above the floral bracts.
2. Flowers erect; inflorescence simple...Panama, Trinidad. T. subulifera
2. Flowers spreading; inflorescence compound. Brazil...T. limae
1. Sepals wholly covered by the floral bracts.
3. Floral bracts densely cinereous-lepidote with coarse spreading or subspreading scales.
4. Leaf-blades flat for most of their length, the outer ones spirally recurved; inflorescence pinnately compound. Mexico to Honduras, Jamaica.....T. streptophylla
4. Leaf-blades involute-subulate throughout; inflorescence subpinnate to simple.
5. Scape evident above the pseudo-bulb; inflorescence digitate or subpinnate from 3-6 spikes. Mexico, Guatemala. T. seleriana
5. Scape none above the pseudo-bulb; inflorescence simple or rarely of 2-3 spikes. Mexico, Florida and the West Indies to Ecuador and Brazil.....T. pruinosa
3. Floral bracts closely appressed-lepidote or glabrous.
6. Floral bracts carinate, acute, glabrous or glabrescent.
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7. Leaf-sheaths broadly ovate to orbicular, forming a globose pseudo-bulb 2-4 cm long. Colombia to Peru....T. disticha
7. Leaf-sheaths ovate, 10 cm long, forming a narrowly ovoid pseudo-bulb. Mexico.....T. dressleri
6. Floral bracts ecarinate.
8. Floral bracts glabrous or obscurely lepidote.
9. Floral bracts even or nerved only near margin. Florida, West Indies and Mexico to Panama and Venezuela. T. balbisiana
9. Floral bracts strongly nerved. Mexico to Costa Rica. T. caput-medusae
8. Floral bracts densely lepidote.
10. Scape-bracts vaginiform, the upper merely apiculate; leaf blades straight or arched; sepals lepidote.
11. Posterior and anterior sepals all ecarinate, free, elliptic. Colombia, Peru, Bolivia, Brazil. T. paraënsis
11. Posterior sepals carinate, short-connate, oblong. Dominican Republic.....T. ariza-juliae
10. Scape-bracts foliaceous; leaf-blades usually coiled or contorted.
12. Leaf-sheaths variegated. Mexico to Panama.....T. butzii
12. Leaf-sheaths green, concolorous or with only a narrow marginal band of red or purple.
13. Leaf-sheaths orbicular, abruptly contracted into the blades. West Indies and Mexico to Brazil and Colombia.....T. bulbosa
13. Leaf-sheaths ovate or elliptic, merging into the blades
14. Pseudo-bulb elongate, one-third to more than one-half the total length of the plant. Florida, West Indies and Mexico to Colombia.....T. circinnata
14. Pseudo-bulb relatively much smaller, only 2-5 cm long. Texas to Guatemala.....T. baileyi

Subkey VII

1. Posterior and anterior sepals convex, ecarinate, alike.
2. Leaf-blades green; floral bracts inflated, glaucous. Mexico. T. mooreana
2. Leaf-blades cinereous.
3. Sepals 50 mm long. Ecuador.....T. spathacea
3. Sepals 15-27 mm long.
4. Floral bracts convex, ecarinate. Peru. V. (6a) sagasteguii, Phytologia 16: 82.
4. Floral bracts carinate.
5. Inflorescence erect; spikes almost wholly covered by the primary bracts; floral bracts densely lepidote. V. (8) tillandsioides
5. Inflorescence pendulous.
6. Floral bracts much exceeding the sepals, 40 mm long. Ecuador.....V. (9) arpocalyx

6. floral bracts equaling or shorter than the sepals, 22 mm long. Venezuela to Peru.....V. (10) tequendamae

1. Posterior sepals carinate, distinct from the anterior.
7. Leaf-blades fine-subulate or setaceous.
8. Spikes lax. Venezuela, Brazil.....T. globosa
8. Spikes dense.
9. Leaf-blades tomentose-lepidote; inflorescence dense. Mexico..... ...T. plumosa
9. Leaf-blades appressed-lepidote; inflorescence lax.
10. Floral bracts densely appressed-lepidote at least when young, 8-14 (-19) mm long; (stamens exserted). South Carolina to Florida, West Indies and Mexico to Venezuela and northern Brazil.....T. setacea
10. Floral bracts sparsely lepidote, 10 mm long; (stamens included). Mexico, Guatemala, Salvador.....T. remota
7. Leaf-blades definitely if narrowly triangular.
11. Inflorescence appearing simple, short and dense with all of the 1-few-flowered spikes covered by the sheaths of the primary bracts.
12. Leaf-blades greenish with inconspicuous scales at least above.
13. Sheaths distinct; floral bracts and sepals glabrous. Mexico, Central America.....T. brachycaulos
13. Sheaths merging with the blades; floral bracts and sepals lepidote. Costa Rica.....T. abdita
12. Leaf-blades densely cinereous-lepidote on both sides.
14. Primary bracts subfoliaceous.
15. (Stamens exserted; petals blue). Mexico, Greater Antilles.....T. capitata
15. (Stamens included; petals whitish). Bolivia, Argentina. T. sphaerocephala
14. Primary bracts membranaceous.
16. Inflorescence fasciculate; primary bracts narrow. Mexico to Nicaragua.....T. ionantha
16. Inflorescence fusiform or ellipsoid; primary bracts ample. Mexico.
17. Primary bracts acute; (petals green).....T. benthamiana
17. Primary bracts obtuse or apiculate; (petals violet). T. andrieuxii
11. Inflorescence obviously compound, long or lax; upper spikes mostly exceeding the sheaths of the primary bracts.
18. Lower primary bracts merely acute or apiculate.
19. Leaf-blades equally cinereous-lepidote throughout. Ecuador, Peru.....T. latifolia
19. Leaf-blades green above, cinereous-lepidote beneath. Colombia.....T. dichrophylla
18. Lower primary bracts long-laminate.
20. Spikes all strict; inflorescence dense.
21. Scape very short or none; inflorescence subsessile in the center of the rosette.
22. Leaf-sheaths ample, inflated. Mexico.....T. diguetii

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22. Leaf-sheaths narrow and indistinct, flat. Salvador. T. plagiotropica

21. Scape evident.

23. Inflorescence narrow, cylindric or fusiform.

24. Sepals 8-15 mm long.

25. Spikes dense; floral bracts exceeding the sepals. Colombia.....T. engleriana

25. Spikes lax; floral bracts much shorter than the sepals. Brazil.....V. (72) drepanocarpa

24. Sepals ca. 20-25 mm long.

26. Floral bracts convex, ecarinate. Hispaniola..T. hotteana

26. Floral bracts carinate. Mexico.

27. Spikes subterete especially toward apex, 6-flowered; floral bracts glabrous (position here according to key of Mez, Pflanzenreich p. 440, 441: "Spicae bracteis primariis breviores vel eas vix superantes"; contradicted in description, p. 482)....T. roland-gosselinii

27. Spikes complanate; floral bracts densely lepidote. T. strobilifera

23. Inflorescence broad, ellipsoid to subglobose.

28. Floral bracts densely cinereous-lepidote. Colombia, Trinidad, Venezuela, Brazil.....T. gardneri

28. Floral bracts glabrous or at apex slightly lepidote.

29. Sepals 7-9 mm long; inflorescence 4.5-7 cm long. Venezuela, Colombia.....T. myriantha

29. Sepals 13-20 mm long.

30. Leaf-blades green, inconspicuously lepidote. Dominican Republic.....T. moscosoi

30. Leaf-blades densely and conspicuously lepidote on both sides.

31. Posterior sepals short-connate; (stamens exserted). Mexico.....T. macrochlamys

31. Posterior sepals high-connate; (stamens included). Colombia, Venezuela, Guiana.....T. turneri

20. Spikes at least in part divergent to spreading; inflorescence lax at least at base.

32. Sepals 25-35 mm long.

33. Axis of the inflorescence slender; internodes sigmoid-flexuous; spikes in about 2 ranks, all spreading.

34. Spikes 20 mm wide, strongly complanate. Honduras. T. standleyi

34. Spikes 8 mm wide, slightly complanate. Mexico, Central America.....T. orogenes

33. Axis of the inflorescence stout; internodes straight; spikes in more than 2 ranks.

35. Spikes 3-5 cm wide, broadly ovate or elliptic. Mexico.

36. Floral bracts with flat sides, smooth; spikes much compressed.....T. prodigiosa

36. Floral bracts with convex sides, wrinkled when dry; spikes slightly compressed.....T. violacea

35. Spikes 2-3 cm wide, lance-oblong to elliptic.

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37. Floral bracts densely lepidote near apex. Colombia, Venezuela.....T. cuatrecasasii
37. Floral bracts glabrous. Peru.....T. wurdackii
32..Sepals 12-20 mm long.
38. Spikes lax, the rhachis wholly exposed.
39. Floral bracts much shorter than the sepals. Brazil. T. geminiflora
39. Floral bracts equaling or exceeding the sepals.
40. Leaf-sheaths obscure, concolorous with the blades. Brazil.....T. brachyphylla
40. Leaf-sheaths ample, castaneous. Colombia.....T. archeri
38. Spikes dense or 1-flowered, the rhachis almost or wholly concealed.
41. Spikes 1-6-flowered.
42. Lower primary bracts with erect blades, flat, densely lepidote. Venezuela, Colombia.....T. turneri
42. Lower primary bracts with spreading or reflexed blades, enfolding the narrow spikes. Mexico.
43. Floral bracts 16-19 mm long.....T. foliosa
43. Floral bracts 13 mm long.....T. graebenerii
41. Spikes 10-15-flowered.
44. Spikes about twice as wide as long or less. Ecuador, Peru.....T. confertiflora
44. Spikes lanceolate, 2.5-3 times as long as broad.
45. Floral bracts even. Colombia.....T. caloura
45. Floral bracts nerved. Peru.
46. Inflorescence bipinnate.....T. interrupta
46. Inflorescence tripinnate.....T. pinnato-digitata

Subkey VIII

1. Sepals connate for more than half their length and forming a slender tube, ecarinate.....Guzmania spp.
1. Sepals not more than short-connate or only the posterior ones high-connate and these then carinate.
2. Leaf-blades tomentose-lepidote with narrowly lobed spreading scales, setaceous.
3. Sepals less than 12 mm long; scape well developed. Ecuador. T. rupicola
3. Sepals 15-18 mm long; scape often very short or lacking.
4. Floral bracts 14-17 mm long; (petals yellowish green, 18 mm long; stamens included). Mexico.....T. plumosa
4. Floral bracts 25-35 mm long; (petals violet, 35-40 mm long; stamens exserted). Mexico to Honduras.....T. magnusiana
2. Leaf-blades not tomentose, the scales suborbicular and slightly if at all lobed.
5. Sepals maximally 25-35 mm long, lepidote. Mexico.
6. Sheaths dark castaneous, ample, contrasting with the blades.....T. oaxacana
6. Sheaths cinereous-lepidote, concolorous with the blades.
7. Sepals broadly oblanceolate, densely cinereous-lepidote; bracts caudate or acute.....T. macdougallii

7. Sepals lanceolate, sparsely lepidote.
8. Bracts acute; (petals green).....T. benthamiana
8. Bracts obtuse or apiculate; (petals violet)...T. andrieuxii
5. Sepals 9-20 mm long.
9. Sepals firm, coriaceous or subcoriaceous.
10. Scape short or none. Peru.....T. nana
10. Scape well developed.
11. Posterior sepals carinate and much connate. West Indies and Mexico to Venezuela and Bolivia.....T. juncea
11. Posterior and anterior sepals broadly convex, ecarinate. Peru, Bolivia, Brazil, Paraguay, Argentina...T. pohliana
9. Sepals membranaceous.
12. Scales of the leaf-blades asymmetric with subspreading basal lobes, coarse, cinereous.
13. (Stamens exserted; petals over 40 mm long). North America, northern South America.
14. Leaf-sheaths suborbicular, contracted to the long blades; plant usually long-caulescent and often branched. Mexico and the West Indies to Venezuela and Colombia. T. schiedeana
14. Leaf-sheaths elliptic, merging with the short blades; plants stemless or rarely caulescent. Mexico to Nicaragua.....T. ionantha
13. (Stamens included; petals 18-20 mm long). Southern South America.
15. Sepals lepidote; leaves 9-12 cm long. Brazil, Paraguay, Argentina.....T. meridionalis
15. Sepals glabrous; leaves 3-4 cm long. Brazil. T. sprengeliana
12. Scales of the leaf-blades symmetric, closely appressed or with equally raised margins.
16. Leaf-blades thin, flaccid, green, 10-20 mm wide; sheaths conspicuous.
17. Plant stemless or nearly so; posterior sepals carinate. Mexico, Central America.....T. brachycaulos
17. Plant caulescent; posterior and anterior sepals convex, ecarinate. Nicaragua to Ecuador..Guzmania angustifolia
16. Leaf-blades triangular or crescentiform in cross-section, mostly rigid, more or less cinereous, 5-13 mm wide; sheaths inconspicuous.
18. Lower floral bracts acute, not caudate; (petals yellow). Argentina.
19. Floral bracts broadly ovate or elliptic, stramineous; sepals posteriorly connate; (flowers odorless). T. ixioides
19. Floral bracts ovate or lanceolate, roseate; sepals equally subfree; (flowers fragrant).....T. jucunda
18. Lower floral bracts rounded or attenuate, mostly setiform-caudate; (petals white or blue).
20. Scape very short, hidden by the leaves; leaves rigid, curved and often secund, attenuate but subpungent. Brazil.....T. rosea

20. Scape evident, well developed.
21. Lower floral bracts attenuate, then caudate; leaf-scales cup-shaped with an erect free margin; plant stemless or nearly so. Trinidad and Venezuela to Brazil and Argentina.....T. stricta
21. Lower floral bracts rounded and abruptly caudate; leaf-scales appressed in most cases; plant distinctly caulescent.
22. Leaf-blades slender (about 20 times as long as wide), or if robust then strongly secund.
23. Scape exceeding the leaves; (petals 28-30 mm long). Brazil.
24. Leaf-blades short, stout, strongly secund. T. araujei
24. Leaf-blades long, nearly straight, not notably secund.....T. nuptialis
23. Scape usually shorter than the slender leaves; (petals not over 20 mm long).
25. Sepals posteriorly connate. West Indies to Argentina.....T. tenuifolia
25. Sepals free. Brazil.....T. montana
22. Leaf-blades stouter (about 10 times as long as wide), scarcely if at all secund.
26. Floral bracts dark red;(petals dark blue). Brazil, Paraguay, Uruguay, Argentina.....T. aëranthos
26. Floral bracts pale rose to whitish;(petals dull blue to white). Argentina.....T. bergeri

Subkey IX

1. Posterior and anterior sepals all ecarinate and alike.
2. Floral bracts 45-55 mm long.
3. Inflorescence simple; plant 5-7 dm high. Ecuador, Peru, Bolivia.....T. walteri
3. Inflorescence amply compound; plants 1-2 m high.
4. Floral bracts coriaceous, nearly or quite even when dry. Mexico.....T. thyrsigera
4. Floral bracts fleshy, strongly rugose-sulcate in drying. Peru.....T. carnosa
2. Floral bracts 15-30 mm long.
5. Inflorescence simple.
6. Floral bracts even, dark-spotted; leaf-blades rounded and apiculate. Colombia.....T. excavata
6. Floral bracts nerved, concolorous; leaf-blades acute. Honduras.....T. glossophylla
5. Inflorescence compound.
7. Spikes pendent; floral bracts and sepals ecarinate, strongly nerved. Peru.....T. ecarinata
7. Spikes divergent to spreading.
8. Floral bracts narrowly elliptic, coriaceous, inflorescence usually amply tripinnate. Cuba, Jamaica, Central America.....T. excelsa

8. Floral bracts very broadly ovate, thin; inflorescence bipinnate. Ecuador.....T. hamaleana

1. Posterior sepals carinate.
9. Floral bracts all broadly convex and ecarinate, or a few faintly carinate.
10. Inflorescence simple; scapes numerous and axillary in each rosette. West Indies and Costa Rica to Guyana and Bolivia.....T. complanata
10. Inflorescence compound, solitary, central.
11. Floral bracts nearly or quite even.
12. Spikes substrict; floral bracts to 35 mm long. Mexico to Honduras.....T. lucida
12. Spikes nutant; floral bracts 15-20 mm long. Venezuela to Peru.....T. denudata
11. Floral bracts strongly nerved or rugose-sulcate at least when dry.
13. Floral bracts 22-50 mm long, rugose-sulcate when dry.
14. Floral bracts narrow, exposing the rhachis. Bolivia, Argentina.....T. maxima
14. Floral bracts broad, wholly covering the rhachis. Peru. T. rauhii
13. Floral bracts 10-20 mm long, evenly nerved, not rugose.
15. Lower primary bracts exceeding the sterile bases of the branches.
16. Spikes terete; inflorescence pendent. Peru....T. teres
16. Spikes complanate; inflorescence erect.
17. Sepals 9-10 mm long; lower branches usually divided. Mexico, Central America.....T. guatemalensis
17. Sepals 12-13 mm long; lower branches usually simple. Greater Antilles.....T. selleana
15. Lower primary bracts shorter than the sterile bases of the branches.
18. Floral bracts 12 mm long. Venezuela to Peru. T. tovarensis
18. Floral bracts 17-20 mm long.
19. Flowers barely imbricate. Peru.....T. platyphylla
19. Flowers densely imbricate. Bolivia.....T. boliviana
9. Floral bracts distinctly carinate.
20. Floral bracts strongly and regularly nerved, thin.
21. Inflorescence simple. Colombia. V. (38a) dubia, Phytologia 15: 197.
21. Inflorescence compound.
22. Leaf-sheaths pale, merging with the blades.
23. Lower primary bracts with large foliaceous blades; spikes long-stipitate; floral bracts to 43 mm long. Mexico.....T. deppeana
23. Lower primary bracts acute or apiculate, bladeless.
24. Inflorescence densely digitate; leaf-blades broadly rounded. Peru.....T. brevilingua
24. Inflorescence elongate.
25. Inflorescence tripinnate; leaves acute to acuminate. Venezuela.....T. duidae

25. Inflorescence bipinnate; leaves broadly acute or rounded and apiculate. Ecuador, Peru.
Vriesea (83a) zamorensis (L. B. Smith) L. B. Smith, comb. nov. Tillandsia zamorensis L. B. Smith, Phytologia 4: 213. 1953.
22. Leaf-sheaths dark, contrasting with the blades.
26. Inflorescence laxly and amply tripinnate; plant over 2 m. Bolivia.....T. krukoffiana
26. Inflorescence bipinnate or subtripinnate and narrow.
27. Primary bracts barely exceeding the short sterile bases of the branches; floral bracts strongly incurved. Peru
T. wagneriana
27. Primary bracts covering half of each of the lower branches at least.
28. Inflorescence interrupted below; spikes 8-12-flowered. Ecuador, Peru, Bolivia.....T. rubella
28. Inflorescence densely fusiform; spikes 5-flowered. Colombia.....T. fusiformis
20. Floral bracts even or nearly so.
29. Inflorescence laxly compound at least at base; spikes or branches divergent to nutant.
30. Spikes nutant or reflexed.
31. Spikes subsessile, straight, subovate. Ecuador.
T. superba
31. Spikes long-stipitate, curved, narrow.
32. Floral bracts lance-oblong; spikes 12-flowered. Peru.
T. somnians
32. Floral bracts broad, ovate or obovate.
33. Floral bracts dark castaneous with pale margins, 15-20 mm long. Colombia, Ecuador.....T. denudata
33. Floral bracts pale, concolorous. Ecuador.
34. Sepals 28-30 mm long.....T. clavigera
34. Sepals 20 mm long.....T. brevicapsula
30. Spikes not more than spreading.
35. Floral bracts beaked, acuminate, 27-45 mm long.
36. Spikes caudate-acuminate from a 3-5 cm broad base; floral bracts 27-35 mm long. Ecuador, Peru.....T. stenoura
36. Spikes lance-ovate, acute, 6 cm wide; floral bracts 40-45 mm long. Colombia.....T. sigmoidea
35. Floral bracts acute to rounded and apiculate but not beaked.
37. Leaf-blades marked with dark irregular cross-bands. Peru
T. roezlii
37. Leaf-blades not banded.
38. Leaf-blades densely and conspicuously cinereous-lepidote (at least beneath).
39. Leaf-blades almost as strongly lepidote above as beneath. Peru.....T. subconcolor
39. Leaf-blades glabrous above, the sides strongly contrasting.
40. Floral bracts to 34 mm long; posterior sepals very short-connate. Peru.....T. wurdackii

40. Floral bracts 17-22 mm long; posterior sepals much connate. Colombia to Peru.....T. confinis
38. Leaf-blades green.
41. Sepals distinctly more connate posteriorly than anteriorly
42. Inflorescence subdigitate. Colombia.....T. reversa
42. Inflorescence elongate.
43. Spikes strongly complanate; floral bracts with flat sides. Colombia to Peru.....T. pyramidata
43. Spikes stout; floral bracts with convex sides. Peru. T. macrodactylon
41. Sepals free or equally very short-connate.
44. Spikes less than 3 times as long as wide, broadly ovate. Colombia.....T. lajensis
44. Spikes narrow, more than 3 times as long as wide.
45..Floral bracts oblong, 25 mm long; plant glaucous. Peru. T. glauca
45. Floral bracts obovate, to 45 mm long; plant not glaucous. West Indies to Venezuela and Bolivia. T. fendleri
29. Inflorescence simple or densely compound with strict spikes.
46. Floral bracts long-attenuate, 110-130 mm long; inflorescence simple. Costa Rica, Colombia. V. (36a) monstrum, Phytologia 16: 81.
46. Floral bracts shorter and broader.
47. Inflorescences several, lateral, simple; scape-bracts 2-ranked, much smaller than the floral bracts. Mexico, Central America.....T. multicaulis
47. Inflorescence solitary, central, often compound.
48. Leaf-blades densely pale-lepidote beneath.
49. Blades broadly rounded and apiculate. Colombia. T. fassettii
49. Blades attenuate. Bolivia.....T. kuntzeana
48. Leaf-blades green.
50. Leaf-apices broad; primary bracts at least half as long as the spikes. Ecuador.....T. aequatorialis
50. Leaf-apices acute or acuminate; primary bracts short or the inflorescence simple.
51. Inflorescence amply tripinnate; floral bracts 17 mm long, castaneous with buff margins. Colombia. T. acuminata
51. Inflorescence bipinnate or simple.
52. Floral bracts 50 mm long. Mexico.....T. heterophylla
52. Floral bracts not over 30 mm long (including T. fendleri var. reducta keyed here).
53. Sepals free. Colombia, Ecuador.....T. fendleri
53. Sepals connate posteriorly.
54. Floral bracts orange, drying pale. Colombia. T. reversa
54. Floral bracts dark, drying nearly black. Peru. T. lopezii

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Subkey X

1. Lower floral bracts less than twice the internodes; spike-rhachis slender.
2. Rhachis straight; inflorescence bipinnate. Colombia. T. rariflora
2. Rhachis geniculate; inflorescence tripinnate. Peru. T. hutchisonii
1. Lower floral bracts more than twice the internodes.
3. Flowers downwardly secund. Ecuador.....T. cucullata
3. Flowers not secund.
4. Posterior sepals carinate.
5. Floral bracts not over 11 mm long, thin, nerved; leaf-sheaths very dark; blades broadly acute or rounded.
6. Inflorescence tripinnate; leaf-blades 30-40 mm wide.
7. Floral bracts much shorter than the sepals. Ecuador. T. pinnata
7. Floral bracts about equaling the sepals. Colombia. T. delicatula
6. Inflorescence bipinnate.
8. Floral bracts much shorter than the sepals; leaf-blades 20-25 mm wide. Costa Rica, Panama.....T. singularis
8. Floral bracts equaling the sepals; leaf-blades to 70 mm wide. Ecuador.....T. truncata
5. Floral bracts 15-40 mm long.
9. Floral bracts carinate.
10. Floral bracts even; inflorescence bipinnate. Colombia. T. carrierei
10. Floral bracts nerved.
11. Inflorescence subdensely bipinnate. Ecuador. Cf. 2 pages above, line 3.....V. (83a) zamorensis
11. Inflorescence laxly tripinnate.
12. Primary bracts at most barely exceeding the long sterile bases of the pinnately divided branches. Peru.....T. maculata
12. Primary bracts much exceeding the short sterile bases of the subdigitately divided branches. Venezuela. T. duidae
9. Floral bracts broadly convex, ecarinate.
13. Flowers densely imbricate; floral bracts rugose-sulcate when dry. Bolivia, Argentina.....T. maxima
13. Flowers barely imbricate; floral bracts evenly nerved, not rugose. Peru.....T. platyphylla
4. Posterior and anterior sepals convex, ecarinate.
14. Floral bracts carinate, incurved. Ecuador.
15. Floral bracts 30-34 mm long, much exceeding the sepals; leaf-blades 20 mm wide.....T. dyeriana
15. Floral bracts 12-21 mm long, about equaling the sepals; leaf-blades 30-45 mm wide.
16. Floral bracts imbricate at anthesis and covering much of the rhachis.....T. hamaleana

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16. Floral bracts inrolled about the flowers at anthesis and wholly exposing the rhachis.....T. nubis
14. Floral bracts convex, ecarinate, straight toward apex or nearly so.
17. Rhachis broadly alate; sepals much exceeding the floral bracts.
18. Floral bracts 20-30 mm long. Colombia to Peru. T. platyrhachis
18. Floral bracts 7 mm long. Bolivia.....T. laxissima
17. Rhachis scarcely if at all alate.
19. Floral bracts 30-55 mm long, coriaceous, even or nearly so. Mexico.
20. Floral bracts much exceeding the sepals; scape-bracts foliaceous.....T. thyrsigera
20. Floral bracts from nearly equaling the sepals to much shorter.
21. Inflorescence much branched; plant to 2 m high. T. grandis
21. Inflorescence simple or few-branched....T. viridiflora
19. Floral bracts less than 20 mm long, thin, nerved.
22. Flowers barely twice as long as the internodes; rhachis very slender, geniculate. Peru.....T. hutchisonii
22. Flowers much more than twice as long as the internodes.
23. Leaf-sheaths pale and spotted, concolorous with the blades. Costa Rica.....T. venusta
23. Leaf-sheaths very dark overlaid with a pale gray coat of scales. Ecuador.....T. asplundii

Subkey XI

1. Floral bracts strongly and regularly nerved.
2. Floral bracts broadly ovate or elliptic; sepals mostly exserted.
3. Upper scape-bracts broadly rounded and apiculate. Lesser Antilles, Venezuela..V. (76a) cowellii, Phytologia 16: 80.
3. Upper scape-bracts acute, foliaceous.
4. Spikes 1-3-flowered; leaves 20 cm long; blades 20 mm wide. Costa Rica to Venezuela and Bolivia.....T. biflora
4. Spikes (at least the lowest) more than 3-flowered; leaves 20-50 cm long; blades 20-50 mm wide. Ecuador, Peru, Bolivia.....T. ionochroma
2. Floral bracts narrower and equaling or exceeding the sepals.
5. Sepals 16-20 mm long.
6. Inflorescence densely fusiform; spikes all strict. Colombia.....T. fusiformis
6. Inflorescence lax at least at base with the lower spikes more or less spreading. Mexico, Central America. T. leiboldiana
5. Sepals 8-10 mm long.
7. Plant to 8 dm high. Central America.....T. guatemalensis
7. Plant 2.5-5 dm high. Honduras.....T. uyucensis
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1. Floral bracts even or nearly so, equaling or exceeding the sepals.
 8. Spikes (or some of them) divergent to spreading or recurving or the lower remote.
  9. Spikes digitate, 6-9-flowered; sepals subfree, 21 mm long. Colombia, Ecuador.....T. schimperiana
  9. Spikes pinnate; axis of the inflorescence elongate.
   10. Sepals maximally 21-30 mm long.
    11. Spikes 4-6-flowered. North America.
     12. Inflorescence erect, dense toward apex. Mexico to Honduras.....T. yunckeri
     12. Inflorescence pendent, very lax. Guatemala...T. deflexa
    11. Spikes 7-12-flowered. Andean South America.
     13. Leaf-apex rounded and caudate.
      14. Inflorescence pendent. Colombia, Ecuador...T. brunonis
      14. Inflorescence erect. Ecuador.....T. emergens
     13. Leaf-apex acuminate.
      15. Leaf-blades densely cinereous-lepidote beneath. Peru. T. wurdackii
      15. Leaf-blades glabrous. Ecuador.....T. fosteri
   10. Sepals maximally 13-20 mm long.
    16. Inflorescence tripinnate at least at base. North America.
     17. Inflorescence pyramidal. Central America, Cuba, Jamaica.....T. excelsa
     17. Inflorescence slenderly thyrsoid. Costa Rica. T. werckleana
    16. Inflorescence not more than bipinnate. Andean South America.
     18. Sepals free; spikes spreading.
      19. Spikes 8-14-flowered. Colombia, Ecuador.....T. buseri
      19. Spikes 4-6-flowered. Ecuador.....T. sceptriformis
     18. Sepals connate posteriorly.
      20. Leaf-blade rounded-apiculate; spikes 5-10-flowered. Greater Antilles, Venezuela.....T. compacta
      20. Leaf-blade acute; spikes 4-flowered. Colombia or Ecuador (?).....T. humboldtii
 8. Spikes all strict; inflorescence all dense.
  21. Spikes to 20-flowered. Ecuador.
   22. Inflorescence erect; sepals high-connate posteriorly. T. polyantha
   22. Inflorescence pendent; sepals free.....T. demissa
  21. Spikes not more than 8-flowered.
   23. Sepals 30 mm or longer, free. Mexico, Salvador. T. imperialis
   23. Sepals 8-25 mm long.
    24. Floral bracts about half as long as the sepals; spikes 3-flowered, long-stipitate. Colombia, Venezuela. T. stipitata
    24. Floral bracts about equaling or exceeding the sepals.
     25. Spikes 1-2-flowered; primary bracts all foliaceous. Costa Rica.....T. cauliflora

25. Spikes 4-8-flowered; upper primary bracts not foliaceous.
26. Leaf-blades conspicuously cinereous-lepidote beneath. Colombia.....T. orbicularis
26. Leaf-blades obscurely lepidote beneath.
27. Sepals high-connate posteriorly, 20-25 mm long.
28. Leaf-blades acute or acuminate; sheaths dark purple. Colombia.....T. ultima
28. Leaf-blades rounded and long-caudate; sheaths pale, concolorous with the blades. Ecuador.....T. aequatorialis
27. Sepals equally subfree or the posterior very short-connate
29. Sepals 8-18 mm long.
30. Floral bracts rounded. Bolivia.....T. violascens
30. Floral bracts acute. Colombia, Ecuador.....T. pastensis
29. Sepals 25 mm long. Ecuador.
31. Inflorescence pendulous; floral bracts incurved but not cucullate.....T. sodiroi
31. Inflorescence erect; floral bracts cucullate. T. pachyaxon

Subkey XII

1. Inflorescence simple or subdigitate from a few spikes; floral bracts ample, as long as the sepals or usually twice as long, usually membranaceous.
2. Leaf-blades straight or nearly so.
3. Floral bracts lax, not concealing the rhachis; inflorescence pendulous. Colombia.....T. trapeziformis
3. Floral bracts imbricate and concealing the rhachis; inflorescence erect or nearly so. Colombia to Bolivia. T. seemannii
2. Leaf-blades distinctly undulate-crisped. Panama to Peru. T. crispa
1. Inflorescence ample, pinnately panicled or the floral bracts shorter than the sepals.
4. Flowers remaining distichous, not at all secund.
5. Flowers strictly erect, closely appressed to the rhachis, remote; floral bracts mostly equaling or shorter than the internodes.
6. Leaf-blade ligulate. Venezuela, Colombia.....T. tenuispica
6. Leaf-blades narrowly triangular. Ecuador, Peru. T. pugiformis
5. Flowers more or less divergent or dense.
7. Floral bracts about equaling the sepals or distinctly longer.
8. Floral bracts over 10 mm long.
9. Primary bracts exceeding the spikes; floral bracts exceeding the flowers, membranaceous. Ecuador. T. gilmartinae
9. Primary bracts much shorter than the branches.
10. Floral bracts even, coriaceous.
11. Branches arcuate-spreading; floral bracts subspreading, not at all imbricate. Mexico..T. ghiesbreghtii

11. Branches erect or ascending; floral bracts erect, densely imbricate. Mexico, Honduras.....T. adscendens
10. Floral bracts more or less nerved, thin.
12. Inflorescence very amply and laxly tripinnate. Ecuador. T. elegans
12. Inflorescence bipinnate, the spikes subdense.
13. Leaf-blades ligulate, to 7 cm wide, thin. Ecuador. T. inconspicua
13. Leaf-blades narrowly subtriangular, 2-3 cm wide, subcoriaceous.....T. riocreuxii
8. Floral bracts less than 10 mm long.
14. Floral bracts even or faintly few-nerved margin, without a midnerve.
15. Floral bracts almost exactly equaling the sepals, not conspicuously incurved at apex.
16. Inflorescence pendent at maturity. West Indies, Venezuela.....T. lescaillei
16. Inflorescence erect.
17. Branches all turned to one side; leaf-blades ligulate, usually narrow. Venezuela.....T. stenoglossa
17. Branches pointing in all directions. Costa Rica to Bolivia and Brazil.....T. spiculosa
15. Floral bracts definitely exceeding the sepals.
18. Floral bracts not at all incurved at apex; flowers suberect.
19. Spikes dense, strict; floral bracts concealing the rhachis with their very broad bases. Central America. T. rothschuhiana
19. Spikes lax; floral bracts not at all concealing the rhachis. Jamaica.....T. fawcettii
18. Floral bracts definitely incurved at apex; flowers spreading.
20. Leaf-blades lanceolate; inflorescence bipinnate. Ecuador.....T. homostachya
20. Leaf-blades ligulate; inflorescence tripinnate. Ecuador, Bolivia.....T. monticola
14. Floral bracts nerved, thin.
21. Leaf-blades ligulate.
22. Spikes subdense; flowers mostly contiguous. Ecuador. T. quadripinnata
22. Spikes very lax; flowers not contiguous. Peru. T. diffusa
21. Leaf-blades narrowly triangular.
23. Primary bracts erect; branches arching-pendulous. Ecuador to Bolivia.....T. pendulispica
23. Primary bracts spreading; branches not arching-pendulous.
24. Flowers spreading; spikes oblong. Colombia..T. subalata
24. Flowers erect; spikes linear. Ecuador.....T. sinuosa
7. Floral bracts all or nearly all distinctly shorter than the sepals.
25. Leaf-blades ligulate or subligulate, mostly abruptly acute or rounded.

26. Floral bracts and sepals densely ferruginous-lepidote. Ecuador.....T. tripinnata
26. Floral bracts and sepals white-lepidote to glabrous.
27. Inflorescence bipinnate.
28. Branches all turned to one side; leaf-blades usually narrow; scape-bracts mostly remote. Venezuela. T. stenoglossa
28. Branches pointing in all directions; scape-bracts imbricate. Colombia.....T. membranacifolia
27. Inflorescence tripinnate.
29. Sepals acute, nerved, the posterior ones strongly keeled.
30. Leaf-blades rounded-apiculate. Galapagos Islands of Ecuador.....T. insularis
30. Leaf-blades attenuate. Ecuador, Peru.....T. multiflora
29. Sepals rounded to truncate; leaf-blades 30-50 mm wide.
31. Leaf-blades attenuate. Peru.....T. pallidoflavens
31. Leaf-blades with broad apiculate apices.
32. Branches arching-pendulous; scape-bracts much shorter than the internodes. Colombia.....T. michelii
32. Branches spreading; scape-bracts about equaling the internodes. Bolivia.....T. pardina
25. Leaf-blades narrowly triangular or linear, attenuate.
33. Floral bracts and sepals densely ferruginous-lepidote.
34. Sepals and floral bracts cuspidate; spikes strict; inflorescence slenderly cylindric. Peru.....T. cuspidata
34. Sepals and floral bracts not more than apiculate.
35. Rhachis geniculate, quadrangular; inflorescence subdensely tripinnate. Ecuador.....T. tripinnata
35. Rhachis flexuous, subterete.
36. Sepals 4-5 mm long.
37. Primary bracts small and inconspicuous; inflorescence amply and laxly tripinnate. Peru, Bolivia...T. bakeri
37. Primary bracts at least half as long as the axillary branches; inflorescence bipinnate. Costa Rica to Bolivia.....T. adpressa
36. Sepals 6-9 mm long.
38. Spikes 3-5- (rarely more -) flowered, distinctly stipitate. Greater Antilles, Venezuela....T. caribaea
38. Spikes about 10-flowered, subsessile. Venezuela to Peru T. tetrantha
33. Floral bracts and sepals pale-lepidote.to glabrous.
39. Sepals acute. Ecuador, Peru.....T. multiflora
39. Sepals rounded or subtruncate.
40. Spikes dense.
41. Scape-bracts acuminate or apiculate; inflorescence bipinnate. Nicaragua to Panama.....T. contorta
41. Scape-bracts with fine linear contorted blades; inflorescence 4-pinnate. Colombia, Ecuador. T. penlandii
40. Spikes lax.
42. Branches spreading, straight. West Indies, Venezuela, Guayana.....T. jenmanii

42. Branches divergent or curved-ascending.
43. Inflorescence amply tripinnate, to 50 cm long; leaf-blades to 30 mm wide.
44. Scape-bracts exceeding the internodes. Peru.
T. pallidoflavens
44. Scape-bracts remote. Colombia, Ecuador.
T. ropalocarpa
43. Inflorescence bipinnate or tripinnate only at base.
45. Leaf-sheaths with large purple spots; scape strongly curved. Brazil.....T. aeris-incola
45. Leaf-sheaths not spotted.
46. Blades about as long as the sheaths; flowers all about twice as long as the internodes. Colombia.
T. sanctae-martae
46. Blades much longer than the sheaths; flowers usually much shorter than the lower internodes.
47. Leaf-blades linear, about 5 mm wide. Peru, Bolivia.
T. parviflora
47. Leaf-blades distinctly triangular, to 18 mm wide. Peru.....T. commixa
4. Flowers turning secund.
48. Flowers all turned upwards.
49. Inflorescence ferruginous-lepidote, bipinnate or rarely subtripinnate. Venezuela, Colombia, Ecuador, Peru.
T. tetrantha
49. Inflorescence sparsely white-lepidote; amply tripinnate. Colombia, Ecuador, Peru.....T. fraseri
48. Flowers all turned downwards.
50. Scape-bracts foliaceous-laminate; leaf-blades narrowly triangular.
51. Sepals 10 mm long; bract-blades straight. Peru.
T. laminata
51. Sepals 5 mm long; bract-blades contorted. Colombia, Ecuador.....T. penlandii
50. Scape-bracts not more than apiculate; leaf-blades ligulate.
52. Floral bracts turning secund with the flowers. Colombia.
T. pectinata
52. Floral bracts remaining distichous. Colombia, Ecuador.
T. riocreuxii

Supplement to Key

II - 83a. Leaf-sheaths ferruginous; blades evenly lepidote on (90a) both sides; (stamens exserted).....T. fasciculata
83a. Leaf-sheaths dark castaneous; blades somewhat less (90a) densely lepidote above; (stamens included). Peru.
T. subconcolor

II - 87a. Spikes linear-lanceolate, 15-20 mm wide.....T. confinis
87a. Spikes lance-oblong, 30 mm wide. Costa Rica.
T. oerstediana

.....

III - 36a. Floral bracts lepidote at apex only; spikes erect.
T. vernicosa

36a. Floral bracts densely cinereous-lepidote; spikes spreading. Peru.
V. (67a) appenii, Brom. Soc. Bull. 19: 111.

TILLANDSIA

Relative to Mez in Engler, Pflanzenreich IV. Fam. 32. 1935. (Synonymy in separate list following)

ABDITA L. B. Smith, Phytologia 8: 10. 1961. TIL?

ACHYROSTACHYS E. Morr. ex Baker; Pflr. 494. TIL.

Var. ACHYROSTACHYS. Floral bracts ample, completely covering the rhachis.

Var. STENOLEPIS L. B. Smith, Contr. U. S. Nat. Herb. 29: 505. 1951. Floral bracts narrow, not altogether concealing the rhachis, not over 3 cm long.

ACOSTAE Mez & Tonduz; Pflr. 466. TIL.

ACOSTA-SOLISII Gilmartin, Phytologia 16: 160. 1968. PHY.

ACUMINATA L. B. Smith, Contr. U. S. Nat. Herb. 29: 434. 1951. ALL?

ADPRESSA André; Pflr. 512. PS-C.

Var. ADPRESSA. Inflorescence 15-20 cm long, often decurved; primary bracts shorter to longer than the spikes; spikes erect, lax.

Var. ORTHIANTHA (Standley) L. B. Smith, Contr. Gray Herb. 89: 9. 1930. Inflorescence 6-12 cm long, erect; primary bracts covering most or all of each spike; spikes erect, dense.

Var. TONDUZIANA (Mez) L. B. Smith, Contr. Gray Herb. 89: 8. 1930. Inflorescence erect or decurved; spikes spreading to reflexed at maturity, laxly flowered.

ADPRESSIFLORA Mez; Pflr. 459. ALL.

ADSCENDENS L. B. Smith, North Am. Fl. 19: 122. 1938. PS-C.

AEQUATORIALIS L. B. Smith, Phytologia 6: 258. 1958. ALL?

AËRANTHOS (Loisel.) L. B. Smith, Lilloa 9: 200. 1943. ANO.

AERIS-INCOLA (Mez) Mez; Pflr. 514. PS-C.

AIZOIDES Mez; Pflr. 588. DIA.

ALBERTIANA Vervoorst, Brom. Soc. Bull. 19: 128. 1969. ANO.

ALBIDA Mez & Purpus; Pflr. 459. TIL.

AMPLA Mez & Sodiro; Pflr. 534. ALL.

ANCEPS Lodd.; Pflr. 573. PHY.

ANDICOLA Gillies ex Baker; Pflr. 590. DIA.

ANDREANA E. Morr. ex André; Pflr. 496. TIL.

ANDRIEUXII (Mez) L. B. Smith, Contr. Gray Herb. 117: 31. 1937. TIL.

ANGULOSA Mez; Pflr. 589. DIA.

ANTILLANA L. B. Smith, Contr. U. S. Nat. Herb. 29: 282. 1949. ALL.

ARAUJEI Mez; Pflr. 563. ANO.

ARCHERI L. B. Smith, Proc. Am. Acad. 68 (Contr. Gray Herb. 102): 147. 1933. ALL.

.....

ARCUANS L. B. Smith, Contr. U. S. Nat. Herb. 29: 436. 1951. ALL.

Var. ARCUANS. Floral bracts to 55 mm long, 33 mm wide; rhachis-internodes 5 mm long.

Var. NAUNDORFFII Gilmartin, Phytologia 16: 158. 1968. Floral bracts 38-40 mm long, 23 mm wide; rhachis-internodes 9 mm long.

ARENICOLA L. B. Smith, Phytologia 16: 77. 1968. ALL?

AREQUITAE André ex Mez; Pflr. 558. ANO.

ARGENTEA Griseb.; Pflr. 463. TIL.

ARGENTINA C. H. Wright, Kew Bull. "1907": 60. 1907; A. Hunziker, Trab. Mus. Bot. Univ. Cordoba 2: 299. 1960. ANO.

ARHIZA Mez; Pflr. 580. PHY.

ARIZA-JULIAE L. B. Smith & Jiménez, Phytologia 6: 433. 1959. TIL.

ASPLUNDII L. B. Smith, Phytologia 6: 441. 1959. ALL.

AUREA Mez; Pflr. 585. PHY.

AUREO-BRUNNEA Mez; Pflr. 570. PHY.

BAILEYI Rose ex Small; Pflr. 492. TIL.

BALBISIANA Schult. f.; Pflr. 475. TIL.

BALIOPHYLLA Harms, Notizblatt 12: 538. 1935; L. B. Smith, Bromel. Soc. Bull. 15: 4. 1965. PSA.

BANDENSIS Baker; Pflr. 584. PHY.

BARBEYANA Wittm.; Pflr. 505. ALL.

BARTRAMII Ell.; L. B. Smith, Phytologia 13: 454. 1966. TIL.

BENTHAMIANA Kl. ex Baker; Pflr. 498. TIL.

BERGERI Mez; Pflr. 566. ANO.

BIFLORA R. & P.; Pflr. 548. ALL.

BOLIVIANA Mez; Pflr. 522. ALL.

BOLIVIENSIS Baker; Pflr. 528. ALL?

BOURGAEI Baker; Pflr. 481. TIL.

BRACHYCAULOS Schlecht.; Pflr. 478. TIL.

Var. BRACHYCAULOS. Plant slender. Spikes 1-2-flowered.

Var. MULTIFLORA L. B. Smith, Contr. Gray Herb. 154: 35. 1945. Plant stout. Spikes to 4-flowered.

BRACHYPHYLLA Baker; Pflr. 569. ANO.

BREVICAPSULA Gilmartin, Phytologia 16: 156. 1968. ALL?

BREVILINGUA Mez ex Harms; Pflr. 535. ALL.

BREVIOR L. B. Smith, Contr. U. S. Nato. Herb. 29: 436. 1951. TIL? VRIESEA?

BRUNONIS André, Pflr. 544. ALL?

BRYOIDES Griseb. ex Baker, emend. L. B. Smith, Proc. Am. Acad. 70 (Contr. Gray Herb. 106): 192. 1935. DIA.

BULBOSA Hook. Pflr. 491. TIL.

BUSERI Mez, Pflr. 542. ALL.

Var. BUSERI. Sepals subfree, to 6 mm wide.

Var. NUBICOLA Gilmartin, Phytologia 16: 158. 1968. Sepals posteriorly connate for 4-6 mm, to 8 mm wide.

BUTZII Mez; Pflr. 636. TIL.

CACTICOLA L. B. Smith, Contr. U. S. Nat. Herb. 29: 534. L954. PHY.

CAERULEA H. B. K.; Pflr. 586. PHY.

CALCICOLA L. B. Smith & Proctor, Phytologia 16: 77. 1968. TIL.

CALOCEPHALA Wittm.; Pflr. 567. ALL.
CALOTHYRSUS Mez; Pflr. 473. TIL.
CALOURA Harms, Pflr. 543. ALL?
CANESCENS Sw.; Pflr. 486. TIL.
CAPILLARIS R. & P.; Pflr. 593. DIA.
Forma CAPILLARIS. Leaves linear. Scape elongate, pseudo-axillary. Floral bracts with 5 or more nerves, glabrous or subglabrous.
Forma INCANA (Gillies ex Baker) L. B. Smith, Proc. Am. Acad. 70 (Contr. Gray Herb. 106): 211. 1935. Leaves short and stout, mucronate, appressed and ascending so that they form an almost continuous plane.
Forma CORDOBENSIS (Hieron.) L. B. Smith, l. c. Leaves slender widely spaced so that the greater part of each sheath is uncovered. Scapes usually terminal. Floral bracts densely and persistently lepidote.
Forma VIRESCENS (R. & P.) L. B. Smith, op. c. 212. Scapes never elongating much after anthesis, mostly shorter than the leaves.
Forma HIERONYMII (Mez) L. B. Smith, op. c. 213. Floral bracts with only 3 strong nerves meeting near the apex, other nerves if any, short and with free apices.
CAPITATA Griseb.; Pflr. 477. TIL.
Var. CAPITATA. Sepals glabrous or nearly so.
Var. GUZMANIOIDES L. B. Smith, Contr. Gray Herb. 127: 18. 1939 Sepals densely lepidote.
CAPUT-MEDUSAE E. Morr.; Pflr. 488. TIL.
CARDENASII L. B. Smith, Proc. Am. Acad. 70 (Contr. Gray Herb. 106): 154. 1935. ALL.
CARIBAEA L. B. Smith, Proc. Am. Acad. 70 (Contr. Gray Herb. 106): 155. 1935. PS-C.
CARLSONIAE L. B. Smith, Phytologia 7: 1. 1959. TIL.
CARNOSA L. B. Smith, Phytologia 9: 251. 1963. TIL.
CARRIEREI André; Pflr. 534. ALL?
CASTELLANII L. B. Smith, Contr. Gray Herb. 104: 80. 1934. DIA
CAULESCENS Brongn. ex Baker; Pflr. 555. ALL.
CAULIFLORA Mez & Werckle; Pflr. 549. ALL.
CAULIGERA Mez; Pflr..555. ALL.
CERNUA L. B. Smith, Phytologia 5: 401. 1956. ALL.
CERRATEANA L. B. Smith, Phytologia 5: 398. 1956. ALL.
CHAETOPHYLLA Mez; Pflr. 494. ALL?
CHARTACEA L. B. Smith, Contr. U. S. Nat. Herb. 29: 437. 1951. ALL.
Var. CHARTACEA. Floral bracts dense. Sepals 22 mm long.
Var. PERUVIANA L. B. Smith, Phytologia 4: 218. 1953. Floral bracts subdense and partly exposing the rhachis. Sepals 16 mm long.
CHLOROPHYLLA L. B. Smith, North Am. Fl. 19: 145..1938. TIL.
CIRCINNATA Schlecht.; Pflr. 492. TIL.
CLAVIGERA Mez; Pflr. 533. ALL.
COMMIXA Mez; Pflr. 510. PS-C.
COMPACTA Griseb.; Pflr. 547. ALL.

Var. COMPACTA. Floral bracts 18-23 mm long. Sepals 14-16 mm. long.

Var. INTERMEDIA L. B. Smith, Phytologia 7: 3. 1959. Floral bracts 35 mm long. Sepals 18 mm long.

COMPLANATA Benth.; Pflr. 552. ALL.

CONCOLOR L. B. Smith, Phytologia 7: 249. 1960. TIL.

CONFERTIFLORA André; Pflr. 542. ALL.

CONFINIS L. B. Smith, Phytologia 4: 218. 1953. ALL.

CONTORTA Mez & Pittier; Pflr. 514. PS-C.

CORNUTA Mez & Sodiro; Pflr. 572. PHY?

CRISPA (Baker) Mez; Pflr. 499. PS-C.

CROCATA (E. Morr.) Baker; Pflr. 585. PHY.

CRYPTOPODA L. B. Smith, Ceiba 1: 229. 1951. TIL.

CUATRECASASII L. B. Smith, Phytologia 5: 36. 1954. ALL.

CUCULLATA L. B. Smith, Phytologia 6: 193. 1958. ALL.

CUSPIDATA L. B. Smith, Phytologia 9: 252. 1963. PS-C.

CYANEA Linden ex K. Koch; L. B. Smith, Contr. U. S. Nat. Herb. 29: 489. 1951. PHY.

Var. CYANEA. Scape short. Spikes elliptic. Petal-blades wholly deep violet.

Var. TRICOLOR (André) L. B. Smith, op. c. 491. Spike broadly oblong, many-flowered. Petal-blade blue with a white eye at base

Var. ELATIOR L. B. Smith, Phytologia 5: 181. 1955. Scape to 29 cm high.

DASYLIRIIFOLIA Baker; Pflr. 462. TIL.

DEFLEXA L. B. Smith, Contr. Gray Herb. 154: 35. 1945. TIL?

DELICATULA L. B. Smith, Phytologia 5: 36. 1954. ALL.

DEMISSA L. B. Smith, Contr. U. S. Nat. Herb. 29: 527. 1954. ALL.

DENUDATA André; Pflr. 534. ALL.

DEPPEANA Steud.; L. B. Smith, Bromel. Soc. Bull. 15: 4. 1965. ALL.

DIAGUITENSIS Castellanos; Pflr. 558. ANO.

DICHROPHYLLA L. B. Smith, Phytologia 5: 283. 1955. ALL.

DIDISTICHA (E. Morr.) Baker; Pflr. 529. ANO.

DIFFUSA L. B. Smith, Phytologia 9: 252. 1963. PS-C.

DIGUETII Mez & Rol.-Goss.; Pflr. 476. TIL?

DISTICHA H. B. K.; Pflr. 525. ALL.

DRESSLERI L. B. Smith, Phytologia 8: 221. 1962. ALL.

DUGESII Baker; Pflr. 472. TIL.

DUIDAE L. B. Smith; Pflr. 518. ALL.

DURA Baker; Pflr. 555. ALL.

DURATII Vis.; Pflr. 579. PHY.

Var. DURATII. Inflorescence largely bipinnate; spikes strict. Floral bracts densely and persistently lepidote.

Var. CONFUSA (Hassler) L. B. Smith, Phytologia 16: 78. 1968. Inflorescence 2-3-pinnate; spikes curved-spreading. Floral bracts densely and persistently lepidote.

Var. SAXATILIS (Hassler) L. B. Smith, l. c. Inflorescence 2-3-pinnate; spikes curved-spreading. Floral bracts glabrous or subglabrous.

DYERIANA André; Pflr. 576. PHY.

ECARINATA L. B. Smith, sp. nov. A T. carnosa L. B. Smith, cui verisimiliter affinis, omnibus partibus bene minoribus, spicis valde laxioribus differt.

PLANT flowering to 1.5 m high. LEAVES very many in a dense rosette, ca 6 dm long, covered with appressed brown-centered scales; sheaths broadly elliptic, 2 dm long, dark castaneous; blades ligulate, acuminate, 8 cm wide, yellow-green in spite of the scales. SCAPE erect, stout; scape-bracts subfoliaceous, densely imbricate. INFLORESCENCE erect but with pendent spikes, very laxly tripinnate, glabrous; primary bracts subtriangular, shorter than the sterile bracteate bases of the branches; axes pale carmine red (! Rauh), glaucous; spikes linear, 20-30 cm long 23 mm wide, strongly complanate, subdensely many-flowered; rhachis flexuous, narrowly alate. FLORAL BRACTS suberect, slightly more than twice the internodes but narrow and largely exposing the rhachis, oblong, broadly acute, 23 mm long, ecarinate, strongly nerved, red; flowers subsessile. SEPALS elliptic, obtuse, 23 mm long, slightly exserted, ecarinate, strongly nerved; petals blue-violet, the blades elliptic, 8 mm long; stamens slightly exserted, greenish. CAPSULE fusiform. Pl. I, fig. 1: Plant x 1/20; fig. 2: Floral bract and fruit x 1; 3: Sepal x 1.

PERU: AMAZONAS: On steep rocks, near Bagua Grande, 700 m alt, Sep 1967, Rauh RP - 20390 (US, type); on Cactaceae, Pongo de Rentema, Prov. Bagua, 300 m alt, 25 May 1963, López, Sagástegui & Collantes 4152 (TRP, US).

EHRENBERGIANA Kl. ex Baker; L. B. Smith, Proc. Am. Acad. 70 (Contr. Gray Herb.): 175, 176. 1935. TIL.

ELEGANS L. B. Smith, Contr. U. S. Nat. Herb. 29: 528. 1954. PS-C.

ELONGATA H. B. K.; Pflr. 525. ALL.

Var. ELONGATA. Spikes to 4 dm long and 40-flowered.

Var. SUBIMBRICATA (Baker) L. B. Smith, Journ. Washington Acad. Sci. 43: 68. 1953. Spikes only about 2 dm long and 20-flowered.

EMERGENS Mez & Sodiro; Pflr. 542. ALL?

ENGLERIANA Wittm.; Pflr. 541. ALL?

ERECTA Gill. ex Baker; Pflr. 588. DIA.

ESSERIANA Rauh & L. B. Smith, sp. nov. A T. diaguitense Castellanos, cui affinis, caule brevi, bracteis florigeris dense imbricatis, petalorum laminis amplissimis differt.

PLANT short-caulescent to nearly stemless, the flowering shoot shorter than the leaves. LEAVES polystichous, to 50 cm long; sheaths indistinct, ca 5 cm long, brown; blades narrowly triangular, arching-recurved, 25 mm wide at base, covered with closely appressed cinereous scales. SCAPE erect, to 15 cm long; scape-bracts vaginiform, tightly imbricate, green. INFLORESCENCE of 1-3 spikes; spikes fusiform, slightly complanate, 10-17 cm long. FLORAL BRACTS densely imbricate and completely covering the rhachis, elliptic, very broadly acute, 45 mm long, 15 mm wide, broadly convex, ecarinate or the midnerve slightly thickened near apex, green, covered with pale inconspicuous appressed scales; flowers subsessile. SEPALS lanceolate, acute, 27 mm long, free, ecarinate, thin, nerved, sparsely pale-lepidote; petals with

linear white claws 45 mm long, the blades spreading, broadly ovate, rounded, 20-25 mm long, undulate on the margins, bright violet; stamens shorter than the petal-claws but exceeding the pistil; style slender, more than twice as long as the ovary. Pl. I, fig. 4: Plant x 1/5; fig. 5: Sepal x 1.

PARAGUAY: AMAMBAY: On steep rocks of the Cerro Guazú and Cerro Corá, Esser s. n., cult. W. Rauh ES-14853 (US, type).

EXCAVATA L. B. Smith, Caldasia 3: 243. 1945. ALL? VRIESEA?

EXCELSA Griseb.; Pflr. 520. ALL.

EXSERTA Fernald; Pflr. 476. TIL.

EXTENSA Mez; Pflr. 461. TIL.

FASCICULATA Sw.; Pflr. 467. TIL.

Var. FASCICULATA (latispica); Pflr. 467.

Var. CONVEXISPICA Mez; l. c.

Var. PENDULISPICA Mez; op. c. 468.

Var. VENOSISPICA Mez; l. c.

Var. CLAVISPICA Mez; l. c.

Var. DENSISPICA Mez; l. c.

Var. LAXISPICA Mez; l. c.

Var. UNCISPICA Mez; l. c.

Var. ROTUNDATA L. B. Smith, Contr. Gray Herb. 154: 36. 1945. Inflorescence globose; primary bracts suborbicular, apiculate; spikes ovate, complanate, 4-6 cm long. Floral bracts cucullate, more or less rugose when dry.

Var. FLORIDANA L. B. Smith, Phytologia 15: 197. 1967. Inflorescence of several small spikes as in var. densispica Mez. Floral bracts thin-coriaceous, lepidote.

FASSETTII L. B. Smith, Phytologia 5: 284. 1955. ALL.

FAWCETTII Mez, Pflr. 509. PS-C.

FENDLERI Griseb.; L. B. Smith, Bromel. Soc. Bull. 15: 4. 1965. ALL.

Var. FENDLERI. Inflorescence bipinnate or subtripinnate, elongate, lax.

Var. REDUCTA (L. B. Smith) L. B. Smith, Mem. N. Y. Bot. Gard. 14, pt. 3: 48. 1967. Inflorescence simple or digitate from a few spikes.

Var. NERVISEPALA Gilmartin, Phytologia 16: 157. 1968. Floral bracts 27 mm long. Sepals 20 mm long, nerved.

FERREYRAE L. B. Smith, Publ. Mus. Hist. Nat."Javier Prado" Univ. Nac. Mayor San Marcos ser. B. no. 16: 5. 1964. TIL?

FERRISIANA L. B. Smith, Bromel. Soc. Bull. 10: 92. 1960. TIL?

FESTUCOIDES Brongn. ex Mez; Pflr. 466. TIL.

FILIFOLIA Schlecht. & Cham.; Pflr. 463. TIL.

FLABELLATA Baker; Pflr. 484. TIL.

Var. FLABELLATA. Leaves red, to 35 cm long.

Var. VIRIDIFOLIA M. B. Foster, Bromel. Soc. Bull. 7: 70. 1957. Leaves green, smaller.

FLAGELLATA L. B. Smith, Phytologia 6: 258. 1958. ALL?

FLEXUOSA Sw.; L. B. Smith, North Am. Fl. 19: 129. 1938. TIL.

FLORIBUNDA H. B. K.; Pflr. 465. ALL.

FOLIOSA Martens & Galeotti; L. B. Smith, North Am. Fl. 19: 151. 1938. TIL.

FOSTERI Gilmartin, Phytologia 16: 157. 1968. ALL?
FRASERI Baker; Pflr. 516. PS-C.
FRIESII Mez; Pflr. 556. ANO.
FUNEBRIS Castellanos; Pflr. 588. DIA.
FUSIFORMIS L. B. Smith, Contr. U. S. Nat. Herb. 29: 438. 1951. ALL.
GARDNERI Lindl.: Pflr. 568. ANO.
GAYI Baker; Pflr. 537. ALL.
GEISSEI Phil.: Pflr. 559. ANO.
GEMINIFLORA Brongn.; Pflr. 569. ANO.
Var. GEMINIFLORA. Leaf-scales closely appressed.
Var. INCANA (Wawra) Mez; Pflr. 569. Leaf-scales spreading.
GHIESBREGHTII Baker; Pflr. 505. PS-C.
GILLIESII Baker; Pflr. 589. DIA.
GILMARTINIAE L. B. Smith, Phytologia 9: 247. 1963. PS-C.
GLAUCA L. B. Smith, sp. nov. A T. fendleri Griseb., cui verisimiliter affinis, planta omnino glauca, bracteis floribusque subduplo minoribus differt.

PLANT stemless, flowering 1.2 m high, glaucous. LEAVES few, suberect, 40-50 cm long; sheaths large but narrow and concolorous with the blades beneath; blades ligulate, acuminate, 6-8 cm wide, green. SCAPE erect, exceeding the leaves; scape-bracts imbricate, the lowest subfoliaceous, the others ovate, acuminate. INFLORESCENCE pyramidal, laxly tripinnate; primary bracts ovate, acuminate, exceeding the sterile bracteate bases of the branches; branches spreading; spikes lance-oblong, 9 cm long, 15 mm wide, strongly complanate. FLORAL BRACTS imbricate and nearly or quite concealing the rhachis at anthesis, elliptic, broadly acute, 20-25 mm long, coriaceous, even, thick-carinate toward apex; flowers subsessile. SEPALS free, elliptic, acute, 23 mm long, coriaceous, faintly nerved, the posterior carinate; petals 35 mm long, blue; stamens included. Pl. I, fig. 6: Branch x 1/2; fig. 7: Sepal x 1.

PERU: PIURA: Near Ayabaca, 1700-2000 m alt, Rauh 20033 (US, type).

GLOBOSA Wawra; Pflr. 569. ANO.
Var. GLOBOSA. Inflorescence not more than bipinnate; spikes 2-3-flowered.
Var. MAJOR L. B. Smith, Arq. Bot. Est. S. Paulo II. 1: 114. 1943. Inflorescence tripinnate; some spikes 4-flowered.
GLOSSOPHYLLA L. B. Smith, Field Mus. Publ. Bot. 17: 319. 1938. ALL.
GRAEBENERII Mez; Pflr. 477. TIL.
GRANDIS Schlecht.; Pflr. 455. PSA.
GUATEMALENSIS L. B. Smith, Contr. U. S. Nat. Herb. 29: 281. 1949. ALL.
GYMNOBOTRYA Baker; Pflr. 518. ALL.
HAMALEANA E. Morr.; Pflr. 575. PHY.
HETEROMORPHA Mez; Pflr. 531. ANO?
HETEROPHYLLA E. Morr.; L. B. Smith, North Am. Fl. 19: 111. 1938. PSA.
HOMOSTACHYA André; Pflr. 507. PS-C.

HOTTEANA Urb.; Pflr. 547. ALL.
HUMBOLDTII Baker; Pflr. 546. ALL?
HUMILIS Presl; Pflr. 570. PHY.
HUTCHISONII L. B. Smith, Phytologia 13: 145. 1966. ALL.
IGNESIAE Mez; Pflr. 494. ALL.
IMPERIALIS E. Morr.; Pflr. 482. TIL.
INCARNATA H. B. K.; Pflr. 554. ALL.
INCONSPICUA André; Pflr. 505. PS-C.
INDIGOFERA Mez & Sodiro; Pflr. 518. ALL.
INSIGNIS (E. Morr.) L. B. Smith & Pittendrigh, Journ. Washington Acad. Sci. 43: 402. 1953. ALL.
INSULARIS Mez; Pflr. 511. PS-C.
Var. INSULARIS. Leaf-blades 25-40 mm wide; sheaths usually concolorous with the blades, without purple coloring. Spikes ascending to recurving. Floral bracts glabrous, usually shorter than the sepals. Capsule to 23 mm long.
Var. LATILAMINA Gilmartin, Phytologia 16: 163. 1968. Leaf-blades wider; sheaths purple. Spikes ascending. Floral bracts lepidote, sometimes slightly exceeding the sepals.
INTERRUPTA Mez; Pflr. 544. ALL.
INTUMESCENS L. B. Smith, Phytologia 5: 177. 1955. TIL.
IONANTHA Planch.; L. B. Smith, Lilloa 6: 384. 1941. TIL.
Var. IONANTHA. Plant stemless. Scape lacking.
Var. SCAPOSA L. B. Smith, Lilloa 6: 384. 1941. Plant stemless. Scape short, but distinct.
Var. VANHYNINGII M. B. Foster, Bromel. Soc. Bull. 7: 71. 1957. Plant caulescent. Scape lacking.
IONOCHROMA André ex Mez; Pflr. 548. ALL.
IXIOIDES Griseb.; Pflr. 559. ANO.
Var. IXIOIDES. Plant flowering 16 cm or slightly higher. Leaves about 10 cm long.
Var. OCCIDENTALIS Castellanos, An. Mus. Nac. Hist. Nat. Buenos Aires 37: 504. 1933. Plant flowering 30 cm and higher. Leaves 13-18 cm long.
JENMANII Baker; Pflr. 514. PS-C.
JUCUNDA Castellanos, An. Mus. Nac. Hist. Nat. Buenos Aires 36: 56. 1929. ANO.
JUNCEA (R. & P.) Poir.; Pflr. 465. TIL.
KARWINSKYANA Schult. f.; Pflr. 459. TIL.
KEGELIANA Mez; Pflr. 493. TIL.
KIRCHHOFFIANA Wittm.; Pflr. 473. TIL.
KRUKOFFIANA L. B. Smith, Contr. Gray Herb. 154: 36. 1945. ALL
KUNTZEANA Mez; Pflr. 540. ALL?
LAJENSIS André; Pflr. 535. ALL.
LAMINATA L. B. Smith, Phytologia 9: 253. 1963. PS-C.
LAMPROPODA L. B. Smith, Field Mus. Publ. Bot. 17: 320. 1938. TIL.
Var. LAMPROPODA. Plant flowering 4-5 dm high. Leaves to 5 dm long. Inflorescence simple.
Var. MAJOR L. B. Smith, Phytologia 10: 483. 1964. Plant flowering over 6 dm high. Leaves ca 8 dm long. Inflorescence digitate from 3 spikes.

LANDBECKII Phil.; Pflr. 591. DIA.
LATIFOLIA Meyen; Pflr. 539. ALL.
Var. LATIFOLIA (Pflr..539).
Var. MAJOR Mez; Pflr. l. c.
Var. DIVARICATA (Benth.) Mez: Pflr. l. c.
LAXISSIMA Mez; Pflr. 577. PHY?
LEIBOLDIANA Schlecht.: Pflr. 551. ALL.
Var. LEIBOLDIANA. Leaves concolorous.
Var. GUTTATA M. H. Hobbs, Bromel. Soc. Bull. 11: 43. 1961. Leaves red-spotted at base.
LEPIDOSEPALA L. B. Smith, Proc. Am. Acad. 70 (Contr. Gray Herb. 106): 155. 1935. TIL?
LESCAILLEI C. Wright in Sauvalle; Pflr. 514. PS-C.
LEUCOLEPIS L. B. Smith, Phytologia 8: 497. 1963. TIL.
LIMAE L. B. Smith, sp. nov. A T. subulifera Mez, cui verisimiliter affinis, inflorescentia ramosa, spicis laxis, floribus patentibus differt.

PLANT stemless, flowering 25-30 cm high with inflorescence extended. LEAVES 20-30 in an ovoid pseudobulb, erect, the inner ones to 20 cm long, the outer greatly reduced, appressed-cinereous-lepidote, concolorous; sheaths ovate, about as long as the blades; blades narrowly triangular, abruptly acute or obtuse, involute. SCAPE curved, 2 mm in diameter; scape-bracts erect, ovate, shorter than the internodes. INFLORESCENCE bipinnatefrom 3 or 4 spikes, lax, 9-11 cm long, glabrous (?); primary bracts like the scape-bracts, shorter than the sterile naked or 1-bracteate bases of the branches; spikes subspreading, 4-8.5 cm long, laxly 2-9-flowered; rhachis slender, geniculate. FLORAL BRACTS broadly ovate, about half as long as the sepals, strongly nerved; flowers spreading, subsessile. SEPALS elliptic, 14 mm long, nerved, ecarinate. CAPSULE cylindric, beaked, 25 mm long. Pl. I, fig. 8: Plant x 1/4; fig. 9: Sepal x 1.

BRAZIL: MATO GROSSO: On trunk of buritirana palm, bank of Rio Tuatuari (affluent of Rio Kuluene), 12° 12' S, 53° 22' W, 12 May 1958, A. Lima 58-3144 (IPA type, US photo)

LINDENII Regel; L. B. Smith, Contr. U. S. Nat. Herv. 29: 491. 1951. PHY.
Var. LINDENII. Scape solitary, terminal. Spike lanceolate, acute.

Var. DUVALIANA L. B. Smith, nom. nov. T. lindenii E. Morr. (non Regel) var. duvalii Duval ex André, Rev. Hort. 71: 516. 1899, nom. illeg. T. lindenii Regel var. duvalii L. B. Smith, Contr. U. S. Nat. Herb. 29: 493. 1951, nom. illeg. Scape solitary, terminal. Spike elliptic, obtuse.

Var. ABUNDANS L. B. Smith, nom. nov. T. lindenii E. Morr. (non Regel) var. luxurians E. Morr. Belg. Hort. 21: 289. 1871, nom. illeg. T. lindenii Regel var. luxurians L. B. Smith, Contr. U. S. Nat. Herb. 29: 494. 1951, nom. illeg. Scapes several, terminal and axillary. Flowers single.

Var. KOUTSINSKYANA (E. Morr.) L. B. Smith, Contr. U. S. Nat. Herb. 29: 494. 1951. Phytarrhiza lindenii E. Morr. (non Tillandsia lindenii Regel) var. koutsinskyana E. Morr. Belg. Hort. 30:

80. 1880. Scapes several, terminal and axillary. Flowers more or less doubled, to 8 cm in diameter.

LINEARIS Vell.; Pflr. 585. ANO. (style too long for subgenus Phytarrhiza).

LINEATISPICA Mez; Pflr. 473. TIL.

LOLIACEA Mart. ex Schult. f.; Pflr. 586. DIA.

LONGIFOLIA Baker; Pflr. 520. ALL.

LOPEZII L. B. Smith, Phytologia 8: 502. 1963. ALL.

LORENTZIANA Griseb.; Pflr. 529. ANO. Including forma simplex Kuntze, Pflr. 530.

LUCIDA E. Morr. ex Baker; Pflr. 470. ALL.

MACBRIDEANA L. B. Smith; Pflr. 556. ANO.

MACDOUGALLII L. B. Smith, Contr. U. S. Nat. Herb. 29: 277. 1949. TIL.

MACROCHLAMYS Baker; Pflr. 477. TIL.

MACRODACTYLON Mez; Pflr. 536. ALL. I once considered this a synonym of the species now known as T. fendleri Griseb. because both supposedly had free sepals. Recently Dr. Edith Raadts has examined the type of T. macrodactylon and reports that in reality it has the posterior sepals distinctly connate.

MACULATA R. & P.; Pflr. 522. ALL.

MAGNUSIANA Wittm.; Pflr. 497; L. B. Smith, Phytologia 19: 287. 1970. TIL.

MAKOYANA Baker; Pflr. 460. TIL.

MALLEMONTII Glaziou ex Mez; Pflr. 584. PHY.

MARANTOIDEA Rusby; Pflr. 519. ALL.

MATUDAE L. B. Smith, Contr. U. S. Nat. Herb. 29: 278. 1949. ALL.

MAURYANA L. B. Smith, Contr. Gray Herb. 117: 31. 1937. ALL.

MAXIMA Lillo & Hauman; Pflr. 518. ALL.

Var. MAXIMA. Plant flowering 1.5 m high. Leaf-blades 10 cm wide. Spikes rather lax, 10 cm long. Floral bracts 22-40 mm long. Sepals 22-30 mm long.

Var. DENSIOR L. B. Smith, Lilloa 14: 97. 1948. Plant flowering 8-10 dm high. Leaf-blades 6-8 cm wide. Spikes very dense, 14-19 cm long. Floral bracts to 3 cm long. Sepals 22 mm long.

MEMBRANACIFOLIA L. B. Smith; Pflr. 505. PS-C.

MERIDIONALIS Baker; Pflr. 561. ANO.

MEXIAE L. B. Smith, Contr. Gray Herb. 117: 32. 1937. TIL?

MEXICANA L. B. Smith, North Am. Fl. 19: 140. 1938. TIL?

MICANS L. B. Smith, Phytologia 5: 402. 1956. ALL.

MICHELII Mez; Pflr. 510. PS-C.

MIMA L. B. Smith, Caldasia 3: 244. 1945. TIL.

MONADELPHA (E. Morr.) Baker; Pflr. 571. PHY.

MONTANA Reitz, Sellowia no. 14: 106. 1962. ANO.

MONTICOLA Mez & Sodiro; Pflr. 507. PS-C.

MOOREANA L. B. Smith, nom. nov. T. inflata Mez in DC. Mon. Phan. 9: 701. 1896, non Baker, 1886; Pflr. 457. TIL. The new specific name is in honor of Harold E. Moore, Jr., to whom I am indebted for beautiful material of this and many other species.

MOSCOSOI L. B. Smith, Phytologia 5: 281. 1955. TIL.

MULTICAULIS Steud.; L. B. Smith, North Am. Fl. 19: 130. 1938.

TIL.

MULTIFLORA Benth.; Pflr. 509. PS-C.

Var. MULTIFLORA. Leaf-blades narrowly triangular, caudate-attenuate. Scape-bracts much exceeding the internodes. Primary bracts exceeding the lower axillary branches.

Var. DECIPIENS (André) L. B. Smith, Contr. Gray Herb. 89: 13. 1930. Leaf-blades and scape-bracts as in the typical variety. Primary bracts all shorter than the axillary branches.

Var. TOMENSIS L. B. Smith; Pflr. 509. Leaf-blades linear-lanceolate, acute or acuminate. Scape-bracts equaling or slightly exceeding the internodes. Primary bracts broadly lanceolate, apiculate, much shorter than the axillary branches.

MYOSURA Griseb. ex Baker; L. B. Smith, Proc. Am. Acad. 70 (Contr. Gray Herb. 106): 199. 1935. DIA.

MYRIANTHA Baker; Pflr. 549. ALL.

NANA Baker; Pflr. 567. ANO.

NARTHECIOIDES Presl; Pflr. 571. PHY.

NUBIS Gilmartin, Phytologia 16: 161. 1968. PHY.

NUPTIALIS Ruby Braga & D. Sucre, Loefgrenia no. 35: 1. 1969. ANO.

OAXACANA L. B. Smith, Contr. U. S. Nat. Herb. 29: 279. 1949. TIL.

OERSTEDIANA L. B. Smith, Phytologia 13: 141. 1966. ALL?

ORBICULARIS L. B. Smith, Phytologia 5: 38. 1954. ALL?

OROGENES Standley & Williams, Ceiba 3: 188. 1953. ALL.

OROYENSIS Mez; Pflr. 537. ALL.

ORTGIESIANA E. Morr. ex Mez; Pflr. 466. TIL.

PACHYAXON L. B. Smith, Phytologia 6: 259. 1958. ALL?

PALEACEA Presl; L. B. Smith, Contr. Gray Herb. 104: 81. 1934. PHY.

PALLIDOFLAVENS Mez; Pflr. 511. PS-C.

PANICULATA L.; Ariza-Julia, Bromel. Soc. Bull. 9: 3. 1959; Howard, ibid. 9: 54. 1959. PSA.

PARAENSIS Mez; Pflr. 490. TIL.

PARDINA L. B. Smith, Lilloa 14: 98. 1948. PS-C.

PARRYI Baker; Pflr. 474. TIL.

PARVIFLORA R. & P.; Pflr. 513. PS-C.

PASTENSIS André; Pflr. 543. ALL?

PECTINATA André; Pflr. 516. PS-C.

PEIRANOI Castellanos, Lilloa 2: 14. 1938. PHY.

PENDULISPICA Mez; Pflr. 503. PS-C.

PENLANDII L. B. Smith, Lilloa 6: 384. 1941. PS-C.

Var. PENLANDII. Primary bracts equaling or exceeding the sterile bases of the branches. Floral bracts broadly ovate, obtuse, slightly shorter than the sepals.

Var. PEDUNCULATA L. B. Smith, Lilloa 6: 385. 1941. Primary bracts shorter than the long sterile bases of the branches. Floral bracts triangular, acute, much shorter than the sepals.

*petraea L. B. Smith, Contr. U. S. Nat. Herb. 29: 497. 1951. VRIESEA PETRAEA (L. B. Smith) L. B. Smith, comb. nov. Fresh cultivated material arriving from Alfred Blass after the completion of my key shows appendaged petals and necessitates the transfer

of this species to Vriesea.

PINNATA Mez & Sodiro; Pflr. 519. ALL?

PINNATO-DIGITATA Mez; Pflr. 541. ALL.

PIURENSIS L. B. Smith, Phytologia 13: 146. 1966. ALL?

PLAGIOTROPICA Rohweder, Senckenbergiana 34: 112. 1953. TIL?

PLATYPHYLLA Mez; Pflr. 522. ALL.

PLATYRHACHIS Mez; Pflr. 576. PHY.

PLUMOSA Baker; Pflr. 497. ALL.

POHLIANA Mez; L. B. Smith, Smithsonian Misc. Coll. 126: 84. 1955. ANO.

POLITA L. B. Smith, Lilloa 6: 385. 1941. TIL.

POLYANTHA Mez & Sodiro; Pflr. 481. ALL?

POLYSTACHIA (L.) L.; Pflr. 475. TIL.

PONDEROSA L. B. Smith, Contr. Gray Herb. 154: 37. 1945. TIL.

PRETIOSA Mez; Pflr. 575. PHY?

PRODIGIOSA (Lem.) Baker; Pflr. 481. TIL.

PRUINOSA Sw.; Pflr. 493. TIL.

PUEBLENSIS L. B. Smith; Pflr. 494. TIL.

Var. PUEBLENSIS. Floral bracts appressed-gray-lepidote.

Var. GLABRIOR L. B. Smith, Phytologia 6: 257. 1958. Floral bracts soon glabrous.

PUGIFORMIS L. B. Smith; Pflr. 515. PS-C.

PUNCTULATA Schlecht. & Cham.; Pflr. 470. TIL.

PURPUREA R. & P.; Pflr. 532. PHY.

PYRAMIDATA André; Pflr. 536. ALL?

QUADRIPINNATA Mez & Sodiro; Pflr. 508. PS-C.

QUEROENSIS Gilmartin, Phytologia 16: 159. 1968. ALL.

RACINAE L. B. Smith, Contr. U. S. Nat. Herb. 29: 439. 1951. ALL?

RARIFLORA André; Pflr. 524. ALL?

RAUHII L. B. Smith, Bromel. Soc. Bull. 8: 44. 1958. TIL.

RECTANGULA Baker; Pflr. 588. DIA.

RECURVATA (L.) L.; Pflr. 591. DIA.

Var. RECURVATA. (Pflr. 591).

Var. CILIATA E. Morr. ex Mez; Pflr. 592.

Var. CONTORTA André; Pflr. 592.

Var. MINUTA Mez; Pflr. 592.

REDUCTA L. B. Smith, Phytologia 5: 399. 1956. ALL.

REICHENBACHII Baker; L. B. Smith, Proc. Am. Acad. 70 (Contr. Gray Herb. 106): 155. 1935. PHY.

REMOTA Wittm.; Pflr. 464; L. B. Smith, Phytologia 8: 10. 1961. ALL.

RESTREPOANA André; Pflr. 542. ALL.

RETORTA Griseb. ex Baker, Pflr. 589. DIA.

RETTIGIANA Mez; Pflr. 472. TIL.

REVERSA L. B. Smith, Phytologia 5: 40. 1954. ALL?

RHOMBOIDEA André; Pflr. 554. ALL.

RIOCREUXII André; Pflr. 516. PS-C.

RODRIGUEZIANA Mez; Pflr. 474. TIL.

ROEZLII E. Morr.; Pflr. 537. ALL.

ROLAND-GOSSELINII Mez; Pflr. 482. TIL?

ROMEROI L. B. Smith, Phytologia 8: 499. 1963. ALL.

ROPALOCARPA André; Pflr. 511. PS-C.

ROSEA Lindl.; L. B. Smith, Smithsonian Misc. Coll. 126: 81. 1955. ANO.

ROTHSCHUHIANA Mez; Pflr. 504. PS-C.

RUBELLA Baker; Pflr. 536. ALL.

RUPICOLA Baker; Pflr. 560. PHY?

RUSBYI Baker; L. B. Smith, Rhodora 71: 244. 1969. ALL.

SAGASTEGUII L. B. Smith, Phytologia 8: 503. 1963. ALL.

SANCTAE-MARTAE L. B. Smith, Phytologia 5: 396. 1956. PS-C.

SCALIGERA Mez & Sodiro; Pflr. 572. PHY.

SCEPTRIFORMIS Mez & Sodiro, Pflr. 546. ALL?

SCHIEDEANA Steud.; L. B. Smith, North Am. Fl. 19: 150. 1938.

SCHIMPERIANA Wittm.; Pflr. 541. ALL.

SCHULTZEI Harms; Pflr. 550. ALL.

SECUNDA H. B. K.; Pflr. 522. ALL.

SEEMANNII (Baker) Mez; Pflr. 498. PS-C.

SELERIANA Mez; Pflr. 492. TIL.

SELLEANA Harms; Pflr. 535. ALL.

SETACEA Sw.; L. B. Smith, Phytologia 8: 219. 1962. TIL.

SIGMOIDEA L. B. Smith, Contr. U. S. Nat. Herb. 29: 440. 1951. ALL?

SINGULARIS Mez & Werckle; Pflr. 524. ALL.

SINUOSA L. B. Smith, Pflr. 508. PS-C.

Var. SINUOSA. Leaf-blades 20 mm wide. Inflorescence 30 cm long; branches ascending. Floral bracts 5-6 mm long.

Var. QUIROZII Gilmartin, Phytologia 16: 162. 1968. Leaf-blades 15 mm wide. Inflorescence 7 cm long (normal?); spikes recurved. Floral bracts 6-7 mm long.

SOCIALIS L. B. Smith, Phytologia 6: 257. 1958. TIL.

SODIROI Mez; Pflr. 545. ALL.

SOMNIANS L. B. Smith, Phytologia 7: 422. 1961. ALL?

SPATHACEA Mez & Sodiro; Pflr. 483. TIL? VRIESEA?

SPHAEROCEPHALA Baker; Pflr. 567. ALL.

SPICULOSA Griseb.; Pflr. 504. PS-C.

Var. SPICULOSA. Leaf-blades merely spotted or concolorous. Inflorescence usually tripinnate; spikes densely flowered at least toward apex. Floral bracts (5-) 6-9 mm long, mostly more than twice as long as the internodes.

Var. USTULATA (Reitz) L. B. Smith, Phytologia 19: 288. 1970. Leaf-blades irregularly cross-banded with dark purple. Inflorescence usually bipinnate; spikes densely flowered at least toward apex. Floral bracts (5-) 6-9 mm long, mostly more than twice the internodes.

Var. MICRANTHA (Baker) L. B. Smith, l. c. Spikes laxly flowered at maturity. Floral bracts 4-5 mm long, mostly less than twice the internodes.

SPRENGELIANA Kl.; Pflr. 560. ANO.

STANDLEYI L. B. Smith; Pflr. 541. ALL?

STEIROPODA L. B. Smith, Phytologia 6: 257. 1958. TIL.

STENOGLOSSA L. B. Smith, Fieldiana Bot. 28: 151. 1951. PS-C.

STENOURA Harms, Notizblatt 12: 537. 1935. ALL.

Var. STENOURA. Inflorescence bipinnate; spikes with sterile

base 1-3 cm long and 1-3-bracteate. Floral bracts not over 30 mm long.

Var. GONZALEZII Gilmartin, Phytologia 16: 155. 1968. Inflorescence tripinnate; spikes subsessile. Floral bracts 27-30 mm long.

Var. MAUROI Gilmartin, op. c. 156. Inflorescence 25 cm long, 10 cm wide; spikes erect, 5-10 cm long. Floral bracts 30-35 mm long.

STIPITATA L. B. Smith, Phytologia 5: 40. 1954. ALL?

STRAMINEA H. B. K.; Pflr. 531. PHY.

STREPTOCARPA Baker; Pflr. 577. PHY.

STREPTOPHYLLA Scheidw.; Pflr. 488. TIL.

STRICTA Soland.; Pflr. 561. ANO.

Var. STRICTA. Flowers polystichous.

Var. DISTICHA L. B. Smith, Arq. Bot. Est. S. Paulo II. 1: 115. 1943. Flowers distichous.

STROBILIFERA E. Morr. ex Baker; Pflr. 480. TIL.

SUBALATA André; Pflr. 507. PS-C.

SUBCONCOLOR L. B. Smith, sp. nov. A T. wurdackii L. B. Smith, cui affinis, foliorum laminis supra subdense lepidotis, inflorescentia pauciramosa, spicis multifloris differt.

PLANT stemless, flowering 1.2 m high. LEAVES to 65 cm long, covered beneath with fine appressed cinereous scales; sheaths ovate, indistinct, 9 cm long, dark castaneous; blades subligulate to narrowly triangular, attenuate, 45 mm wide, subdensely cinereous-lepidote above. SCAPE erect, 1 cm in diameter, densely lepidote; scape-bracts imbricate, lanceolate, the upper short-caudate, lepidote toward apex. INFLORESCENCE typically of 4 spikes, lax; primary bracts ovate, apiculate, to 6 cm long, much exceeding the short bracteate sterile bases of the branches; spikes ascending, oblong, 13 cm long, 25 mm wide, strongly complanate with flat sides. FLORAL BRACTS densely imbricate, elliptic, acute, to 30 mm long, exceeding the sepals, carinate, coriaceous, even, lepidote at apex; flowers subsessile. SEPALS lance-oblong, acute, 24 mm long, glabrous, faintly nerved, the posterior short-connate; petal-blades elliptic, 8 mm long, pale violet; stamens included. Pl. I, fig. 10: Spike x 1/2; fig. 11: Sepals x 1.

PERU: CUZCO: epiphytic, Quillabamba, Rauh 20811 (US, type).

SUBULIFERA Mez; Pflr. 490. TIL.

SUESCANA L. B. Smith, Contr. U. S. Nat. Herb. 29: 441. 1951. ALL.

SUPERBA Mez & Sodiro; Pflr. 534. ALL.

TECTORUM E. Morr.; Pflr. 531. ALL.

TENUIFOLIA L.; L. B. Smith, Phytologia 8: 219. 1962. ANO.

Var. TENUIFOLIA. Leaves scarcely or not secund, usually exceeding the inflorescence; sheaths not distinct. Flowers polystichous.

Var. DISTICHA (L. B. Smith) L. B. Smith, Phytologia 8: 220. 1962. As the typical but flowers distichous.

Var. SURINAMENSIS (Mez) L. B. Smith, l. c. Leaves usually secund but divergent from each other, exceeded by the inflores-

cence; sheaths indistinct. Flowers polystichous.

Var. SAXICOLA (L. B. Smith) L. B. Smith, l. c. Leaves very densely secund, pressed together; sheaths indistinct. Flowers polystichous.

Var. VAGINATA (Wawra) L. B. Smith, l. c. Leaf-blades involute and thus contrasting with the sheaths, often spreading, much shorter than the long branching stem. Flowers polystichous.

TENUISPICA André; Pflr. 515. PS-C.

TERES L. B. Smith, Phytologia 16: 78. 1968. TIL.

TETRANTHA R. & P.; Pflr. 501. PS-C.

Var. TETRANTHA. Inflorescence laxly bipinnate. Floral bracts minute or wanting.

Var. AURANTIACA (Griseb.) L. B. Smith, Contr. Gray Herb. 89: 15. 1930. Scape-bracts mostly shorter than the internodes. Inflorescence bipinnate, long, lax; primary bracts often shorter than the spikes, orange to dark brown; spikes lax. Floral bracts half as long as the sepals.

Var. DENSIFLORA (André) L. B. Smith, l. c. Scape-bracts imbricate. Inflorescence bipinnate, short, dense; primary bracts orange to dark brown. Floral bracts about half as long as the sepals.

Var. SCARLATINA (André) L. B. Smith, l. c. Leaves coriaceous, firm. Inflorescence bipinnate, long, lax; primary bracts exceeding the spikes, bright red or rarely pale greenish yellow. Floral bracts about half as long as the sepals.

Var. MINIATA (André) L. B. Smith, l. c. Leaves soft, flexible Inflorescence bipinnate, mostly small, compact; primary bracts exceeding the spikes, bright red or rarely pale greenish yellow. Floral bracts about half as long as the sepals.

Var. RAMOSIOR L. B. Smith, Phytologia 13: 147. 1966. Inflorescence laxly tripinnate; rhachis neither angled nor geniculate; primary and floral bracts large.

THYRSIGERA Baker; L. B. Smith, North Am. Fl. 19: 131. 1938. TIL.

TOVARENSIS Mez; Pflr. 520. ALL.

TRAPEZIFORMIS Mez; Pflr. 498. PS-C.

TRICHOLEPIS Baker; Pflr. 587. DIA.

Var. TRICHOLEPIS. Stem short. Leaves not over 15 mm long.

Var. MACROPHYLLA L. B. Smith, Lilloa 14: 98. 1948. Stem becoming long and much branched. Leaves to 50 mm long.

TRICOLOR Schlecht. & Cham.; Pflr. 469. TIL.

Var. TRICOLOR. Plant 30-40 cm high. Leaf-sheaths concolorous

Var. MELANOCRATER (L. B. Smith) L. B. Smith, Journ. Washington Acad. Sci. 43: 68. 1953. Plant not over 25 cm high. Leaf-sheaths concolorous.

Var. PICTA L. B. Smith, Contr. Gray Herb. 154: 38. 1945. Leaf-sheaths more or less pale-maculate.

TRIGLOCHINOIDES Presl; Pflr. 572. PHY.

TRIPINNATA (Baker) Mez; Pflr. 503. PS-C.

TRUNCATA L. B. Smith, Contr. U. S. Nat. Herb. 29: 530. 1954. ALL.

TRUXILLANA L. B. Smith, Phytologia 8: 503. 1963. ALL.

TURNERI Baker; Pflr. 546. ALL.

Var. TURNERI. Plant 40-50 cm high. Inflorescence much branched, compact. Sepals 18-20 mm long.

Var. ORIENTALIS L. B. Smith, Mem. N. Y. Bot. Gard. 9: 421. 1927. Plant 15-40 cm high. Inflorescence few branched or simple compact. Sepals 13-15 mm long.

Var. PATENS L. B. Smith, Phytologia 16: 462. 1968. Inflorescence subcylindric, sublax, to 30 cm long; branches spreading.

ULTIMA L. B. Smith, Contr. U. S. Nat. Herb. 29: 442. 1951. ALL?

UMBELLATA André; Pflr. 575. PHY.

USNEOIDES (L.) L.; Pflr. 594. DIA.

Var. USNEOIDES. (Pflr. 595).

Var. FILIFORMIS André; Pflr. 596.

Var. FERRUGINEA André; l. c.

Var. LONGISSIMA André; l. c.

Var. ROBUSTA E. Morr. ex Mez; l. c.

Var. CRETACEA Mez, l. c. All of difficult distinction and doubtful value.

UTRICULATA L.; Pflr. 459. TIL.

UYUCENSIS Gilmartin, Ceiba 11: 23. 1965. ALL.

Forma UYUCENSIS. Plant to 50 cm high. Leaves to 32 cm long, mostly green.

Forma MINOR Gilmartin, Ceiba 11: 23. 1965. Plant only about 25 cm high. Leaves 20-25 cm long, reddish.

VALENZUELANA A. Rich.; Pflr. 486. TIL.

VENUSTA Mez & Werckle; Pflr. 576. PHY.

VERNICOSA Baker; Pflr. 528. ANO.

VICENTINA Standl.; Pflr. 484. TIL.

Var. VICENTINA. Floral bracts covered with appressed cinereous scales.

Var. GLABRA L. B. Smith, var. nov. A var. vicentina bracteis florigeris mox glabris differt.

MEXICO: CHIAPAS: Venustiano Carranza: on Quercus, north side of Aguacatenango near the lake, 1770 m alt, 28 January 1965, Raven & Breedlove 20098 (US, type).

VIOLACEA Baker; Pflr. 480. TIL.

VIOLASCENS Mez; Pflr. 546. ALL.

VIRIDIFLORA (Beer) Baker; Pflr. 455. PSA.

WAGNERIANA L. B. Smith, Phytologia 9: 254. 1963. PHY.

WALTERI Mez; Pflr. 553. ALL.

WERCKLEANA Mez; Pflr. 523. ALL?

WERDERMANNII Harms; Pflr. 555. ALL?

WURDACKII L. B. Smith, Phytologia 9: 254. 1963. ALL.

XEROGRAPHICA Rohweder, Senckenbergiana 34: 113. 1953. TIL.

XIPHIOIDES Ker-Gawl.; Pflr. 557. ANO.

Var. XIPHIOIDES. Leaf-scales mostly with broad lobes. Floral bracts to 7 cm long. Sepals to 42 mm long. Petals white.

Var. TAFIENSIS L. B. Smith, var. nov. A var. xiphioides foliis tomentoso-lepidotis, bracteis florigeris (5-6 cm) sepalisque (30 mm) minoribus, petalis violaceis differt. T. friesii sensu Castellanos, An. Mus. Hist. Nat. Buenos Aires 37: 501,

pl. 1. 1933.

ARGENTINA: TUCUMAN: Tafi: on algarrobo (Prosopis), Managua (Colalao del Valle), 2000 m alt, December 1931, Schreiter 7176 (US, type; LIL).

YUNCKERI L. B. Smith, Field Mus. Publ. Bot. 17: 322. 1938. TIL?

*zamorensis L. B. Smith, Phytologia 4: 213. 1953. VRIESEA ZAMORENSIS (L. B. Smith) L. B. Smith, comb. nov. The evidence for this species being a Vriesea was overlooked until too late to include it in my key correctly. The combination is based on the evidence of Blass in herb. Rauh 17729 from Ecuador.

ZARUMENSIS Gilmartin, sp. nov. Vriesea petream (L. B. Smith) L. B. Smith valde simulans sed petalorum ligulis non visis et floribus majoribus, bracteis florigeris subduplo longioribus angustioribus carinatis differt.

PLANT ca. 70 cm tall, epiphytic. LEAVES 40-50 cm long; sheaths 10-14 cm long by 8-10 cm wide, reddish brown; blades 34-45 mm wide, narrowly triangular, gray-green, densely subappressed lepidote above and below, apex caudate. SCAPE unknown. INFLORESCENCE fragmented but apparently compound; primary bracts 10 cm long by 3 cm wide, like the floral bracts but not carinate; spikes 30 cm long by 3.5 cm wide, glabrous, 20-30-flowered; rhachis alate. FLORAL BRACTS 11 cm long by 2.3 cm wide, erect, densely imbricate, narrowly ovate, obtuse, salmon-colored, nerved carinate, glabrous within and without. SEPALS 4 cm long by 1 cm wide, ovate, erect, ecarinate, nerved, free, glabrous within and without, acute; petals to 13 cm long, erect, green, turning yellow; stamens included by several mm; ovary 9 mm long by 7 mm in diameter, style many times longer than ovary, stigma included; distance between flowers ca 8 mm. Pl. II, fig. 1-3.

ECUADOR: EL ORO: between Corredores and Cashatambo, north of Zaruma (ca 3° 35' S, 79° 37' W), 2600 m alt, 10 September 1947, A. Espinosa 2229 (US, type).

SYNONYMS AND EXCLUDED NAMES

acroleuca Mez & Purpus; Pflr. 472 - TRICOLOR var. TRICOLOR.
aloifolia Hook.; Pflr. 462 - FLEXUOSA.
apoloensis Rusby; Pflr. 579 - STREPTOCARPA.
araeostachya Harms; Pflr. 511 - JENMANII.
arguta L. B. Smith, Phytologia 6: 440. 1959 - STENOURA var. STENOURA
arnoldiana Harms; Pflr. 521 - TOVARENSIS.
arpocalyx André; Pflr. 482 - VRIESEA A.
augustae-regiae Mez; Pflr. 548 - BIFLORA.
barclayana Baker; Pflr. 553 - VRIESEA B.
bicolor Brongn.: Pflr. 566 - AËRANTHOS.
brachypodia (E. Morr.) Mez; Pflr. 564 - TENUIFOLIA var. VAGINATA
bradeana Mez & Tonduz; Pflr. 479 - BRACHYCAULOS.
brevispicula André; Pflr. 508 - SUBALATA.
brittoniana Baker; Pflr. 509 - SPICULOSA var. SPICULOSA

bromoides Mez; Pflr. 465 - SETACEA.
buchii Urb.; Pflr. 471 - FASCICULATA var. VENOSISPICA.
buchtienii H. Winkler; Pflr. 530 - RUSBYI
caespitosa Schlecht. & Cham.; Pflr..458 - MULTICAULIS.
candelifera Rohweder, Senckenbergiana 34: 109. 1953 - IMPERIALIS.
caricifolia E. Morr.; Pflr. 463 - FESTUCOIDES.
castaneo-bulbosa Mez & Werckle; - Pflr. 491 - VRIESEA INCURVA.
cereicola Mez; Pflr. 487 - VRIESEA C.
chilensis Baker; Pflr. 583 - PALEACEA
chinchicuana Harms; Pflr. 506 - SPICULOSA var. MICRANTHA.
chontalensis Baker; Pflr. 527 - VRIESEA C.
coarctata Gill. ex Baker; Pflr. 587 - BRYOIDES
compressa Bertero; Pflr. 470 - FASCICULATA var. VENOSISPICA.
condensata Baker; Pflr. 580 - STREPTOCARPA.
confusa Hassler; Pflr. 581 - DURATII var. CONFUSA
confusa var. saxatilis Hassler; Pflr. 581 - DURATII var. SAXATILIS.
cordobensis Hieron.; Pflr. 592 - CAPILLARIS f. CORDOBENSIS.
costaricana Mez & Werckle; Pflr. 523 - EXCELSA.
cowellii Mez & N. L. Britton; Pflr. 550 - VRIESEA C.
crenulipetala Mez; Pflr. 533 - VRIESEA C.
cryptantha Baker; Pflr. 478 - BRACHYCAULOS.
cucaensis Wittm.; Pflr. 461 - MAKOYANA.
cyanea (A. Dietr.) Morr. ex Mez; Pflr. 521 - GUATEMALENSIS.
cyanescens Mez; Pflr. 563 - TENUIFOLIA var. VAGINATA.
cygnea Mez & Sodiro; Pflr. 483 - VRIESEA TEQUENDAMAE.
cylindrica S. Watson; Pflr. 480 - BOURGAEI.
decipiens Andre; Pflr. 510 - MULTIFLORA var. DECIPIENS
decomposita Baker; Pflr. 580 - DURATII var. SAXATILIS.
dependens Hieron. ex Mez; Pflr. 594 - CAPILLARIS f. HIERONYMII
deppeana var. clavigera (Mez) L. B. Smith, Phytologia 5: 395. 1956 - CLAVIGERA.
var. costaricensis (Mez) L. B. Smith, Phytologia 5: 395. 1956- OERSTEDIANA.
var. latifolia (Griseb.) L. B. Smith, Phytologia 5: 394. 1956- FENDLERI var. FENDLERI.
var. reducta (L. B. Smith) L. B. Smith, Phytologia 5: 395. 1956 - FENDLERI var. REDUCTA.
var. tripinnata L. B. Smith, Phytologia 5: 49. 1954 - FENDLERI var. FENDLERI.
dianthoidea Rossi; Pflr. 565 - AËRANTHOS.
var. grisea Guillaumin, Bull. Mus. Nat. Hist. Nat. Paris 19, pt. 4: 353. 1947, nom. illeg., not seen, but probably equals T. BERGERI.
didistichoides Mez; Pflr. 526 - VRIESEA D.
dielsii Harms, Notizblatt 12: 534. 1935 - PENDULISPICA.
digitata Mez; Pflr. 483 - VRIESEA INCURVA.
distachya Baker; Pflr. 486 - ?
domingensis Mez; Pflr. 485 - VALENZUELANA.
dubia L. B. Smith, Phytologia 5: 284. 1955 - VRIESEA DUBIA.
ehrenbergii Kl. ex Beer, Brom. 264. 1857, nomen; Mez, DC. Mon.

9: 727. 1836. description; Pflr. 495 - EHRENBERGIANA.
ekmanii Harms; Pflr. 461 - PANICULATA
elata Baker; Pflr. 519 - VRIESEA E.
erubescens Schlecht. Linnaea 18: 427. 1844 - ?
erubescens sensu Mez; Pflr. 496 - IONANTHA var. IONANTHA
espinosae L. B. Smith, Contr. U. S. Nat. Herb. 29: 498. 1951 - VRIESEA E.
euosma Spegazzini; Pflr. 582 - REICHENBACHII.
exaltata Mez, Pflr. 520 - VRIESEA ELATA.
exigua Ule; Pflr. 513 - PARVIFLORA.
favillosa Mez; Pflr. 583 - PALEACEA.
fendleri (Baker) Mez, non Griseb.; Pflr. 500 - CARIBAEA.
ferruginascens Mez; Pflr. 500 - CARIBAEA.
firmula Mez; Pflr. 565 - TENUIFOLIA var. SURINAMENSIS.
flammea Mez; Pflr. 478 - BRACHYCAULOS.
fluminensis Mez; Pflr. 568 - GARDNERI.
fragrans André; Pflr. 550 - VRIESEA F.
fulgens (Kl.) Mez; Pflr. 501 - TETRANTHA var. AURANTIACA.
funckiana Baker; Pflr. 496 - ANDREANA.
fusca Baker; Pflr. 495 - PALEACEA.
fusco-guttata Mez; Pflr. 550 - IONOCHROMA.
glaucophylla (Hook.) Baker; Pflr. 471 - FASCICULATA var. FASCICULATA.
goyazensis Mez; Pflr. 528 - DIDISTICHA.
gracilis Ule; Pflr. 524 - VRIESEA GRACILIS var. TENUIS.
grisebachiana Baker; Pflr. 549 - BIFLORA.
guanacastensis Standl.; Pflr. 513 - CONTORTA.
guentheri Harms; Pflr. 530 - RUSBYI.
hahnii Mez; Pflr. 479 - FOLIOSA.
harmsiana L. B. Smith; Pflr. 533 - VRIESEA HARMSIANA.
herrerae Harms; Pflr. 554 - WALTERI.
herzogii Wittm.; Pflr. 582 - REICHENBACHII.
heterandra André; Pflr. 532 - VRIESEA H.
hieronymi Mez; Pflr. 592 - CAPILLARIS f. HIERONYMII.
hitchcockiana L. B. Smith; Pflr. 485 - VRIESEA H.
incurva Griseb.; Pflr. 487 - VRIESEA I.
inflata Mez; Pflr. 457 - MOOREANA.
ingens Mez; Pflr. 458 - VRIESEA SANGUINOLENTA.
intermedia Mez; Pflr. 488 - CIRCINNATA.
juruana Ule; Pflr. 490 - PARAENSIS.
krameri (E. Morr.) Baker; Pflr. 562 - STRICTA var. STRICTA.
kunthiana Meyen; L. B. Smith, Phytologia 7: 108. 1960; 13: 141. 1966. - LATIFOLIA var. LATIFOLIA.
var. major (Mez) L. B. Smith, l. c. - LATIFOLIA var. MAJOR.
var. divaricata (Benth.) L. B. Smith, l. c. - LATIFOLIA var. DIVARICATA.
lanata Mez; Pflr. 583 - PALEACEA.
lateritia André; Pflr. 553 - VRIESEA BARCLAYANA.
latisepala L. B. Smith; Pflr. 560 - POHLIANA.
lilacina Mez; Pflr. 551 - LEIBOLDIANA.
lindeniana Regel; Pflr. 573 - LINDENII.
mandonii E. Morr. ex Mez; Pflr. 590 - CROCATA.

melanopus E. Morr. ex Baker; Pflr. 467 - TRICOLOR var. MELANOCRATER.

mezii André ex Mez; Pflr. 499 - SEEMANNII var. MEZII.

micrantha Baker; Pflr. 506 - SPICULOSA var. MICRANTHA.

microxiphion Baker; Pflr. 566 - AËRANTHOS.

miniatispica Rohweder, Senckenbergiana 34: 110. 1953 - CRYPTOPODA.

minor Mez & Sodiro; Pflr. 539 - LATIFOLIA var. DIVARICATA.

modesta Mez; Pflr. 481 - FOLIOSA.

monobotrya Mez; Pflr. 571 - MONODELPHA.

monstrum Mez; Pflr. 573 - VRIESEA M.

morreniana Regel; Pflr. 574 - CYANEA.

multifolia Mez; Pflr. 547 - TURNERI var. ORIENTALIS.

murorum Mez; Pflr. 538 - LATIFOLIA var. LATIFOLIA.

orthiantha Standl.; Pflr. 500 - ADPRESSA var. ORTHIANTHA.

palmana Mez; Pflr. 504 - SPICULOSA var. SPICULOSA.

patula Mez; Pflr. 487 - VRIESEA P.

pavonii Mez; Pflr. 525 - MONOTAGMA LAXUM (Poepp. & Endl.) K. Schum., Marantaceae.

pereziana André; Pflr. 485 - VRIESEA P.

petraea L. B. Smith, Contr. U. S. Nat. Herb. 29: 497. 1951 - VRIESEA P.

plicatifolia Ule; Pflr. 499 - CRISPA.

pulchella Hook.; Pflr. 563 - TENUIFOLIA var. TENUIFOLIA.

pulvinata E. Morr. ex Baker; Pflr. 460 - DASYLIRIIFOLIA.

pungens Mez; Pflr. 468 - FASCICULATA var. FASCICULATA.

purpusii Mez; Pflr. 526 - VALENZUELANA.

pusilla Gill. ex Baker; Pflr. 593 - CAPILLARIS f. VIRESCENS.

rectiflora André; Pflr. 515 - FRASERI.

recurvifolia Hook.; Pflr. 561 - ROSEA.

regnellii Mez; Pflr. 568 - GARDNERI.

rhodocincta Baker; Pflr. 540 - TURNERI var. ORIENTALIS.

robusta Griseb.; Pflr. 487 - VRIESEA R.

rubra R. & P.; L. B. Smith, Phytologia 13: 120. 1966 - VRIESEA RUBRA.

rubra sensu L. B. Smith, Contr. Gray Herb. 95: 46. 1931; Pflr. 457 - FENDLERI var. FENDLERI.

var. costaricensis Mez; Pflr. 458 - OERSTEDIANA.

var. fendleri (Griseb.) Mez; Pflr. 458 - FENDLERI var. FENDLERI.

var. reducta L. B. Smith, Fieldiana Bot. 28: 151. 1951 - FENDLERI var. REDUCTA.

rupestris Mez; Pflr. 581 - ARHIZA.

sanctae-crucis Spencer-Moore; Pflr. 483 - PARAENSIS.

saxicola Mez; Pflr. 530 - TECTORUM.

scalarifolia Baker; Pflr. 582 - PALEACEA.

schreiteri Lillo & Castellanos; Pflr. 540 - SPHAEROCEPHALA.

schumanniana (Wittm.) Mez; Pflr. 500 - ADPRESSA var. TONDUZIANA.

scorpiura Mez; Pflr. 503 - PENDULISPICA.

simulata Small; L. B. Smith, North Am. Fl. 19: 133. 1938; Phytologia 13: 454. 1966 - BARTRAMII.

soratensis Baker; Pflr. 577 - STREPTOCARPA.
sordida Salisb. Prodr. 247. 1796. "folia rare ciliato-spinosa." Therefore not Tillandsioideae. Pflr. 608.
spuria Mez & Werckle; Pflr. 491 - VRIESEA CHONTALENSIS.
stolpii Phil.; Pflr. 593 - CAPILLARIS f. VIRESCENS.
subimbricata Baker; Pflr. 525 - ELONGATA var. SUBIMBRICATA.
sublaxa Baker; Pflr. 485 - VALENZUELANA.
subulata E. Morr. ex Baker; Pflr. 493 - CHAETOPHYLLA.
tenuifolia sensu Mez, non L.; Pflr. 464 - SETACEA.
tephrophylla Harms; Pflr. 477 - CAPITATA.
tequendamae André; Pflr. 544 - VRIESEA T.
tonduziana Mez; Pflr. 512 - ADPRESSA var. TONDUZIANA.
triangularis Rusby; Pflr. 507 - PENDULISPICA.
tristis Mez; Pflr. 516 - RIOCREUXII.
triticea Burchell ex Baker; Pflr. 506 - SPICULOSA var. USTULATA.
tucumanensis Mez; Pflr. 580 - REICHENBACHII.
tuerckheimii Mez; Pflr. 523 - VRIESEA T.
uhdei Mez; Pflr. 474 - THYRSIGERA.
ulei Mez; Pflr. 536 - RUSBYI.
unca Griseb.; A. Hunziker, Trab. Mus. Bot. Univ. Cordoba 2: 299. 1960 - AERANTHOS.
unca sensu Mez; Pflr. 556 - ARGENTINA.
undulifolia Mez; Pflr. 499 - CRISPA.
variegata Schlecht.; Pflr. 489 - BUTZII.
venusta Silveira, non Mez & Werckle; Pflr. 638 - GARDNERI.
vestita Schlecht. & Cham.; Pflr. 495 - SCHIEDEANA.
virescens R. & P.; Pflr. 594 - CAPILLARIS f. VIRESCENS.
virginalis E. Morr.; Pflr. 457 - HETEROPHYLLA.
wangerinii Mez; Pflr. 543 - IONOCHROMA.
weberbaueri Mez; Pflr. 512 - PARVIFLORA.
williamsii Rusby; Pflr. 592 - CAPILLARIS f. VIRESCENS.
zamorensis L. B. Smith, Phytologia, 4: 213. 1953 - VRIESEA Z.

MISCELLANEOUS NOTES

Thanks to a steady influx of material I find myself in the anomalous but not wholly unfamiliar position of writing a supplement to an unpublished paper. In this case, new species of Encholirium and Dyckia arrived after my monograph manuscript passed the point of no return.

AECHMEA MOLLIS L. B. Smith, sp. nov. Ab omnibus speciebus inflorescentia bipinnata subglobosa lanata, sepalis serrulato-alatis differt.

LEAVES rosulate, to 5 dm long; sheaths elliptic, 11 cm long, subdensely brown-lepidote; blades ligulate, narrowed toward base, subacute with a terminal mucro 7 mm long, obscurely pale-lepidote beneath, glabrous above, laxly serrulate. SCAPE 7 cm long; scape bracts densely imbricate, the upper elliptic, apiculate. INFLORESCENCE bipinnate, densely subglobose, 6 cm wide, densely and finely brown-lanate with only primary bracts and petal-blades visible; primary bracts ovate, acute, mucronate, about equaling

the lower spikes, purplish; spikes dense with the few flowers apparently polystichous. FLORAL BRACTS suborbicular, mucronulate, serrulate, about equaling the sepals, thin, nerved; flowers sessile. SEPALS strongly asymmetric, 12 mm long, connate for 3 mm, mucronulate, the keel alate and serrulate; petals yellow, bearing 2 suborbicular scales at base; ovary compressed and with serrulate wings continuing those of the sepals, epigynous tube 3 mm long. Pl. II, fig. 7: Sepals and ovary (without indument) x 1 fig. 8: Sepal extended x 1.

BRAZIL: BAHIA: terrestrial, bank of Rio Una, near Una, 7 June 1968, R. P. Belem 3684 (US, type; NY).

DYCKIA LIMAE L. B. Smith, sp. nov. D. velascanae Mez in systemate meo affinis sed rhachi floribusque valde gracilioribus differt.

PLANT flowering 7-8 dm high. LEAF (only one known) 24 cm long; sheath suborbicular, 35 mm wide, stramineous at base, dark brown and densely serrulate at apex; blade narrowly triangular, curved, 15 mm wide, pungent, laxly serrate with antrorse and retrorse uncinate slender brown spines 2 mm long, covered on both sides with pale appressed scales. SCAPE nearly straight, 3 mm in diameter, glabrous; scape-bracts (except the lowest) triangular, small, remote, finely serrulate. INFLORESCENCE depauperately compound with 1 or 2 small suberect lateral branches, to 25 cm long, lax, covered with pale appressed scales except for the petals; rhachis slender, flexuous, compressed. FLORAL BRACTS ovate, acuminate, 6 mm long, the lowest serrulate and slightly exceeding the pedicels; flowers secund; pedicels rather stout but distinct, to 5 mm long in fruit. SEPALS ovate, broadly acute and apiculate, 7 mm long, sulcate; petals 12 mm long, orange, the blade elliptic-rhombic, obtuse, carinate; stamens included, filaments free above the 4 mm common tube; style ca 1 mm long. CAPSULE subglobose, 15 mm long. Pl. II, fig. 9: Flower x 1; fig. 10: Sepal x 1; fig. 11: Pistil x 1.

BRAZIL: PERNAMBUCO: in compact nearly bare arenitic soil, slopes of the Chapada de São José, Buique, 8° 34' S, 37° 12' W, 1 November 1961, A. Lima 61-3996 (IPA, type; US, photo).

DYCKIA PERNAMBUCANA L. B. Smith, sp. nov. D. encholirioides (Gaud.) Mez in systemate meo affinis sed inflorescentiae indumento albido, sepalis late rotundatis, stigmatibus sessilibus differt.

PLANT flowering to 8 dm high. LEAF (only one known) 33 cm long; sheath reniform, 4 cm wide, dark brown, subentire; blade narrowly triangular, nearly straight, 20 mm wide, sublaxly serrate with antrorse uncinate spines 1 mm long, covered with appressed cinereous scales beneath, becoming wholly glabrous above. SCAPE nearly straight, 4 mm in diameter, soon glabrous; scape-bracts erect, the lower subfoliaceous, the upper narrowly triangular, shorter than the internodes, serrulate, pale-lepidote. INFLORESCENCE compound or simple, to 40 cm long, lax, except for the petals covered with appressed finely lacerate white scales; primary bracts like the upper scape-bracts, several times shorter than the long naked sterile bases of the suberect slender

branches. FLORAL BRACTS triangular-ovate, attenuate, more or less serrulate, those on the terminal or only axis to 10 mm long and exceeding the pedicels of the lower flowers, those on the lateral axes equaling or shorter than the pedicels; pedicels subcylindric, to 5 mm long; flowers scarcely if at all secund. SEPALS ovate, broadly rounded, 9 mm long, ecarinate, sulcate; petals 12 mm long, orange, the blades suborbicular, slightly carinate; stamens included, the filaments connate for 2 mm above the common tube; stigmas sessile. Pl. II, fig. 12: Flower x 1; fig. 13: Sepal x 1; fig. 14: Pistil x 1.

BRAZIL: PERNAMBUCO: half bare hill of gneiss, Propriedade (Estate) Bituri, Brejo da Madre de Deus, 8° 11' S, 36° 30' W, 5 February 1965, A. Lima 65-4275 (IPA, type; US, photo).

ENCHOLIRIUM ERECTIFLORUM L. B. Smith, sp. nov. A E. horrido L. B. Smith, cui affinis, pedicellis gracilibus, floribus sursum secunde versis, seminibus breviter caudatis differt.

PLANT flowering ca 2 m high. LEAVES rosulate, 1 m long; sheaths reniform, 10 cm wide, dark brown, densely pale-lepidote; blades very narrowly triangular, flat, 6 cm wide, repand-serrate with dark spines 5-10 mm long, covered beneath with whitish appressed scales, glabrous and lustrous above. SCAPE erect, stout, glabrous; upper scape-bracts triangular, shorter than the internodes. INFLORESCENCE lax, typically 9-branched, glabrous; primary bracts much shorter than the long naked sterile bases of the branches; branches spreading, to 6 dm long; racemes very dense with all the flowers upwardly secund. FLORAL BRACTS triangular-ovate, attenuate, 4 mm long; pedicels slenderly cylindric, 10 mm long, even. SEPALS ovate, obtuse, 8 mm long, densely nerved; petals oblong, 20 mm long, slightly shorter than the stamens. CAPSULE ovoid, 13 mm long, dark castaneous. Pl. II, fig. 15: Habit x 1/60; fig. 16: Flower x 1.

BRAZIL: PIAUI: on sandstone, slopes of Serra do Ibiapaba, Tianguá to Alto Alegre, 14 December 1966, A. Lima 66-4800 (US, type; IPA).

PORTEA PICKELII A. Lima & L. B. Smith, sp. nov. A P. kermesina K. Koch, cui affinis, foliorum spinis parvis, sepalis breviter connatis breviter mucronatis differt.

PLANT flowering ca 1 m high. LEAVES about equaling the inflorescence, green, densely and finely brown-lepidote; sheaths elliptic, 2 dm long; blades ligulate, rounded, retuse-cuspidate, 4 cm wide, laxly serrate with slender curved antrorse spines 2 mm long. SCAPE erect, ca 1 cm in diameter, lepidote; scape-bracts imbricate and closely enfolding the scape or the lowest lax, ovate, subacute and apiculate, densely appressed-lepidote. INFLORESCENCE clavate, bipinnate, 15 cm long, 4 cm in diameter; primary bracts imbricate, suborbicular, to 45 mm long, nearly covering the sepals, densely appressed-lepidote, entire; branches fasciculately few-flowered. FLORAL BRACTS broadly elliptic, much exceeding the ovary, subchartaceous, densely lepidote; flowers obscurely pedicellate. SEPALS strongly asymmetric with a broad semiorbicular wing, short-mucronate, 23 mm long, connate 1-2 mm, glabrous; petals incompletely known, the blades elliptic. 8 mm

long, white; stamens included, pollen grains 5-7-porate (! H. Robinson); ovary slenderly subcylindric, blending with the pedicel, epigynous tube 3 mm long. Pl. II, fig. 4: Inflorescence x 1/2; fig. 5; flower and bract x 1/2; fig. 6: Sepal x 1.

BRAZIL: PERNAMBUCO: in shade of low open woods, Forest of Camocim, Engenho São Bento, São Lourenço da Mata, 8° 04' S, 35° 14' W, 26 December 1963, A. Lima 63-4198 (IPA, type; US).

VRIESEA LIMAE L. B. Smith, sp. nov. A V. brassicoides (Baker) Mez, cui affinis, rhachidis internodiis gracilibus valde curvatis subteretibus, bracteis florigeris quam internodiis subduplo brevioribus differt.

PLANT stemless, flowering 5 dm high. LEAVES 3 dm long, completely covered with fine appressed brown-centered scales, tinged with dark purple; sheaths elliptic, ca 10 cm long, conspicuous, dark castaneous; blades narrowly triangular, attenuate, 25 mm wide. SCAPE erect, 3 mm in diameter, glabrous; scape-bracts small, remote, the lower caudate, the upper apiculate. INFLORESCENCE simple, lax, secundly 3-5-flowered, 5-9 cm long, glabrous outside; rhachis slender, subterete; internodes curved, 20-25 mm long. FLORAL BRACTS secund with the flowers, broadly ovate, apiculate or obtuse, 14 mm long, ecarinate, dark and nerved when dry; pedicels obconic, 6 mm long. SEPALS oblong, obtuse, 23 mm long, ecarinate, nerved when dry, densely lepidote inside; petals (immature) shorter than the sepals, bearing 2 acute scales at base. Pl. II, fig. 17: Inflorescence x 1/2; fig. 18: Sepal x 1.

BRAZIL: PERNAMBUCO: half-bare gneiss hill, Propriedade (Estate) Bituri, Brejo da Madre de Deus, 8° 11' S, 36° 30' W, 5 February 1965, A. Lima 65-4276 (IPA, type; US).

VRIESEA TUERCKHEIMII (Mez) L. B. Smith, emend. descr.: SCAPE erect, 10-15 mm in diameter; scape-bracts subfoliaceous, imbricate.

REPUBLICA DOMINICANA: without locality, cultivated July 1968, L. Ariza Julia s. n. (US).

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Plate I

Fig. 1-3: Tillandsia ecarinata; 4, 5: T. esseriana; 6, 7: T. glauca; 8, 9: T. limae; 10, 11: T. subconcolor.

Plate II

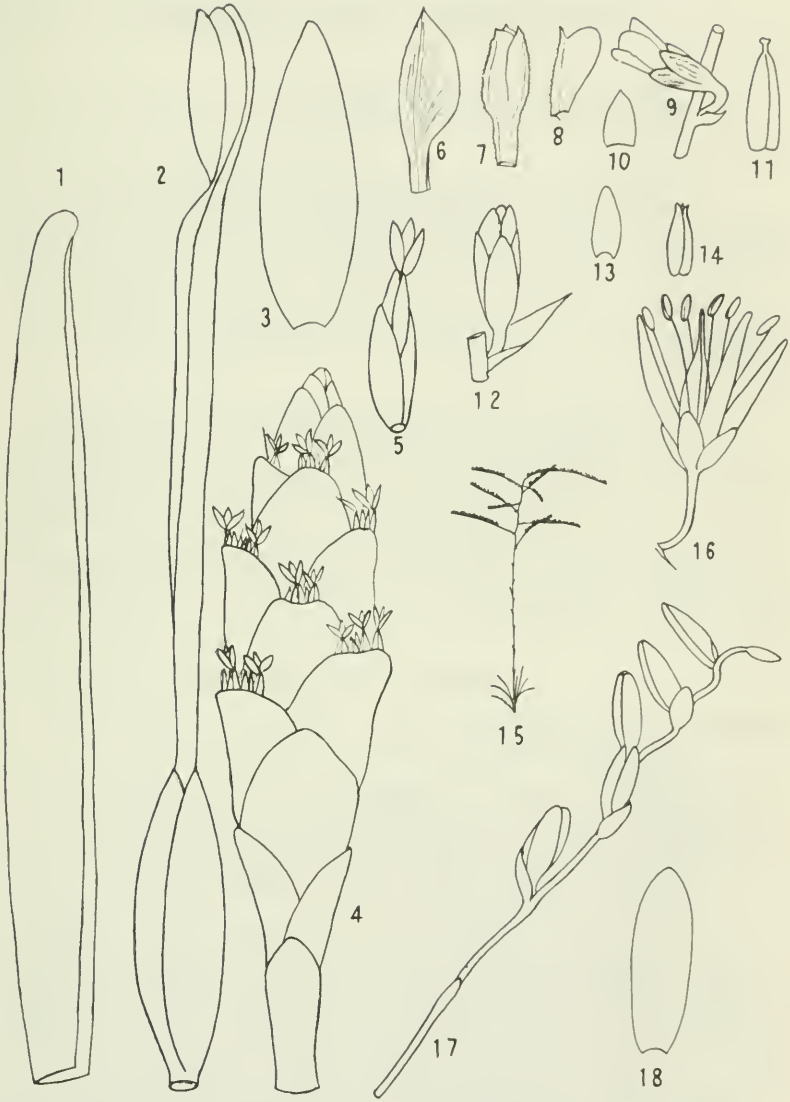

Fig. 1-3: Tillandsia zarumensis; 4-6: Portea pickelii; 7, 8: Aechmea mollis; 9-11: Dyckia limae; 12-14: D. pernambucana; 15, 16: Encholirium erectiflorum; 17, 18: Vriesea limae.

A REVISION OF THE MOSS GENUS, TRICHOSTOMOPSIS

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A broader geographic approach resulted some years ago in the realization that Trichostomopsis of North America and Barbula section Asteriscium of the southern hemisphere were the same. More recently, study has shown that the species concepts should also be broadened. Both Hilpert (1933) and Herzog (1952) recognized the congeneric nature of Asteriscium and Trichostomopsis, however, Asteriscium was the valid name at the sectional level and the prior use of the name for a genus of the Umbelliferae was not noted.

As recognized here, Trichostomopsis is a distinct genus related to Barbula, but it is distinguished by the very lax basal cells of the leaves, the bistratose upper leaf margins, the lack of an adaxial stereid band in the costa, and the scarcely twisted peristome teeth. I include five species that fall into two distinct groups. One group includes the type, T. umbrosa, and two closely related species of limited distribution. The second group of two species includes the variable T. australasiae which occurs throughout the range of the genus.

Trichostomopsis Card.

Barbula section Asteriscium C.Müll., Linnaea 42: 342. 1872. type Barbula umbrosa C.Müll. = T. umbrosa (C.Müll.) H. Robinson.

Trichostomopsis Card., Rev. Bryol. 36: 73. 1909. type T. crispifolia Card. = T. umbrosa (C.Müll.) H.Robinson.

Asteriscium (C.Müll.) Hilpert, Beih. Bot. Centralbl. 50 (3): 618. 1935. hom. illeg. (preocc. Asteriscium Cham. & Schlecht. Linnaea 1: 254. 1826. Umbelliferae).

Plants small, caespitose with short erect stems. Leaves crowded, usually incurved or crisped when dry, spreading from a rather clasping base when moist, entire, lanceolate to oblong, short-acute to attenuate, channelled; margins slightly reflexed, bistratose in one or more rows in upper part; costa percurrent, with only abaxial stereid band; basal leaf cells usually very lax and hyaline; upper leaf cells rounded or quadrate, papillose or mamillose, rarely smooth. Dioicous. Seta terminal, elongate; capsules oval to cylindrical, erect; peristome teeth divided nearly to base into two filiform papillose forks which are erect to slightly twisted; operculum conic-rostrate with spirally twisted cells.

Key to the species of Trichostomopsis

1. Cells of upper leaf lamina pluripappilose.
 2. Leaf tip narrowly attenuate, cylindrical; upper leaf cells mostly 7-8μ wide with very fine papillae T. curvipes
 2. Leaf tip narrowly to broadly acute, channelled nearly to apex; upper leaf cells mostly 10-12μ wide with large often C-shaped papillae T. australasiae
1. Cells of upper leaf lamina mamillose or smooth.
 3. Leaf base usually quadrate, with only a few rows of narrower marginal cells T. fayae
 3. Leaf base usually ovate with many rows of very narrow marginal cells
  4. Cells of upper leaf lamina mostly 9-14μ wide. American plants T. umbrosa
  4. Cells of upper leaf lamina mostly 7-8μ wide. South African plants T. trivialis

Material seen indicates that the following five species should be recognized. There are a number of names associated with Barbula section Asteriscium for which I have seen only descriptions. Most if not all of these are likely to be synonyms of the five species recognized here.

Trichostomopsis umbrosa (C.Müll.) H.Robinson, comb. nov.
Barbula (Asteriscium) umbrosa C.Müll., Linnaea 42: 340. 1879.
Trichostomopsis crispifolia Card., Rev. Bryol. 36: 74. 1909.
Asteriscium flavisetum Herz., Feddes, Rep. Spec. Nov. Regn. Veg. 55: 18. 1952.
Barbula flaviseta (Herz.) Wijk & Marg., Taxon 7: 289. 1958.

Stems up to 1 cm high. Leaves strongly contorted when dry, spreading when moist, 1.5-3.5 mm long, narrowly lanceolate from an ovate base, sharply acute with usually a slightly attenuate tip (some California specimens with obtuse leaf tips); cells of upper leaf lamina rounded with somewhat thickened corners, mamillose, mostly 9-14μ wide, cells near margin often shorter than wide, row near costa often longer than wide; inner basal cells very lax, up to 50 x 20μ, 5-8 rows of very narrow cells on basal margin; costa percurrent; cells of upper surface of costa papillose, in section smaller than guide cells with single low papillae. Seta ca. 1 cm long, slightly flexuous, reddish when mature.

Distribution: California, Mexico, Uruguay, Argentina.

A phyletic subdivision of the genus Trichostomopsis would place T. umbrosa in a group with T. curvipes and T. trivialis having adaxial cells of the costa smaller than the guide cells

and having many rows of narrow marginal cells on the leaf base. Of this series, T. umbrosa has larger leaf cells and more highly differentiated margins on a broader ovate leaf base. Asteriscium flavisetum as described is only a rather immature specimen of the species.

Specimens examined:

U.S.A. California: Los Angeles Co., Montrose, 1961 W. Verdugo Blvd, 25 VI 1953, MacFadden 21702 (US); Hondo, Rancho Los Amigos, 7 X 1955, MacFadden 22085 (US).

MEXICO. without precise locality, Liebmann s.n. (NY). Dist. Fed.: near Texcoco, on soil, dry roadside bank, 8 IX 1954, H.Robinson s.n. (US). Hidalgo: Guadalupe, volcanic hills to the east, alt. 2270 m, inside aqueduct, 21 VIII 1929, Ynes Mexia 2756 (NY, US); Xula, 9 X 1908, Pringle 15273 (isotype of Trichostomopsis crispifolia, NY). Jalisco: Rio San Francisco, 14 X 1910, Bro. Nicolas 5622 ex Bro Arsène (US). Mexico: Tenango, 10 III 1927, Bro Amable s.n. (NY). Michoacán: vicinity of Morelia, Cerro Azul, 2300 m, III 1910, Bro. Arsène 4934 (US); 4936 (NY, US). Puebla: vicinity of Puebla, Rancho Posadas, 20 VIII 1908, Bro. Arsène 4807 (US); vicinity of Puebla, Rancho Santa Barbara, 2160 m, 5 IX 1907, Bro. Arsène 4593 (NY, US); 4599 (US). San Luis Potosi: Charcas, damp stucco wall, 6 VII 1934, A.A.Lundell 50 (US).

URUGUAY. Montevideo: Jardín Botanica, Pared, IX 1961, Zorrón 2787 (US); Facultad de Agronomiá Sayago, X 1961, Zorrón 2795 (US); Prado, sobre ladrillo, VIII 1963, Zorrón 2966 (US).

ARGENTINA. Cordoba: near Cordoba, with Trichostomum umbrosum, 1870, Lorentz s.n. (syntype of Barbula umbrosa, NY); Ascochinga, 1871, Lorentz s.n. (syntype of Barbula umbrosa, NY); Tulumba, VI 1871, Lorentz s.n. (syntype of Barbula umbrosa, NY).

Trichostomopsis curvipes (C.Müll.) H.Robinson, comb. nov.

Barbula (Asteriscium) curvipes C.Müll., Linnaea 42: 344. 1879.

Asteriscium curvipes (C.Müll.) Hilpert, Beih. Bot. Centralbl. 50 (3): 619. 1933.

Stems up to 5 mm high. Leaves somewhat crisped when dry, spreading when moist, 1.5-2.0 mm long, narrowly lanceolate from an oblong base, narrowly cylindrically attenuate; cells of upper leaf lamina irregularly quadrate or oblong with rather thickened corners, multipapillose with minute papillae, mostly 7-8μ wide, juxtacostal cells up to 12μ wide, series of cells near margins often shorter than wide; inner basal cells very lax, up to 55μ long and 20μ wide, 3-4 rows of very narrow marginal cells; costa percurrent; cells of upper surface of costa finely papillose, in section smaller than guide cells. Seta short flexuous or decurved.

Distribution: Argentina.

The species seems distinct in its finely papillose leaf

cells. On the basis of limited material the slender leaf apex seems distinctive also, but somewhat attenuate apices have been seen in the variable T. umbrosa.

Specimens examined:

ARGENTINA. Tucumán: between Siambon and Tafi, 1872, Lorentz s.n. (syntype of Barbula curvipes, NY); Siambon, 1872, Lorentz s.n. (NY); Tucumán and Tafi, 1872, Lorentz s.n. (NY).

Trichostomopsis trivialis (C.Müll.) H.Robinson, comb. nov.
Barbula trivialis C.Müll., Hedwigia 38: 107. 1899.

Stems up to 1 cm high. Leaves scarcely crisped when dry, spreading when moist, 1.5-2.5 mm long, narrowly lanceolate from an oblong base, acute, channelled to the tip; cells of upper leaf lamina irregularly quadrate or rectangular with rather thickened corners, smooth to mamillose, mostly 7-10μ wide, series of cells near the margin often shorter than wide; inner basal cells very lax, up to 50μ long and 20μ wide, with 3-5 rows of very narrow marginal cells; costa percurrent; cells of upper surface of costa slightly papillose or mamillose, in section smaller than guide cells. Seta of medium length, slightly flexuous, reddish when mature.

Distribution: South Africa.

The species is closest to the South American T. curvipes from which it differs by its relatively smooth cells and shorter leaf tips. Two specimens, Rehmann 98 and 99, were distributed as Barbula trichostomacea var. chlorophyllosa C.Müll. Only Rehmann 99 was later cited by Müller. Material seen of no. 98 proves to be the same as typical B. trichostomacea C.Müll. which is equal to Trichostomopsis australasiae.

Specimen examined:

SOUTH AFRICA. Orange Free State: Kadziberg, 1875. A.Rehmann 99 (isotype of Barbula trivialis, NY).

Trichostomopsis australasiae (Hook. & Grev.) H.Robinson, comb. nov.
Tortula australasiae Hook. & Grev., Edinburgh J. Sc. 1: 301. 1824.
Barbula australasiae (Hook. & Grev.) Brid., Bryol. Univ. 1: 828. 1827.
Barbula poeppigiana C.Müll., Linnaea 17: 585. 1843.
Barbula rufiseta Tayl., London J. Bot. 5: 51. 1846.
Tortula poeppigiana (C.Müll.) Mont. in Gay, Hist. Fis. Polit. Chile Bot. 7: 155. 1850.
Trichostomum fuscescens Hook.f. & Wils., Fl. Nov. Zel. 2: 73. 1854.
Barbula decolorans Hampe, Ann. Sc. Nat. Bot. ser. 5, 3: 1865.
Tortula fuscescens Hook.f. & Wils. ex Hook.f., Handb. New Zealand Fl. 796. 1867. in syn., error pro Trichostomum

fuscescens.
Tortula decolorans (Hampe) Mitt., J. Linn. Soc. Bot. 12: 149. 1869.
Trichostomum australasiae (Hook. & Grev.) Jaeg., Ber. S. Gall. Naturw. Ges. 1871-72: 397. 1873.
Tortula incurvidens Stirt., Proc. Nat. Hist. Soc. Glasgow 2: 187. 1876.
Trichostomum cockaynii R.Brown ter., Trans. New Zealand Inst. 29: 486. 1897 (in part).
Trichostomum gracile R.Brown ter., Trans. New Zealand Inst. 29: 486. 1897. hom. illeg.
Barbula trichostomacea C.Müll., Hedwigia 38: 108. 1899.
? Trichostomum makanuiense R.Brown ter., Trans. New Zealand Inst. 35: 332. 1903.
Didymodon subtophaceus R.S.Williams, Bull. New York Bot. Gard. 3 (9): 119. 1903.
Didymodon decolorans (Hampe) R.S.Williams, Bull. New York Bot. Gard. 3 (9): 120. 1903.
Didymodon diaphanobasis Card., Rev. Bryol. 37: 125. 1910.
Desmatodon subtophaceus (R.S.Williams) R.S.Williams, Bull. Torrey Bot. Club 42: 398. 1915.
Barbula ecuadoriensis Broth., Rev. Bryol. 47: 8. 1920.
Didymodon diaphanobasis var. angustifolius Thér. in Bartram, Bryologist 32: 8. 1929.
Trichostomopsis brevifolia Bartram, Bryologist 34: 61. 1932.
Asteriscium decolorans (Hampe) Hilpert, Beih. Bot. Centralb. 50 (3): 619. 1933.
Asteriscium ecuadoriense (Broth.) Hilpert, Beih. Bot. Centralbl. 50 (3): 619. 1933.
Asteriscium poeppigianum (C.Müll.) Hilpert, Beih. Bot. Centralbl. 50 (3): 619. 1933.
Asteriscium subtophaceum (R.S.Williams) Hilpert, Beih. Bot. Centralbl. 50 (3): 619. 1933.
Asteriscium trichostomaceum (C.Müll.) Hilpert, Beih. Bot. Centralbl. 50 (3): 619. 1933.
Trichostomopsis diaphanobasis (Card.) Grout, Moss Fl. N. Amer. 1: 228. 1939.

Stems up to 1 cm high. Leaves incurved to contorted when dry, spreading when moist, 1.5-2.5 mm long, oblong to narrowly lanceolate from an oblong base, short to long acute, channelled to the tip; cells of upper leaf lamina subquadrate often with somewhat thickened corners, pluripapillose with papillae sometimes C-shaped, cells mostly 9-12μ wide, many series are slightly shorter than wide; inner basal cells very lax, up to 60μ long and 20μ wide, with 2-3 rows of only slightly narrower marginal cells; costa percurrent; cells of upper surface of costa distinctly pluripapillose, in section as large as or larger than guide cells. Seta 7-10 mm long, straight, reddish

when mature.

Distribution: U.S.A., Mexico, Guatemala, Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile, Australia, Tasmania, New Zealand South Africa.

The wide distribution of T. australasiae has only been partially appreciated before. Dixon (1923) realized that New Zealand and Chilean material were the same as the Australian. Crum has anotated some Venezuelan plants as being identical to the Mexican T. diaphanobasis. In reality, most plants from Australia, New Zealand, Chile, Bolivia, Ecuador, Colombia, Venezuela, Mexico and South Africa seem indistinguishable. In only two areas are there variations worth noting. A number of specimens from the SW United States that have been called T. brevifolia have less differentiated hyaline leaf bases. These specimens somewhat resemble Husnotiella. The coastal region of Peru as represented by three collecting areas, Ancash, Lima, and Libertad seems to consistently show a very narrow leaved variant that never has the short-acute leaf tips so common in other specimens.

Specimens examined:

U.S.A. Arizona: Pima Co., Santa Catalina Mts., alt. 2500 ft., 2 I 1923, Bartram 175 (US); Santa Catalina Mts., alt. ca. 2600 ft., 26 II 1927, Bartram 1691, Musci Acrocarpi Boreali Americani et Europaei 636 (US, distributed as Didymodon crasspedophyllus Card.); Picacho Peak, 1600 ft., on soil on rock, open desert, II 1945, Haring & Haskell 3317 (NY); Pinal Co., Picacho Peak, 1600 ft., on soil among rocks and along wash, shaded or open desert on mountain side, 3 III 1945, Haring & Haskell 3234, 3255 (NY). California: Los Angeles Co., Tuna Canyon, under shrubs on hill top, III 1931, MacFadden 8107 (Isotype of Trichostomopsis brevifolia, NY).

MEXICO. Dist. Fed.: Mixcoac, 2270 m, 18 IX 1913, Bro. Arsène 9442 (US); Desierto de los Leones, on soil, VI 1956, Sanchez & Herrera s.n. (US). Mexico: Valle de Mexico, Contradero, 17 XII 1925, Bro. Arsène s.n. (US). Michoacan: Paracutin, 1 IX 1949, Crum 1448 (US).

VENEZUELA. Merida: Piedra Gorda, 9 II 1928, Pittier 12960 (US); probably between Tabay and Mucuruba, 1928, Pittier 12966 (US).

COLOMBIA. Cundinamarca: Bogotá, Guadalupe, alt. 3100 m, VIII 1863, Lindig s.n. (Isotype of Barbula decolorans, NY); Monoserrate near Bogotá, alt. 9000 ft., 27 VI 1965, King & Guevara C-737 (US).

ECUADOR. Chimborazo: Tixan, alt. 9200 ft., 23 VIII 1918, Rose & Rose 23635 (US); Cotopaxi: around Pilalo, 72°2' W, 0°57' S, on soil, in shadow, moderate humidity, 30 VI 1968, Holm-Nielsen & Jeppesen 1078 (AAU, US).

PERU. Ancash: 5 kms. NE of Huaráz, alt. 3100 m, a la orilla de un cañyón chico tributario del Río Santa, 28 VIII 1965, Dana & Nancy Griffin III s.n. (US). Arequipa: 67 kms. above Arequipa,

23 VIII 1914, Mr. & Mrs. J.N.Rose 19533 (US). La Libertad: Prov. Trujillo, Cerro Campana, alt. 720-740 m, terricola & saxicola, 11 X 1968 - 3 XI 1968, Ayala 7095, 7097, 7131 (US); Cerro Chiputur, alt. 550 m, sobre rocas & epifita, sobre arbusto, 16 VIII 1968 - 30 X 1968, Ayala 7065, 7067, 7108 (US). Lima: Prov. Canta, Saucán, camino a Huascoy, falde de terreno, 2 II 1960, Cesar Acleto 76 (US); Huascoy, alt. 2800 m, sobre terreno aranoso, expuesto, 28 III 1964, Cesar Acleto 796 (US); Huascoy, alt. 2800 m, sobre muro, flanco expuesto, 20 IV 1969, Cesar Acleto 1467 (US). Puno: Juliaca, 4 IX 1914, Mr. & Mrs. J.N.Rose 19099 (US).

BOLIVIA. La Paz: Canabuca on Lake Titicaca, 4200-4300 m, IV 1918, Buchtien 232 (US); Copacabana on Lake Titicaca, alt. 3840, I 1951, Aliaga Suarez 11 (US).

CHILE. Aconcagua: La Ligua, 21 X 1914, Mr. & Mrs. J.N.Rose 19521 (US). Coquimbo: Las Vacas, near Choapa, 6 X 1914, Mr. & Mrs. J.N.Rose 19230 (US). Concepción: Talcomanco, 1828, Poeppig 4 (type frag. Barbula poeppigiana, NY). Santiago: Cerro Bravo, in terra admuros, IX 1934, M.Bertho, Musci Selecti et Critici Ser. III, 113 (NY, US).

AUSTRALIA. Queensland: Swan River, 1843, J.Drummond s.n. (NY). Victoria: near Melbourne, 27 VII 1884, JR 52 (NY).

TASMANIA: 10 VII, M.Archer s.n. (NY); N side of Cataract, IX 6, M.Archer s.n. (NY); Tasman Peninsula, Eaglehawk, on beach, 29 X 1889, Weymouth s.n. (NY); Hobart Waterworks, on wall of overflow, 14 XII 1891, Weymouth s.n. (NY).

NEW ZEALAND. NE Valley, X 1889 W.Ball s.n. (NY); Colenso 1447 (NY); Insellay, Colenso s.n. (NY); Keri Keri, Kirk 261 (NY); Knight s.n. (NY). North Island: Wairoa "Kiwi", on rich ground, 1931, Hodgson s.n. (NY); Napier, VIII 1874, S.Berggren s.n., Musci Novae Zelandiae (NY).

SOUTH AFRICA. Cape of Good Hope: Rondebosch, VIII 1875, A.Rehmann 97 (Isotype of Barbula trichostomacea, NY); Cape Town, 1875, A.Rehmann 98 (NY).

Trichostomopsis fayae Grout, Moss Fl. N. Amer. 1: 228. 1939.

Stems 3-5 mm high. Leaves subimbricate and incurved when dry, spreading when moist, ca. 1.5 mm long, broadly lanceolate from an oblong base, sharply acute, channelled to the tip; cells of upper leaf lamina rounded-hexagonal with somewhat thickened corners, slightly mamillose, pluripapillose on part of the abaxial surface, mostly 12-15μ wide, many cells shorter than wide; inner basal cells very lax, up to 80μ long and 25μ wide, with marginal cells only slightly narrower; costa percurrent; cells of upper surface of costa distinctly pluripapillose, in section as large as or larger than the guide cells. Seta up to 1 cm long, straight and erect.

Distribution: California.

The species seems very close to T. australasiae but has

cells generally larger and smoother. Only the type specimen is known. Later collections that were placed under the name have proven to be T. umbrosa.

Specimen examined:

U.S.A. California: Los Angeles Co., near Sherman Way, from wash, under Syringa shrubs, 9 V 1932, MacFadden 8172 (Holotype, DUKE).

Species Excluded

Barbula (Asteriscium) uncinicoma C.Müll., Linnaea 42: 345. 1879.

The species has narrower basal cells and a unistratose strongly recurved margin. Also, the peristome is described as contorted. The species seems best retained in Barbula for the present in spite of the lack of an adaxial stereid band in the costa.

Barbula (Asteriscium) fuscula C.Müll., Linnaea 42: 343. 1879.

According to Hilpert (1933) the proper disposition is Erythrophyllopsis fuscula (C.Müll.) Hilpert.

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TWO NEW TAXA IN TEXAS HYMENOXYS (COMPOSITAE).

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Hymenoxys turneri K.F.Parker sp. nov. Herba perennis; caudex ramosus, infirmus et decumbens non caespitosus. Caules simplices vel aliquot pauci-ramosi prope basin, piloso-villosi interfolia, terminates in pedunculos monocephalos aphyllos 20-35 cm. longos. Folia basi et saepe usque ad tertios caulium, villosa, 6-15 mm. lata, integra vel 2-5 parvilobata; petiolis 2.5-6 mm. latis. Capitula heterogama, solitaria, terminalia, discis 14-22 mm. diam.; phyllaria 5.5-8.5 mm. longa; corollae radii 15-30, 13-20 mm. longae; corollae disci 3.2-4.5 mm. altae. Pappi paleae 5-8, 2-4 mm. longae. Achenia tereti-turbinata, longe sericeo-villosa, 2.5-3.5 mm. longa. Chromosomatum numerus hexaploideus, n = 45.

Leafy basal part of plant spreading, decumbent; stems soft pilose-villous among the leaves, usually with the internodes clearly visible; leaves basal and somewhat ascending the stem, sometimes to a third or more the stem length, spatulate to oblanceolate, densely pilose-villous; petioles broad with the clasping bases not or scarcely broader. This hexaploid is closely related to H. scaposa but is densely pilose-villous, much larger throughout, and with a different growth habit.

Forming small clones in local populations in dry limestone plains or roadsides. Endemic to the southern tip of the Blackland Prairies and south central Rio Grande Plains of Texas, from Karnes and Goliad counties south through Live Oak and southern San Patricio to Jim Wells county. Flowering February to April.

Type. Two miles north of Karnes City, Karnes County, Texas. B.L.Turner 5154, April 21, 1965. (holotype, US).

Hymenoxys scaposa (DC.) K.F.Parker var. argyrocaulon K.F. Parker var. nov. Caudex vulgo ramossisimus, saepe caespitosus. Caules piloso-lanati densi interfolia, pilis albidis, ramosi infra medium. Folia basi et usque ad tertios caulium, 1-4 mm lata.

The most notable features are the white pubescence of the stems and the linear-lanceolate leaves.

Sandy calcareous soil in south western Rio Grande Plains in Webb, Duval, Jim Hogg, and Zapata counties, Texas; Nuevo Leon and Tamaulipas, Mexico. Flowering February to April.

Type. Along highway 83 to Carrizo Springs, 15 miles north of Laredo, Webb County, Texas. Howard S. Gentry & Arthur S. Barclay 18436, March 24, 1960. (holotype, US).

STUDIES IN THE EUPATORIEAE (COMPOSITAE). XXVIII.

THE GENUS PRAXELIS

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A group of sparingly branched South American species with highly conical receptacles have often been distinguished under the names Praxelis or Ooclinium. Many of the species are notable for the long scapose heads with easily deciduous phyllaries which make the receptacles very prominent. There have been some problems, however, in defining the limits of the group.

Although often placed remote from each other as sections of the genus Eupatorium, Praxelis and Chromolaena (including section Cylindrocephala) are actually very closely related. We here define Praxelis as those species which have distinctly enlarged cells in the carpopodium, a very high conical receptacle, more flattened achenes, and less distinct rows of phyllaries. On this basis some of the species that have been placed in Praxelis prove to be Chromolaena.

In the area of greatest concentration of the genus, Brazil, there are two closely related monotypic genera. Praxeliopsis G.M. Barroso is distinguished by the reduced pappus setae. Eupatoriopsis Hieronymus has the pappus reduced to a short fringe but also has very broad flat obcordate achenes.

A few characters help to show the relationships between the genera. In most of the species there is a characteristic anther collar with a broader base and annular thickenings which run vertically in some cells. The papillosity on the inner surface of the corolla lobes continues well down the inside of the corolla tube in Praxelis, Eupatoriopsis and some species of Chromolaena. In most species in this group of genera the apex of the anther appendage is rather serrate, but this condition becomes extreme in the highly lobed appendages of a few species of Praxelis.

Praxelis Cassini, Dict. Sci. Nat. 43: 261. 1826

Haberlea Pohl ex Baker in Martius, Fl. Bras. 6(2): 341. 1876.

Ooclinium A. P. Decandolle, Prod. 5: 133. 1836.

Eupatorium Section Praxelis (Cass.) Benth.

Sparingly branched herbs or subshrubs; leaves opposite, ovate to elliptical, margin subentire to sharply serrate.

Inflorescence monocephalic to very laxly corymbose; heads 25-30 flowered; involucre of 15-25 long imbricate, unequal deciduous phyllaries in 3-4 series; receptacle highly conical, glabrous. Corolla tubular with scarcely constricted base; outer surface smooth with some projecting cells usually at tips of lobes, with a few glands, without stomates; inner surface of lobes papillose with a dense layer of long projecting cells, cells inside of corolla tube narrow with sinuous walls with upper ends projecting. Anther collar composed of numerous quadrate cells below, elongate cells above, all with prominent ornate banding on walls, bands transverse in elongate cells and oblique or vertical in many of the short cells; exothecial cells mostly about as long as wide; anther appendage large, usually toothed but sometimes highly dissected at apex; pollen spherical, tricolpate, spinose. Style without basal node; surface cells of stylar appendage long projecting. Achene flattened, 3-4 costate, bearing scattered setae on costae and surfaces; carpopodium distinct, highly asymetric, cells clear, quadrate or elongate with thin firm walls; embryo usually borne high in the achene on a distinct highly vascularized stalk, lower end of embryo projecting below insertion of stalk and partially sclerotized, basal vasculature of achene united to well above level of carpopodium; pappus of ca. 40 slender, scrabrous, presistent setae, with pointed apical cells. Chromosome number determined as X = 20 (Turner & Irwin, 1960).

Type species: Praxelis villosa Cassini = P. pauciflora (H.B.K.) R.M.King & H.Robinson.

Our studies indicate that the genus contains the following thirteen species.

Praxelis asperulacea (Baker) R.M.King & H.Robinson, comb. nov. Eupatorium asperulaceum Baker in Mart., Fl. Bras. 6(2): 292. 1876. Brasil.

Praxelis basifolia (Malme) R.M.King & H.Robinson, comb. nov. Eupatorium basifolium Malme, Arkiv. Bot. Stockh. 24A, No 8, 30. 1932. Brasil.

Praxelis capillaris Sch.-Bip., Pollichia 22-24: 254. 1866. Brasil.

Praxelis clematidea (Griseb.) R.M.King & H. Robinson, comb. nov. Eupatorium clematideum Griseb. in Goett., Abh. 19: 172. 1879. Argentina, Bolivia.

Praxelis conoclinanthia (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium conoclinanthium Hieron., Engl. Bot. Jahrb. 40: 388. 1908. Bolivia.

Praxelis grandiflora (A.P.Decandolle) R.M.King & H.Robinson,

comb. nov. Ooclinium grandiflorum A.P.Decandolle, Prodr. 5: 134. 1836. Brasil.

Praxelis insignis (Malme) R.M.King & H.Robinson, comb. nov. Eupatorium insigne Malme, Arkiv. Bot. Stockh. 24 (8): 28. 1932. Brasil.

Praxelis karuaiensis (Badillo) R.M.King & H.Robinson, comb. nov. Eupatorium karuaiense Badillo, Bot. Soc. Venezolana Cienc. Nat. 10: 294. 1946. Venezuela.

Praxelis kleinioides (H.B.K.) Sch.-Bip., Pollichia 22-24: 254. 1866. Eupatorium kleinioides H.B.K., Nov. Gen. et Sp. 4: 120. ed. fol. 1818. Bolivia, Brasil, Colombia, Peru, Venezuela.

Praxelis missiona (Malme) R.M.King & H.Robinson, comb. nov. Eupatorium missionum Malme, Arkiv. Bot. Stockh. 24 A (6): 35. 1932. Argentina, Brasil.

Praxelis odontodactyla (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium odontodactylum B.L.Robinson, Contr. Gray Herb. n.s. 75: 10. 1925. Brasil.

Praxelis ostenii (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium ostenii B.L.Robinson, Ostenia 356. 1933. Paraguay.

Praxelis pauciflora (H.B.K.) R.M.King & H.Robinson, comb. nov. Eupatorium pauciflorum H.B.K., Nov. Gen. et Sp. 4: 120. ed. fol. 1818. Brasil, Colombia, Peru, Venezuela.

Literature Cited

Turner, B. L. & H. S. Irwin. 1960. Chromosome numbers in the Compositae II. Meiotic counts for fourteen species of Brazilian Compositae. Rhodora 62: 122-126.

STUDIES IN THE EUPATORIEAE (COMPOSITAE). XXIX.

THE GENUS CHROMOLAENA

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In this treatment we recognize under the name Chromolaena that group of Eupatorian species previously known as Osmia or Eupatorium section Cylindrocephala. The genus falls in the general group we would call Critonioid with style bases glabrous and not enlarged, leaves opposite, few hairs on the corolla, and a small but distinct carpopodium. The most distinctive feature of Chromolaena, however, is the phyllaries. In other groups of Eupatorieae the phyllaries may differ greatly in closely related species and they have been much overused as indicators of relationship. In Chromolaena, the phyllaries show a rather consistent pattern of many rows which are progressly longer and which often give a markedly cylindrical appearance to the head. Also rather characteristic of the genus is the anther collar usually enlarged below and with short cells which are prominently annulate in various directions.

Among the many species of Chromolaena, there are some evident specializations. The typical element of the genus is characterized by prominent pales on the receptacle, and because of these, separate generic or sectional status has been maintained. However, consistently placed in Chromolaena, was the species epaleacea which was otherwise nearly identical to the type species. The relationship of the two species is close enough to warrant careful field studies. Another group of species in Brazil seem particularly close in habit to the related genus Praxelis (King & Robinson, Studies XXVIII) and one species Chromolaena decumbens is usually placed in that group. The carpopodium, ribs of the achene, receptacle, and even the phyllaries of C. decumbens do show the critical characters of Chromolaena, however, and indicate a substantial separation between the genera. A group of West Indian species including C. dussii(Urban) R.M.King & H.Robinson, C. geranifolia (Urban) R.M.King & H.Robinson, C. mononeura (Urban) R.M.King & H.Robinson, and C. trigonocarpa (Griseb.) R.M.King & H.Robinson have only 3-4 ribs on the achenes and the corolla lobes have distinct papillae inside only along the lateral margins.

The most distinctive group of species in the genus we have placed in a separate subgenus Osmiella. These species all lack the papillae in the inner surface of the corolla lobes. The subgenus is geographically limited to Mexico-Central America with a few species in Hispaniola. The less specialized anther collars with only transverse markings in some of the species and the more Critonia-like corollas lead to the belief that Osmiella is a more

primitive element in Chromolaena. It is in Osmiella that the involucre is most reduced having only 3-4 series in C. collina (DC.) R.M.King & H.Robinson and 2-3 series with very reduced scarcely imbricated basal scales in C. ortegae (B.L.Robinson) R.M.King & H.Robinson. In spite of such departures from the Chromolaena standard the involucres are unlike those of Critonia and its relatives and the species can be placed microscopically by the short cylindrical or even rather peg-like shape of the carpopodium. There are interesting species in Osmiella that are very similar to others in the subgenus Chromolaena. The involucre of C. opadoclinia (Blake) R.M.King & H.Robinson is strikingly like that of the type species of Chromolaena horminoides and both have prominent pales. Both species have their paleless equivalents which are respectively C. glaberrima(DC.) R.M.King & H.Robinson and C. epaleacea DC. Chromolaena (Osmiella) pulchella (H.B.K.) R.M.King & H.Robinson is markedly like C. odorata (L.) R.M.King & H.Robinson but in addition to lacking papillae on the corolla lobes it has a very unique elongate large-celled carpopodium. Both C. (Osmiella) bigelovii(A.Gray) R.M.King & H.Robinson of Mexico and C.rhinanthacea (DC.) R.M.King & H.Robinson of Brazil have phyllaries that are very reddish with sharply acute spreading tips.

The pollen aberration that we have previously designated Type II (King & Robinson, 1967) seems particularly common in Chromolaena, occurring in many species of both subgenera. Such pollen is known from the genus Stevia and has recently been reported from Aster (Quintero, 1969). Otherwise, only the much more irregular Type II pollen of some species of Ageratina (A. adenophora) is known at present.

Chromolaena A.P.Decandolle, Prod. 5: 133. 1836.

Heterolaena Schultz-Bipontinus ex Bentham and Hooker, Gen. Pl. 2: 245. 1873.

Osmia Schultz-Bipontinus, Pollachia 22-24: 251. 1866.

Eupatorium section Cylindrocephala A.P.Decandolle, Prod. 5: 141. 1836.

Sparingly to densely branched herbs or shrubs; leaves opposite, triangular to elliptical, margins subentire to highly lobed. Inflorescence laxly to densely corymbose; heads 10-40 flowered; involucre of 18-45, ovate to lanceolate densely imbricate very unequal sometimes deciduous phyllaries in 4-6 series; receptacle flat to convex, glabrous, pales sometimes present. Corolla tubular with scarcely constricted base; outer surface smooth with tips of lobes usually capped with a group of

thick walled often prominently projecting cells, outer surface with few to many short stalked glands and often with rather stiff hairs without stomates; inner surface of lobes usually papillose with a dense layer of projecting cells, cells inside of corolla tube narrow with sinuous walls with upper ends sometimes projecting. Anther collar composed of numerous quadrate cells below, elongate cells above, usually with prominent ornate banding on walls, bands transverse in elongate cells and oblique or vertical in many of the short cells; exothecial cells mostly about as long as wide; anther appendage large, entire or toothed at the apex; pollen spherical, tricolpate, spinose, modified " type II " present in many species. Style without basal node; surface cells of stylar appendage smooth to long projecting. Achene prismatic, 5 or rarely 3 costate, bearing setae mostly on costae, sometimes with glands; carpopodium short cylindrical or narrowed below, cells small often wider than high with usually thickened walls; embryo usually borne high in the achene on a distinct highly vascularized stalk, lower end of embryo projecting below point of insertion of stalk and partially sclerotized, basal vasculature of achene united to well above level of carpopodium; pappus of ca 40 slender, scabrous presistent setae, with usually pointed apical cells.

Chromosome numbers are known for 8 species: C. callilepis n = 20, C. congesta n = 20 (Coleman, 1968); C. ivaefolia var. hirsuta n = 50I (Turner, Powell, and Cuatrecasas, 1967); C. mononeura n = 10, C. odorata n = ca 40 (Powell & King, 1969a); C. odorata 2n = 58 (Ghosh, 1961); C. laevigata n = 20, C. scabra n = 10, C. tacotana n = 10 (Powell & King, 1969b).

Type species: Chromolaena horminoides A. P. Decandolle

Our studies indicate that the genus contains the following 2 subgenera and 129 species.

Subgenus Chromolaena

Plants with phyllaries in 4-6 series; corolla lobes papillose on inner surface; anther collars with cells irregularly annulate. 116 species.

Chromolaena adenolepis (Schultz-Bip. ex Baker) R.M.King & H.Robinson, comb. nov. Eupatorium adenolepis Schultz-Bip. ex Baker in Mart., Fl. Bras. 6(2): 291. 1876. Brazil.

Chromolaena arnottiana (Griseb.) R.M.King & H.Robinson, comb. nov. Eupatorium arnottianum Griseb., in Goett. Abh. 19: 167. 1874. Argentina, Bolivia.

Chromolaena arrayana (Gardn.) R.M.King & H.Robinson, comb. nov. Eupatorium arrayanum Gardn., Hook. Lond. Journ. Bot. 6: 439.

1847. Brazil.

Chromolaena ascendens (Schultz-Bip. ex Baker) R.M.King & H.Robinson, comb. nov. Eupatorium ascendens Schultz-Bip. ex Baker in Mart., Fl. Bras. 6(2): 344. 1876. Argentina, Brazil, Paraguay.

Chromolaena austera (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium austerum B.L.Robinson, Contr. Gray Herb. n.s. 68: 9. 1923. Bolivia.

Chromolaena bahamensis (Northrop) R.M.King & H.Robinson, comb. nov. Eupatorium bahamense Northrop, Mem. Torrey Bot. Club 12: 70. 1902. Bahama Isl.

Chromolaena bangii (Rusby) R.M.King & H.Robinson, comb. nov. Eupatorium bangii Rusby, Mem. Torrey Bot. Club 6: 56. 1896. Bolivia.

Chromolaena barbacensis (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium barbacense Hieron., Engl. Bot. Jahrb. 22: 750. 1897. Brazil.

Chromolaena barranquillensis (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium barranquillense Hieron., Engl. Bot. Jahrb. 28: 564. 1901. Colombia.

Chromolaena bathyphlebia (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium bathyphlebium B.L.Robinson, Contr. Gray Herb. n.s. 100: 12. 1932. Venezuela.

Chromolaena borinquensis (Britt.) R.M.King & H.Robinson, comb. nov. Osmia borinquensis Britt., Sc. Surv. Porto Rico & Virgin Isl. 6: 288. 1925. Puerto Rico.

Chromolaena bullata (Klatt) R.M.King & H.Robinson, comb. nov. Eupatorium bullatum Klatt, Engl. Bot. Jahrb. 8: 34. 1886. Colombia.

Chromolaena caaguazuensis (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium caaguazuense Hieron., Engl. Bot. Jahrb. 22: 760. 1897. S.Brazil, Paraguay.

Chromolaena calamocephala (Baker) R.M.King & H.Robinson, comb. nov. Eupatorium horminoides var. calamocephalum Baker in Mart., Fl. Bras. 6(2): 300. 1876. Brazil.

Chromolaena callilepis (Schultz-Bip. ex Baker) R.M.King & H.Robinson, comb. nov. Eupatorium callilepis Schultz-Bip. ex Baker in Mart., Fl. Bras. 6(2): 285. 1876. Brazil.

Chromolaena campestris (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium campestre A.P.Decandolle, Prodr. 5: 152. 1836. S.Brazil.

Chromolaena chaseae (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium chaseae B.L.Robinson, Contr. Gray Herb. n.s. 104: 14. 1934. Brazil.

Chromolaena christieana (Baker) R.M.King & H.Robinson, comb. nov. Eupatorium christieanum Baker in Mart., Fl. Bras. 6(2): 298. 1876. S.Brazil.

Chromolaena chrysosticta (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium chrysostictum B.L.Robinson, Proc. Amer. Acad. 54: 240. 1918. Colombia.

Chromolaena cinereoviridis (Schultz-Bip. ex Baker) R.M.King & H.Robinson, comb. nov. Eupatorium cinereoviride Schultz-Bip. ex Baker in Mart., Fl. Bras. 6(2): 294. 1876. Brazil.

Chromolaena columbiana (Heering) R.M.King & H.Robinson, comb. nov. Eupatorium columbianum Heering, Mém. Soc. Neuchât Sci. Nat. 5: 421. 1913. Colombia.

Chromolaena congesta (Hook. & Arn.) R.M.King & H.Robinson, comb. nov. Eupatorium congestum Hook. & Arn. in Hook. Comp. Bot. Mag. 1: 239. 1835. Brazil, Uruguay.

Chromolaena connivens (Rusby) R.M.King & H.Robinson, comb. nov. Eupatorium connivens Rusby, Mem. Torrey Bot. Club 6: 57. 1896. Peru, Bolivia.

Chromolaena corymbosa (Aubl.) R.M.King & H.Robinson, comb. nov. Eupatorium corymbosum Aubl., Hist. Pl. Guiane Fr. 2: 799. 1775. West Indies, French Guiana.

Chromolaena decumbens Gardn., Hook. Lond. Journ. Bot. 5: 466. 1846. Brazil.

Chromolaena densiflora (Morong.) R.M.King & H.Robinson, comb. nov. Eupatorium densiflorum Morong., Ann. N.Y. Acad. Sci. 7: 136. 1893. Paraguay.

Chromolaena dussii (Urban) R.M.King & H.Robinson, comb. nov. Eupatorium dussii Urban, Symb. Ant. 5: 521. 1908. Guadeloupe.

Chromolaena elliptica (Hook. & Arn.) R.M.King & H.Robinson, comb. nov. Eupatorium ellipticum Hook. & Arn. in Hook. Comp. Bot. Mag. 1: 240. 1835. · Argentina, Brazil.

Chromolaena epaleacea Gardn., Hook. Lond. Journ. Bot. 6: 436. 1847. Brazil.

Chromolaena eripsima (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium eripsimum B.L.Robinson, Proc. Amer. Acad. 55: 14. 1919. Peru.

Chromolaena extensa (Gardn.) R.M.King & H.Robinson, comb. nov. Eupatorium extensum Gardn., Hook. Lond. Journ. Bot. 6: 440. 1847. Bolivia, Brazil.

Chromolaena farinosa (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium farinosum B.L.Robinson, Contr. Gray Herb. n.s. 80: 19. 1928. Venezuela.

Chromolaena foliata (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium foliatum Hieron., Engl. Bot. Jahrb. 22: 748. 1897. Brazil.

Chromolaena frustrata (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium frustratum B.L.Robinson, Proc. Amer. Acad. 47: 193. 1911. Florida.

Chromolaena furcata (Lam.) R.M.King & H.Robinson, comb. nov. Eupatorium furcatum Lam., Encyc. 2: 407. 1788. West Indies.

Chromolaena geranifolia (Urban) R.M.King & H.Robinson, comb. nov. Eupatorium geranifolium Urban, Symb. Ant. 1: 458. 1899. Puerto Rico.

Chromolaena haughtii (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium haughtii B.L.Robinson, Contr. Gray Herb. n.s. 90: 25. 1930. Peru.

Chromolaena herzogii (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium herzogii B.L.Robinson, Contr. Gray Herb. n.s. 68: 19. 1923. Bolivia.

Chromolaena heteroclinia (Griseb.) R.M.King & H.Robinson, comb. nov. Eupatorium heteroclinium Griseb., Fl. Brit. W. Indies. 358. 1861. Jamaica.

Chromolaena hirsuta (Hook. & Arn.) R.M.King & H.Robinson, comb. nov. Eupatorium hirsutum Hook. & Arn. in Hook. Comp. Bot. Mag. 1: 239. 1835. Argentina, Brazil, Uruguay.

Chromolaena horminoides A.P.Decandolle, Prodr. 5: 133. 1836. Brazil.

Chromolaena hypericifolia (H.B.K.) R.M.King & H.Robinson, comb. nov. Eupatorium hypericifolium H.B.K., Nov. Gen. et Sp. 4: 118. ed. fol. 1818. Colombia.

Chromolaena integrifolia (Bert. ex Spreng.) R.M.King & H.Robinson, comb. nov. Eupatorium integrifolium Bert. ex Spreng., Syst. 3: 410. 1826. Guadeloupe.

Chromolaena iridolepis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium iridolepis B.L.Robinson, Proc. Amer. Acad. 54: 247. 1918. Colombia.

Chromolaena ivaefolia (L.) R.M.King & H.Robinson, comb. nov. Eupatorium ivaefolium L., Syst. ed. 10, 2: 1205. 1759. Texas, Mississippi, Cuba, Jamaica, Lesser Antilles, Mexico to Bolivia and Brazil.

Chromolaena jelskii (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium jelskii Hieron., Engl. Bot. Jahrb. 36: 464. 1905. Peru.

Chromolaena jujuiensis (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium jujuiense Hieron., Engl. Bot. Jahrb. 22: 744. 1897. Argentina.

Chromolaena kleinii (Cabrera) R.M.King & H.Robinson, comb. nov. Eupatorium kleinii Cabrera, Bol. Soc. Argent. Bot. 7: 187. 1959. Brazil.

Chromolaena laevigata (Lam.) R.M.King & H.Robinson, comb. nov. Eupatorium laevigatum Lam., Encyc. 2: 408. 1788. Mexico to Argentina.

Chromolaena latisquamulosa (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium rhinanthaceum var. latisquamulosum Hieron., Engl. Bot. Jahrb. 22: 759. 1897. Argentina, Brazil.

Chromolaena leivensis (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium leivense Hieron., Engl. Bot. Jahrb. 21: 329. 1895. Colombia.

Chromolaena leptocephala (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium leptocephalum A.P.Decandolle, Prodr. 5: 148. 1836. Colombia, Ecuador, Peru.

Chromolaena lilacina (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium lilacinum Hieron., Engl. Bot. Jahrb. 22: 757. 1897. Brazil.

Chromolaena linearis (Malme) R.M.King & H.Robinson, comb. nov. Eupatorium lineare Malme, Arkiv. Bot., Stockh. 24A(8): 23. 1932. Brazil, Guayana.

Chromolaena lucayana (Britt.) R.M.King & H.Robinson, comb. nov. Eupatorium lucayanum Britt. in Britt. & Millspaugh, Bahama Fl. 439. 1920. Bahama Isl.

Chromolaena luguensis (Chod.) R.M.King & H.Robinson, comb. nov. Eupatorium luguense Chod., Bull. Herb. Boiss. ser. 2. 1: 413. 1901. Paraguay.

Chromolaena macrantha (Sw.) R.M.King & H.Robinson, comb. nov. Eupatorium macranthum Sw., Fl. Ind. Occ. 3: 1315. 1806. West Indies.

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Chromolaena myriocephala (Gardn.) R.M.King & H.Robinson, comb. nov. Eupatorium myriocephalum Gardn., Hook. Lond. Journ.

Bot. 6: 442. 1847. Brazil.

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Chromolaena paraguariensis (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium paraguariense Hieron., Engl. Bot. Jahrb. 22: 752. 1897. Paraguay.

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Chromolaena pellia (Klatt) R.M.King & H.Robinson, comb. nov. Eupatorium pellium Klatt, Ann. k. k. Naturh. Hofmus. Wien. 9: 357. 1894. Venezuela.

Chromolaena perforata (Schultz-Bip. ex Baker) R.M.King & H.Robinson, comb. nov. Eupatorium perforatum Schultz-Bip. ex Baker in Mart., Fl. Bras. 6(2): 289. 1876. Brazil.

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Chromolaena porphyrolepis (Baker) R.M.King & H.Robinson, comb. nov. Eupatorium porphyrolepis Baker in Mart., Fl. Bras. 6(2): 280. 1876. Brazil.

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Chromolaena punctulata (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium punctulatum A.P.Decandolle, Prodr. 5: 147. 1836. Colombia, E.Brazil.

Chromolaena revoluta (Gardn.) R.M.King & H.Robinson, comb. nov. Eupatorium revolutum Gardn., Hook. Lond. Journ. Bot. 6: 444. 1847. Brazil.

Chromolaena rhinanthacea (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium rhinanthaceum A.P.Decandolle, Prodr. 5: 146. 1836. Brazil.

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Chromolaena sagittata (A.Gray) R.M.King & H.Robinson, comb. nov. Eupatorium sagittatum A.Gray, Smithson. Contr. Knowl. 3: 88. 1850.

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Chromolaena sanctopaulensis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium sanctopaulense B.L.Robinson, Contr. Gray Herb. n.s. 68: 32. 1923. Argentina, Brazil.

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Chromolaena squalida (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium squalidum A.P.Decandolle, Prodr. 5: 142. 1836. Brazil, Venezuela.

Chromolaena squarroso-ramosa (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium squarroso-ramosum Hieron., Engl. Bot. Jahrb. 22: 753. 1897. Bolivia, N.Argentina.

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Chromolaena toldensis (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium toldense Hieron. in Urban, Engl. Bot. Jahrb. 40: 378. 1908. Argentina, Bolivia.

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Chromolaena urticoides (Schultz-Bip. ex Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium urticoides Schultz-Bip. ex Hieron., Engl. Bot. Jahrb. 28: 568. 1901. Venezuela.

Chromolaena verbenacea (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium verbenaceum A.P.Decandolle, Prodr. 5: 146. 1836. Brazil, Paraguay, Argentina.

Chromolaena xestolepis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium xestolepis B.L.Robinson, Proc. Amer.

Acad. 54: 261. 1918. Venezuela.

Chromolaena xylorrhiza (Schultz-Bip. ex Baker) R.M.King & H.Robinson, comb. nov. Eupatorium xylorrhizum Schultz-Bip. ex Baker in Mart., Fl. Bras. 6(2): 292. 1876. Brazil.

Subgenus Osmiella R.M.King & H.Robinson, subg. nov.

Involucri squamae inaequilongae 3-5 seriatae valde imbricatae; corollae intus omnino laeves; filamenta antherarum in parte superiore transverse vel irregulariter annulata; carpopodia distincta breve cylindrica. 13 species. Type: Eupatorium collinum A.P.Decandolle.

Chromolaena bertholdii (Schultz-Bip.) R.M.King & H.Robinson, comb. nov. Eupatorium bertholdii Schultz-Bip. in Seemann, Bot. Voy. Herald 299. 1856. Mexico.

Chromolaena bigelovii (A.Gray) R.M.King & H.Robinson, comb. nov. Eupatorium bigelovii A.Gray in Torrey, Bot. Mex. Bound. 75. 1859. Mexico.

Chromolaena collina (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium collinum A.P.Decandolle, Prodr. 5: 164. 1836. Mexico.

Chromolaena glaberrima (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium glaberrimum A.P.Decandolle, Prodr. 5: 144. 1836. Mexico.

Chromolaena haenkeana (A.P.Decandolle) R.M.King & H.Robinson, comb. nov. Eupatorium haenkeanum A.P.Decandolle, Prodr. 5: 158. 1836. Mexico.

Chromolaena holguinensis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium holguinense B.L.Robinson, Contr. Gray Herb. n.s. 77: 18. 1926. Cuba.

Chromolaena mornicola (Urban & Ekman) R.M.King & H.Robinson, comb. nov. Eupatorium mornicola Urban & Ekman, Arkiv. Bot., Stockh. 23(11): 65. 1931. Haiti.

Chromolaena oerstediana (Benth. ex Oerst.) R.M.King & H.Robinson, comb. nov. Eupatorium oerstedianum Benth. ex Oerst., Kjoeb. Vidensk. Meddel. 74. 1852. Central America.

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Chromolaena plumerii (Urban & Ekman) R.M.King & H.Robinson, comb. nov. Eupatorium plumerii Urban & Ekman, Arkiv. Bot. 23A(11): 52. 1931. Haiti.

Chromolaena pulchella (H.B.K.) R.M.King & H.Robinson, comb. nov. Eupatorium pulchellum H.B.K., Nov. Gen. et Sp. 4: 119. ed. fol. 1818. Mexico.

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STUDIES IN THE EUPATORIEAE (COMPOSITAE). XXX.

THE GENUS AYAPANA

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The species placed here in Ayapana represent one of the most natural groups in the Eupatorieae, a group that has been given amazingly little recognition.. The relationships of the species have become evident through the analysis of the anatomical characters, but as presently delimited all the species have a strikingly distinctive aspect. The distinctive aspect of Ayapana is shared by a number of related genera including some which have been mistakenly placed in the tribe Heliantheae.

We have delimited the genus primarily on the basis of the style branches which are covered by rather hairlike projecting cells. In all species the corolla is smooth on both surfaces with glands on the backs of the lobes, the anther collar is rather slender with prominent transverse thickenings in the cell walls, the stylar node is much enlarged and glabrous, the cells of the carpopodium are very thick walled with the lower tier of cells very prominently enlarged, the inflorescence is laxly branching, and the leaves tend to be sessile or narrowly winged to the base.

The genus is here considered to include Lepidesmia which has a reduced pappus. Isocarpha with its compact inflorescence and distinct interspersed bracts is related but generically distinct. Both Lepidesmia and Isocarpha have been placed in the tribe Heliantheae, but they like all the members of this group lack solid keeled anther appendages, apically thickened exothecial cells, inornate anther collars and stigmatic lines running to the tips of the style branches that are characteristic of that tribe.

Ayapana is also closely related to the new genus Polyanthina which has scarcely papillose style branches and 200-300 very slender flowers per head. To the south in Peru and Bolivia are other related species having smooth style branches and hairy stylar nodes. These latter species indicate an ultimate relationship with the genus Campuloclinium which is found primarily in southern Brasil.

Ayapana Spach, Hist. Veg. Phan. 10: 290. 1841

Lepidesmia Klatt, Bull. Herb. Boiss. 4: 479. 1896.

Erect herbaceous plants with mostly opposite leaves, leaves

sessil or winged to base, lamina narrowly ovate to elliptical. Inflorescence laxly paniculate-corymbose. Involucre of 15-35 lanceolate subimbricate phyllaries; in 2-3 series; receptacle convex, glabrous; flowers 5-40 per head; corollas tubular or funnel-shaped, glabrous internally, with glands externally on the lobes, cells of corolla narrow with rather sinuous walls; stomates lacking; anther collar usually rather slender with elongate transversely annulate cells, exothecial cells rather quadrate, appendage usually long triangular; stylar node distinctly enlarged and glabrous, stylar appendages with prominent elongate projecting cells; achenes prismatic, 5-costate, with a few to many setae mostly along the costae. Carpopodia very distinct, enlarged with constriction above, cells very thick-walled, lowest row of cells very enlarged and other cell rows much smaller; pappus setae long but reduced to short scales in one species, scabrous, apical cells acute. Chromosome number determined as X = 17 (Coleman, 1970).

Type species: Ayapana officinalis Spach = A. triplinervis (Vahl) R.M.King & H.Robinson.

Our studies indicate that the genus contains the following ten species.

Ayapana amygdalina(Lam.) R.M.King & H.Robinson, comb. nov. Eupatorium amygdalinum Lam. in Lam., Encyc. 2: 408. 1788. Costa Rica, Venezeula-Bolivia, Brasil.

Ayapana hylophila (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium hylophilum B.L.Robinson, Proc. Am. Acad. 55: 18. 1919. Colombia.

Ayapana jaramillii R.M.King & H.Robinson, sp. nov.

Frutex ad 3 dm. Caules graciles, teretes, inferne procumbentes, pubescentes. Folia opposita, anguste elliptica, ad 9 cm longa, ad 2.3 cm lata, integra, sessilia vel subsessilia, basi anguste cuneata, apice acuta, subtriplinervia, utrinque ferentia pilos graciles numerosos. Inflorescentiae laxe cymosae. Involucri squamae 25-35, aliquantum inequales, 2-3-seriatae, anguste lanceolatae, acutissimae, dense breve pubescentes; receptacula glabra. Flores 30-40 in capitulo, 5-6 mm longi; corollae infundibulares, intus glabrae, lobis extus paulo minute glanduliferis et distincte 1-2-setiferis; achaenia distincte setifera; setae pappi scabrae, fragiles.

COLOMBIA: Llanos Orientales: La Macarena (Parte Sur): Rio Guayabero, Sabanos de Arenisca; Alt.235-700 m. Hierba. Inflorescencia rosada. Enero a Marzo 1959. H. Garcia Barriga et R. Jaramillo Mejía 17082 (Holotype US, isotype COL.).

This species is named for R. Jaramillo Mejía of the staff of the Instituto de Ciencias Naturales in Bogotá, who accompanied the senior author on one of his field trips to Colombia. Sr. Jaramillo's collecting has added greatly to our knowledge of the flora of Colombia.

Ayapana ornatiloba (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium ornatilobum B.L.Robinson, Contr. Gray Herb. 80: 27. 1928. Colombia.

Ayapana pyramidalis (Klatt) R.M.King & H.Robinson, comb. nov. Eupatorium pyramidale Klatt, Abh. Naturf. Ges. Halle 15: 324. 1882. Bolivia.

Ayapana squarrosa (Klatt) R.M.King & H.Robinson, comb. nov. Lepidesmia squarrosa Klatt, Bull. Herb. Boiss. 4: 479. 1896. Cuba, Colombia, Venezeula.

Ayapana tovarensis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium tovarense B.L.Robinson, Proc. Am. Acad. 54: 259. 1918. Venezeula.

Ayapana trinitensis (Kuntze) R.M.King & H.Robinson, comb. nov. Baccharis trinitensis Kuntze, Rev. Gen. 319. 1891. Colombia, Trinidad, Venezeula.

Ayapana triplinervis (Vahl) R.M.King & H.Robinson, comb. nov. Eupatorium triplinerve Vahl, Symb. Bot. 3: 97. 1794. West Indies, widely adventive.

Ayapana turbacensis (Hieron.) R.M.King & H.Robinson, comb. nov. Eupatorium turbacense Hieron., Bot. Jahrb. 21: 332. 1895. Colombia.

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STUDIES IN THE EUPATORIEAE (COMPOSITAE). XXXI.

A NEW GENUS, POLYANTHINA

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The genus Polyanthina is established for a single species that has been placed in Eupatorium section Hebeclinium (King & Robinson, 1969) but which is most closely related to species now placed in the genus Ayapana. Polyanthina is like Ayapana in the smooth corolla with glands on the backs of the lobes, slender transversely annulate anther collars, enlarged glaberous stylar node, leaves sessile or winged to the base, and especially the carpopodium with thick-walled cells with an enlarged basal tier. Polyanthina is distinct in the heads containing 200-300 slender flowers, the receptacles with short pubescence, and the cells of the style branches scarcely bulging.

Polyanthina R.M.King & H.Robinson, genus nov.

Plantae herbaceae erectae. Folia plerumque opposita, petiolis valde alatis, laminis ovatis serratis. Inflorescentiae paniculato-corymbosae. Involucri squamae 40-50 lanceolatae, 2-3 seriatae imbricatae; receptacula convexa breve pubescentia. Flores 200-300 in capitulo; corollae tubulares perangustatae intus et extus glabrae, stomatibus nullis; filamenta antherarum in parte superiore angusta, cellulis plerumque elongatis parietibus leniter transverse annulatis, cellulis exothecialibus subquadratis; appendicibus antherarum longe triangularbuis; styli inferne valde nodulosi glabri, appendicibus gracilibus leniter papillatis; achaenia prismatica 5-costata, subglabra superne pauce setifera; carpopodia valde distincta, cellulis valde incrassatis plerumque parvis, serie basilari distincte majore; pappi setiformes scabri, cellulis apicalibus acutis.

Species typica: Eupatorium nemorosum Klatt

Chromosome number determined as X = 10, (Powell & King, 1969).

Polyanthina nemorosa (Klatt) R.M.King & H.Robinson, comb. nov.
Eupatorium nemorosum Klatt, Engl. Bot. Jahrb. 8: 35. 1887.
Costa Rica, Colombia, Ecuador,Venezeula, Bolivia, Peru.

Literature Cited

King, R.M., and H. Robinson. 1969. Studies in the Compositae-Eupatorieae, IX. A review of the genus Eupatorium section Hebeclinium in Colombia. Sida 3(5): 321-326.

Powell, A.M. and R.M.King 1969. Chromosome numbers in the Compositae: Colombian species. Amer. Journ. Bot. 56: 116-121.

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BOOK REVIEWS

Alma L. Moldenke

The Hafner Publishing Company (New York, N. Y. 10003) is continuing making available by facsimile printing many botanical (and other) classics long out of print yet still needed for active consultation from the book shelves of individual professional and amateur botanists, of colleges and universities, of botanical institutions and public libraries. Members of the teaching profession, those who guide the research of younger scientists, and those who enjoy such readings are and will be grateful indeed to have such materials readily available. The following have recently been sent to this reviewer:

"ORGANOGRAPHY OF PLANTS" by Karl E. Goebels, Part I General Organography, xvi & 270 pp., illus., 1900. Part II Special Organography, xxiv & 707 pp., illus., 1905, originally Oxford University Press. Facsimile reprinting 1969. $32.50.

Part I deals with general differentiation of the plant-body, the relationships to symmetry, the differences in organ formation at different developmental stages, and the nature and significance of malformations. Although statedly limited to Archegoniates and Spermatophyta, the text is rich in much pertinent comparative data derived from simpler plants.

Part II deals with great clarity and copious detail with the development of and variation in each of the organs in bryophytes, pteridophytes, gymnosperms and angiosperms.

"LIBERTY HYDE BAILEY - A STORY OF AMERICAN PLANT SCIENCES" by Andrew Denny Rodgers III, 506 pp., illus., 1949, originally Princeton University Press. Facsimile reprinting 1965. $10.

This well written account by the author (who performed a similar writing task in this same series on the life of his great grandfather Sullivant who was to forestry what Bailey was to horticulture) covers Bailey's boyhood as a budding naturalist in the forest home on Lake Michigan, his student days at the new Michigan Agriculture College there, his journalistic years, his graduate studies at Harvard, and his professional life at Cornell in horticulture, in rural extension work, in the agricultural experiment station, in the country-life commission and in the Bailey Hortorium -- the finest in the world for cultivated plants.

His masterful teaching, his productive botanical expeditions and his prolific -- yet careful -- writings from taxonomic tomes to rural leaflets on plant growing to beautifully expressed poetry are described and excerpted. Schools, botanical institutions, libraries and literate households just could not function without Bailey's "Manual of Cultivated Plants". Today's ecologically oriented world should read or reread "The Holy Earth" which presents "the mind, the heart, the voice, the worth of Liberty Hyde Bailey -- agriculturist, horticulturist, botanist, humanitarian, philosopher and writer". To this list of titles "ecologist" could now quite aptly be added.

The quantity and quality of work accomplished by this one wonderful man throughout his fortunately very long professional life can hardly be matched by that of any ten other highly competent men cumulatively!

"ON THE INTERPRETATION OF PHENOMENA OF PHYLLOTAXIS" by A. H. Church, 74 pp., illus., 1920, originally Botanical Memoirs No. 6. Facsimile reprinting 1968. $3.50.

This book summarizes the general principles of leaf origin as an extension of the plant-soma, discusses the advantages and disadvantages of the Equipotential Theory, describes the general method for examining phyllotaxis phenomena and mechanisms in cryptogams generally, in thallophytes as the leafy marine ones, and in the foraminiferan Quinqueloculina.

No final solution is reached but impressive data are recorded on effective figures. The lateral photosynthetic appendages of transmigrant Land-Flora trace back to the sea. "The solution of primary problems of stem and root, leaf and branch, members and tissues, cells and space-form, is to be sought far behind the comparatively modern and wholly secondary subaerial environment."

"A FLORA OF NORTH AMERICA" by John Torrey & Asa Gray, Volume I, xviii & xiv & 711 pp., 1838 & 1840. Volume II, xviii & 506 pp., 1841, 1842, 1843, originally Wiley & Putnam Company. Facsimile reprinting 1969. $45.00.

These books constitute Volume IV of the CLASSICA BOTANICA AMERICANA series ably edited by Joseph Ewan who has written an interesting and historically valuable introduction to this "foundation work in systematic botany for this country, an enduring though unfinished monument to the organizing skills of John Torrey and Asa Gray". Original descriptions depended upon the taxonomic judgments of these authors' teamwork which slowed down after Gray left New York City, where he had lived with Torrey, and moved to Harvard.

The original title page gives as a subtitle "Abridged Descriptions of all Known Indigenous and Naturalized Plants Growing North of Mexico -- comprising the polypetalous division of the dicotyledonous or exogenous plants." This is the work in which "-aceae"

groups are called orders, not families. It is also the first important work in which the "natural" rather than the Linnean "sexual" system of classification is followed.

This publication has considerable comparative and historical value. It is distributed in Europe by Verlag J. Cramer, 3301 Lehre, Germany.

"INTROGRESSIVE HYBRIDIZATION" by Edgar Anderson, ix & 109 pp., illus., 1949, originally John Wiley & Sons Company. Facsimile reprinting 1968. $5.50.

This reprinting is timed, incidentally, so that it serves as a memorial to its much-admired author.

Introgressive hybridization occurring under natural conditions involves most commonly backcrossing of hybrids with one or both parents resulting in the introgression of one species (subspecific units or genera) into another through the flow of the genes possibly proving to be a primary factor in evolution because it so greatly increases variation in the participating organisms. Only where catastrophic natural forces (floods, lightning fires, retreat of ice sheets, etc.) and man (what an equivalent!) have altered or "hybridized" the habitats do such segregates survive because the pastures, roads, etc. bring about new combinations of light, moisture and soil conditions.

The author explains how our "cultivated plants and weeds are very largely products of introgression". He gives examples from studies of Tradescantia, Iris, Nicotiana, Helianthus, Cistus, Crataegus and the Cupressus-Chamaecyparis natural cross with intergradations.

Introgressive hybridization — as a process, as a factor in evolution, and as a natural happening in changing ecological niches — is explained very lucidly and convincingly.

"INDEX OF PLANTS OF TEXAS WITH REPUTED MEDICINAL AND POISONOUS PROPERTIES" by Henry M. Burlage, 272 pp., University of Texas, Austin, Texas 78712. 1968.

Much valuable material from a wide range of written and spoken sources has been collated between the paper covers, indexed alphabetically by families, annotated with literature references, with various common names, with habitat notes, and with the reputed (not recommended) uses and effects. The orthography throughout has many scores more variations than those presented by the different sources. In the reference to the Verbenaceae there is the inclusion of the non-verbenaceous genus Pseudocymopterus. The 1208 entry should have been included under 1197. There are indexes at the end for chemical constituents, for therapeutic and other uses, for common and scientific names but with many misspellings inconsistent with the text, misalignments, and omissions.

PHYTOLOGIA

Designed to expedite botanical publication

Vol. 20 July, 1970 No. 4

CONTENTS

BECKNER, J., *Notes on Florida and West Indian orchids* 217

KOYAMA, T., *Iconographia Cyperacearum III* 218

MOLDENKE, H. N., *Taxonomic notes on the Eriocaulaceae and Verbenaceae* 242

MOLDENKE, H. N., *Additional notes on the Eriocaulaceae. XXXII* 244

MOLDENKE, A. L., *Book reviews* 270

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NOTES ON FLORIDA AND WEST INDIAN ORCHIDS

John Beckner
Research Associate, University of Florida

HABENARIA X RAFINESQUEI Beckner, nom. nov., based on Blephariglottis bicolor Raf., Flora Telluriana, Cent. II, p. 39, 1836; not Habenaria bicolor Conrath and Kraenzl., in Vierteljahrsschr. Nat. Ges. Zurich, Li:131, 1906 (Flora Capensis V, III:123, 1913).

Synonyms: Habenaria schweinfurthii C.A. Luer, Am. Orchid Soc. Bull. 34:324, April 1968. Habenaria bicolor (Raf.) Beckner, Am. Orchid Soc. Bull. 37:480, June 1968.

In typing, the X symbol for hybridity was lost in my paper. The H. bicolor Coranth & Kraenzl., of the Transvaal of Africa, was missed in preparing that account. It is possible that some of the other names given to the Habenaria blephariglottis group were based upon this hybrid, and thus have priority. But I am unable to see anything that supports such a conclusion. Herbarium specimens are rather inconclusive, since the morphology of the parental species is so close. Florida localities known to me for H. X rafinesquei are in Bradford, Duval, Hillsborough, Manatee, Nassau, Osceola, and Polk counties. Nash, in the Bulletin of the Torrey Botanical Club 22:157-158, 1895, may have had this hybrid from near Eustis, Lake County.

Dressler (Brittonia 13:253-266, July 1961) has summarized the distinctions between Encyclia and Epidendrum. No arguments for continuing to merge these genera have appeared in the years since. It is necessary to make the following transfers:

Encyclia hodgeana (A.D. Hawkes) Beckner comb. nov., based on Epidendrum hodgeanum A.D. Hawkes, Orquidea 18:171, 1957. Hawkes has correctly pointed out that Epidendrum altissimum Bateman ex. Ldl. Bot. Reg. 124:Misc. 38, 1838, is a later homonym of Epidendrum altissimum Jacq. Enum. Pl. Carib. 30, 1760.

Britton and Millspaugh, in the Bahama Flora, p. 92, 1920, included Epidendrum gracile and Epidendrum altissimum Batem. under their "catch-all" name Encyclia diurna. The species is often cultivated in Florida as "Epidendrum gracile" and a number of garden hybrids have been produced. True Encyclia gracilis (Ldl.) Schltr. (Epidendrum gracile Ldl., Bot. Reg. 21:pl. 1765, 1835.) is a natural hybrid of Encyclia hodgeana X E. tampensis. I have seen this growing with the parents on New Providence Island.

ENCYCLIA TRUNCATA (Cogn.) Beckner comb. nov., based on Epidendrum truncatum Cogn., in Urb. Symb. Antill. VI:496, 1910.

ENCYCLIA OLIVACEA (Cogn.) Beckner comb. nov., based on Epidendrum olivaceum Cogn., in Urb. Symb. Antill. VI:506, 1910.

The last two species are part of a complex in Hispaniola, that needs field study. It is possible that Tetramicra species have contributed genes.

ICONOGRAPHIA CYPERACEARUM III

Tetsuo KOYAMA
The New York Botanical Garden

Plate 21. CAREX HAKONENSIS Franchet & Savatier

Carex hakonensis Franchet & Savatier, Enum. Pl. Japon. 2: 123 & 550. 1879.

Synonymy: Carex krameri Franchet & Savatier, Enum. Pl. Japon. 2: 124 & 551. 1879.

Carex heleochariaeformis Léveillé & Vaniot, Bull. Acad. Intern. Géogr. Bot. 10: 53. 1901.

Carex onoei Franchet & Savatier var. krameri (Franchet & Savatier) Kükenthal ex Matsumura, Index Pl. Japon. 2(1): 24. 1905.

Densely tufted in large clumps with short inconspicuous rhizome. Culms 10 - 35 cm tall, ca. 1/3 mm thick, slender, trigonous, soft, glabrous, lightly green, smoothish or weakly scabrous above, leaved only at base. Leaves few to a culm, basal and subbasal; leaf-blades capillary, involute-margined or flattish, 0.8 - 1 mm wide, much shorter than culms, fresh-green, thinly herbaceous, acute at apex; leaf-sheaths 0.7 - 3 cm long, pale to lightly brown, thinly herbaceous. Spike solitary, terminal, androgynous, non-bracteate, broadly ovoid to subglobose, 3 - 5 mm long, 3 - 4 mm across, greenish and tinged with red-brown; staminate part narrowly lanceolate, few-flowered, shorter than the pistillate part; pistillate part densely 7- to 14-flowered. Pistillate glumes ovate-elliptic or ovate, shallowly boat-shaped, 1.5 - 2 mm long, acute at apex, membranous, pale and broadly reddish-brown on margins, the costa green, 3-nerved. Utricles spreading, ovate to ovate-elliptic, 2.2 - 3 mm long, compressed-trigonous, membranous, smooth, glabrous, green, suddenly contracted at base, contracted above to a short conical beak, the orifice white-hyaline, emarginate to shallowly 2-toothed. Achenes tightly contained, ovate, trigonous, 1.5 - 1.7 mm long; style short; stigmas 3.

Voucher specimen: Japan, foot of Mt. Hiuchi-dake in Nikko National Park, Fukushima Prefecture, T. Koyama July 1950 (NY).

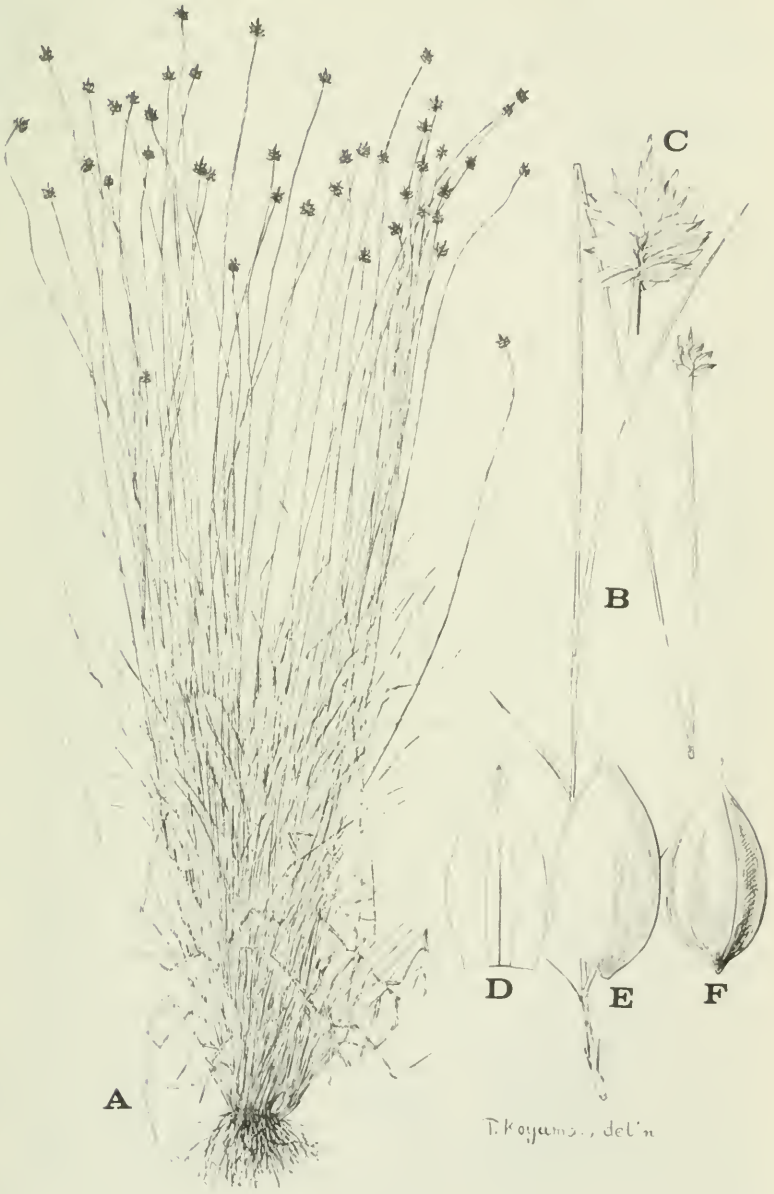


Plate 21. Carex hakonensis Franchet & Savatier

Relatively frequent on damp ground of forests at foot of high mountain. Endemic to Japan and Korea; from southwestern Hokkaido through northeastern and central Honshu southwestwards to high mountains of Shikoku and Kyushu, and in southern Korea.

Plate 21. A. Total plant; B. Enlargement of a culm with leaves; C. Spike; D. Pistillate glume; E. Utricle; F. Achene.

Plate 22. CAREX POCULISQUAMA Kükenthal

Carex poculisquama Kükenthal, Feddes Repert. Sp. Nov. 27: 111. 1924.

Rhizome knotty, decumbent, covered with red-brown scales; roots reddish-brown. Culms solitary or 2 to 4 together, hardly tufted, aphyllopodic, slender, 38-60 cm tall, triquetrous 3- to 5- noded, scaberulous on angles or smoothish. Basal sheaths scale-like to spathaceous, the upper ones short-bladed, purplish-brown to reddish-brown, puberulent. Bladed leaves wholly cauline, 3 or 4 to a culm, much spaced; leaf-blades linear, flattish-plicate, 2 - 3 mm wide, 5 - 17 cm long, rather rigid, glaucous- or bluish - green, gradually tapering to acute apex, hispidulous-scabrous on margins and along costas; leaf-sheaths tightly clothing internode, 2.5 - 5 cm long, ventrally white - membranous; ligule white-membranous, 1 mm long. Spikes 3 or 4, erect, subfastigiate or the lowest one slightly apart; terminal spike staminate, linear, 1 - 2.8 cm long, 1 mm a cross, pale, with a short inclosed peduncle, equalling or slightly shorter than the highest pistillate spike; lateral spikes pistillate, or rarely with a few staminate flowers at apex, narrowly cylindrical, 2-4.5 cm long, 2.5 - 3 mm wide, subloosely many-flowered on a flexuose rhachilla, the uppermost spike sessile, the lower one (s) peduncled. Bracts 2 or 3, all surpassing the inflorescence, bearing ferrugineous auricles at orifice; the lower one(s) 2 to 3 times as long as the inflorescence, short - (0.5-1.2 cm) -sheathing, the uppermost bract setaceous, hardly sheathing. Staminate glumes oval, as a rule more or less connate on margins forming a small cup-like structure, the green costa ending in a long scabrous awn. Pistillate glumes broadly ovate-oval, 1.7-2 mm long excluding awn, membranous, pale, median costa 3 - nerved, projecting beyond the contracted apex into a scabrous recurved awn. Utricles erect, twice or more longer than glume, obovate- to subrhombic-ellipsoidal, 3.8 - 4.2 mm long, 3-sided, thickly membranous, glaucous-green, often red –spotted, many-(10 -12-)-nerved, sparsely hairy, cuneate at base, attenuated above into a short conical beak, 2-toothed at orifice. Achene tightly inclosed, elliptic to obovate-elliptic, 2.5 mm long, acute-

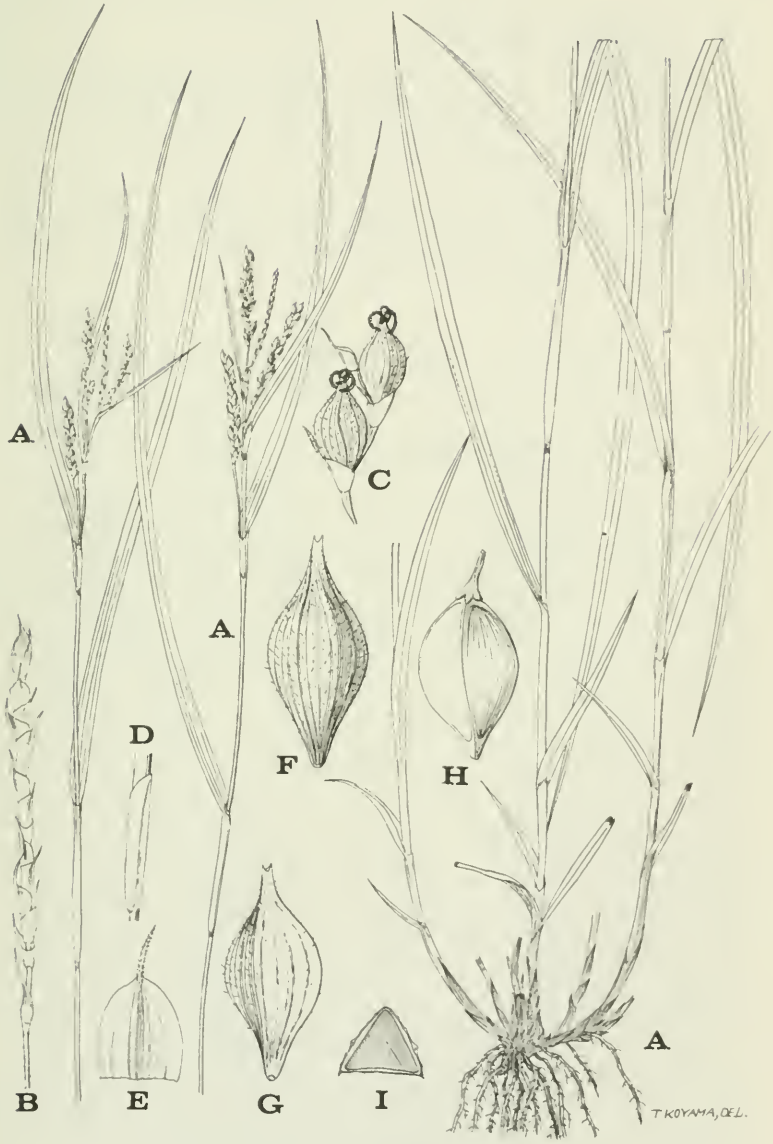


Plate 22. Carex poculisquama Kükenthal

ly 3-angled; stylebase conical, thickened and 3-lobed at base; stigmas 3, short, recurved.

Voucher specimen: Japan, Mt. Iwafune in Tochigi Prefecture, T. Koyama, 6604 (NY).

Open limestone slope covered with shallow soil and poor grassy and scrubby vegetation. Extremely rare sedge sporadically found in Mt. Iwafune and Akiyoshi Plateau of Japan and the Nangkin area of Central China.

Plate 22. A. Total plant; B. Staminate spike; C. Two utricles on the rhachilla; D. Prophyll at base of peduncle; E. Pistillate glume; F. Dorsal view of utricle; G. Ventral view of utricle; H. Achene; I. Cross section of utricle.

Plate 23. CAREX HYMENODON Ohwi

Carex hymenodon Ohwi, Act. Phytotax. Geobot. 1: 298. 1932.

Synonymy: Carex aequibilirostris Suto & Suzuki, Utsunomiya Nogaku-kenkyu-kai-shi 8, 14, 1933.

Tufted perennial, often forming a dense large clump; stons few, slender, elongated, subloosely covered with pale-brown scales. Shoots phyllopodic. Leaves basal and subbasal, and normally one upper on the culm; leaf-blades linear, 4 - 7 mm wide, shorter than to slightly overtopping the inflorescence, herbaceous, soft, fresh green, flattish, 3-costate, long-sheathing at base; basal sheaths bladed, pale-brown and in part tinged with purple-brown, eventually weakly disintegrating into fibers. Culms central, 1-noded in the midway portion , 40-55 cm tall, slender, 3-sided, smooth except on inflorescence axis. Spikes 3 or 4 (rarely 5 with 2 staminate spikes), all spaced, erect; staminate spike solitary (very rarely with a small sessile second one), terminal on an elongated peduncle, linear, 3 - 4 cm long, pale, later becoming pale-brownish; lateral spikes pistillate, cylindrical, 1.5-4 cm long, 6 mm across, lightly green and rusty-brown when dry, densely or subdensely many-flowered, the upper spike sessile or nearly so, the lowest spike with a short peduncle up to 2 cm long. Bracts 2 or 3, leaf-like, all equalling or briefly surpassing the inflorescence, hardly or in the lowest one short-(0.5 - 1.5 cm)-sheathing. Pistillate glumes ovate, 3-4mm long, membranous, pale with a broad green belt of 3-nerved costa, acutish at apex. Utricles ovoid or broadly ovoid, patent, swollen, 6-7mm long, very obtusely trigonous, green and becoming brown when dry, smooth, glabrous, many-nerved, rounded at base, gradually narrowed above to a relatively short beak, shallowly

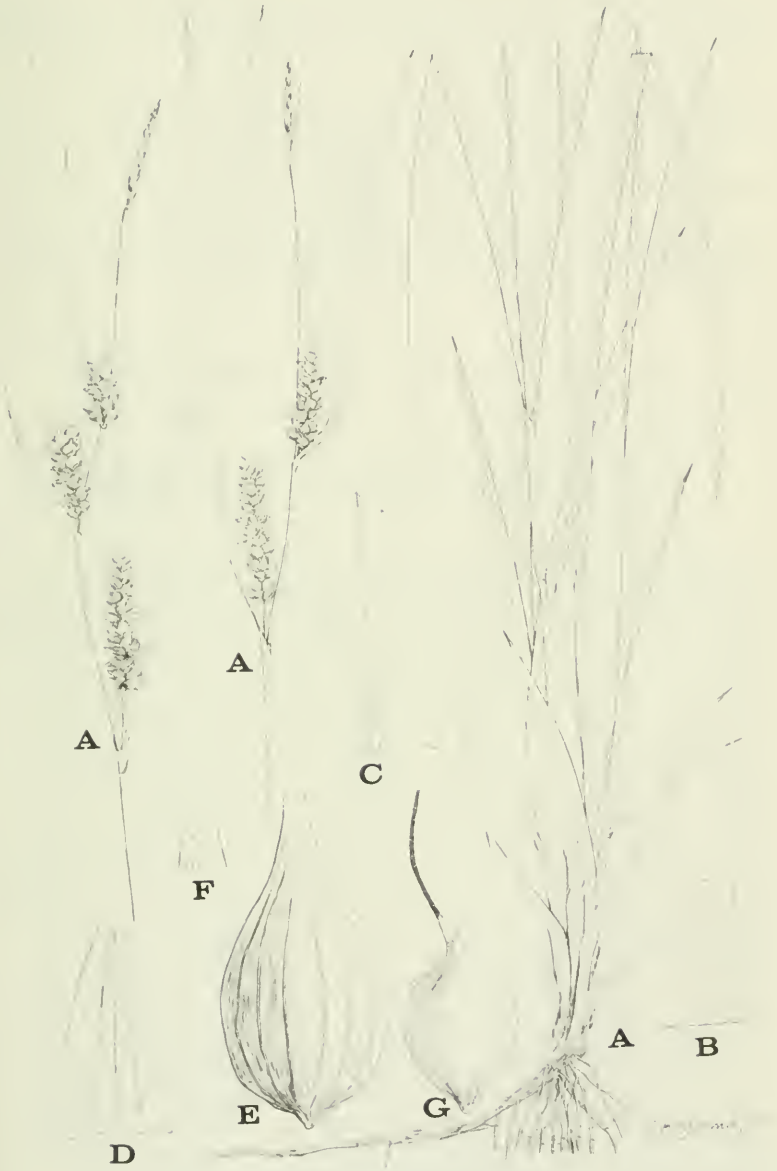


Plate 23. Carex hymenodon Ohwi

2-lobed at hyaline orifice. Achenes loosely enveloped, obovate-elliptic, triquetrous with slightly thickened angles, 2 mm long; style slender, the base more or less persistent but not markedly thickened; stigmas 3.

Voucher specimen: Japan, Mt. Asama-yama in Ohsawa Village, Tochigi Prefecture, K. Ogawa, s.n. (NY, TNS).

Wet grassy depressions in deciduous woods. Confied to the western hilly region of Tochigi Prefecture, Japan.

Plate 23. A. Total plant; B. Portion of leaf blade; C. Staminate glume; D. Pistillate glume; E. Utricle; F. Orifice of utricle; G. Achene.

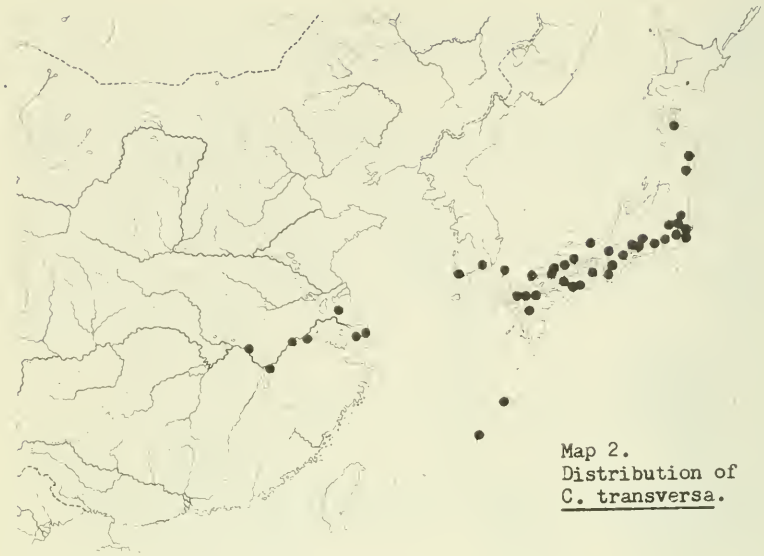
Plate 24. CAREX TRANSVERSA Boott

Carex transversa Boott ex A. Gray, Narr. Exped. Perry 2: 324. 1857.

Synonymy: Carex brownii Tuckerman var. transversa (Boott) Kükenthal ex Matsumura, Index Plant. Japan. 2(1): 103. 1905.

Densely tufted in large clumps; rhizome short, woody, covered with purple- or reddish-brown scales. Leaves basal and subbasal, occasionally one or two upper on the culm; leaf-blades linear; flattish, 2.5 - 6 mm wide, shorter than culms, soft, herbaceous, glabrous, smoothish, grass-green, long-(2 - 5 cm)-sheathing at base; cauline leaf-sheaths ventrally pale-membranous, transversely truncate at orifice; basal sheaths scale-like or short-bladed, brownish to deeply purplish- or red-brown, finally more or less disintegrating into parallel fuscous fibers. Culms 25 - 70 cm tall, triquetrous, 0.5 - 1 mm thick, 1- to 3-noded, rather soft, smooth except below the inflorescence where often scaberulous on angles. Spikes (2 -) 3 or 4 (- 5), subcontiguous or the lowest one much apart, erect; terminal spike staminate, 1 - 3 cm long, 2 mm across, linear, short-(0.7 - 1.2 cm)-peduncled or subsessile, pale green; lateral spikes pistillate, rarely bearing a few staminate flowers at apex, cylindrical to oblong, 1 - 4.5 cm long, 6 - 7 mm in diameter, densely many-flowered, grass-green and becoming brownish when dry, subsessile or with an inclosed peduncle up to 1.5 cm long, or the lowest spike occasionally on a long (up to 6 cm) exserted peduncle. Bracts (1 -) 2 or 3 (- 4) leaf-like, equalling to much surpassing the inflorescence, the sheath 0.5 - 4 cm long, the uppermost without sheath and often setaceous, surpassed by the staminate spike. Staminate glumes lanceolate, long-awned. Pistillate glumes ovate to ovate-oblong, 1.5 mm long excluding

Plate 24. Carex transversa Boott



Map 2.
Distribution of
C. transversa.

awn, pale-membranous, acute at apex, the green median belt 3-nerved, projecting beyond the glume apex into a long erect or slightly recurved awn up to 2 mm long. Utricles slightly patent, ovoid to ovoid-ellipsoidal, 5.5 - 6.5 mm long, obtusely trigonous, membranous, many-(8 to 12)-nerved, thinly herbaceous, green and becoming brownish when dry, rounded at base, gradually attenuated above into a long narrow beak, the beak erect or somewhat recurved, 2.2 - 3.2 mm long, smooth, ventrally membranous and deeply lobed for the half way, and exposing stigmas laterally, the apex minutely two-toothed. Achenes loosely enveloped, obovate, 3-sided, 1.5 - 1.7 mm long, cuneate at base, contracted at apex; style slender, elongated, slightly thickened at spongy base; stigmas 3.

Voucher specimen: Japan, Tajimagahara Swamp along Arakawa River, about 4 km SW of Urawa City, Saitama Prefecture, T. Koyama, June 1950 (NY).

Wet or marshy grasslands on aluvial plain or wet shady spots on wooded hillsides, rather common. Temperate eastern Asia from central and western Honshu through Kyushu and southern Korea southwestwards to Okinawa and Yangtze River Valley of Central China.

Plate 24. AA. Total plant; B. Pistillate glume; C. Lateral view of utricle; D. Dorsal view of utricle; E. Ventral side of beak; F. Achene.

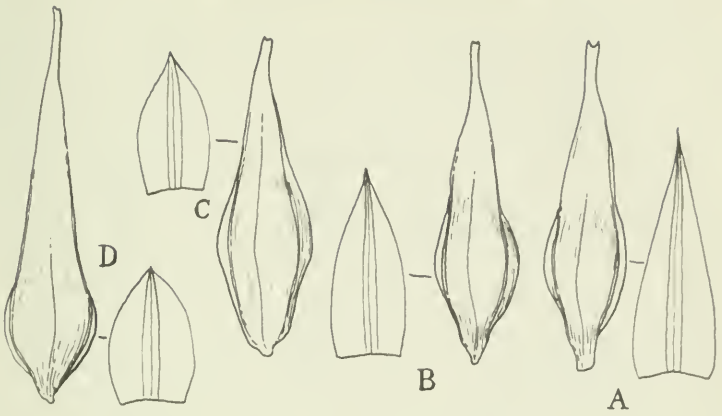


Figure 1. Utricles and pistillate glumes in Carex jackiana and its subspecies macroglossa. A. Carex jackiana subsp. jackiana, from India, Khasia, C. B. Clarke 43050 (K); B. C. jackiana subsp. macroglossa, from Japan, Saitama, Koyama 387 (TI); C. C. jackiana subsp. macroglossa, from Japan, Niigata, Ikegami 26082 (NY, TNS); D. C. jackiana subsp. macroglossa. A form with exceptionally long-beaked utricle (f. subsessilis), from Japan, Saitama, Koyama 2880.

Plate 25. CAREX JACKIANA Boott
subsp. MACROGLOSSA T. Koyama

Carex jackiana Boott subsp. macroglossa (Franchet & Savatier) T. Koyama, stat. nov.

Synonymy: Carex macroglossa Franchet & Savatier, Enum. Pl. Japon. 2: 148 & 576. 1879.

Carex jackiana Boott var. macroglossa (Franchet & Savatier) Kükenthal ex Matsumura, Index Pl. Japon. 2(1): 115. 1905.

Carex jackiana Boott subsp. parciflora Kükenthal var. macroglossa (Franchet &Savatier) Kükenthal, Pflanzenr. 4(20): 638. 1909.

Carex parciflora Boott var. macroglossa (Franchet & Savatier) Ohwi, Mem. Coll. Sci. Kyoto Univ. Ser. B, 5: 290. 1930.

Plant phyllopodic, densely tufted in large clumps without conspicuous rhizome. Leaves many, radical and one upper on the midway portion of culms; leaf-blades linear, flat, 3 - 8 mm wide,

thinly herbaceous, soft, yellowish green, with 1 midvein and 2 weak lateral veins, gradually acute at apex, long sheathing at base; basal leaf-sheaths short-bladed, yellowish brown, occasionally disintegrating into brown fibers. Culms 10 - 35 (-60) cm tall, 3-sided with acute angles, glabrous, soft. Spikes as a rule 3 or 4, sometimes 5 or 6 with divided lower spikes, all except the upper two spaced; terminal spike staminte, linear-clavate, 0.7 - 1.2 cm long, 1 - 1.2 mm thick, greenish, erect on a short (0.5-2 cm long) peduncle, equalling to slightly surpassing the next pistillate spike; lateral spikes pistillate, oblong, 1-1.8 cm long, 3 - 4 mm thick, subloosely flowered, glaucous green, erect, the upper ones on a short (0.5 - 4 cm long) peduncle, sometimes divided with 1 small side spike. Bracts leaf-like, slightly surpassing the inflorescence, the lower ones long- (2-6 cm long)-sheathing, the uppermost one nearly sheathless. Pistillate glumes ovate, ovate-oval or ovate-elliptic, 2.25 - 2.75 mm long, membranous, pale, contracted to acute or rounded apex, the costa broadly green, 3-nerved, occasionally scaberulous. Utricles suberect, ovate-fusiform, 5 - 6 mm (rately up to 8 mm) long, trigonous, thinly herbaceous, whitish-green and becoming brownish when dry, glabrous, smooth, 2-costate, weakly many-veined, contracted at short-stipitate base, gradually narrowed above into a long (2-3 mm long) straight or weakly incurved beak, the orifice white-membranous, obliquely truncate or lobed on the ventral side. Achene tightly enveloped, broadly obovate, three-sided, 1.7 - 1.9 mm long; style elongated, filiform, more or less flexuose; stigmas 3.

Voucher specimen: Japan, Tajimagahara, flood plain of Arakawa River, Saitama Prefecture, T. Koyama, June 1949 (NY).

Rather common in wet grasslands at low altitude. Endemic to southern Korea and Japan, from Kyushu northeastwards to southern Hokkaido.

Plate 25. A. Total plant; B. Pistillate glume; C. Utricle; D & E. Two examples of utricular orifice; F. Achene.

Plate 26. CAREX PAPULOSA Boott

Carex papulosa Boott ex A. Gray, Bot. Japan 418. 1859.

Synonymy: Carex flectens Boott, Illustr. Carex 4: 171, t. 581. 1867.

Carex grandisquama Franchet, Bull. Soc. Philom. Paris 8e sér., 7: 51. 1895.

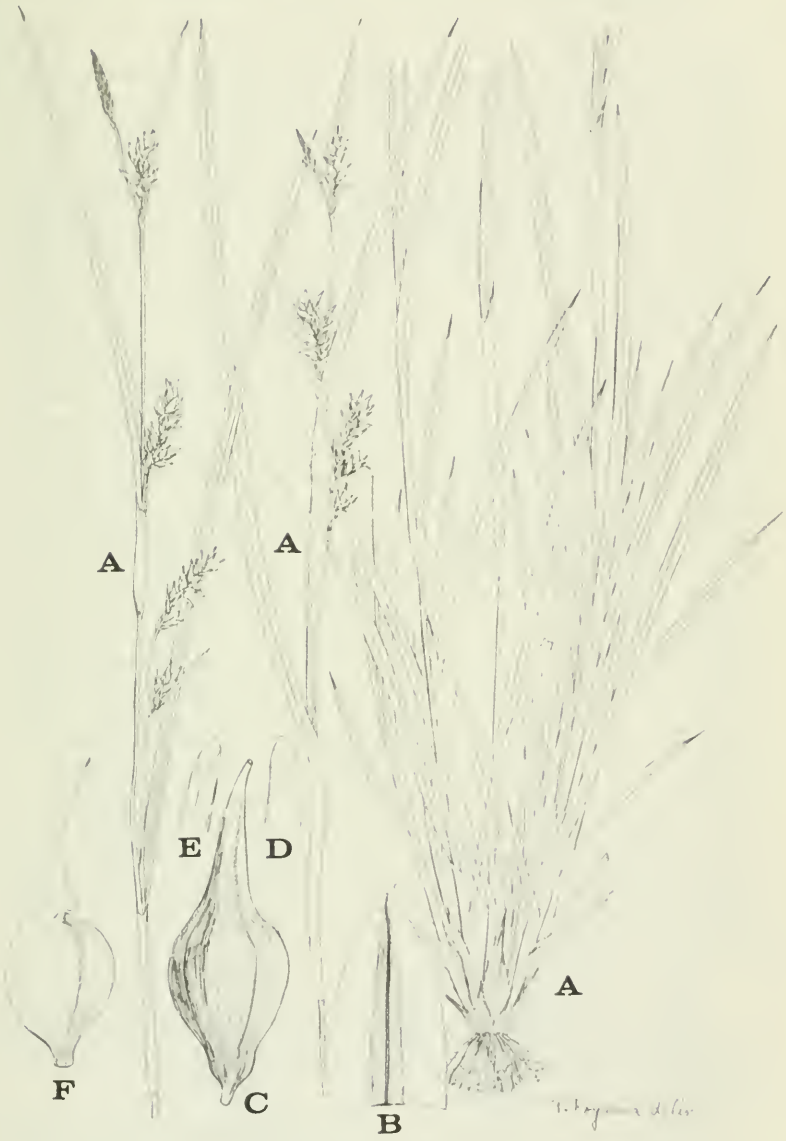


Plate 25. Carex jackiana Boott ssp. macroglossa T. Koyama

Carex papulosa Boott ex A. Gray ff. laxiflora & paupercula Kükenthal, Pflanzenr. 4(20): 637. 1909.

Carex sekimotoi Honda, Bot. Mag. Tokyo 43: 543. 1929.

Plant subloosely tufted with short-decumbent rhizome. Leaves rather many, radical and subradical, the uppermost one often on the lower part of culms; leaf-blades linear or broadly linear, flattish-plicate with 3 costas, 4 - 14 mm wide, thinly herbaceous, soft, glaucous-green, glabrous, acute at apex, long-sheathing at base; leaf-sheaths subloosely clothing the culm-base, pale and often with green transverse nerves, the ventral side white-membranous, obliquelt truncate at orifice. Culms central, 30 - 47 cm tall, truly triquetrous, soft; glabrous, smooth, normally 1-noded below the middle. Basal sheaths bladeless or short-bladed, membranous, pale-brownish, eventually disintegrating into fine brown parallel fibers. Spikes 2 or 3, much spaced; terminal spike staminate, linear-cylindrical, 1.7 - 3 cm long, 3 mm thick, erect on long exserted peduncle, fuscous; lateral spikes pistillate, pendant on exserted filiform peduncle 2-3 cm long, oblong or ovate-oblong, 1 - 2 cm long, 4 - 6 mm across, densely manyflowered, glaucous-green and tinged with rusty-brown. Bracts short-bladed, much shorter than the inflorescence, suberect, long-(1.7 - 3 cm)-sheathing at base. Staminate glumes obovate, rounded at apex, reddish-brown, distantly 3-nerved. Pistillate glumes large, broadly oval to obovate-oval, boat-shaped, 5 mm long, glaucous and ferrugineous-margined on both sides, the keel a broad green belt with 3 nerves projecting beyond the truncate apex of glume into a long straight scabrous awn. Utricles erect-patent, ovate to rhombic-ovate, trigonous, 5.5 - 6.5 mm long, thickly membranous, glaucous-green with brownish lineolae, smooth and powdery, glabrous, many nerved, cuneate at base, gradually attenuate above into an erect cylindrical beak, the orifice obliquely truncate with ferrugineous membranous margin. Achenes tightly enveloped, obovate, triquetrous, 1.8 - 2 mm long, contracted at base, contracted above to a mucronate apex; style slender, 3 mm long; stigmas 3, elongated, 4 mm long.

Voucher specimen: Korea, Sosura, J. Ohwi (KYO, TNS).

Sporadically occurring in grassy ground in deciduous forests. Temperate region of Far Eastern Asia from Hokkaido southwestwards to central Honshu and Korea, also discontinuously in high altitude of northern Kyushu.

Plate 26. A. Total plant; B. Portion of leaf blade; C. Ligule; D. Portion of culm; E. Staminate glume; F, G. Two views of prophyll at base of peduncle; H. Pistillate glume; I. Utricle; J.

Plate 26. Carex papulosa Boott

Orifice of beak; K. Surface of beak; L. Achene; M. Surface of Achene.

Plate 27. CAREX STENANTHA Franchet & Savatier

Carex stenantha Franchet & Savatier, Enum. Pl. Japon. 2: 146 & 573. 1879.

Synonymy: Carex stenantha Franch. & Savatier var. yatsugatakensis Akiyama, Journ. Fac. Sci. Hokkaido Imp. Univ. Ser. 5, 1: 60, t. 11, f. 6. 1931.

Subloosely tufted in large clumps. Rhizome branched, rather slender, obliquely ascending, clothed with brown or purple-brown fibers. Leaves rather many, all basal and subbasal, nearly half as long as the culms; leaf blades linear, 7 - 20 cm long, 2 - 3 mm wide, flattish, thinly herbaceous, soft, gradually long-acute at apex; leaf sheaths 1 - 6 cm long, all bladed, the upper ones pale-brown, the basal ones brown to purple-brown, eventually disintegrated into slightly reticulate fine fibers. Culms central, slender, exserted, 14 - 40 cm tall, 0.5 - 0.7 mm thick, trigonous, smothish, inclined above. Spikes normally 3 to 5, rarely up to 9, all spaced, occasionally the lowest subbasal and on long filiform peduncle arising from leaf axil; terminal spike staminate, linear-lanceolate acute-tipped, 2 - 3 cm long, deeply brown or rusty brown, inclined on a filiform long-exserted peduncle; lateral spikes pistillate, linear-cylindrical, 2 -4.5 cm long, rusty brown to dark brown, subloosely many-flowered, often basal 2 or 3 flowers very spaced, the peduncle filiform, long-exserted. Bracts much shorter than the spike, the lowest with somewhat leaf-like blade 2 - 6 cm long, the upper ones with short setaceous blade 0.5 - 1.5 cm long, all with a sheathing base 0.7 - 1.4 cm long. Pistillate glumes elliptic to oblong-elliptic, acute-tipped, boat- shaped, 4 - 5 mm long, membranous, rusty brown to purple-brown, the costa pale, 1-nerved, forming a scabrous mucro or projecting into a scabrous short awn at glume apex. Utricles suberect, narrowly lanceolate, trigonous, 6 - 7.75 mm long, membranous, pale to straw-colored, often purplish-lineolate on the lower portion, nerveless except two marginal costas, glabrous, roughened, gradually attenuate at base into a short (1 mm long) stipe, gradually narrowed above to a long erect beak, the margins of beak scabrous, the orifice hyaline, shallowly obliquely lobed or nearly entire. Achenes tightly enveloped in the lower part of utricle, linear-oblong, trigonous, 1.8 - 2 mm long, mucronate at apex, stiped at base; style slender, elongated; stigmas 3.

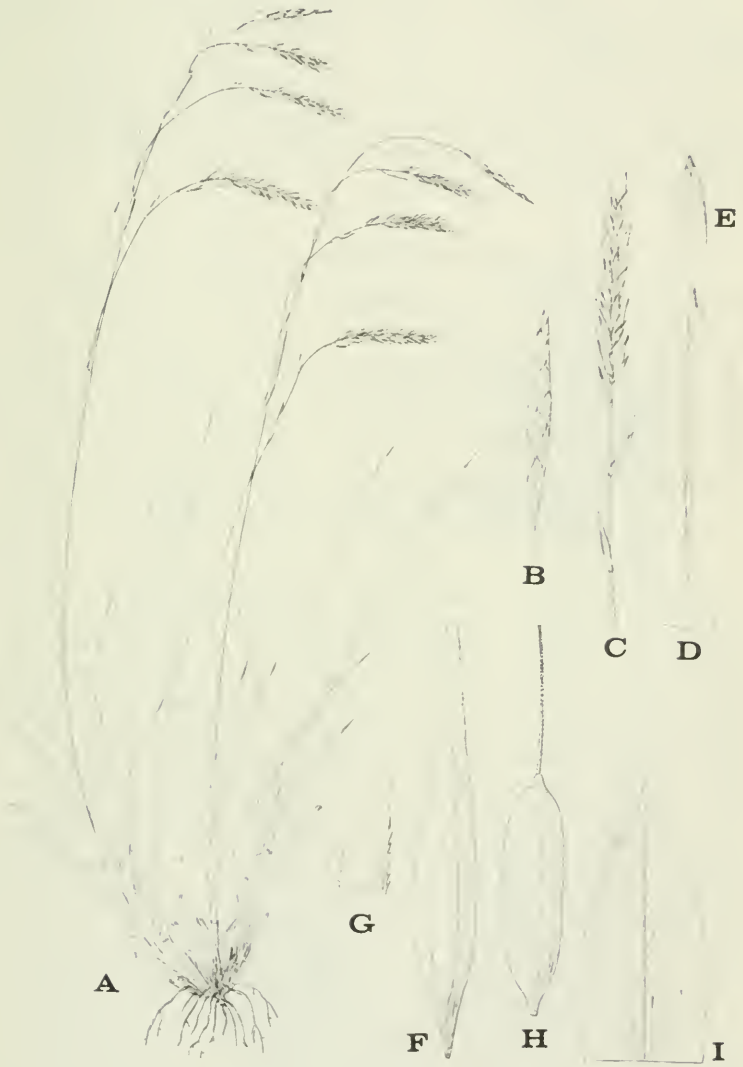


Plate 27. Carex stenantha Franchet & Savatier

Voucher specimen: Japan, Mt. Hiuchi-dake, Nikko National Park, Fukushima Prefecture, 2250 m alt., T. Koyama July 1950 (NY).

Relatively abundant in rocky slopes, sandy places or grasslands in subalpine to alpine zone. Endemic to central and northern Honshu, Japan.

Plate 27. A. Total plant; B. Staminate spike; C. Pistillate spike; D. Staminate glume; E. Apical part of anther; F. Pistillate glume; G. Dorsal view of utricle; H. Ventral view of utricular orifice; I. Achene.

Plate 28. CAREX SHIMIDZENSIS Franchet

Carex shimidzensis Franchet, Bull. Soc. Philom. Paris 8^{e} sér., 7: 33. 1895.

Synonymy: Carex nervulosa Franchet, Bull. Soc. Philom. Paris 8^{e} série, 9: 120. 1897.
Carex sorachensis Léveillé & Vaniot, Bull. Soc. Bot. Fr. 51: 205. 1904.
Carex shimidzensis Franchet var. nervulosa (Franchet) Kükenthal, Pflanzenr. 4(20): 357. 1909.
Carex takeshimensis Nakai, Bot. Mag. Tokyo 31: 281. 1909.

Plant aphyllopodic, subloosely tufted in large clumps. Rhizome thick, obliquely ascending, clothed with reddish-brown scales; roots robust. Cataphylls bladeless, 1 - 15 cm long, the lower ones brown to purplish-fuscous, only slightly disintegrating into brown fibers; the upper ones pale, the ventral side brown hyaline. Bladed leaves 3 to 6 to a culm, the upper two borne on the midway portion of culm, spaced, the lower 3 or 4 close together on the basal part of the culm; blades broadly linear, 4 - 12 mm wide, 3-nerved, flattish, surpassing the culm, herbaceous, soft, whitish-green, gradually tapering above to a long acute apex, the basal leaves long-sheathing at base, the upper ones short-(1 - 1.5 cm long)-sheathing. Spikes 3 to 6, short-peduncled, approximate, nodding; terminal spike gynaecandrous or staminate, 4 - 6 (- 10) cm long, the staminate part 2 - 2.5 mm thick, pale-brown or greenish; lateral spikes as a rule pistillate, rarely androgynous with short or long staminate portion, 4-13 cm long, 5 mm thick, cylindrical, densely many-flowered, whitish-green; peduncles filiform, smoothish, the lowest 1 - 2 cm long, others shorter. Bracts leaf-like, all non-sheathing at base, the lowest bract twice to thrice as long as the inflorescence, second bract equalling or slightly overtopping the inflores-

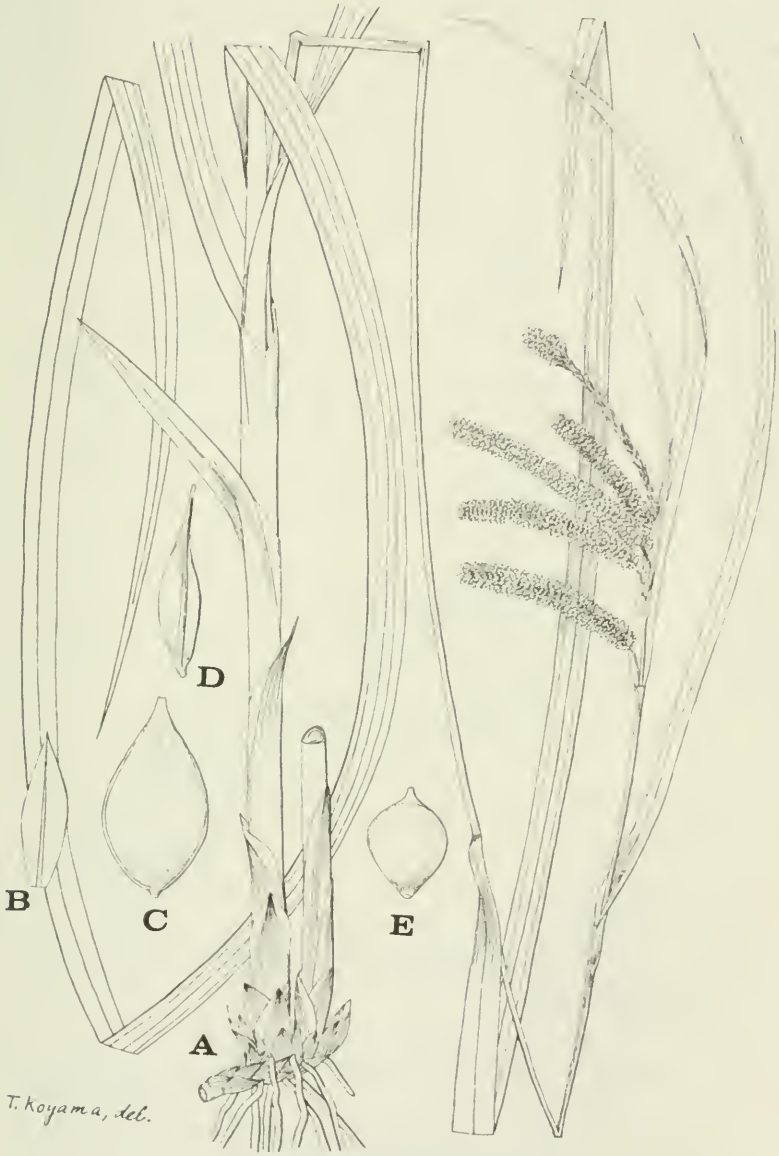


Plate 28. Carex shimidzensis Franchet

cence, upper bracts subsetaceous. Pistillate glumes elliptic or ovate-oblong, 2.7 - 3 mm long, membranous, pale or later tinged with straw-color, attenuate above to acute or mucronate and roughened apex, the costa green, 3-nerved. Utricles spreading when mature, much longer and wider than the glume, ovate, 2.8 - 3.2 mm long, thickly lenticular, membranous, greenish above, pale and brown-spotted below, faintly few-nerved or nearly nerveless except two marginal veins, rounded at base, attenuate above to a short conical smooth beak, the orifice shallowly emarginate, hyaline. Achene loosely enveloped, obovate-oval, 1.5 mm long, biconvex, cuneate at base, rounded at apex; style filiform, elongated; stigmas 2.

Voucher specimen: Japan, Sampei Pass in Nikko National Park, Gumma Prefecture, T. Koyama, July 1950 (NY).

On wet ground or stream bank in mountain forests. Endemic to Japan, from Kunashiri Island through Hokkaido and Honshu southwestwards to northern Kyushu and Takeshima Island.

Plate 28. A. Total plant; B. Pistillate glume; C. Dorsal view of utricle; D. Lateral view of utricle; E. Achene.

Plate 29. CAREX PRESCOTTIANA Boott subsp. KIOTENSIS T. Koyama

Carex prescottiana Boott subsp. kiotensis (Franchet & Savatier) T. Koyama, stat. nov.

Synonymy: Carex kiotensis Franchet & Savatier, Enum. Pl. Japon. 2: 128 & 556. 1879.

Carex fuscescens Böckeler, Bot. Jahrb. 5: 517. 1884.

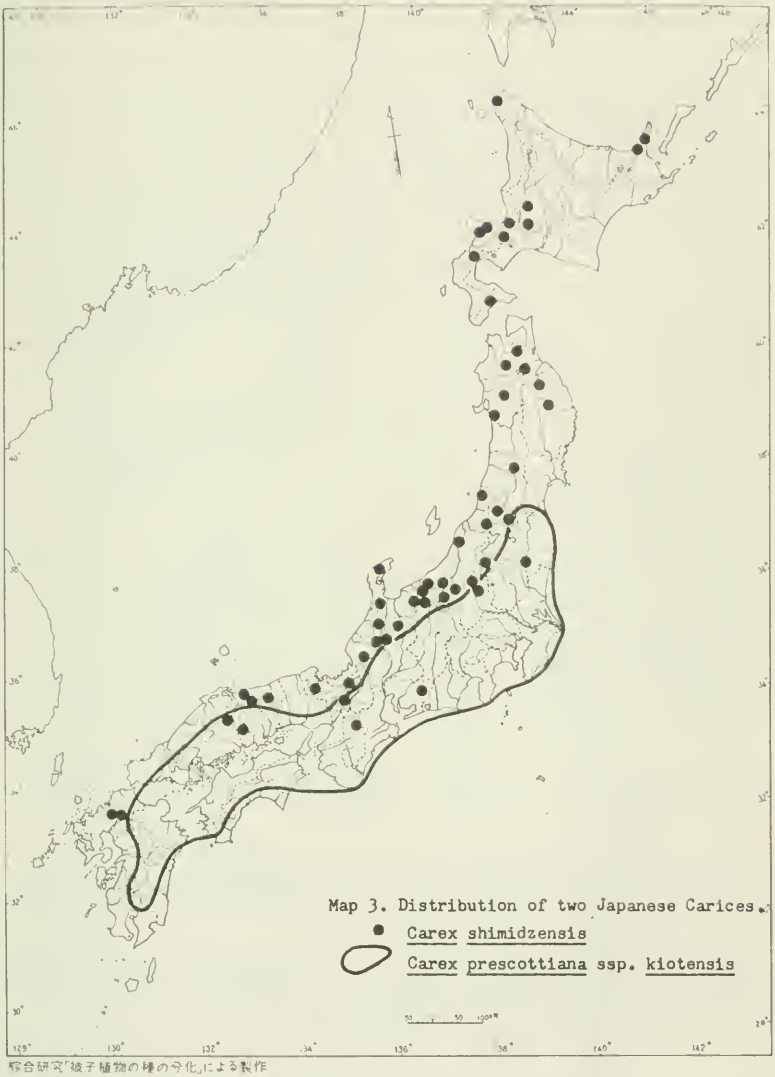
Carex guffroyana Léveillé & Vaniot, Bull. Acad. Intern. Géogr. Bot. 10: 203. 1901.

Carex kinashii Léveillé & Vaniot, Bull. Soc. Bot. France 51: 204. 1904.

Carex prescottiana Boott var. kiotensis (Franchet & Savatier) Kükenthal ex Matsumara, Index Pl. Japon. 2(1): 127. 1905.

Carex prescottiana Boott var. fuscescens (Böckeler) Kükenthal, Pflanzenr. 4(20): 356. 1909.

Plant phyllopodic, densely tufted in large clumps; rhizome abbreviated, erect to erect-oblique; roots stout. Leaves many, radical and one upper on the midway portion of the culm; leaf-blades linear, slightly overtopping the culm, 4 - 8 mm wide,



総合研究「被子植物の種の分化」による製作

flattish-plicate with 3 costas, lightly green stiffish, prominently scabrous on margins and adaxial costas, gradually attenuate to sharply acute apex; cauline leaf non-sheathing; sheaths of radical leaves 2 - 7 cm long, rusty-brown or purplish-brown, coriaceous; basal sheaths subcataphylloid, eventually more or less disintegrating into reticulate fibers especially on ventral side. Culms central erect, 27 - 60 cm tall, acutely triquetrous, 2 mm thick, rigid, scabrous on angles, 1-noded. Spikes 5 to 7, approximate and often subfastigiate, upper ones subsessile and erect-patent, lower ones peduncled and inclined; terminal spike staminate or rarely with a short pistillate portion at apex, linear, 4 - 10 cm long, lightly brown, surpassed by the next two pistillate spikes; lateral spikes pistillate or sometimes bearing a short staminate part either at apex or in midway part, cylindrical, 5 - 15 cm long, 4 - 4.5 mm thick, yellow-brown to orange-brown, densely many-flowered, upper ones short-peduncled, lower ones with peduncle up to 5 cm long. Bracts 3 to 5, leaf-like, the longer ones much surpassing the inflorescence, the upper ones short and becoming setaceous, none sheathing. Pistillate glumes ovate-elliptic, 2 - 2.3 mm long, membranous, pale-green and tinged with light brown especially on margins, contracted above to acute tip, the costa green, 3-nerved, forming a scabrous mucro at glume apex. Utricles longer and wider than the glume, patent, elliptic to ovate-elliptic, lenticular, 2.5 - 2.7 mm long, membranous, pale-brown or straw-colored, densely spotted with brown tannin cells, hardly veined, contracted at the short-stipitate base, subabruptly attenuate to short conical beak, the orifice emarginate. Achene loosely contained, broadly ovate, lenticular, 1 - 1.25 mm long; style slender, straight; stigmas 2.

Voucher specimen: Japan, by trail between Oshimidzu and Sampei Pass, ca. 850 m alt., Gumma Prefecture, T. Koyama July 1950 (NY).

Common in wet grasslands, stream sides or on unstable slope in montane region of Japan, from Hokkaido throughout Honshu southwestwards to Shikoku and Kyushu.

Plate 29. AAA. Total plant; B. Portion of leaf showing the adaxial side; C. Staminate glume; D. Pistillate glume; E. Utricle; F. Portion of utricle, enlarged to show tannin spots; G. Transverse section of utricle; H. Achene.

Plate 30. CAREX INCISA Boott

Carex incisa Boott in A. Gray, Narr. Exped. Perry 2: 327.1856.

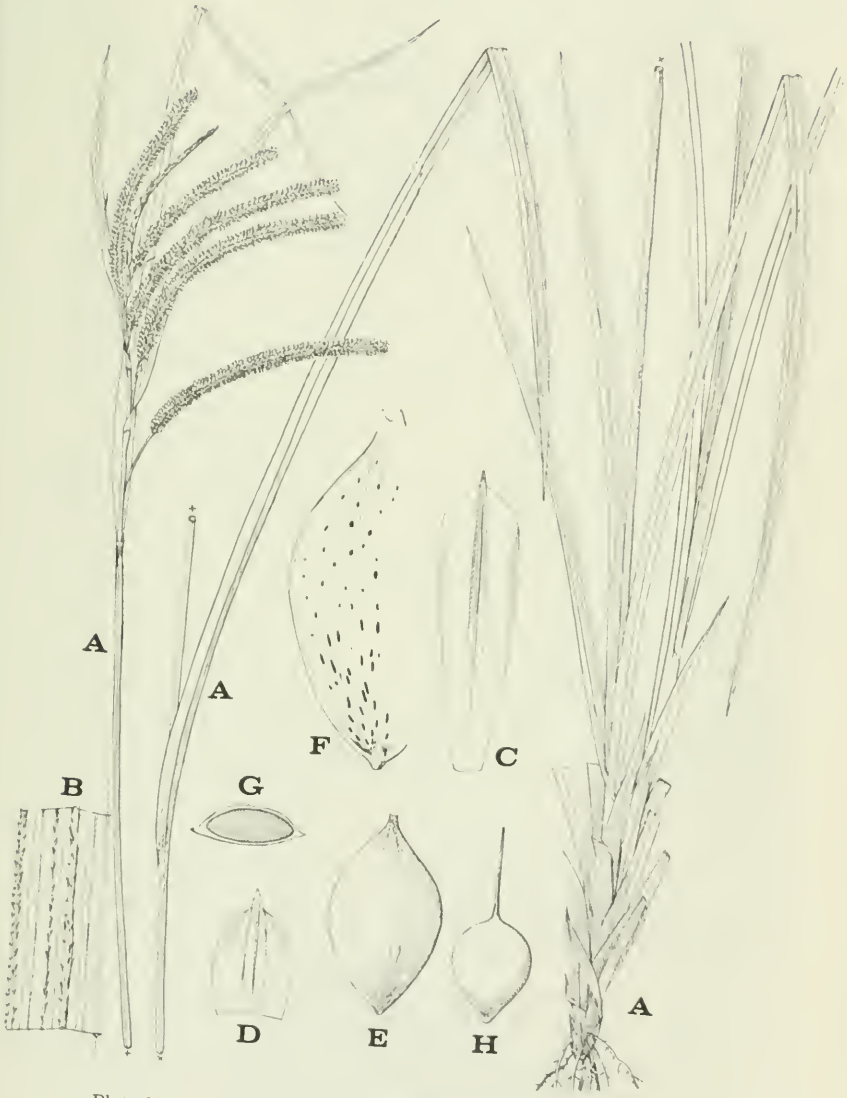


Plate 29. Carex prescottiana Boott ssp. kiotensis T. Koyama

Synonymy: Carex textori Miquel, Ann. Mus. Bot. Lugd.-Batav. 3: 151. 1867.

Carex incisa Boott forma textori (Miquel) Miquel, Ann. Mus. Bot. Lugd.-Batav. 3: 193. 1867.

Plant aphyllopodic, loosely tufted. Rhizome short, branched, occasionally stoloniferous; roots slender but stout. Bladeless sheaths at culm bases scale-like to spathaceous, 0.5 - 4 cm long, thinly herbaceous, cinnamon-colored or reddish-brown, finally disintegrating into fine fibers. Leaves several to a culm, borne on the lower 1/3 to half of culms, rather spaced but sheaths overlapping without exposing culm-internodes; leaf-blades narrowly linear, much shorter than culms, 3 - 6 mm wide, thinly herbaceous, flattish, glaucous-green above, white-powdery beneath, subabruptly short-acute at apex; ventral side of leaf-sheaths membranous, cinnamon-colored or pale-brownish, spotted with rusty brown. Culms 10 - 60 cm tall, slender, 3-sided, smooth except below inflorescence where scaberulous, inclined above. Spikes 4 - 6, subfastigiate; terminal spike staminate or gynaecandrous with short pistillate part, narrowly linear, 2 - 4.5 cm long, 1.5 - 2 mm thick, pale, sessile or nearly so, equalling or shorter than the next pistillate spike; lateral spikes pistillate, rarely with a small number of staminate flowers, narrowly cylindrical, 3 - 7 cm long, 2.5 - 2.7 mm thick, subdensely many-flowered, glaucous-green, the upper ones short-peduncled to subsessile, the lower on a capillary peduncle, the peduncles 0.5 - 5 cm long. Bracts much shorter than the inflorescence, the lowest leaf-like, 6-8 cm long, not sheathing, other bracts subsetaceous, 0.5 - 1.7 cm long, not sheathing. Pistillate glumes obovate, flattish, 2 mm long, membranous, pale with rusty brown spots, truncate to shallowly emarginate at apex, the 3-veined green costa projecting beyond the glume apex into a short erect scabrous awn. Utricles suberect, ovate, lenticular, 2.8 - 3 mm long, membranous, glabrous, oli aceous-green above, straw-colored toward the base, often spotted with dark tannin cells, nerveless except on margins, rounded at base, subabruptly narrowed above to a short conical beak, obscurely 2-toothed at orifice. Achenes tightly enveloped, broadly obovate, lenticular, 2 mm long, contracted at both ends; style noticeably thickened at base; stigmas 2.

Voucher specimen: Japan, Tajimagahara, flood plain of Arakawa River, Saitama Prefecture, T. Koyama May 22, 1949 (NY).

Frequent in wet grasslands in montane regions or on alluvial plains. Endemic to Japan; throughout Hokkaido and Honshu.

Plate 30. A. Habit; B. Glume; C. Utricle; D. Achene.

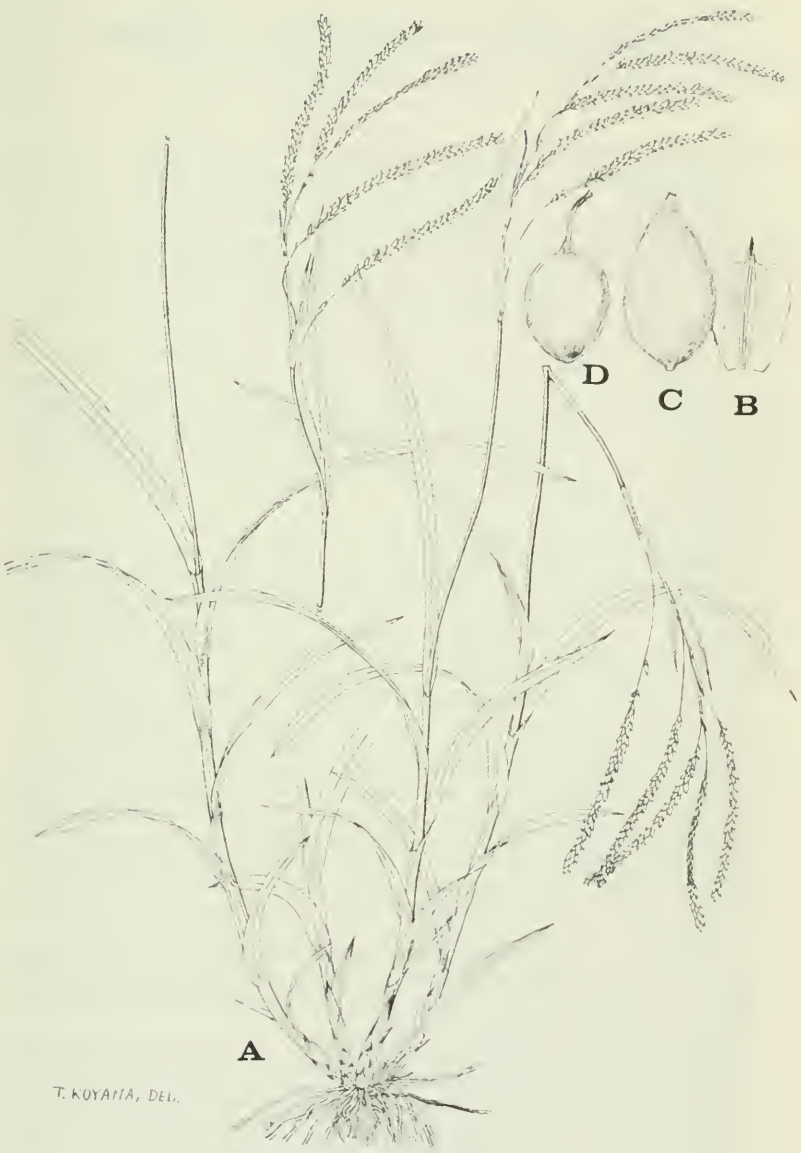


Plate 30. Carex incisa Boott

TAXONOMIC NOTES ON THE ERIOCAULACEAE AND VERBENACEAE

Harold N. Moldenke

LANTANA HIRTA var. PUBESCENS Moldenke, var. nov.

Haec varietas a forma typica speciei ramulis foliisque juvenilibus dense cinereo-pubescentibus recedit.

This variety differs from the typical form of the species in having its young twigs, branchlets, petioles, and leaf-blades densely whitish- or ashy-pubescent and the older branchlets also rather densely appressed-pubescent with the mature leaves definitely and often rather densely pilose at least on the lower surface.

The type of this variety was collected by Robert M. Laughlin (no. 1799) on a slope with Pinus and Quercus along Mexican Highway 190 at Paraje Sekemtik, in the municipality of Zinacantán, Chiapas, Mexico, at an altitude of 5200 feet, on September 4, 1966, and is deposited in the United States National Herbarium. The collector describes the plant as a shrub 6 feet tall, with white flowers.

LIPPIA GRISEA Moldenke, sp. nov.

Suffruticosa ubique incano-grisea; ramis ramulisque gracilibus obtuse tetragonis valde sulcatis dense griseo-puberulis; laminis oppositis adscendentibus ellipticis utrinque denseque griseo-puberulis acutis, versus basin attenuato-acuminatis supra mediam serrulatis; inflorescentiis breviter pedunculatis terminalibus ternatis ubique dense griseo-puberulis.

Subshrub, about 50 cm. tall, densely and conspicuously ashy-gray throughout; stems, branches, and branchlets slender, conspicuously obtusely tetragonal and sulcate, densely ashy-puberulent with appressed hairs; principal internodes elongate; leaves decussate-opposite, ascending, densely ashy-gray on both surfaces, elliptic, 3—6 cm. long, 1—2 cm. wide, acute at the apex, regularly serrulate to below the middle, long-attenuate or acuminate-attenuate at the base into a pseudo-petiole; inflorescence terminal, mostly ternate, shorter than the subtending leaves, densely ashy-gray throughout, 1.5—2 cm. long; peduncles very short, 5—7 mm. long, densely ashy-puberulent; bractlets lanceolate, densely involucrate, rather uniform, about 5 mm. long and 1 mm. wide, acuminate and often recurved at the apex, very densely ashy-pubescent; corolla white, hypocrateriform, somewhat surpassing the subtending bractlets.

The type of this species was collected by H. S. Irwin and T. R. Soderstrom (no. 5595) in the cerrado about 25 km. south of Brasília on the road to Belo Horizonte, Distrito Federal, Brazil, at an elevation of 700—1000 meters, on August 26, 1964, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors note that the leaves of this plant were fragrant when fresh and that the plant is only occasional in distribution.

STACHYTARPHETA ANGUSTISSIMA Moldenke, sp. nov.

Herba usque ad 1 m. alta; caulibus simplicibus dense albido-hirsutulis; laminis oppositis sessilibus angustissime oblongis ca. 7 cm. longis acutis utrinque dense albido-hirsutulis, margine brevissime inconspicueque serrulatis; spicis subcrassis elongatis dense multifloris albido-pubescentibus; bracteolis lanceolatis longiter acuminatis scariosis puberulis.

Perennial herb, to about 1 m. tall; stems simple or sparsely branched at the base only, erect, densely whitish-hirsutulous throughout with divergent hairs, tetragonal; leaves decussate-opposite, ascending, sessile, the blades very narrowly oblong, about 7 cm. long, to 5 mm. wide, acute at the apex, long-attenuate at the base, gray-green on both surfaces, densely whitish-hirsutulous on both surfaces, sparsely and very inconspicuously serrulate along the margins; spikes solitary, erect, rather stoutish, very densely many-flowered, short-pubescent or puberulent with whitish hairs throughout; rachis deeply sculptured in the fruiting condition; bracts lanceolate, about 8 mm. long, long-attenuate at the apex, closely appressed and imbricate during anthesis, somewhat divergent later, whitish-strigillose; corolla purple, the tube paler.

The type of this distinctive species was collected by H. S. Irwin, R. Souza, J. W. Grear, and R. Reis dos Santos (no. 15104) in wet places of the cerrado at Córrego Estrema, about 40 km. northeast of Formosa, Goiás, Brazil, at 800 meters altitude, on April 20, 1966, and is deposited in my personal herbarium at Plainfield, New Jersey.

STACHYTARPHETA POLYURA 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 H. S. Irwin, J. W. Grear, Jr., R. Souza, and R. Reis dos Santos (no. 12682) on the margin of a gallery forest, in a region of gallery forest and adjacent campo, Chapada dos Veadeiros, at an altitude of 1000 meters, about 15 km. west of Veadeiros, Goiás, Brazil, on February 12, 1966, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as a subshrub about 1 meter tall, the corollas white.

SYNGONANTHUS ALBOPULVINATUS (Moldenke) Moldenke, comb. nov.

Paepalanthus albopulvinatus Moldenke in Maguire & Phelps, Bol. Soc. Venez. Cienc. Nat. 14: 10. 1952.

SYNGONANTHUS UMBELLATUS f. BRACHYPHYLLUS (Huber) Moldenke, comb. nov.

Paepalantuhs [sic] umbellatus f. brachyphylla Huber, Bol. Mus. Para. 2: 499. 1898.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXXII

Harold N. Moldenke

ERIOCAULACEAE Lindl.

Additional & emended bibliography: A. St. Hil., Voy. Distr. Diam. 2: 443—444. 1833; Benth., Pl. Hartw. 260. 1846; Bück, Flora 56: 90—91. 1873; imThurn, Timehri 5: 208. 1886; Oliv., Trans. Linn. Soc. Lond. Bot., ser. 2, 2: 286, pl. 49b. 1887; V. A. Pouls., Bot. Tidsskr. 18: 279--292, 295, & 296, pl. 20 & 21. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 681, 690, 992, 1021, 1088, & 1283. 1895; Kuntze, Rev. Gen. Pl. 3 (2): 329. 1898; Burkill, Trans. Linn. Soc. Lond. Bot., ser. 2, 6: 13. 1901; N. E. Br., Trans. Linn. Soc. Lond. Bot., ser. 2, 6: 69—72. 1901; Malme, Bihang Svensk. Vet. Akad. Handl. 27 (3), no. 2: 29, pl. 2, fig. 3. 1901; Thonn., Blütenpfl. Afr. pl. 15. 1908; T. Fr. in R. E. Fr., Schwed. Rhod.-Kong.-Exped. 1911-12 Bot. 1 (2): 218—219, pl. 16. 1916; J. C. Diogo, Bol. Mus. Nac. Rio Jan. 1: [27]—29. 1923; Stapf, Ind. Lond. 3: 90—91 (1930) and 4: 22, 67, 280, & 518—519. 1930; J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 492. 1936; Moldenke, Bull. Torr. Bot. Club 68: 67—70. 1941; Worsdell, Ind. Lond. Suppl. 2: 28, 38, & 104. 1941; Suesseng. in Engl., Bot. Jahrb. 72: 293. 1942; Muenscher, Aquat. Pl. U. S. 12, 191—195, & 367, fig. 84 & 85 A & B, maps 204—208. 1944; Alain, Contrib. Occas. Mus. Hist. Nat. Coleg. La Salle 7: 47 & 114. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 19, 35, 71, 84, 214, 295, 401—402, 497, 681, 960, 992, 1021, 1088, & 1283. 1946; Moldenke, Mutisia 6: [1]—3. 1952; Uribe, Mutisia 25: 26 & 28. 1956; A. Robyns, Excerpt. Bot. A.1: 58 & 215. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 19, 35, 71, 84, 214, 295, 401--402, 497, 681, 960, 992, 1021, 1088, & 1283. 1960; Hocking, Excerpt. Bot. A.4: 141, 284, & 591—593 (1962), A.6: 454—455 (1963), and A.7: 455. 1964; Dau, Excerpt. Bot. A.7: 520. 1964; Hocking, Excerpt. Bot. A.9: 289 & 290. 1965; Koyama in Ohwi, Fl. Jap. 265—270. 1965; Hocking, Excerpt. Bot. A.12: 425. 1967; Harborne & Clifford, Phytochem. 8: 2071—2075. 1969; Anon., Biol. Abstr. 51: 3848. 1970; Moldenke, Phytologia 20: 4—52 & 80—120. 1970; G. Taylor, Ind. Kew. Suppl. 14: 54 & 97. 1970; Mohlenbrock, Illust. Fl. Ill. Flow. Pl. Flow. Rush 249 & 270. 1970.

The Japanese name for this group of plants, according to Koyama (1965) is "hoshi-kusa ka". Harborne & Clifford (1969) give a survey of the known flavonoid patterns in the family.

BLASTOCAULON Ruhl.

Emended synonymy: Blastocaulum Ruhl. ex Alv. Silv., Fl. Mont. 1: 274, sphalm. 1928.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 277, 293, 350—352, & 507. 1863; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 11, 14, 15, 19, 20, 24, 25, 29, 30, 159, 223—225, [283],

291, & 292, fig. 32. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 64. 1904; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Phytologia 2: 494. 1948; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Phytologia 19: 322 (1970) and 20: 5. 1970.

BLASTOCAULON ALBIDUM (Gardn.) Ruhl.

Additional & emended synonymy: Paepalanthus albidus Gardn. in Hook., Icon. Pl. 6 [ser. 2, 2]: pl. 525. 1843. Dupatya albida (Gardn.) Kuntze, Rev. Gen. Pl. 3 (2): 329. 1898. Dupatya albida Kuntze apud Thiselt.-Dyer, Ind. Kew. Suppl. 2: 64, in syn. 1904.

Additional & emended bibliography: G. Gardn. in Hook., Icon. Pl. 6 [ser. 2, 2]: pl. 525. 1843; Kuntze, Rev. Gen. Pl. 3 (2): 329. 1898; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 64. 1904; Moldenke, Phytologia 20: 5. 1970.

Emended illustrations: G. Gardn. in Hook., Icon. Pl. 6 [ser. 2, 2]: pl. 525. 1843.

It would appear that the illustration given by Gardner (1843) applies to this species rather than to B. rupestre (Gardn.) Ruhl. as is sometimes stated.

BLASTOCAULON PROSTRATUM (Körn.) Ruhl.

Additional & emended synonymy: Dupatya prostrata (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya prostrata Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 277, 293, 300, 350, & 507. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 24, 223, 224, [283], 284, 291, & 292. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Phytologia 19: 322. 1970.

BLASTOCAULON RUPESTRE (Gardn.) Ruhl.

Emended synonymy: Paepalanthus rupestris Gardn. in Hook., Icon. Pl. 6 [ser. 2, 2]: pl. 525. 1843.

Additional & emended bibliography: G. Gardn. in Hook., Icon. Pl. 6 [ser. 2, 2]: pl. 525. 1843; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 24, 223—224, [283], 287, 291, & 292, fig. 32. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402 (1946) and pr. 3, 2: 402. 1960; Moldenke, Phytologia 20: 5. 1970.

CARPTOTEPALA Moldenke

Additional & emended bibliography: A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Moldenke, Known Geogr. Distrib. Erioc. 6 & 50. 1946; Moldenke, Phytologia 2: 377. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 66 & 210. 1949; Moldenke, Résumé 70, 72, 74,

249, 326, 401, 479, & 486. 1959; Moldenke, Résumé Suppl. 17: 2. 1968; Moldenke, Phytologia 19: 7—8. 1969.

CARPTOTEPALA JENMANI (Gleason) Moldenke

Additional & emended bibliography: A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Moldenke, Known Geogr. Distrib. Erioc. 6 & 50. 1946; Moldenke, Phytologia 2: 377. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 66 & 210. 1949; Moldenke, Résumé 70, 72, 74, 249, 326, 401, 479, & 486. 1959; Moldenke, Résumé Suppl. 17: 2. 1968; Moldenke, Phytologia 17: 374—376. 1968.

COMANTHERA L. B. Sm.

Additional bibliography: Körn. in Mart., Fl. Bras. 3 (1): 438—439 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 273. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Phytologia 2: 491. 1948; Moldenke, Bull. Jard. Bot. Brux. 27: 119--120. 1957; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Hocking, Excerpt. Bot. A.11: 450. 1967; Moldenke, Phytologia 19: 322. 1970.

COMANTHERA KEGELIANA (Körn.) Moldenke

Emended synonymy: Paepalanthus kegelianus Körn. in Mart., Fl. Bras. 3 (1): 438—439. 1863.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 438—439 & 507. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145 (1902) and pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Phytologia 2: 491. 1948; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Hocking, Excerpt. Bot. A.11: 450. 1967; Moldenke, Phytologia 19: 8. 1969.

ERIOCAULON Gron.

Additional & emended bibliography: A. St. Hil., Voy. Distr. Diam. 2: 443—444. 1833; Benth. in Hook. f., Niger Fl. 547—548. 1849; Böck., Flora 56: 90—92. 1873; N. E. Br., Trans. Linn. Soc. Lond. Bot., ser. 2, 6: 69. 1901; Muenscher, Aquat. Pl. U. S. 192-195 & 367, fig. 84 & 85 A & B, maps 204—208. 1944; E. J. Salisb., Ind. Kew. Suppl. 11: 38, 88, 157, 176, & 272. 1953; Hocking, Excerpt. Bot. A.6: 455 (1963) and A.7: 455. 1964; Koyama in Ohwi, Fl. Jap. 265—270. 1965; Moldenke, Phytologia 20: 5—32, 35—37, 39, 41, 42, 47—50, 52, 82, 83, 86, 92—96, 99, 104—108, 113, 114, & 120. 1970; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970; Mohlenbrock, Illust. Fl. Ill. Flow. Pl. Flow. Rush 249 & 270. 1970.

The Japanese name for this genus, according to Koyama (1965), is "hoshikusa zoku". He gives a splendid key to the Japanese

species of the genus.

ERIOCAULON ARUPENSE Van Royen
Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 66. 1969; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970.

ERIOCAULON ATRATUM Körn.
Additional & emended bibliography: Körn., Linnaea 27: 579, 584, & 610—611. 1856; Moldenke, Phytologia 2: 379 (1947) and 19: 324, 415, 451, & 476. 1970.

ERIOCAULON ATROIDES Satake
Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 266 & 269. 1965; Moldenke, Phytologia 19: 18. 1969.
Koyama (1965) records the vernacular name "kuro-inu-no-hige-modoki" for this plant. The species is known thus far only from the Kodzuki, Shimotsuke, and Uzen provinces on Honshu, Japan.

ERIOCAULON ATROIDES f. NANUM Satake
Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 269. 1965; Moldenke, Phytologia 18: 78. 1969.
This is a small form of the species with a lighter colored pistillate calyx and a slightly shorter involucre than in the typical form. It is known as "oze-inu-no-hige" and is found only in the Ozegahara moor on Honshu island, Japan.

ERIOCAULON ATRUM Nakai
Additional synonymy: Eriocaulon atrum var. atrum Koyama in Ohwi, Fl. Jap. 270. 1965.
Additional bibliography: Moldenke, Phytologia 2: 376 & 377 (1947) and 3: 143 & 144. 1949; Koyama in Ohwi, Fl. Jap. 266, 269, & 270. 1965; Moldenke, Phytologia 19: 324—325 & 451. 1970.
Koyama (1965) records the vernacular variant "kuro-inu-no-hige". It should be noted that E. atrum var. glaberrimum (Satake) Koyama is herein treated as E. glaberrimum Miyabe & Satake; E. atrum var. hananoegoense (Masamune) Koyama is by me treated under E. hananoegoense Masamune; and E. atrum var. nakasimanum (Satake) Koyama is treated by me as E. nakasimanum Satake. Koyama claims that E. glaberrimum is distinguished from E. atrum only by the "Flowers of both sexes wholly glabrous except the pistillate petals which are pilose inside"; E. hananoegoense is distinguished only by being "A dwarf phase of the typical variety"; and E. nakasimanum "Differs from the typical variety in the glabrous receptacle, not blackish involucre, and quite glabrous petals".

ERIOCAULON ATRUM var. INTERMEDIUM Nakai
Synonymy: Eriocaulon atrum var. intermedium "Nakai ex Satake"

apud Koyama in Ohwi, Fl. Jap. 270. 1965.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 270. 1965; Moldenke, Phytologia 18: 78. 1969.

Koyama (1965) records the vernacular name "saikoku-kuro-inu-no-hige" for this plant, states that it grows in western Honshu and on Kyushu, and that it is "A transitional phase between the typical variety and var. nakasimanum, distinguishable from the former by the not blackish involucral bracts".

ERIOCAULON ATRUM var. PLATYPETALUM Satake

Additional bibliography: Moldenke, Phytologia 3: 144 (1949) and 18: 78—79. 1969.

ERIOCAULON AUSTRALASICUM (F. Muell.) Körn.

Additional & emended bibliography: Körn., Linnaea 27: 579, 584, & 616—617. 1856; Körn. in Mart., Fl. Bras. 3 (1): 286, 293, 475, & 503. 1863; Moldenke, Phytologia 19: 18. 1969.

LEIOTHRIX BECKII (Szysz.) Ruhl.

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 226—227, 236, & 288—290. 1903; Moldenke, Phytologia 20: 90—91. 1970.

LEIOTHRIX CRASSIFOLIA (Bong.) Ruhl.

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 10, 227—229, [283], 285, & 289. 1903; Moldenke, Phytologia 20: 92—93. 1970.

LEIOTHRIX CURVIFOLIA (Bong.) Ruhl.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 426—428 & 507. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 233—235, 285, & 288—291. 1903; Moldenke, Phytologia 20: 90, 93—100, & 120. 1970.

LEIOTHRIX CURVIFOLIA var. LANUGINOSA (Bong.) Ruhl.

Additional & emended bibliography: Bobg., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 627 (1831) and 2: 236—237, pl. 19 [inf.]. 1832; Ruhl. in Engl., Pflanzenreich 13 (4-30): 234, 286, 288, & 290. 1903; Moldenke, Phytologia 20: 94—97 & 100. 1970.

Emended illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 2: pl. 19 [inf.]. 1832.

LEIOTHRIX DIELSII Ruhl.

Synonymy: Paepalanthus dielsii (Ruhl.) J. F. Macbr., Candollea 5: 348. 1934.

Additional bibliography: J. F. Macbr., Candollea 5: 348. 1934; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Moldenke, Phytologia 20: 100—101. 1970.

LEIOTHRIX FLAGELLARIS (Guill.) Ruhl.

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 225, 237, [283], 285, 288, & 290. 1903; Moldenke, Phytologia 20: 86 & 104--105. 1970.

LEIOTHRIX FLAVESCENS (Bong.) Ruhl.

Emended synonymy: Paepalanthus flavescens (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 423--424. 1863. Paepalanthus eriocephalus Klotzsch apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 423--424, 502, 505, & 507. 1863; Burkill, Trans. Linn. Soc. Lond. Bot., ser. 2, 6: 13. 1901; N. E. Br., Trans. Linn. Soc. Lond. Bot., ser. 2, 6: 69 & 70. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 223, 228, 231, [283], 285, 288, & 290. 1903; J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 492. 1936; Moldenke, Phytologia 20: 105--109 & 116. 1970.

Bongard (1831) actually describes this species as "acaule; pubescens; foliis lineari-lanceolatis subfalcatis nitentibus; pedunculis caespitosis; vaginis insignibus apice lacinulatis..... Habitat in humidis montis Itacolumni. Floret Augusto. Obs. Species longitudine vaginarum insignis et facile distinguenda." Ruhland (1903) comments "Weit verbreitet daselbst an grasigen sumpfigen oder sandig-feuchten Standorten". Klotzsch (1848) noted that it was found "Am südlichen Abhange des Roraima, in einer Meershöhe von 6000 Fuss, auf sumpfigen Grasstellen, zwischen Utricularia, Heliamphora, Cypripedium und Stegolepis. Blüht im October und November. Perennirendes Kraut."

Macbride, rejecting the generic segregate Leiothrix, describes this plant as "Leaves spreading-hirsute, lanceolate, 5--13 cm. long, 2--8 mm. broad; peduncles shortly pubescent or glabrous; heads 1 cm. thick; bracts oblong-obovate, acute, somewhat yellowish" and cites Weberbauer 1292 from Puno, Peru, which, he says, was so determined by Ruhland himself.

LEIOTHRIX HIRSUTA (Wikstr.) Ruhl.

Emended synonymy: Dupatya hirsuta (Wikstr.) Kuntze, Rev. Gen. Pl. 2: 745. 1891 [not D. hirsuta Vell., 1825].

Additional & emended bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 227, 229--230, [283], 286--288, & 290. 1903; Moldenke, Phytologia 20: 108, 112, & 114--116. 1970.

The Dupatya hirsuta Vell., referred to in the synonymy above, actually belongs in the synonymy of Paepalanthus dupatya Mart.

LEIOTHRIX HIRSUTA var. BLANCHETIANA (Körn.) Ruhl.

Additional & emended bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 227, 230, [283], 288, & 289. 1903; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 401 (1946) and pr. 3, 2: 401. 1960; Moldenke, Phytologia 20: 108 & 115--116. 1970.

LEIOTHRIX MUCRONATA (Bong.) Ruhl.

Additional & emended bibliography: Bong., Mém. Acad. Sci. St. Pétersb., sér. 6, 2: 234--235, pl. 19 [sup.]. 1832; Bong., Ess. Monog. Erioc. 71—72, pl. 19 [sup.]. 1832; Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 232—233, 284, 286, 288, & 291. 1903; Moldenke, Phytologia 20: 94 & 119—120. 1970.

Emended illustrations: Bong., Mém. Acad. Sci. St. Pétersb., sér. 6, 2: pl. 19 [sup.]. 1832; Bong., Ess. Monog. Erioc. pl. 19 [sup.]. 1832.

LEIOTHRIX NUBIGENA (Kunth) Ruhl.

Additional bibliography: Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 227, 229, 284, 288, & 291, fig. 33. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 400. 1928; Stapf, Ind. Lond. 4: 67 & 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 53, fig. 21. 1930; Gleason, Bull. Torr. Bot. Club 58: 331. 1931; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 30, 43, & 51. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and 2: 402. 1946; Moldenke, Alph. List Cit. 3: 935. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 499. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 281, 327, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and 2: 402. 1960; Moldenke, Résumé Suppl. 17: 10. 1968; Moldenke, Phytologia 20: 91, 108, & 120. 1970.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 55, fig. 2. 1863; Ruhl. in Engl., Pflanzenreich 13 (4-30): 229, fig. 33. 1903; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 53, fig. 21. 1930.

The type of this species was collected by Friedrich Sellow "in summitate Serra de S. Antonio", Minas Gerais, Brazil, and probably is the Sellow B.1292 and the unnumbered collection from this locality cited below. Ruhland (1903) cites only the original Sellow collection. Silveira (1928) cites A. Silveira 527 from Serro Pouso Alto, Minas Gerais, collected in 1908.

Kunth (1841) says of this plant "Acaulibus affinior?, habitu tamen pluribusque aliis characteribus cum praecedente [Syngonanthus caulescens (Poir.) Ruhl.] arcte conjunctus videtur, licet vix caulescens, sepala interiora mascula (juvenilia) distincta et sepala exteriora feminea ab interioribus remota, haec basi pilis cincta; pistillum verisimiliter ut in Paepalantho rufulo. Nisi structura florum obstaret, pro varietate alpina P. caulescentis habuerim".

It should be noted here that Steudel (1855), when he made the new combination in the genus Eriocaulon, plainly accredits it to Kunth, but adds the qualifying phrase "l.c. sub: Paepalanthus)".

Recent collectors have found this plant growing on campos,

flowering and fruiting in January and May. Irwin and his associates found it "frequent on rocky slopes with sand-filled pockets" at 1300 meters altitude and describe it as having "inflorescences ascending, heads light grayish-brown".

Material has been misidentified and distributed in herbaria as L. beckii (Szysz.) Ruhl. and L. flavescens (Bong.) Ruhl. On the other hand, the M. A. Chase 10358, distributed as L. nubigena, is actually the type collection of Paepalanthus chaseae Moldenke.

Additional citations: BRAZIL: Minas Gerais: Irwin, Santos, Souza, & Fonseca 22056 (Z); Sellow B.1292 [0.266] (B--type, N--photo of isotype, S--isotype, Z--photo of isotype), s.n. [Serra do S. Antonio] (Br--isotype, Br--isotype, N--isotype); A. Silveira 527 (N--photo, Z--photo); Williams & Assis 6924 (Ca--744430, N, W--1932846), 6925 (W--1932847). MOUNTED ILLUSTRATIONS: Mart., Fl. Bras. 3 (1): pl. 55 (B, B).

LEIOTHRIX OBTUSIFOLIA Alv. Silv.

Bibliography: Alv. Silv., Fl. Serr. Min. 69, pl. 26. 1908; Alv. Silv., Fl. Mont. 1: 280--281 & 400, pl. 182 [bis]. 1928; Stapf, Ind. Lond. 4: 67. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 133. 1933; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Phytologia 2: 374 & 379. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 26. 1908; Alv. Silv., Fl. Mont. 1: pl. 182 [bis]. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 376) in the Serra do Cipó, Minas Gerais, Brazil, and is deposited in the Silveira herbarium.

Citations: BRAZIL: Minas Gerais: Mendes Magalhães 2542 [Herb. Jard. Bot. Belo Horiz. 43822] (N); A. Silveira 376 (B--isotype, Z--isotype); Tryon & Tryon 6770 (Z).

LEIOTHRIX PEDUNCULOSA Ruhl.

Synonymy: Paepalanthus pedunculosus Ruhl. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 235, 237, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 400. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 43. 1930; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959; Moldenke, Résumé Suppl. 1: 6 & 21. 1959.

Ruhland (1903) cites only the type collection of this species, Glaziou 19999, from Minas Gerais, Brazil. Silveira (1928) cites A. Silveira 672 from Diamantina, Minas Gerais, collected in 1918. Recent collectors have found the plant growing at 1870 meters altitude, flowering and fruiting in April.

Citations: BRAZIL: Minas Gerais: Glaziou 19999 [Macbride

photos 10672] (B--type, N--photo of type, W--photo of type, Z--isotype). São Paulo: Segadas-Vianna 2694 [Lev. Fitosociol. 510430-0108] (Ja), 2697 [Lev. Fitosociol. 510430-01.13] (Ja, Ja, Z).

LEIOTHRIX PILULIFERA (Körn.) Ruhl.

Synonymy: Paepalanthus pilulifer Körn. in Mart., Fl. Bras. 3 (1): 425--426, pl. 55, fig. 1. 1863. Dupatya pilulifera (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya pilulifera Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix pilulifera Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908. Leiothrix pilulifer (Körn.) Ruhl. apud Thanikaimoni, Pollen & Spores 7: 186, sphalm. 1965.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 425--426, 500, & 506, pl. 55, fig. 1. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 231, 284, 288, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 288. 1928; Stapf, Ind. Lond. 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 30, 43, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Alph. List Cit. 1: 222 (1946) and 3: 814. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 499. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 281, 327, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 2: 5. 1960; Thanikaimoni, Pollen & Spores 7: 183, 185, & 186, tab. 1. 1965; Moldenke, Résumé Suppl. 14: 9. 1966; Moldenke, Phytologia 20: 82. 1970.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 55, fig. 1. 1863; Thanikaimoni, Pollen & Spores 7: 183, tab. 1. 1965.

Ruhland (1903) cites only the type collection, G. Gardner 1429, from Alagoas, and also Schwacke 4294, from Pernambuco, Brazil. Material of L. pilulifera has been misidentified and distributed in herbaria as Paepalanthus sp. On the other hand, the Curtiss 6894, distributed as Leiothrix pilulifera, is a mixture of Lachnocaulon engleri Ruhl. and L. minus (Chapm.) Small.

Additional & emended citations: BRAZIL: Alagoas: G. Gardner 1429 (N--isotype, S--isotype). Paraíba: Coêlho de Moraes 2209 (Z); Tavares 992 (W--2405118). Pernambuco: Pickel 3165 (Ml, Qu, Ug, W--1790159); Ridley s.n. (Er, S); Schwacke 4294 (B). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B, B); Martius, Fl. Bras. 3 (1): pl. 55 (B).

LEIOTHRIX POLYSTEMMA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 293--294 & 400. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr.

Distrib. Erioc. 9 & 43. 1946; Moldenke, Phytologia 2: 492. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Angely, Fl. Paran. 10: 12 & 14. 1957; Moldenke, Résumé 92 & 484. 1959; Angely, Fl. Paran. 16: 59 (1960) and 17: 24. 1961; Angely, Fl. Anal. Paran., ed. 1, 201. 1965.

The type and only known collection of this species is A. Silveira 737 from "campis humidis prope Barauna", Minas Gerais, Brazil, collected in April of 1918 and deposited in the Silveira herbarium. On page 400 of his work (1928) Silveira gives "1916" as the year of collection of the type. Whether this is a typographic error or is meant to be a correction of the earlier citation is not clear. There are numerous such discrepancies on the latter pages of this work when compared to the earlier pages. It is not at all clear which is to be regarded as correct.

LEIOTHRIX POLYSTEMMA var. ROBUSTA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 294 & 400. 1928; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Phytologia 2: 492. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Angely, Fl. Paran. 10: 12 & 14. 1957; Moldenke, Résumé 92 & 484. 1959; Angely, Fl. Paran. 16: 59 (1960) and 17: 24. 1961; Angely, Fl. Anal. Paran., ed. 1, 201. 1965.

Silveira (1928) describes this variety as "Folia rigida, coriacea, usque 26 cm longa, 1--1,5 cm lata. Capitula 10--12 mm diametro lata. Planta tota rufula et quam formam typicam robustior." The type was collected "In campis secus margines fluminis Pirahy", Paraná, Brazil, by Dr. Joaquim Gomes Michaeli in February of 1916. It is number 678 in the Silveira herbarium and as of this writing is the only known collection.

LEIOTHRIX PROLIFERA (Bong.) Ruhl.

Synonymy: Eriocaulon proliferum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 632. 1831 [not E. proliferum Hochst., 1855]. Paepalanthus prolifer (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 417--418. 1863. Paepalanthus prolifer Körn. in Mart., Fl. Bras. 3 (1): 507. 1863. Dupatya prolifera (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Stephanophyllum proliferum Guill. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 992. 1895. Dupatya prolifera Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 632. 1831; Bong., Ess. Monog. Erioc. 32. 1831; Guill. in Deless., Icon. Sel. 3: 61. 1837; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 5: pl. 28. 1839; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 577 & 614. 1841; D. Dietr., Syn. Pl. 5: 268. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 278 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 417--418 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893), 2: 402 (1894), and 2: 992. 1895; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902;

Ruhl. in Engl., Pflanzenreich 13 (4-30): 235, 236, 284, 287, 288, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 400. 1928; Stapf, Ind. Lond. 3: 91. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 31, 39, 43, & 52. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and 2: 402 & 992. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 281, 291, 327, & 484. 1959; Moldenke, Résumé Suppl. 1: 23. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and 2: 402 & 992. 1960; Moldenke, Phytologia 20: 86, 104, & 118. 1970.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 5: pl. 28. 1839.

The type of this species was collected by Ludwig Riedel (no. 287) "In jugis montium St. Joze, locis arenosis, graminosis", Minas Gerais, Brazil, and is deposited in the Leningrad herbarium. Ruhland (1903) cites only the type collection, L. Riedel 287, and two others, Glaziou 17310 and A. Silveira 1042, all from Minas Gerais. Silveira (1928) cites A. Silveira 212 from the Serra do Lenheiro, Minas Gerais, collected in 1896.

The Eriocaulon proliferum Hochst., referred to in the synonymy above, is a synonym of Leiothrix vivipara var. angusta Ruhl.

It should be noted here that Guillemin (1837) does not actually make the binomial combination in the genus Stephanophyllum attributed to him by Jackson (1895), but merely suggests it.

Recent collectors note that L. prolifera specimens are noteworthy for their almost uniformly viviparous inflorescence heads. W. H. Camp, in a note appended to the Herb. A. Gray s.n. specimen cited below, in 1942 opines that "this is probably an abnormal form of some [other] species". It has been collected in fruit in April. Material has been distributed in herbaria under the name Stephanophyllum Pouls. On the other hand, the Martius s.n., distributed as Leiothrix prolifera, is actually a cotype collection of L. luxurians (Körn.) Ruhl.

Citations: BRAZIL: Minas Gerais: Glaziou 17310 (Br); Mello Barreto 4738 [Herb. Jard. Bot. Belo Horiz. 17744; Herb. U. S. Nat. Arb. 176189] (W--2121719), 4779 [Herb. Jard. Bot. Belo Horiz. 17536] (N), 17537 (N); E. Pereira 3153 [Pabst 3988] (Bd--3834, Z); L. Riedel 287 [Macbride photos 18737] (B--isotype, Br--isotype, Mu--149--isotype, N--photo of isotype, S--isotype, Ut--339--isotype, W--photo of isotype). State undetermined: Herb. A. Gray s.n. [Brasil] (T); Herb. Mus. Nac. Rio Jan. 4831 (S); Sellow s.n. [Brasilia meridionalis] (B), s.n. [Brasilia] (B, Br, N). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B); Martius, Fl. Bras. pl. ined. (B).

LEIOTHRIX PROPINQUA (Körn.) Ruhl.

Synonymy: Paepalanthus propinquus Körn. in Mart., Fl. Bras. 3

(1): 418—419, pl. 53, fig. 3. 1863. Dupatya propinqua (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya propinqua Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix propinqua Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 418—419, pl. 53, fig. 3. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 235, 237, 284, 288, & 291. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 400. 1928; Stapf, Ind. Lond. 4: 519. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Erioc. 9, 31, 43, & 52. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 281, 327, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 53, fig. 3. 1863.

Ruhland (1903) cites only the type collection of this species, but Silveira (1928) cites A. Silveira 427 from the Serra do Cipó, Minas Gerais, Brazil, as a second known collection, gathered in 1905.

Citations: BRAZIL: Minas Gerais: Sellow C.274 (B--type, Z--isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LEIOTHRIX RETRORSA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 299 & 400, pl. 186. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 186. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 836) in sandy fields near Serrinha, Grão Mogol, Minas Gerais, Brazil, in June of 1926 and is deposited in the Silveira herbarium. The collector notes that "Species pedunculis retrorso-pubescentibus valde distincta". The taxon is known only from the original collection.

LEIOTHRIX RUFULA (A. St. Hil.) Ruhl.

Synonymy: Eriocaulon rufulum A. St. Hil., Voy. Distr. Diam. 1: 391. 1833. Eriocaulon trinianum Mart., Flora 24, Beibl. 2: 58. 1841. Paepalanthus rufulus (A. St. Hil.) Kunth, Enum. Pl. 3: 530. 1841. Paepalanthus trinianus Mart. ex Walp., Ann. 1: 890. 1849. Eriocaulon claussenianum Steud., Syn. Pl. Glum. 2: [Cyp.] 279. 1855. Paepalanthus rufulus Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 296, 423—425, & 507. 1863. Paepalanthus rufulus

var. vulgaris Körn. in Mart., Fl. Bras. 3 (1): 424. 1863. Trichocalyx rufulus Kunth ex V. A. Pouls., Vidensk. Medd. Kjøbenhavn 1888: 353. 1888. Dupatya rufula (A. St. Hil.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Paepalanthus trinianus Walp. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894. Dupatya rufula Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix rufula Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: A. St. Hil., Voy. Distr. Diam. 1: 391. 1833; Mart., Flora 24, Beibl. 2: 58. 1841; Kunth, Enum. Pl. 3: 530, 539, & 614. 1841; Walp., Ann. 1: 890. 1849; D. Dietr., Syn. Pl. 5: 262. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 276, 279, 280, 333, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 296, 423—425, & 507. 1863; V. P. Pouls., Vidensk. Medd. Kjøbenhavn 1888: 353. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 227, 230, 285, 287, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 33, 39, 41, 43, & 53. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and 2: 402. 1946; Moldenke, Phytologia 2: 499. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Alph. List Cit. 3: 710. 1949; Moldenke, Phytologia 3: 499—500. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 72, 282, 287, 292, 293, 328, 355, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and 2: 402. 1960; Moldenke, Phytologia 20: 100. 1970.

This species has been found growing on beaches. Ruhland (1903) cites no specimens at all, but records the species from Bahia, Minas Gerais, and Rio de Janeiro. I have seen no collections of it from Minas Gerais unless the Clausen collections, cited below, are from that state -- which is very possible. Martius 550 is the type collection of Eriocaulon trinianum Mart. — on the label of one of the sheets of this number in the Brussels herbarium the words "Rio de Janeiro" are crossed out and "Bahia ?" has been substituted by an unknown hand.

Kunth (1841) notes under what he called Paepalanthus nubigena that its "pistillum verisimiliter ut in Paepalantho rufulo". Under what he called Paepalanthus rufulus he says "In specimine a Luschnathio in Praya Sernambatiba lecta pedunculi 3—6-pollicares", while as norm for the species he gives the length as 3 — 3 1/2 inches. Körnicke (1863) describes the typical form of the species as "planta 2 1/2 — 6-pollicaris" in height, while his var. elatior is "planta robustior, 8 -- 9-pollicaris". He cites for the typical form Clausen s.n., Gaudichaud s.n., Luschnath s.n. [Campos Bravos et Boa Perna] & s.n. [Campos S. João], Martius 550, L. Riedel 560, A. St. Hilaire s.n., and Weddell 572, all from Rio

de Janeiro, and also L. Riedel s.n. and Sellow s.n. [inter Vittoria et Bahia] from Minas Gerais.

Walpers' description (1849) actually is "12. Paepalanthus (Eriocaulon) trinianus Mart. l. c. 58 - Affinis P. saxatilis, sed differt foliis densioribus strictioribusque, scapis strictioribus et crassioribus, capitulis duplo majoribus. - Ad Sebastianopolin in Brasilia."

Additional citations: BRAZIL: Bahia: Sellow 628/1149 (B). Rio de Janeiro: Gaudichaud 308 (B, Br, N); Luschnath s.n. [Campos St. João, Martio 1833] (Br), s.n. [Cabo Frio] (B); Martius 550 (B, Br, Br, Mu--173, N, N--photo, Z--photo); Netto, Glaziou, & Schwacke 1881 [Herb. Mus. Nac. Rio Jan. 4835] (S); L. Riedel 559 (B), 560 (B), s.n. [inter Macahe et St. Salvador dos Campos] (B, Mu--172, S, Ut--340); A. Saint Hilaire I.391 (B--isotype); Segadas-Vianna, Dau, Ormond, Machline, & Lorêdo 151 (Ja, Z); L. B. Smith 6592 (W-2120190); Weddell 572 (Br). State undetermined: P. Clausen 6 (B), 2006 (E, Ut--383). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LEIOTHRIX RUFULA var. ELATIOR (Körn.) Moldenke, comb. nov.

Synonymy: Paepalanthus rufulus var. elatior Körn. in Mart., Fl. Bras. 3 (1): 424. 1863.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 424. 1863.

Körnicke (1863) separates this variety from the typical form of the species by describing it as "planta robustior, 8--9-pollicaris", while the typical form of the species [which he calls Paepalanthus rufulus var. vulgaris] is described as "planta 2 1/2 — 6-pollicaris". The variety elatior is based on L. Riedel s.n. from Minas Gerais, Brazil.

LEIOTHRIX SCHLECHTENDALII (Körn.) Ruhl.

Synonymy: Paepalanthus schlechtendalii Körn. in Mart., Fl. Bras. 3 (1): 425—426. 1863. Dupatya schlechtendalii (Körn.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya schlechtendalii Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix schlechtendalii Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 425—426 & 506. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 228, 231, 284, 288, & 291. 1903; Alv. Silv., Fl. Mont. 1: 288. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 31, 43, & 53. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 282, 328, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 402. 1960; Moldenke, Résumé Suppl. 12: 10. 1965.

Ruhland (1903) cites only the type collection of this species, Blanchet 3818, from Bahia, Brazil, and this seems to be the only collection known thus far. Macbride photographed the type in the herbarium of the Botanisches Museum at Berlin as his type photograph number 10673.

Citations: BRAZIL: Bahia: Blanchet 3818 [Macbride photos 10673] (B--type, Br--isotype, N--isotype, N--photo of type, W--photo of type). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LEIOTHRIX SCLEROPHYLLA Alv. Silv.

Bibliography: Alv. Silv., Fl. Serr. Min. 68, pl. 26. 1908; Alv. Silv., Fl. Mont. 1: 276--277 & 400, pl. 183. 1928; Stapf, Ind. Lond. 4: 67. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 133. 1933; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Phytologia 2: 374 & 379. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 26. 1908; Alv. Silv., Fl. Mont. 1: pl. 183. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 377) in the Serra do Cipó, Minas Gerais, Brazil, in 1905 and is deposited in the Silveira herbarium.

Citations: BRAZIL: Minas Gerais: A. Silveira 377 (B--isotype, Z--isotype); L. B. Smith 6844 (Z).

LEIOTHRIX SPERGULA Ruhl.

Synonymy: Paepalanthus spergula Ruhl. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 235, 237--238, & 288. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 400. 1928; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 484. 1959; Moldenke, Résumé Suppl. 1: 22. 1959.

Ruhland (1903) based this species on Glaziou 20000 from Minas Gerais, Brazil, and cites only this collection, which, according to its labels, he apparently intended first to place in the genus Paepalanthus. He comments "Species foliis latis insignis", but I can hardly see any justification whatever for such a comment. Macbride photographed the type specimen in the herbarium of the Botanisches Museum at Berlin as his type photograph number 10674. Silveira (1928) cites A. Silveira 531, collected at Diamantina, Minas Gerais, in 1908.

The plant has been found by collectors at the edges of rivers and forming mats in disintegrated rock between crags at 2160 meters altitude, flowering and fruiting in May and November. Miss Mexia refers to it as "abundant".

Material of this species has been misidentified and distributed in herbaria under the names Leiothrix vivipara (Bong.) Ruhl. and Paepalanthus viviparus Mun. Mexia 5734 is a mixture with Syngonanthus niveus var. rosulatus (Körn.) Moldenke.

Citations: BRAZIL: Minas Gerais: Glaziou 20000 [Macbride photos 10674] (B--type, Br--isotype, N--isotype, N--photo of type, W--1112518--isotype, W--photo of type); Mello Barreto 9445 [Herb. Jard. Bot. Belo Horiz. 24636] (N); Mexia 5734, in part [Herb. Leonard 7657] (B, B), 5781 (B, Go, Mi, N, N, Qu, S, Se--114036, Ut--502148a, W--1571906, Z).

LEIOTHRIX SPIRALIS (Bong.) Ruhl.

Synonymy: Eriocaulon spirale Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 634. 1831. Paepalanthus spiralis (Bong.) Körn. in Mart., Fl. Bras. 3 (1): 420--421. 1863. Paepalanthus spiralis Körn. in Mart., Fl. Bras. 3 (1): 507 & 508. 1863. Dupatya spiralis (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Dupatya spiralis Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix spiralis (Körn.) Ruhl. in Engl., Pflanzenreich 13 (4-30): 226 & 288. 1903. Leiothrix spiralis Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 634, [pl. 45]. 1831; Bong., Ess. Monog. Erioc. 8 & 34. 1831; Steud., Nom. Bot., ed. 2, 1: 586. 1840; Kunth, Enum. Pl. 3: 572, 578, & 614. 1841; D. Dietr., Syn. Pl. 5: 268. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 280 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 420--421, 507, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and 2: 402. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 226, 284, 287, 288, & 292. 1903; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 54. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 31, 40, & 43. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and 2: 402. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 282, 292, 328, & 484. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and 2: 402. 1960; Moldenke, Résumé Suppl. 12: 10. 1965.

It should be noted here that, according to Körnicke, the plate "45" of Bongard's original work (1831) was never actually published and probably exists only in the Leningrad herbarium. Kunth (1841) notes of this species "Affine videtur E. Freyreisii Billb. sed folia non setacea". Ruhland (1903) cites only the type collection, L. Riedel 1066, from rather wet gravelly places in the Serra da Lapa, Minas Gerais, Brazil, the actual type doubtless deposited in the Leningrad herbarium.

Recent collectors have found this plant growing in wet sand in areas of grassland and sedgeland interspersed with shrubby areas containing sandstone and quartzite rocks and derived soil, at altitudes of 1200 to 1295 meters, flowering and fruiting in February and November.

Citations: BRAZIL: Minas Gerais: L. Riedel 1066 [Macbride photos 10675] (B--isotype, N--photo of isotype, N--photo of isotype, W--photo of isotype); Segadas-Vianna 6003 (N); Tryon & Tryon 6767 (Z). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (F).

LEIOTHRIX STEYERMARKII Moldenke

Bibliography: Moldenke, Phytologia 2: 379. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 63 & 207. 1949; Moldenke, Alph. List Cit. 3: 975. 1949; Moldenke, Fieldiana Bot. 28: 118—119. 1951; Moldenke, Phytologia 3: 500. 1951; J. A. Steyerm., Fieldiana Bot. 28: 1157. 1957; G. Taylor, Ind. Kew. Suppl. 12: 79. 1959; Moldenke, Résumé 71 & 484. 1959; J. A. Steyerm., Act. Bot. Venez. 1: 69. 1966.

The type of this handsome species was collected by Julian Alfred Steyermark (no. 59779) — in whose honor it is named — in a Brocchinia-Stegolepis-Heliamphora swamp on the southwest-facing shoulder of Ptari-tepui, at an altitude of 2200 meters, Bolívar, Venezuela, on November 2, 1944, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species does not resemble closely any other species of the genus in northern South America.

LEIOTHRIX SUBULATA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 288 & 400. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 485. 1959.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 538) in sandy fields in the Serra da Raiz, along the road to Diamantina, Minas Gerais, Brazil, in April of 1908 and is deposited in the Silveira herbarium. The collector says of the species "Ab affinibus L. Schlechtendalii (Koern.) Ruhl. et L. pilulifera (Koern.) Ruhl. praecipue bracteis flores stipantibus, sepalis florum masculorum et sepalis petalisque florum femineorum omnibus subulatis differt". Thus far the species is known only from the type collection.

LEIOTHRIX TENUIFOLIA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 285, 286, & 400. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 485. 1959; Moldenke, Phytologia 20: 86. 1970.

This species is based on A. Silveira 675 from "In campis arenosis humidisque prope Barauna", Minas Gerais, Brazil, collected in April of 1918 and deposited in the Silveira herbarium. The collector notes (1928) that the species appears to be closely related to L. affinis Alv. Silv. On page 400 of his work he spells the name of the type locality "Braunas"; if this is a mis-

print or is intended as a correction is not clear. Thus far the species is known only from the original collection.

LEIOTHRIX TINGUENSIS Herzog

Synonymy: Leiothrix tinuensis Herzog ex Moldenke, Known Geogr. Distrib. Erioc. 9 & 43, sphalm. 1946.

Bibliography: Lützelburg, Estud. Bot. Nordést. 3: 148. 1923; Herzog in Fedde, Repert. Sp. Nov. 20: 87. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 135. 1929; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 500. 1951; Moldenke, Résumé 92, 309, & 485. 1959.

Thus far this species is known only from the type collection.

Citations: BRAZIL: Bahia: Lützelburg 2023 [Macbride photos 18738] (Mu--type, N--photo of type, W--photo of type, Z--isotype).

LEIOTHRIX TRIANGULARIS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 305--306, pl. 192. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 43. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 485. 1959; Moldenke, Phytologia 20: 105. 1970.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 192. 1928.

The type of this species was collected by Dr. Joaquim Gomes Michaeli near Araxa, Minas Gerais, Brazil, in 1918, and is number 625 in the Silveira herbarium. Silveira (1928) remarks that "Species a L. arrecta Ruhl. vaginis triangularibus et folia superantibus facile distinguenda". Material has been misidentified and distributed in herbaria as L. flagellaris (Guill.) Ruhl.

Citations: BRAZIL: Minas Gerais: Williams & Assis 6910 (Ca--744431, W--1932843, Z).

LEIOTHRIX TRICHOPUS Alv. Silv.

Synonymy: Leiothrix trichophyllus Alv. Silv., Fl. Mont. 1: 400. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 281 & 400. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Phytologia 2: 495. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92, 309, & 485. 1959.

This species is based on A. Silveira 717, collected in sandy fields in the Serra do Cipó, Minas Gerais, Brazil, in April of 1905 and is deposited in the Silveira herbarium. Thus far it is known only from this original collection, and Silveira (1928) remarks of it "Species ob sepala floris masculi certe distincta".

LEIOTHRIX TRIFIDA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 277, 294, & 400, pl. 184. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Worsdell, Ind. Lond. Suppl. 2: 38. 1941; Moldenke, Known Geogr. Distrib.

Erioc. 8 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 485. 1959; Moldenke, Phytologia 20: 112. 1970.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 184. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 670) "In campis subrupibus secus margines fluminis Jequitinhonha, inter Diamantina et Itambé", Minas Gerais, Brazil, in April of 1918 and is deposited in the Silveira herbarium. Thus far the species is known only from the original collection and Silveira (1928) notes that "Species ob vaginas trifidas et pistilli rudimentum perspicue pedicellatum et petala aequans in sectione Eleutherandra distinctissima". He also notes that it is related to L. glandulifera Alv. Silv.

LEIOTHRIX TURBINATA Gleason

Bibliography: Gleason, Bull. Torr. Bot. Club 58: 331. 1931; A. W. Hill, Ind. Kew. Suppl. 9: 156. 1938; Moldenke, Known Geogr. Distrib. Erioc. 6 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 63 & 207. 1949; Moldenke, Alph. List Cit. 3: 975. 1949; Moldenke, Phytologia 3: 500. 1951; Moldenke, Résumé 71 & 485. 1959; Moldenke, Résumé Suppl. 3: 12. 1962.

The type of this species was collected by George Henry Hamilton Tate (no. 775) on moist slopes of the Savanna Hills, Mount Duida, Amazonas, Venezuela, and is deposited in the Britton Herbarium at the New York Botanical Garden. Tate 692, cited below, has larger leaves than those seen on the type, being as much as 8 mm. wide. Gleason claims (1931) that the species is "apparently related to L. nubigena (Kunth) Ruhl., of Minas Geraes, which has much smaller leaves, glabrous peduncles, and acuminate outer bracts".

Recent collectors have found this plant growing on quartzite of escarpments, "singly or in clumps, frequent in scrub forest and savannas", "occasional on low bush slopes", "frequent solitary or forming loose cushions on escarpment savannas", and "occasional on open cumbre savannas", at altitudes of 1200 to 2100 meters, flowering and fruiting from November to January. Maguire and his associates describe it as a "perennial sometimes cespitose herb" with white floral heads.

Additional citations: VENEZUELA: Amazonas: Maguire, Wurdack, & Bunting 37031 (N), 37124 (N), 37196 (N), 37309 (N); Maguire, Wurdack, & Maguire 42114 (N, S), 42285 (N); G. H. H. Tate 692 (N), 775 (N--type). Bolívar: Steyermark & Nilsson 285 (Ve), 593 (N, Z).

LEIOTHRIX UMBRATILIS Moldenke

Synonymy: Leiotrhix umbratilis Moldenke ex J. A. Steyerm., Act. Bot. Venez. 1: 98, sphalm. 1966.

Bibliography: Moldenke, Phytologia 2: 379. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 63 & 207. 1949; Moldenke, Alph. List Cit. 3: 976. 1949; Moldenke, Phytologia 3: 500.

1951; Moldenke, Fieldiana Bot. 28: 119—120. 1951; J. A. Steyerm., Fieldiana Bot. 28: 1157. 1957; G. Taylor, Ind. Kew. Suppl. 12: 79. 1959; Moldenke, Résumé 71, 92, & 485. 1959; J. A. Steyerm., Act. Bot. Venez. 1: 98. 1966; Moldenke, Résumé Suppl. 16: 23. 1968.

The type of this species was collected by Julian Alfred Steyermark (no. 60280) in shaded places at the edge of a forest in scrubby Stegolepis-shrub growth on the mesa between Ptari-tepuí and Sororopán-tepuí, in the vicinity of Misia Kathy Camp, at an altitude of 1615 meters, Bolívar, Venezuela, between November 15 and 17, 1944, and is deposited in the Britton Herbarium at the New York Botanical Garden. The species is obviously related to L. flavescens (Bong.) Ruhl., but differs in its longer and broader leaves, the peduncles not surpassing the leaves, and in floral characters. Recent collectors describe it as "locally common, in clumps" or as "infrequent" in Amazonas, but "frequent in burnt-over bogs on the Brazil-Venezuela frontier", at 1900 to 2400 meters altitude, flowering and fruiting in November and December.

Additional citations: VENEZUELA: Amazonas: Maguire, Wurdack, & Maguire 42353 (N, S), 42385 (N). Bolívar: Agostini & Koyama 7446 (N, N, N); Maguire & Maguire 40419 (N).

LEIOTHRIX VIVIPARA (Bong.) Ruhl.

Synonymy: Eriocaulon viviparum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 632. 1831. Paepalanthus viviparus Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 417 & 507. 1863. Dupatya vivipara (Bong.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Stephanophyllum viviparum Guill. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 992. 1895. Dupatya vivipara Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Leiothrix vivipara Ruhl. apud Prain, Ind. Kew. Suppl. 3: 101. 1908. Leiothrix vivipara (Mart.) Ruhl. ex Alv. Silv., Fl. Mont. 1: 400. 1928. Paepalanthus viviparus Mun., in herb.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 632. 1831; Bong., Ess. Monog. Erioc. 32. 1831; Guill. in Deless., Icon. Sel. 3: 61. 1837; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 5: 13, pl. 28a. 1839; Steud., Nom. Bot., ed. 2, 586. 1840; Kunth, Enum. Pl. 3: 526, 577, & 614. 1841; D. Dietr., Syn. Pl. 5: 268. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 296, 417, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893), 2: 402 (1894), and 2: 992. 1895; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 238, 284, 287, 288, & 292. 1903; Prain, Ind. Kew. Suppl. 3: 101. 1908; Alv. Silv., Fl. Mont. 1: 400. 1928; Stapf, Ind. Lond. 3: 91. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9, 31, 39, 41, 44, & 55. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and 2: 402 & 992. 1946; Moldenke,

Phytologia 2: 495. 1948; Moldenke, Alph. List Cit. 3: 731. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Phytologia 3: 500. 1951; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 92, 282, 291, 293, 309, 329, & 485. 1959; Moldenke, Résumé Suppl. 1: 22 & 23. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and 2: 402 & 992. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Biol. Abstr. 47: 6792. 1966; Hocking, Excerpt. Bot. A.11: 450. 1967; Moldenke, Phytologia 20: 86, 104, & 105. 1970.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 5: pl. 28a. 1839.

The type of this species was collected by Ludwig Riedel (no. 582) in rather wet shady places in the Serra da Piedade, Minas Gerais, Brazil. Ruhland (1903) cites only this original collection, specimens of which apparently sometimes occur in herbaria without a collector's number. It also seems very probable that the specimens from the herbarium of Asa Gray, cited below, are a part of this type collection. Silveira (1928) cites A. Silveira 426, collected in the Serra do Caraça, Minas Gerais, in 1906.

Kunth (1841) states that Bongard's plate "28", depicting this species, was never published, but it seems most probable to me that it corresponds to the plate "28a" published by him in 1839. Under what is now called L. flagellaris (Guill.) Ruhl. this same author states "Eriocaulo viviparo et prolifero Bong. valde affinis, nonnisi glabritie et vaginarum brevitate ab iis differre videtur".

In spite of what is claimed by Jackson (1895), Guillemin (1837) does not actually make the combination in Stephanophyllum credited to him by Jackson and other later authors.

Recent collectors in Brazil describe Leiothrix vivipara as a "rosette herb, the inflorescence to about 25 cm. tall, heads sordid-white" and found it growing "in cerrado interspersed with wet rocky campo", at 950 meters altitude, flowering and fruiting in February.

The Mello Barreto 2513, distributed as L. vivipara, is actually L. flagellaris (Guill.) Ruhl., while Mello Barreto 9445 and Mexia 5781 are L. spergula Ruhl.

Additional citations: BRAZIL: Minas Gerais: P. Clausen s.n. [1840] (S); Herb. Martens s.n. (Br); Irwin, Santos, Souza, & Fonseca 23372 (Rf); L. Riedel 582 [Macbride photos 18739] (B--isotype, Br--isotype, Mu--150--isotype, N--isotype, N--photo of isotype, S--isotype, Ut--341--isotype, W--photo of isotype). State undetermined: Herb. A. Gray s.n. [Brasil] (T). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

LEIOTHRIX VIVIPARA var. ANGUSTA Ruhl.

Synonymy: Eriocaulon proliferum Hochst. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 334. 1855 [not E. proliferum Bong., 1831].

Paepalanthus viviparoides Ruhl. ex Moldenke, Résumé Suppl. 1: 22, in syn. 1959.

Bibliography: Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 334. 1855; Ruhl. in Engl., Pflanzenreich 13 (4-30): 238 & 288. 1903; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 79 & 207. 1949; Moldenke, Résumé 92 & 485. 1959; Moldenke, Résumé Suppl. 1: 22. 1959.

Ruhland (1903) describes this taxon as follows: "Differt a forma typica foliis setaceo-linearibus, fere teretibus, 0,5--1,5 cm longis, densissime fasciculato-caespitosis; capitulis supremis plerumque viviparis, semper plus minus cinereo-flavescentibus, latissime obconicis (nec non viviparis, fere globosis, splendide-flavescentibus), bracteis involucrantibus acutis (nec acuminatis)." He bases the variety on P. Clausen 1163, Glaziou 15515, and Mendonca 323, all of which he cites to Minas Gerais, Brazil. The printed label accompanying the Glaziou collection, however, in at least some herbaria is inscribed "Rio de Janeiro" as the state in which the collection was made. P. Clausen 163 in the Berlin herbarium appears to be the type collection of both Eriocaulon proliferum Hochst. and Paepalanthus viviparoides Ruhl. and is also probably the collection cited as "1163" by Ruhland. He comments (1903) that "Specimina a Clausen collecta a cl. Koernicke ad formam typicam ducta sunt". The Eriocaulon proliferum Bong., referred to in the synonymy above, is the name-bringing synonym of Leiothrix prolifera (Bong.) Ruhl.

Recent collectors describe L. vivipara var. angusta as cespitose, to 10 cm. tall, with white flower-heads, and found it growing on wet campos in areas of gallery forests and adjacent rocky campos, at 1200 meters altitude, flowering and fruiting in February. The Mello Barreto 2513 [Herb. Jard. Bot. Belo Horiz. 8281], distributed as this variety, is actually L. flagellaris (Guill.) Ruhl.

Citations: BRAZIL: Minas Gerais: P. Clausen s.n. [Aug.-April 1840] (Br), s.n. [Serra do Caraça; U. S. Nat. Herb. photo 5898] (N--photo, P), 163 (B--cotype, B--cotype, Br--cotype, Z--cotype); Glaziou 15515 (B--cotype, Br--cotype, N--cotype, N--photo of cotype, Z--photo of cotype); F. C. Hoehne 4955 (Mu), s.n. [Herb. Inst. Biol. S. Paulo 4955] (N); Irwin, Maxwell, & Wasshausen 21005 (N, Z); R. Mendonca 323 (B--cotype).

LEIOTHRIX VIVIPARA var. LONGIPILOSA Moldenke

Bibliography: Moldenke, Phytologia 13: 218. 1966; Moldenke, Résumé Suppl. 13: 3. 1966; Moldenke, Biol. Abstr. 47: 6792. 1966; Hocking, Excerpt. Bot. A.11: 450. 1967.

Citations: BRAZIL: Minas Gerais: Tryon & Tryon 6784 (Z--type).

MESANTHEMUM Körn.

Synonymy: Messanthemum Körn. apud Pritz., Icon. Ind. 2: 185. 1866. Eulepis Bong. apud Post & Kuntze, Lexicon 219. 1904.

Messanthemum Pritz. apud Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 718. 1966. Eulepis (Bong.) Post & Kuntze apud Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 430, in syn. 1966.

Bibliography: Lam., Encycl. Méth. Bot. 3: 276. 1789; Lam., Tabl. Encycl. Méth. 1: 213. 1791; Pers., Syn. Pl. 1: 111. 1805; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 866. 1817; Steud., Nom. Bot. Phan., ed. 1, 313. 1821; Spreng. in L., Syst. Veg., ed. 16, 3: 776. 1826; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 632 & 635. 1831; Bong., Ess. Monog. Erioc. 3, 4, 11, 12, 16, & 35. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 569, 578, 579, & 614. 1841; Hook. f., Niger Fl. 547--548. 1849; D. Dietr., Syn. Pl. 5: 265 & 268. 1852; Walp., Ann. 3: 663 (1852) and 3: 1014. 1853; Steud., Syn. Pl. Glum. 2: [Cyp.] 272--273, 278, 282, & 334. 1855; Körn., Linnaea 27: 562, 572--576, & 798. 1856; C. Müll. in Walp., Ann. 5: 921--922 & 958. 1860; Körn. in Mart., Fl. Bras. 3 (1): 283, 284, 287, 294, 298, 301--302, 471--472, & 504--506, pl. 60, fig. 1. 1863; Pritz., Icon. Ind. 2: 185. 1866; Körn., Abh. Naturw. Ver. Bremen 7: 34. 1880; Benth. & Hook. f., Gen. Pl. 3 (2): 1021--1022 & 1246. 1883; J. G. Baker, Journ. Linn. Soc. Lond. Bot. 20: 278--279. 1883; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23--25 & 27, fig. 12 T. 1888; Morong, Bull. Torr. Bot. Club 18: 352. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and 2: 214. 1894; Baill., Hist. Pl. 12: 398 & 399. 1894; N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 52, 58, & 781. 1897; Ruhl. in Engl., Bot. Jahrb. 27: 79. 1899; Thiselt.-Dyer, Fl. Trop. Afr. 8: 260--261. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 12, 14--16, 19, 22, 25, 29, 30, 117--120, 285, 287, & 288, fig. 16. 1903; Post & Kuntze, Lexicon 219. 1904; Stapf in H. Johnston, Liberia 2, app. 4: 662. 1906; Pax in Engl., Bot. Jahrb. 39: 609. 1907; H. Lecomte, Bull. Soc. Bot. France 55: 573, 594, 595, 597--602, & 643, fig. 1 & 2. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 153. 1913; T. Fr. in R. E. Fr., Wiss. Ergebn. Schwed. Rhod.-Kong.-Exped. 1911-12 Bot. 1 (2): 218-219, pl. 16. 1916; A. W. Hill, Ind. Kew. Suppl. 6: 127. 1926; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 44--48 & 50, fig. 18. 1930; Stapf, Ind. Lond. 4: 280. 1930; Hutchinson & Dalz., Fl. W. Trop. Afr. 2: 327--328, fig. 292. 1936; Dinklage in Fedde, Repert. Sp. Nov. 41: 243. 1937; Nakai & Honda, Nov. Fl. Jap. 6: 4 & 87. 1940; Abbiatti, Rev. Mus. La Plata Bot., new ser., 6: [311], 314, & 315. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and 2: 214. 1946; Moldenke, Known Geogr. Distrib. Erioc. 7, 20--22, 35, 38, 39, 44, 61, & 62. 1946; Jacques-Félix, Bull. Soc. Bot. France 94: 143--151. 1947; Terrac, Trav. Lab. Mat. Méd. 33 (3): 107. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 109, 111--115, 119, 120, 123, & 207. 1949; Moldenke, Phytologia 3: 113--114 & 143 (1949) and 3: 500--501. 1951; Meikle & Baldwin, Am. Journ. Bot. 39: 44, 45, 47, & 50, fig. 9--18. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 157. 1953; Duvigneaud, Lejeunia 16: 103. 1953; Zinderenbakker, S. Afr. Pollen 1: 36. 1953; E. Müll., Phytopath. Zeit. 23: 109. 1955; Moldenke in Humbert, Fl. Madag. 36: 30--33, fig. 4. 1955;

H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 139, 178--185, & 203, fig. 1--3. 1955; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1955: 30. 1956; Angely, Cat. Estat. 10: [2]. 1956; Bourdu, Bull. Soc. Bot. France 104: 156. 1957; Angely, Fl. Paran. 10: 8, 9, & 11. 1957; Anon., U. S. Dept. Agr. Bot. Subj. Ind. 5: 4227. 1958; Prain, Ind. Kew. Suppl. 4, pr. 2, 153. 1958; Moldenke, Résumé 133, 135--138, 140, 142, 147--149, 151, 156, 288, 290, 291, 320, 400, & 485. 1959; G. Taylor, Ind. Kew. Suppl. 12: 90. 1959; Moldenke, Résumé Suppl. 1: 8--10, 18, 19, & 25 (1959) and 2: 6. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and 2: 214. 1960; Moldenke, Résumé Suppl. 4: 6. 1962; Moldenke, Phytologia 8: 390--391. 1962; Moldenke, Résumé Suppl. 4: 6 (1962) and 7: 8. 1963; [Wiltshire], Rev. Appl. Myc. Ind. Fungi 2: 355, 359, & Cum. Ind. 202. 1963; Hocking, Excerpt. Bot. A.6: 455. 1963; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1962: 29. 1963; Moldenke, Biol. Abstr. 42: 1517. 1963; Hegnauer, Chemotax. Pfl. 2: 152 & 153. 1963; H. P. Riley, Fam. Flow. Pl. S. Afr. 199. 1963; Melchior in Engl., Syllab. Pfl., ed. 12, 2: 555. 1964; F. A. Barkley, List Ord. Fam. Anthoph. 113 & 185. 1965; Thanikaimoni, Pollen & Spores 7: 182 & 188. 1965; Moldenke, Résumé Suppl. 12: 11. 1965; Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 430, 716, & 718. 1966; Jaeger, Lamotte, & Roy, Bull. Inst. Fond. Afr. Noire 28: 1160--1161, fig. 7. 1966; Moldenke, Résumé Suppl. 15: 21 (1967), 16: 22 & 24 (1968), and 17: 4 & 11. 1968; M. E. S. Morrison, Journ. Ecol. [Brit.] 56: 373. 1968; Moldenke, Phytologia 17: 450 (1968), 18: 256, 258, 303, 394, 395, & 508 (1969), and 19: 35. 1969; Moldenke, Résumé Suppl. 18: 6 & 13. 1969; Moldenke, Phytologia 19: 458, 468, & 469 (1970) and 20: 8. 1970; G. Taylor, Ind. Kew. Suppl. 14: 86. 1970.

Herbs, with very short stems; leaves non-pellucid, not fenestrate; floral heads villous; staminate florets: sepals 3, connate at the base; petals completely connate into an infundibular tube which is solid at the base, deeply hollowed-out above, and shortly 3-lobed or truncate, glanduliferous beneath the apex within; stamens 6; anthers yellowish; pistillate florets: sepals 3, separate, caducous; petals 3, separate at the base, connate above into a tube, glanduliferous on the inner surface; ovary 3-celled; style very long; stamens 3, simple, usually short; the hairs on the floral heads smooth, slender, acute at the apex.

A small genus of about 13 species limited to tropical Africa and Madagascar. The type species is M. radicans (Benth.) Körn. Hess (1955) says of this genus "Die Gattung Mesanthemum schliesst sich am nächsten an die Gattung Eriocaulon an. Auszer diesen beiden Gattungen haben keine andern Gattungen 6 Staubblätter. Wie bei Eriocaulon sind auch bei Mesanthemum Drüsen an den Petalen vorhanden (Ausnahme: Mesanthemum reductum H. Hess). Mesanthemum hat in den ♂ Blüten stets vollständig verwachsene, einen Tubus bildende Petalen. In den ♀ Blüten sind die Petalen über der Frucht frei, weiter oben röhrig verwachsen. Verwachsungserscheinungen beschränken sich in der Gattung Eriocaulon auf die Sepalen.

"Die Gattung Mesanthemum ist bisher nur aus Afrika und Madagas-

kar bekannt geworden. Sie ist dort innerhalb der beiden Wendekreise wet verbreitet. Gegenwärtig sind aus dieser Gattung etwa ein Dutzend Arten beschrieben, die wahrscheinlich nicht alle systematischen Wert haben. Verschiedene wurden an Hand einer Einzelpflanze beschrieben und können nach den Diagnosen nicht von verwandten Arten getrennt werden....Ein Bestimmungsschlüssel findet sich für alle bekannten Arten (ausgenommen M. africanum Moldenke und M. reductum H. Hess) bei Jacques-Félix (1947)."

Excluded from the genus are the following binomials and the taxa to which they apply:

Mesanthemum chilloui Moldenke = Eriocaulon plumale ssp. kindiae (H. Lecomte) Meikle

Mesanthemum latifolium J. Sm. = Eriocaulon latifolium J. Sm.

Mesanthemum necopinatum Moldenke = Eriocaulon plumale ssp. jaegeri (Moldenke) Meikle

Mesanthemum necopinnatum Moldenke = Eriocaulon plumale ssp. jaegeri (Moldenke) Meikle

Airy Shaw (1966) lists "Eulepis (Bong.) P. & K." as a generic synonym of Mesanthemum, but Eulepis Bong. is now regarded as a valid section of the genus Syngonanthus Ruhl. Also, Post & Kuntze (1904), to whom Airy Shaw accredits the name as a genus, credit it solely to Bongard and plainly propose it to replace the name Mesanthemum Körn., with Eriocaulon prescottianum Bong. as the type species.

It is also worth noting here that the Walpers (1860) reference, given in the generic bibliography above, is often cited as "1858", but actually only pages 1—160 of this work were issued in 1858 — pages 161—640 were issued in 1859 and pages 641—966 in 1860. Lecomte's work in Bull. Soc. Bot. France (1908) is often cited as "1909", but the pages with which we are concerned here were issued in 1908. Körnicke's work (1856) is cited by the Index Kewensis and in other works as "1854", but was not actually issued until April of 1856. Angely (1957), through a typographic error, cites it as "1956".

The generic name is derived from the Greek μεσος (=middle) and ανθος (=flower) in allusion to the fact that the genus stands intermediate between Eriocaulon and Paepalanthus. Angely (1956) says that it contains ten species. Riley (1963) notes that the genus was recorded from South Africa by mistake in the Flora Capensis, and that this error was later corrected to Angola by N. E. Brown in the Flora of Tropical Africa.

MESANTHEMUM AFRICANUM Moldenke

Bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 119, 120, & 207. 1949; Moldenke, Phytologia 3: 113—114 & 143 (1949) and 3: 500. 1951; E. J. Salisb., Ind. Kew. Suppl. 11: 157. 1953; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 180. 1955; Moldenke, Résumé 149, 151, & 485. 1959.

MESANTHEMUM ALBIDUM H. Lecomte

Bibliography: H. Lecomte, Bull. Soc. Bot. France 55: 601—602, fig. 2. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 153. 1913; Stapf, Ind. Lond. 4: 280. 1930; Moldenke, Known Geogr. Distrib. Erioc. 20 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 111, 119, 120, & 207. 1949; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 185. 1955; Prain, Ind. Kew. Suppl. 4, pr. 2, 153. 1958; Moldenke, Résumé 136 & 485. 1959; Moldenke, Résumé Suppl. 4: 6. 1962.

Illustrations: H. Lecomte, Bull. Soc. Bot. France 55: 602, fig. 2. 1908.

The Boismare 445 collection, cited below, was originally a mixture with M. auratum H. Lecomte, but the latter portion has now been re-designated as no. 445a.

Citations: SÉNÉGAL: J. G. Adam 18362' (Z). REPUBLIC OF GUINEA: Boismare 445 [Herb. Chillou 3965] (An, Z).

MESANTHEMUM AURATUM H. Lecomte

Bibliography: H. Lecomte, Bull. Soc. Bot. France 55: 599—602, fig. 1. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 153. 1913; Stapf, Ind. Lond. 4: 280. 1930; Moldenke, Known Geogr. Distrib. Erioc. 20 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 111 & 207. 1949; Prain, Ind. Kew. Suppl. 4, pr. 2, 153. 1958; Moldenke, Résumé 136 & 485. 1959.

Illustrations: H. Lecomte, Bull. Soc. Bot. France 55: 600, fig. 1. 1908.

The Boismare 445a collection, cited below, was originally part of Boismare 445, a mixture with M. albidum H. Lecomte.

Citations: REPUBLIC OF GUINEA: Boismare 445a (Z).

MESANTHEMUM BENNAE Jacques-Félix

Bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: 145. 1947; E. J. Salisb., Ind. Kew. Suppl. 11: 157. 1953; Moldenke, Résumé Suppl. 18: 6. 1969.

This species is known thus far only from the Republic of Guinea.

MESANTHEMUM ERICI-ROSENII T. Fries

Synonymy: Mesanthemum erici-roseni T. Fries apud H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 183 & 203. 1955.

Bibliography: T. Fr. in R. E. Fr., Wiss. Ergebn. Schwed. Rhod.-Kong.-Exped. 1911-12 Bot. 1 (2): 218—219, pl. 16. 1916; A. W. Hill, Ind. Kew. Suppl. 6: 127. 1926; Stapf, Ind. Lond. 4: 280. 1930; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 183 & 203. 1955; Moldenke, Résumé 148, 320, & 485. 1959; Moldenke, Résumé Suppl. 17: 4. 1968.

Illustrations: T. Fr. in R. E. Fr., Wiss. Ergebn. Schwed. Rhod.-Kong.-Exped. 1911-12 Bot. 1 (2): pl. 16. 1916.

Robinson describes this plant as a stoutly-based perennial, the inflorescence-heads white. Collectors have found it growing in marshes and permanently wet "dambo", flowering in October.

BOOK REVIEWS

Alma L. Moldenke

"HOW TO KNOW POLLEN AND SPORES" by Ronald O. Kapp, x & 249 pp., illus., Pictured Key Nature Series, William C. Brown & Company, Dubuque, Iowa 52001. 1969. Spiral binding & paper $3.25, cloth $4.00.

This work deserves appreciation as the first American survey in this field even though the microscope viewer of these structures may wonder about more details he sees than are matched in the drawings and descriptions and about size differences. There are lucid brief descriptions of morphology, physiology and slide preparation. The key seems facilely workable. The inclusion of spores from lower plants and protozoans is helpful in distinguishing them from pollen grains.

"HOW TO KNOW THE FRESH-WATER ALGAE" by G. W. Prescott, 272 pp., illus., Pictured Key Nature Series, William C. Brown & Company, Dubuque, Iowa 52001. 1964. Spiral binding & paper $3.25, cloth $4.00.

This book was petitioned because it was listed incorrectly somewhere as a new edition; actually it is only a reprinting. Nevertheless it is relatively up-to-date in recognizing 9 phyla, but intentionally clings to the older generic and specific names. The title page tells its nature and scope - "An illustrated key for identifying the more common (440) fresh-water algae, with hundreds of species (most common, most characteristic) named and pictured (sketchily, but quite well) and with numerous aids (techniques for collection and preservation, indexed check-list according to phyla, orders and families, combined index and picture glossary) for their study." The author is a well-recognized authority.

"DESERTS OF THE WORLD, An Appraisal of Research into Their Physical and Biological Environments" edited by William G. Mc Ginnies, Bram J. Goldman and Patricia Paylore, xxviii & 788 pp., illus., The University of Arizona Press, Tucson, Arizona 85700. 1968. $15.00

This is a most valuable book because of the great mass of written text, charts, 5000-entry bibliography and maps that have been collected, collated and effectively presented, making it an important and accurate world-wide reference work for years to come. In terms of today's book market the price is fantastically low.

At least 1/8 of the world's land surface is desert and 1/8 is semi-arid in 50 different nations on all continents. In the in-

troduction the staff of the outstanding Office of Arid Land Studies at the University of Arizona gives general descriptions of the 13 major deserts which often include more than one distinct desert unit -- Kalahari-Namib, Sahara, Somali-Chalbi, Arabian, Iranian, Thar, Turkestan, Takla-Makan, Gobi, Australian, Monte-Patagonian, Atacama-Peruvian, and North American. The following chapters give careful appraisal for each desert on weather and climate (Reitan & Green), geomorphology and surface hydrology (Lustig), surface materials (Dregue), vegetation (McGinnies), fauna (Lowe), coastal zones (Schreiber), and ground-water hydrology (Simpson). All the writers have emphasized where basic research in their fields is sorely needed. Botanists will be especially interested in the species summary, the herbaria and library depositories listings, and the phytogeographical descriptions and maps. Once this book is in their hands they will find themselves compelled to read much more than this excellent section on vegetation. What better recommendation could be given for this book?

"THE ENCYCLOPEDIA OF THE BIOLOGICAL SCIENCES", 2nd edition, edited by Peter Gray, xxv & 1027 pp., illus., Van Nostrand Reinhold Company, New York, New York 10001, Cincinnati, Ohio, Toronto, London, and Melbourne. 1970. $24.95.

During the few months while this compendium of copious well organized information has been awaiting this review I asked visiting friends who were botanists, biology teachers, naturalists, etc. to list any 3 items of a biological nature that they have been wanting to "look up" and any 3 that they have recently studied and then to hunt for them in this new book. For both their learning and their checking they found the explanations here to be lucid and full enough so that they did not just repeat dictionary definitions. Inevitably some items were not to be found in the book, as, for instance, [a]estivation. Also inevitably all these persons found the book again after it had intentionally been placed in a less accessible place, and thumbed through it. They all liked having the articles signed and so often provided with further references.

This edition has undergone considerable revision with 35 new articles, e.g., exobiology, and 100 new illustrations. Quite sensibly the illustrations are "used only where they tell a clearer story than could the words that they replace". Cross-referencing is done in the space-saving technique of upper-casing the term in context. Alphabetizing and bibliography citation follow the Library of Congress pattern.

This work and Van Nostrand's "Scientific Encyclopedia", which stresses the physical and chemical sciences, make a good pair for a handy library shelf.

"BIOLOGICAL CONSERVATION" by David W. Ehrenfeld, xi & 226 pp., illus., Holt, Rinehart & Winston, Inc., New York, N. Y. 10017, Chicago, San Francisco, Atlanta, Dallas, Montreal, Toronto, London, and Sydney. 1970. Paperback.

The scope of this important, easily readable, intelligently planned book is limited to the conservation of the flora and fauna. "The twin pressures of a rapidly expanding population and heavy industrialization" are causing "the seemingly inexhaustible open space.....to shrink at an alarming rate" the world over. It considers (1) the factors that threaten natural communities and species carefully documented with case histories and (2) the preservation of natural communities and analogues (as hedgerows, highway margins, artificial reefs, urban parks and lots) and of species through the work of different conservation-directed research and programs, "zoos", commercial animal farms etc. "The growth since 1960 of a cadre of energetic and skilled ecologist-educators, including scientists like Paul Ehrlich, Archie Carr, LaMont Cole, Barry Commoner, Eugene Odum, and Charles Wurster, is the most promising sign that in the near future ecology will be able to supply the large numbers of researchers, consultants and teachers that are so urgently needed". "Re perfecting a still embryonic system of environmental preservation....both optimist and pessimist can agree that there is no other human endeavor more worth the effort."

An excellent choice of references is given after each chapter; plant life literature seems slighted and Ehrlich's pertinent "Population Bomb" is not included. The book is illustrated with many of the author's own fine field photos. The print is clean and legible even though "Javanese" slipped through misspelled (p. 120) and turtles were "born" (p. 146). The index is skimpy.

"FLORA ANALÍTICA E FITOGEOGRÁFICA DO ESTADO DE SÃO PAULO", vol. 1, by João Angely, xlviii & 240 & xxxii pp., illus., Universidade de São Paulo Press, São Paulo, Caixa Postal 30786, Brazil. 1969.

Over three decades of botanical studies in the field, in the herbarium and in the library have preceded the publication of this flora of 1027 of the 7251 known species. The original place of publication of each scientific name is given and much of the synonymy as well as chromosome numbers, medicinal and commercial uses, common names, 373 maps of geographic distribution, as well as notes on the whole range of the species. As additional volumes continue to be published this work will give botanists a reference of ever greater value. The author is a most dedicated prodigious worker; a fortunate combination of the field and the herbarium/library scholar.

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CONTENTS

EITEN, L. T., *Notes on Brazilian Cyperaceae - II* 273

MOLDENKE, H. N., *Additional notes on the Eriocaulaceae. XXXIII* 277

ADAMS, C. D., *Miscellaneous additions and revisions to the flowering plants of Jamaica* 309

MILLER, H. A., *Some Circum-Pacific Schistochilaceae* 315

RUDD, V. E., *Revival of Nissolia microptera (Leguminosae)* 324

MOLDENKE, A. L., *Book reviews* 325

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NOTES ON BRAZILIAN CYPERACEAE— II.

Liene Teixeira Eiten
Instituto de Botânica, São Paulo

In 1943 Süssenguth published a number of new taxa of Brazilian Cyperaceae based mainly on the collections of Luetzelburg. We are at present reexamining the type material and a detailed illustrated account will appear later, but for the moment the following results are of interest.

1. Eleocharis pygmaea (Süss.) L.T. Eiten comb. nov.
Basionym: Chamaegyne pygmaea Süss. Bot. Jahrb. 73: 113 (1943).
Type of basionym: Ph.von Luetzelburg 21041, Brasilia septentrionalis, Milho prope Rio Tacutu, in ditione fluvii Rio Branco, in campo humido. IX 1927. This is the only known collection of the species.

This tiny sedge, at most 3 cm tall, consists of pieces that were probably pulled out of a clump or mat. It has short culms with terminal sterile spikelets and many basal sessile fertile spikelets. Süssenguth considered it a new genus different from Eleocharis because (1) its culm-apex spikelets consist of only two glumes and a single flower, (2) this flower is male, containing no pistil, (3) the achenes lack bristles. In regard to the first item we may point out that several species of Eleocharis have one-flower spikelets with two glumes at the culm apices, such as E. minima occasionally, E. capillacea very often, and E. naumanniana regularly. In regard to the second point, Eleocharis, especially in submersed plants, occasionally has purely male flowers lacking a pistil. However, in fact, Chamaegyne does have a few hermaphrodite flowers in the culm-tip spikelets and so approaches the usual condition in Eleocharis. Süssenguth noted this too in a culm-tip spikelet that had not yet emerged from its leaf sheaths but he thought it was a teretological event. As for the third point, there are many species of Eleocharis that lack bristles at the base of the achene, as well as other species in which some individuals lack bristles and others possess them.

Süssenguth described Chamaegyne as having normal leaves, that is, leaves with blades. Thus he says that four leaves surround the pistil in the basal spikelets and these are "foliis normalibus nec bracteosis nec glumaceis". Now the presence of leaf blades, which a "normal" leaf would have, would be enough to exclude Chamaegyne from Eleocharis but, strangely, Süssenguth does not mention this as a point of difference. However, Chamaegyne really does not possess leaf blades, being similar to Eleocharis in this respect. The only laminar organs to which Süssenguth could have been referring are the glumes of the basal spikelets. He describes the leaves as being "cr. 2 mm longa, lanceolata, acuta, tenerrima, integra, glabra, aliquando subfalcata"; these are exactly the characteristics of the glumes of the basal spikelets. The drawing of Chamaegyne given by Süssenguth shows a pistil and a fruit between

laminar organs which are identical to what we observed surrounding the pistils and fruits in the same type material, and these laminae are plainly the glumes. When mature achenes fall the glumes remain on the plant; these empty glumes are the other "leaves" in the drawing shown not associated with pistils or fruits.

Thus all arguments for separating Chamaegyne from Eleocharis fall. The small size of the plant and the presence of basal spikelets also do not separate it from Eleocharis for the series Tenuissimae has several species with individuals that may be as small as Chamaegyne when mature, and this series also has species with basal spikelets.

It appears that Chamaegyne is most related to Eleocharis minima of the series Tenuissimae. Svenson (1937) has a drawing of basal spikelets of this species (pl. 465, fig.8) which is very similar to a drawing we made from the Chamaegyne material before noting the relation between the two species. Also, in both species the leaf sheath apices are loose, sometimes slightly inflated. Chamaegyne is a separate species in the same series, the main difference being in the achenes. In Eleocharis minima the achenes are ellipsoidal to obovoid, trigonous, 0.75-1.0 mm long (incl. stylebase), whitish to pale brown or olive, the surface minutely striate to lightly reticulate. The depressions of the reticulation are shallow and their shape square or narrow-rectangular with the long axis of the depression vertical. The achene of Chamaegyne is globose-trigonous, 0.85-1.1 mm long, dull ivory white, surface strongly cancellate with the depressions deep and wide-rectangular with the long axis horizontal. The stylebase in Chamaegyne falls within the range of variation that this structure shows in E. minima.

2. Eleocharis minima Kunth

Süssenguth's new genus and species, Helonema estrellensis, was based on two Luetzelburg collections, 14027 and 14062, both taken in the State of Rio de Janeiro. The first is marked, "Serra dos Orgãos, Grota do Inferno, Wasserfall, an Granit im Wasser, I. 1916", the second, "Serra Estrella, im Rio Gongojoco, X. 1916". Several years ago we argued that this material really was a species of Eleocharis (L.T.Eiten, 1963), since the reasons for excluding it from that genus were not valid. The type material had few and much reduced spikelets and no achenes. This was expected since the plants were growing submersed in water and submersion frequently reduces flowering and fruiting in aquatic plants. So we attempted to obtain living topotypes to cultivate out of water to see if the plant would produce better spikelets and mature fruits.

The Grota do Inferno is a deep canyon still containing its native vegetation on the steep forested slope of the Serra dos Órgãos south of Teresópolis. A new highway climbing the mountain face crosses it twice. However, we found no material in the clean rock stream bed although we examined it at probably the same point that Luetzelburg did, where a now abandoned cable-car railroad right-of-way crosses the canyon. The Serra Estrela of the other syntype collection is the part of the coast range between Rio and Petrópolis, with the village of Estrela at its base.

However, there is no Rio Gongojoco on this range and we could not find this name in any gazetteer or map. Luetzelburg, in his Estudos Botanicos do Nordeste, gives a list of plants he collected in Brazil which were identified up to the time of writing, and for one of these he mentions the Rio Gongojoco again, this time as near Rosário on the Baixada do Rio. Rosário (now Saracuruna) is a railroad station and village on the flat swampy lowland or Baixada, several kilometers south of the base of the Serra Estrela. From local inhabitants we found that the Rio Gongoxoco (as it is now spelled) is a stream barely one kilometer long that flows through the marshes just east of a small hill 2 km east of Saracuruna. A road leads to an old fazenda house on the hill so we were able to reach the stream. Sure enough, it contained the identical Heloneme material that Luetzelburg found 50 years previous, even mixed with the same Utricularia as on the type sheet!

Kept in an aquarium for several years the material retains its thin elongated stems which produce new shoots of a few stems at their tips and these when grown produce new stems at their tips until the plant is more than 30 cm long and with several branch orders. No spikelets were ever noticed when collected nor when cultivated under water. But when transplanted to moist soil and allowed to grow in air or covered with only a centimeter or so of water, it produces small dense tufts 3-12 cm tall of thicker culms with many fertile spikelets and ripe achenes, and only very rarely short vegetative shoots at some culm tips.

In the type material from submersed plants the flowers were both hermaphrodite and male. The ovaries were not provided with bristles at the base but this is often true in Eleocharis even when the achenes possess them. In the plants grown in the air thespikelets were much more abundant (but with about the same number of glumes), the flowers were all hermaphrodite and fertile, and the achenes had bristles. The size and other vegetative characters, as well as the achenes, of the plants grown out of the water showed that the Heloneme topotype was Eleocharis minima. The Heloneme habit is really only an extreme aquatic modification of this species. Svenson (1937) described the variety ambigua for the aquatic phase of minima and figured it as an erect plant with several spikelets and a single shoot at the tip of one culm, that is, a plant much less modified from the terrestrial phase than Heloneme. Since the more extreme Heloneme can produce typical E. minima when grown out of the water, it is highly likely that var. ambigua plants can also. This throws doubt on the value of the variety; a true variety would have to be relatively genetically fixed.

3. Diplacrum longifolium Clarke

The new species of Süssenguth, Bisboeckelera paporiensis, based on Luetzelburg 23955 and 23981, both from the Rio Papori at the Brazil-Colombia border, collected July, 1928, is really Diplacrum longifolium. The material agrees with this species in all particulars. In Bisboeckelera each female flower, that is, each terminal pistil, is always enclosed in a utricle while in Diplacrum it is enclosed by two subopposite entirely free glumes, one folded inside the other. In all other charac-

ters, species of the two genera are sufficiently similar, including the branching pattern of the inflorescence, that they could be joined.

The inflorescence of the material seen is composed of 1 or 2 heads per culm. The number of heads per culm in the species in general varies from 1 to 7.

4. Websteria submersa (C.Wright) Britton

Süssenguth described two varieties of this species, var. Luetzelburgii based on Luetzelburg s/n, Serra do Sol |Roraima Territory|, and var. negrensis based on Martius 2810, Barra do Rio Negro |near Manaus|. We examined this material plus several other collections from Pernambuco, Bahia, Roraima Territory, several places in Pará, as well as a fragment of the type of the species from Cuba (C. Wright 3775), and a specimen from Florida. There is a small amount of random variation from one collection to another as was to be expected, particularly in aquatic plants, but no collection was sufficiently distinct to constitute a variety.

Several other collections that Süssenguth cited as Websteria submersa are really aquatic phases of Eleocharis, such as Luetzelburg 12518, 12528, and 15051. The branching pattern is completely different (see table of comparison of Eleocharis, Websteria and Egleria in L.T.Eiten, 1964) and there are other differences all of which may be noted in sterile material.

It should be mentioned here that descriptions of Websteria in several publications say that the plant has verticillate leaves. Thus, S.H. Wright (1887) writes: "leaves capillary, smooth, 1 to 2 inches long, sheathed at base, and in umbellate clusters, terminating the umbellate peduncles and branches." Süssenguth in the description of var. negrensis says: "folia penicillatim vel, se mavis, pseudo-verticillatim posita fert. Folia longe linearia, tenuissima, filiformia,..." In reality, all these "leaves" are filiform culms, that is, stems. The only foliar tissue the plant has is that of the tubular leaf sheaths, exactly as in Eleocharis.

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ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXXIII

Harold N. Moldenke

MESANTHEMUM ERICI-ROSENII T. Fries

Additional bibliography: Moldenke, Phytologia 20: 269. 1970.

Material of this taxon has been misidentified and distributed in herbaria as M. radicans (Benth.) Körn.

Citations: LIBERIA: J. T. Baldwin 10052 (N). DEMOCRATIC REPUBLIC OF CONGO: Overlaet 807 (Mu). ZAMBIA: E. A. Robinson 6116 (Mu, Z); von Rosen 806 (B--isotype, Z--isotype).

MESANTHEMUM JAEGERII Jacques-Félix

Synonymy: Mesanthemum jaegeri Jacques-Félix apud Jaeger, Lamotte, & Roy, Bull. Inst. Fond. Afr. Noire 28: 1160. 1966.

Bibliography: Jacques-Félix, Bull. Soc. Bot. France 94: 146. 1947; E. J. Salisb., Ind. Kew. Suppl. 11: 157. 1953; Jaeger, Lamotte, & Roy, Bull. Inst. Fond. Afr. Noire 28: 1160--1161, fig. 7. 1966; Moldenke, Résumé Suppl. 18: 6. 1969.

Illustrations: Jaeger, Lamotte, & Roy, Bull. Inst. Fond. Afr. Noire 28: 1160, fig. 7. 1966.

According to Jaeger, Lamotte, & Roy (1966) this species grows in association with Impatiens jacquesii and Streptocarpus elongatus. It is known thus far only from Sierra Leone.

MESANTHEMUM PRESCOTTIANUM (Bong.) Körn.

Synonymy: Eriocaulon prescottianum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 632 & 635. 1831. Mesanthemum prescottianum Körn. apud Benth. & Hook. f., Gen. Pl. 3 (2): 1021. 1883. Mesanthemum tuberosum H. Lecomte, Bull. Soc. Bot. France 55: 898--899. 1908.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 632 & 635. 1831; Bong., Ess. Monog. Erioc. 11, 12, & 35. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 578, 579, & 614. 1841; D. Dietr., Syn. Pl. 5: 268. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 282 & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 283, 284, 471, 472, 500, 504, & 506, pl. 60, fig. 1. 1863; Benth. & Hook. f., Gen. Pl. 3 (2): 1021. 1883; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23 & 24, fig. 12 T. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and 2: 214. 1894; Thiselt.-Dyer, Fl. Trop. Afr. 8: 261. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 22, 118, 287, & 288. 1903; H. Lecomte, Bull. Soc. Bot. France 55: 598--599. 1908; Prain, Ind. Kew. Suppl. 4, pr. 1, 153. 1913; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 50. 1930; Stapf, Ind. Lond. 4: 280. 1930; Hutchinson & Dalz., Fl. W. Trop. Afr. 2: 327. 1936; Moldenke, Known Geogr. Distrib. Erioc. 20, 21, 38, & 44. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and 2: 214. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 111 &

207. 1949; Moldenke, Phytologia 3: 500. 1951; Meikle & Baldwin, Am. Journ. Bot. 39: 45, 47, & 50, fig. 9—18. 1952; Prain, Ind. Kew. Suppl. 4, pr. 2, 153. 1958; Moldenke, Résumé 136, 137, 291, 320, & 485. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and 2: 214. 1960; Moldenke, Résumé Suppl. 4: 6 (1962) and 18: 13. 1969; Moldenke, Phytologia 20: 268. 1970.

Illustrations: Körn. in Mart., Fl. Bras. 3 (1): pl. 60, fig. 1. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 23, fig. 12 T. 1888; Meikle & Baldwin, Am. Journ. Bot. 39: 47, fig. 9—18. 1952.

The original description of this species, according to Kunth (1841), is "Acaule; foliis lanceolatis, acuminatis, glabriusculis; pedunculo solitario vaginaque pubescente". He places the species in his section "Eulepis: squamis capitulorum marginalibus radiantibus". A plate "36" is cited as illustrating this species by Bongard (1831) and other authors, but does not appear in the reprint of his work consulted by me. The same plate reference is given by Steudel (1855) and Jackson (1893), but Kunth (1841) says "ic. ined." after his citation of it and Stapf (1931) does not list it. Possibly it occurs only in the Leningrad library and/or herbarium. Bongard (1831) says for the type collection of his Eriocaulon prescottianum "Habitat prope Rio de Janeiro. (Ex herbario amiciss. D. Prescott, cui cel. Lindley)." Kunth (1841) and Steudel (1855) also record it as native to Rio de Janeiro, Brazil, which, of course, is entirely incorrect, since it does not occur in the New World at all.

Meikle & Baldwin (1952) report "thousands of plants on high granitic outcrop near Sanokwele", in Liberia. They report it also from Sierra Leone, and distinguish it from M. radicans as follows:

Inner involucral bracts obtuse, 5—8 mm. long; receptacle black-pilose.....M. radicans.
Inner involucral bracts acuminate, 10—18 mm. long; receptacle white-pilose.....M. prescottianum.

Baldwin reports the plant as "common" in the Republic of Guinea. Recent collectors have found it on open rocky hills, at altitudes of 2000 to 2500 feet, flowering and fruiting in September and October.

Additional citations: LIBERIA: J. T. Baldwin Jr. 9516 (N). REPUBLIC OF GUINEA: J. T. Baldwin Jr. 9772 (N).

MESANTHEMUM PUBESCENS (Lam.) Körn.

Synonymy: Eriocaulon pubescens Lam., Encycl. Méth. 3: 276. 1789. Eriocaulon pubesces Lam. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 272—273, sphalm. 1855. Mesanthemum pubescens Körn. ex Benth. & Hook. f., Gen. Pl. 3 (2): 1022. 1883. Eriocaulon madagascariense Pourr. ex Moldenke in Humbert, Fl. Madag. 36: 33, in syn. 1955 [not E. madagascariense Moldenke, 1951].

Bibliography: Lam., Encycl. Méth. 3: 276. 1789; Lam., Tabl. Encycl. Méth. 1: 213. 1791; Pers., Syn. Pl. 1: 111. 1805; Roem. &

Schult. in L., Syst. Veg., ed. 15 nov., 2: 866. 1817; Steud., Nom. Bot. Phan., ed. 1, 313. 1821; Spreng. in L., Syst. Veg., ed. 16, 3: 776. 1826; Bong., Ess. Monog. Erioc. 3, 4, & 16. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 569 & 614. 1841; D. Dietr., Syn. Pl. 5: 265. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 272—273 & 334. 1855; Körn., Linnaea 27: 575—576. 1856; C. Müll. in Walp., Ann. 5: 922. 1860; Körn. in Mart., Fl. Bras. 3 (1): 471 & 472. 1863; J. G. Baker, Journ. Linn. Soc. Lond. Bot. 20: 279. 1883; Benth. & Hook. f., Gen. Pl. 3 (2): 1022. 1883; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879 (1893) and 2: 214. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 118, 120, & 288. 1903; H. Lecomte, Bull. Soc. Bot. France 55: 573. 1908; Moldenke, Known Geogr. Distrib. Erioc. 22 & 44. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 879 (1946) and 2: 214. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 123 & 207. 1949; Moldenke in Humbert, Fl. Madag. 36: 31 & 33, fig. 4 (5--7). 1955; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 183. 1955; Moldenke, Résumé 156, 290, & 485. 1959; Moldenke, Résumé Suppl. 1: 10, 18, 19, & 25. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 879 (1960) and 2: 214. 1960; Moldenke, Phytologia 20: 8. 1970.

Illustrations: Moldenke in Humbert, Fl. Madag. 36: 31, fig. 4 (5—7). 1955.

Leaves erect-cespitose, ensiform, 18-21 cm. long, 7—11 mm. wide, pubescent or villous on both surfaces, sericeous with silvery hairs at the base; peduncles elongate, about 33 cm. long, surpassing the leaves, 10-costate, not twisted, covered with rather long bulbous-based spreading hairs, finally calvescent; sheaths short, villous; heads semiglobose, 11 mm. wide, flat and white-villous above; involucral bractlets broadly ovate, rigid, yellowish-stramineous, acute or obtuse at the apex, glabrous, slightly shorter than the flowers, the exterior ones gradually smaller; receptacular bractlets filiform-linear, white, claviform-dilated at the apex and there pilose on both surfaces with short spreading hairs; staminate florets: sepals 3, separate, cuneate-obovate, yellowish, rather thickly membranous, navicular, very obtuse at the apex, ciliate toward the apex, hirsute on the back; petal-tube oblong-campanulate, solid toward the base, spongy-membranous and deeply hollowed-out above that, lightly 3-lobed, not involute, densely long-ciliate on the margins, linear-glanduliferous within; pistillate florets: sepals 3, separate, spatulate-oblong, fuscescent, navicular, very obtuse and long-pilose or bearded at the apex; petals 3, finally equaling the sepals, free at the base, connate above, spatulate, white, pilose, glanduliferous, subtruncate and densely long-ciliate at the apex.

The type of this endemic species was collected by Philibert Commerson at Fort Dauphin, Madagascar, and is deposited in the Lamarck-Roeper herbarium at the Muséum National d'Histoire Naturelle at Paris. Körnicke (1856) assures us that he examined the type specimen ["v. frustulum classic."]. Another Commerson specimen in the same herbarium, also unnumbered, is mounted on

the same sheet with an unnumbered Pourret collection of Xyris sp. This appears to be the type of Eriocaulon madagascariense Pourr. Jackson (1894) erroneously dates Körnicke's work as "1854".

Kunth (1841) describes this plant as "Scapo subvilloso; foliis ensiformibus, pubescentibus, maximis; capitulo plano, tomentoso. Lam. — Madagascaria. — Folia plana, utrinque pubescentia, 7—8-pollicaris, basi pilis sericeis argenteis cincta. Scapus striatus, foliis longior, basi vagina brevi villosa instructus. Capitulum orbiculare, 5—6 lineas latum. Bracteae involucrantes ovales, villosae, parum scariosae." Lamarck's original description was merely "E. scapo subvilloso, foliis ensiformibus pubescentibus maximis, capitulo plano tomentoso. Ex ins. Madagascariae. Fol. latitudine semi-pollicaria." There is no picture of it and Stapf (1930) cites no illustration from this work.

In Humbert's Flora of Madagascar (1955) the species is distinguished from the only other known species of the genus in Madagascar as follows:

Inner involucral bracts surpassing the disk; petals of the pistillate florets much longer than their sepals..... M. rutenbergianum.

Inner involucral bracts slightly shorter than the disk; petals of the pistillate florets about equaling their sepals..... M. pubescens.

Mesanthemum pubescens has been found growing in marshes and wet places in general, at altitudes of 1500 to 1600 meters, flowering and fruiting from January to September. The only common name recorded for it is "joncinelle pubescente".

Citations: MADAGASCAR: Baron 458 (P); Collector undetermined 3715 (V—8666); Commerson s.n. [Erioc. pubesc.] (N—photo of isotype, P—isotype, Z—photo of isotype), s.n. [Erioc. madag.] (P); Decary 17200 (N, P); Perrier de la Bâthie 2248 (P); Schlieben 8185 (Mu). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

MESANTHEMUM RADICANS (Benth.) Körn.

Synonymy: Eriocaulon radicans Benth. in Hook. f., Niger Fl. 547—548. 1849. Eriocaulon guineense Steud., Syn. Pl. Glum. 2: [Cyp.] 273 & 334. 1855 [not E. guineënse Moldenke 1968 & 1970]. Mesanthemum radicans Körn., Linnaea 27: 573. 1856; Benth. & Hook. f., Gen. Pl. 3 (2): 1021. 1883. Eriocaulon giganteum Afzel. ex Körn., Linnaea 27: 573, in syn. 1856 [not E. giganteum Beauverd, 1909, nor (Beauverd) Beauverd, 1949]. Eriocaulon radians Hook. f. apud Benth. & Hook. f., Gen. Pl. 3 (2): 1021—1022 [as "Eriocauli radiantis sphalm. Hook. f."]. 1883. Mesanthemum radicans (Bong.) Körn. apud Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 24, sphalm. 1888 [not M. radicans Stapf, 1959]. Eriocaulon radians Benth. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 879, in syn. 1893.

Bibliography: Benth. in Hook. f., Niger Fl. 547--548. 1849; Walp., Ann. 3: 663 (1852) and 3: 1014. 1853; Steud., Syn. Pl. Glum. 2: [Cyp.] 273, 278, & 334. 1855; Körn., Linnaea 27: 573--575. 1856; C. Müll. in Walp., Ann. 5: 922. 1860; Körn. in Mart., Fl. Bras. 3 (1): 283, 284, 294, 298, 471, & 472. 1863; Benth. & Hook. f., Gen. Pl. 3 (2): 1021--1022. 1883; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 24 & 27. 1888; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 & 879 (1893) and 2: 214. 1894; N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 52, 58, & 781. 1897; Ruhl. in Engl., Bot. Jahrb. 27: 79. 1899; Thiselt.-Dyer, Fl. Trop. Afr. 8: 260. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 118--120, 285, 287, & 288. 1903; Stapf in H. Johnston, Liberia 2, app. 4: 662. 1906; Pax in Engl., Bot. Jahrb. 39: 609. 1907; H. Lecomte, Bull. Soc. Bot. France 55: 598. 1908; Thonn., Blütenpfl. pl. 15. 1908; Stapf, Ind. Lond. 4: 280. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 50. 1930; Hutchinson & Dalz., Fl. W. Trop. Afr. 2: 328, fig. 292. 1936; Dinklage in Fedde, Repert. Sp. Nov. 41: 243. 1937; Moldenke, Known Geogr. Distrib. Erioc. 20--22, 35, 39, 44, 61, & 62. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 & 879 (1946) and 2: 214. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 109, 111--115, 119, & 207. 1949; Moldenke, Phytologia 3: 500. 1951; Meikle & Baldwin, Am. Journ. Bot. 39: 44--45. 1952; Duvigneaud, Lejeunia 16: 103. 1953; Zinderenbakker, S. Afr. Pollen 1: 36. 1953; E. Müll., Phytopath. Zeitschr. 23: 109. 1955; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 139 & 179--182. 1955; Moldenke, Résumé 133, 135--138, 140, 142, 147, 288, 291, 320, & 485. 1959; Moldenke, Résumé Suppl. 1: 8--10, 19, & 25 (1959) and 2: 6. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 & 879 (1960) and 2: 214. 1960; Hegnauer, Chemotax. Pfl. 2: 153. 1963; [Wiltshire], Rev. Appl. Myc. Ind. Fungi 2: 355, 359, & Cum. Ind. 202. 1963; Thanikaimoni, Pollen & Spores 7: 182. 1965; Moldenke, Résumé Suppl. 17: 4 (1968) and 18: 13. 1969; Moldenke, Phytologia 18: 256, 258, & 303 (1969), 19: 458, 468, & 469 (1970), and 20: 267. 1970.

Illustrations: Thonn., Blütenpfl. pl. 15. 1908; Hutchinson & Dalz., Fl. W. Trop. Afr. 2: 328, fig. 292. 1936.

This species is actually based on Ansell s.n. from Grand Bassia, Curror s.n. from "south of the Line", and G. Don s.n. from Sierra Leone. Eriocaulon giganteum Afzel is based on Afzelius s.n. from Sierra Leone, deposited in the Berlin and Stockholm herbaria. The homonyms of this binomial, listed above, are in the synonymy of Eriocaulon beauverdi Moldenke; Eriocaulon guineënse Moldenke is a synonym of E. toumouense Moldenke, while Mesanthemum radicans Stapf belongs in the synonymy of Eriocaulon latifolium J. Sm.

Bentham & Hooker (1883), as noted above, list as a synonym an "Eriocauli radiantis, sphalm. Hook. f. Fl. Nigr. 547", but in the Hooker work the cited reference has the binomial of this taxon plainly written as "Eriocaulon radicans Benth." Jackson (1894)

erroneously dates Körnicke's work as "1854".

Recent collectors have found this plant growing in open marshy areas on savannas "and elsewhere" with Xyris decipiens as an associate, at altitudes of 600 to 1500 meters, flowering and fruiting from January to June, August, October, and November. Robinson describes the plant as an "erect annual", stems and leaf-bases more or less succulent". Müller (1955) records the fungus, Sorosporium mesanthemi E. Müll. from the inflorescence of this species in Angola.

Hess (1955) tells us that "Mesanthemum radicans ist wohl von Brown (1901) am genauesten beschrieben worden. Durch die Untersuchung eines umfangreichen Materials aus Afrika wurde er veranlaszt, im Anhang zur Diagnose auf die Variabilität von Merkmalen hinzuweisen. So fand er, dasz die Länge der Sepalen der ♀ Blüten zwischen 1/3 und 3/4 der Länge der Petalen schwankt. Weiter beobachtete er, dasz der Rand der Spitze dieser Sepalen fein gezähnelt oder behaart sei. Immer fand er zwischen den Extremen Übergänge, die ihn veranlaszten, keine systematischen Trennungen vorzunehmen.

"Die Untersuchung des eigenen Materials, das von 3 Fundorten im unteren Belgischen Kongo und dem benachbarten Nordangola sowie von 9 Fundorten aus dem Süden von Angola stammt, hat die von Brown angegebene Variationsbreite der oben erwähnten Merkmale bestätigt. Dagegen fand ich einen konstanten Unterschied zwischen der Gruppe aus Südangola und den Vertretern aus dem Belgischen Kongo und dem angrenzenden Nordangola: Die Hüllbrakteen der Pflanzen aus dem Kongo (nebst den eigenen Sammlungen habe ich die Nummern 115, 3151, 5001, 5006 von V. Coosens, die im Botanischen Museum der Universität Zürich liegen, einbezogen) und aus Nordangola sind immer auf dem Rücken angedrückt behaart, während diese Brakteen an den Pflanzen aus dem Süden von Angola (es wirden die Nummern 302 und 645 von Baum, die ebenfalls im obgenannten Museum liegen, mituntersucht) auf dem Rücken ausnahmslos vollständig kahl sind. Andere konstante Unterschiede sind nicht gefunden worden. Zuerst schien es, als ob sie Sepalen der ♀ Blüten an der Gruppe mit behaarten Brakteen stets kürzer seien (nur 1/3 bis 1/2 so lang wie die Petalen), doch hat sich gezeigt, dass on Pflanzen mit kahlem Brakteen gelegentlich ebenso kurze Sepalen vorkommen. Es liegen aber sicher zwei getrennte Rassen vor, doch möchte ich mit einer Beschreibung zuwarten bis ich experimentell zu klareren Ergebnissen bin. Es ist noch zu erwähnen, dasz aus dem Süden von Angola 45 Pflanzen und aus dem Kongo und Nordangola 31 Pflanzen miteinander verglichen werden konnten.

"Zur Diagnose von Brown ist nachzutragen, dasz die Pflanzen immer ein deutliches, senkrechtes bis horizontales Rhizom entwickeln, das mit Faserwurzeln und abgestorbenen Blattresten bedeckt ist." He cites the following collections: ANGOLA: Bié: H. Hess 52/514, 52/614, 52/638, 52/669, 52/670, 52/671, 52/2059, 52/2088. Congo: H. Hess 52/1288, 52/1289. Huila: H. Hess 52/746. DEMOCRATIC REPUBLIC OF CONGO: H. Hess 50/297.

Hess also tells us that "Mesanthemum radicans wächst an Quellhorizonten, an Bächen und Flüssen (gelehentlich sogar mit submersen Blättern) auf sandigem, sandig-moorigem, durchnästem oder wenig Zentimeter tief überschwemmtem Boden. Also häufiger Begleiter ist Eriocaulon pictum Fritsch zu nennen. Am Rio Cuevi kommt noch E. lanatum H. Hess hinzu."

After discussing the many variations shown in his collections, this splendid worker continues "Diese Angaben zeigen, dasz bei der Untersuchung von Mesanthemum radicans nur auf die Blüten abgestellt werden kann, die in der Länge und Behaarung der Sepalen (es betrifft dies nur die ♀ Blüten) ebenfalls eine beträchtliche Variationsbreite besitzen.....Mesanthemum radicans ist in West-Afrika vom Süden von Angola bis hinauf nach Französisch West-Afrika verbreitet.....Mesanthemum radicans ist sehr nahe verwandt mit dem madagassischen M. Rutenbergianum Körn. Zu Vergleichszwecken lag mit Material von Hildebrandt, Nr. 3714, gesammelt im November 1880 bei Andrangoloaka, Ost-Imerina, Madagaskar, vor. Das Muster liegt im Botanischen Museum der Universität Zürich. Als einzige Unterschiede fand ich bei M. Rutenbergianum braune Sepalen (nicht schwarze, wie in der Literatur angegeben). Bei M. radicans sind die Sepalen durchwegs hellgelb oder weisz. Weiter sind die Brakteen der Blüten an der Spitze mehr verbreitert und tragen dichteren und auch etwas längeren Haarschopf als M. radicans. Die Länge der Blütenstiele stimmt mit M. radicans überein. Jacques-Félix (1947) hat bereits auf den Fehler in der Abbildung bei Ruhland (1903) hingewiesen und die Blütenstiele in seiner Arbeit richtig gezeichnet.

"Nach meiner Ansicht handelt es sich bei Mesanthemum radicans und M. Rutenbergianum aber doch um zwei getrennte Arten. Um M. Rutenbergianum sind noch verschiedene Arten gruppiert, deren systematischer Wert sehr zweifelhaft ist. Es sind dies M. Roseni Pax, M. Erici-Roseni T. Fries und M. pubescens Körn. Sie sind auf kleine Abweichungen gegründet, die allgemein eine grosze Variationsbreite haben, wie die Länge der Blütenstiele, Länge und Behaarung der Sepalen and Grösze, Form und Behaarung der Blätter. Eine Revision dieser Gruppe ist notwendig; doch ist sie nur sinnvoll, wenn von den verschiedenen postulierten Arten ein umfangreiches Material vorhanden ist."

Zinderenbakker (1953) cites P. J. Greenway 5393 from Tanganyika. Meikle & Baldwin (1952) cite from Liberia Ansell s.n., J. T. Baldwin Jr. 10052, 11160, & 12056, Linder 44 & 350, and W. Whyte s.n. Of these, the Ansell collection is a cotype of M. radicans, but I regard J. T. Baldwin Jr. 10052 as M. erici-rosenii T. Fries. They note that M. radicans is "A common species in many parts of West Tropical Africa". They differentiate the two species of the genus known to them from Liberia as follows:

Inner involucral bracts obtuse, 5—8 mm. long; receptacle black-pilose.....M. radicans.

Inner involucral bracts acuminate, 10--18 mm. long; receptacle white-pilose.....M. prescottianum.

Material of M. radicans has been misidentified and distributed in herbaria as M. erici-rosenii T. Fries and as Xyris sp. On the other hand, the J. T. Baldwin Jr. 10052 and Overlaet 807, distributed as M. radicans, are actually M. erici-rosenii T. Fries, while Hildebrandt 3714 is M. rutenbergianum Körn. and Stuhlmann 9143 is the type collection of Eriocaulon mesanthemoides Ruhl.

Citations: MALI: Senegambia: Perrottet s.n. (B). SÉNÉGAL: Perrottet 808 (S). SIERRA LEONE: Afzelius 10.1 (S), 10.2 (S), 10.3 (S), s.n. (B). LIBERIA: J. T. Baldwin Jr. 12056 (N); Mrs. O. F. Cook 130 (W--270508); DeWilde & Voorhoeve s.n. [DeWilde 3787] (S); Dinklage 1627 (B); E. H. L. Krause 3491 (B); Straub 3 (W--945920), 856 (W--1991584). NIGERIA: Southern: Barter 2201 (N). CONGO BRAZZAVILLE: Håkanson s.n. [29/9/1931] (S). PORTUGUESE CONGO: Gossweiler 9153 (N, N--photo). DEMOCRATIC REPUBLIC OF CONGO: Goossens 3151 (S), 5006 (S); Soyaux 104 (Mu--372); Vanderyst 1914 (S), 15979 (Ca--28022), 31004 (B), 31981 (S), 33338 (S), 33352 (N), 33568 (S), 33801 (S). TANZANIA: Tanganyika: Stuhlmann 1064 (B). ZAMBIA: E. A. Robinson 3647 (Mu).

MESANTHEMUM REDUCTUM H. Hess

Bibliography: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 178--180 & 183--185, fig. 1--3. 1955; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1955: 30. 1956; Moldenke, Résumé 147 & 485. 1959; G. Taylor, Ind. Kew. Suppl. 12: 90. 1959; Moldenke, Phytologia 20: 267 & 268. 1970.

Illustrations: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 179, fig. 1--3. 1955.

The type of this species is H. Hess 52/2106, collected in the Rio Quiriri 20 km. eastward from Longa, at an altitude of 1290 meters, Bié, Angola, on June 29, 1952. Thus far this is the only known collection of the species, of which Hess (1955) says: "Mesanthemum reductum besiedelt in Herden den Grund und die Unterwasserböschungen des Flusses. Das Wasser fliesst rasch; der Boden besteht aus weiszem Quarzsand. Die Pflanzen wurden in der Mitte der Trockenzeit aus 1--2 m. Wassertiefe geholt; sie entwickeln sich also bis zur Fruchtreife submers und ragen nie über Wasser. Als. Begleiter wurden Limnanthemum-Arten und Nymphaea sulphurea Gilg notiert. Andere Standorte sind nicht bekannt....Nur von der oben angegebenen Fundstelle bekannt. Dürfte im Rio Quiriri häufig sein.....Systematisch und ökologisch ist Mesanthemum reductum isoliert. Die Reductionserscheinungen in der Blüte sind bei keiner anderen Mesanthemum-Art so weit fortgeschritten. M. albidum H. Lec. besitzt in den ♂ Blüten noch Sepalen; sie war bisher die einzige Art mit Rückbildungen in den Bluten. Die beiden Arten stehen sich aber morphologisch nicht nahe. Weiter ist noch

keine andere Art dieser Gattung bekannt, die sich submers entwickelt."

MESANTHEMUM ROSENI Pax

Bibliography: Pax in Engl., Bot. Jahrb. 39: 609. 1907; Prain, Ind. Kew. Suppl. 4, pr. 1, 153. 1913; H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 183. 1955; Prain, Ind. Kew. Suppl. 4, pr. 2, 153. 1958; Moldenke, Résumé 135 & 485. 1959.

The type and only known collection of this species was gathered by Felix Rosen — in whose honor it is named — in a turf-bog at Aki, at an altitude of 2625 meters, in Mescha, West Schoa, Ethiopia. Concerning it Pax (1907) says: "Verwandt mit M. Rutenbergianum Koern.....von Madagaskar, weniger mit M. radicans Koern. Letztere besitzt lang gestielt ♂ Blüten. Von der malagassischen Spezies unterscheidet sich M. Roseni durch die relativ kurzen Schäfte, die Gestalt der Hochblätter im Köpfchen und die eingeschlechtlichen Inflorescenzen. Die lebende Pflanze beschreibt Rosen: 'Schwammig, sukkulent, lebhaft grün. Blätter in der Tracht an Stratiotes erinnernd. Köpfchen rein weisz."

Citations: MOUNTED DESCRIPTIONS: Pax in Engl., Bot. Jahrb. 39: 609 (B).

MESANTHEMUM RUBRUM Moldenke

Bibliography: Moldenke, Résumé Suppl. 4: 6. 1962; Moldenke, Phytologia 8: 390—391. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Anon., Assoc. Etud. Tax. Fl. Afr. Trop. Index 1962: 29. 1963; Moldenke, Biol. Abstr. 42: 1517. 1963; G. Taylor, Ind. Kew. Suppl. 14: 86. 1970.

Citations: REPUBLIC OF GUINEA: Chillou 1835 (Z--type).

MESANTHEMUM RUTENBERGIANUM Körn.

Synonymy: Mesanthemum platyphyllum J. G. Baker, Journ. Linn. Soc. Lond. Bot. 20: 278. 1883. Mesanthemum ruthenbergianum Körn. ex H. Lecomte, Bull. Soc. Bot. France 55: 573. 1908.

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Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 119, fig. 16. 1903; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 47, fig. 18. 1930; Moldenke in Humbert, Fl. Madag. 36: 31, fig. 4 (1—4). 1955.

Leaves cespitose, linear-lanceolate, 18—26 cm. long, about 3.5 cm. wide at the base, 2--3 cm. wide at the midpoint, gradually narrowed upwards from the very broad base, obtuse and barbulate at the apex, soon becoming glabrous, rather rigid, many-striate, not pellucid; peduncles subterete or many-striate, stout, 30—48 cm. long, about 1.3 mm. thick, slightly twisted, yellow-green, glabrous except for the puberulous apex; sheaths close, 11—20 cm. long, glabrous except for the ciliolate mouth, shortly and obliquely split, the mouth widened, the blade rather rigid, lanceolate-ovate, rather elongated, entire, acuminate at the apex; heads hemispheric, 1.3--1.7 cm. wide, white-villous, flat above; involucral bractlets broadly ovate, rigid, obtuse at the apex, yellow-green, the outer ones glabrate, the inner ones densely white-puberulent especially at the apex and along the margins on the inner surface; receptacle black-pilose; receptacular bractlets filiform, brownish-white, dilated and densely pilose at the apex; staminate florets: sepals 3, scarcely connate at the base, cuneate-obovate, dark-olivaceous, very obtuse at the apex, pilose at the top of the back and along the upper margins; petal-tube glabrous except for the ciliate margin; pistillate florets: sepals 3, separate, spatulate-obovate, dark-olivaceous, concave, more than twice as long as the ovary, obtuse at the apex, glabrous except for the ciliate apex; petals 3, longer than the sepals, connate toward the apex, separate below, narrowly spatulate-oblong, very obtuse at the apex, pilose at the apex, linear-glanduliferous above the middle, whitish, darker at the base.

The type of this endemic Madagascar species was collected by Rutenberg near Lake Alaotra, Madagascar, in December of 1877. The type of M. platyphyllum is Baron 1863 from Vakinankaratra, Madagascar. According to Terrac (1947) this species is employed medicinally by the natives, who take the leaves cooked with rice during their pregnancy in order to avoid any accidents during the period of confinement. This decoction is also employed by them as a sedative, as an astringent in cases of diarrhea, and as an aromatic. According to Humbert's Flora (1955) the plant grows in "Marais, tourbières, clairières humides en forêt, bords de ruisseaux", from 1000 to 1600 meters altitude, flowering from August to March "et peut-être toute l'année". The Baker reference (1883) is sometimes erroneously cited as "1893".

The Madagascar species of this genus may be distinguished as follows:

Inner involucral bractlets surpassing the disk; petals of the pistillate florets much longer than the sepals..... M. rutenbergianum.

Inner involucral bractlets slightly shorter than the disk; petals of the pistillate florets about equaling the sepals..... M. pubescens.

Material of M. rutenbergianum has been misidentified and dis-

tributed in herbaria as M. radicans (Benth.) Körn.

Additional citations: MADAGASCAR: Alleizette s.n. (P); Baron 1863 (N--photo, P, P, Z—photo), s.n. (P); Decary 5015 (P), 13540 (P), 15106 (N, P, P); Hildebrandt 3714 (B, Mu—384, P); Lekyre de Vilers s.n. [1889] (P); Perrier de la Bâthie 13545 (P), 13985 (P), 16949 (P); Viguier & Humbert 1691 (P), 1802 (P).

PAEPALANTHUS Mart.

Synonymy: Dupatya Vell., Fl. Flum. 35, nom. rejic. 1825. Papulanthus Mart. ex Steud., Nom. Bot., ed. 2, 1: 586, in syn. 1840. Cladocaulon G. Gardn. in Hook., Icon. Pl. 6: pl. 528. 1843. Limnoxeranthemum Salzm. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 281, in syn. 1855. Lasiolepis Böck. [in part], Flora 56: 90. 1873 [not Lasiolepis Benn., 1838]. Paepalantuhs Huber, Bol. Mus. Para. 2: 499, sphalm. 1898. Dupata Gleason, Bull. Torr. Bot. Club. 52: 195, sphalm. 1925. Paepalantus Alv. Silv., Fl. Mont. 1: 60 & pl. 15, sphalm. 1928. Paepalnnthus Alv. Silv., Fl. Mont. 1: 77, sphalm. 1928. Baepalanthus Alv. Silv., Fl. Mont. 1: 53, sphalm. 1928. Eriocaulon Auct. [in part] apud Stapf, Ind. Lond. 3: 90, in syn. 1930 [not Eriocaulon Gron., 1753, nor Juss., 1810, nor L., 1753]. Poepalanthus Cuatrecasas, Revist. Acad. Colomb. Cienc. 10: 255, sphalm. 1958. Paepalanthus Kunth apud Rickett & Stafleu, Taxon 8: 232. 1959. Limnoxeranthemum "Salzm. ex Steud." apud Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 656. 1966. Paepalunthus Ruhl. ex Acosta Solis, Divis. Fitogeogr. Ecuad. 89, sphalm. 1968. Paeplanthus Kunth ex Moldenke, Résumé Suppl. 16: 25, in syn. 1968. Paepallanthus Onishi ex Moldenke, Résumé Suppl. 18: 13, in syn. 1969.

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Nov. Gen. & Sp. Pl., ed. quarto, 1: [251]—252 & 254, pl. 69 & 70 (1816) and ed. folio, 1: [200]—203, pl. 69 & 70. 1816; Thunb., Pl. Bras. Dec. 1: 7, pl. 1, fig. 2. 1817; Roem. & Schult. in L., Syst. Veg., ed. 15 nov., 2: 861—863, 866, & 867. 1817; Svensk. Vet. Akad. Handl., ser. 2, 1820: pl. 3 & 4. 1820; Steud., Nom. Bot. Phan., ed. 1, 312—313. 1821; Poir. in Cuvier, Dict. Sci. Nat. 24: 240—241. 1822; P. F. J. Turpin in Cuvier, Dict. Sci. Nat. [63]: Planch. Bot. Monocot. 2, [pl. 41]. 1822; Roem. & Schult., Mant. 2: 468—470. 1824; Vell., Fl. Flum. 35—36. 1825; W. Hamilt., Prod. Pl. Ind. Occ. 16. 1825; Spreng. in L., Syst. Veg., ed. 16, 3: 774—776. 1826; Vell., Fl. Flum. Icon. 1: 85 & 87. 1827; Roem. & Schult., Mant. 3: 671. 1827; Bong., Ess. Monog. Erioc. 3, 5, 6, 8, 10, 13, 16, 17, 21—27, 29—32, 34, 36—43, 45—49, & 51—53, pl. 1—12 & 16—18. 1831; Bong. Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 620—626, 629—632, 636, 637, 641, & 646, pl. 1—5, 7, 9, 10, 16, 39, 41, 48—52, 54, 57, 59, 60, 62—64, & 67 (1831) and 2 (3): 219 & 229, pl. 11, 12, & 16—18. 1832; Bong., Ess. Monog. Erioc. [56]—61, 66—71, [219]—224, & 229—234, pl. 11, 12, & 16—18. 1832; A. St. Hil., Voy. Distr. Diam. 2: 443—444. 1833; Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 10 & 13, pl. 1 & 2. 1835; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 3 (2): pl. 20—25. 1835; Guill. in Deless., Icon. Sel. 3: 57—61 & 67, pl. 95—98. 1837; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 5 (2): pl. 30—34. 1839; Steud., Nom. Bot., ed. 2, 1: 585 & 586 (1840) and 2: 247. 1841; Kunth, Enum. Pl. 3: 497—522, 524, 525, 528—530, 537, 544, 548, 558, 569, 572—580, 612—614, 624, & 625. 1841; Mart., Flora 24, Beibl. 2: 35, 36, & 60. 1841; G. Gardn. in Hook., Icon. Pl. 6 [ser. 2, 2]: pl. 523—528. 1843; Mart. in Hook., Icon. Pl. 6 [ser. 2, 2]: pl. 510 & 512. 1843; Schnitzl., Iconogr. 1: pl. 46. 1845; Benth., Pl. Hartw. 260. 1846; Lindl., Veg. Kingd., ed. 1, 122 (1846) and ed. 2, 122. 1847; Klotzsch in M. R. Schomb., Reisen Brit.-Guian. [Vers. Faun. & Fl. Brit.-Guian.] 3: 896, 1063, 1064, 1115, & 1116. 1848; Walp., Ann. 1: 889—891. 1849; Hook. f., Niger Fl. 548. 1849; Miq., Stirp. Surinam. pl. 65. 1850; Miq., Nat. Verh. Holl. Maatsch. Wet. Haarlem, ser. 2, 7: pl. 65. 1851; D. Dietr., Syn. Pl. 5: 259—263 & 266—268. 1852; Walp., Ann. 3: 662 (1852) and 3: 1093. 1853; Steud., Syn. Pl. Glum. 2: [Cyp.] 270—283, 333, 334, & 342. 1855; Körn., Linnaea 27: [561], 565, & 571—573. 1856; A. Gray, Man. Bot. North. U. S., ed. 2, pr. 1, 489 & 720 (1856), pr. 2, 489 & [622] (1858), and pr. 3, 489 & [720]. 1859; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 1, 502, 503, & 605. 1860; C. Müll. in Walp., Ann. 5: 921, 926, 940, & 960 (1860) and 6: 1245. 1861; A. Wood, Class-book, [ed. 42], pr. 1, 729—730 & 828. 1861; A. Gray, Man. Bot. North. U. S., ed. 3, 489 & [622] (1862) and ed. 4, pr. 1, 489 & [718]. 1863; A. Wood, Class-book, [ed. 42], pr. 2, 729—730 & 828. 1863; Körn. in Mart., Fl. Bras. 3 (1): 276—285, 288, 290—302, 305—471, & 559—562, pl. 39—60. 1863; A. Gray, Man. Bot. North. U. S., ed. 4, pr. 2, 489 & [622]. 1864; A. Wood, Class-book, [ed. 42], pr. 3, 729—730 & 828. 1865; A. W. Chapm., Fl. South. U. S., ed. 1, pr. 2, 502, 503, &

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It should be noted that almost all authors have credited the

generic name, Paepalanthus, to Martius (1835), including Kunth (1841), Lindley (1846), Bentham & Hooker (1883), and Jackson (1894), but Rickett & Stafleu (1959) maintain that it must now be credited to Kunth! In this they are followed by Airy Shaw (1966). Kunth (1841), however, definitely and plainly accredits the name to Martius! The argument advanced by Rickett & Stafleu is that "Paepalanthus 'Martius' was conserved for P. lamarckii Kunth (1841). This species, however, is not included in Paepalanthus Martius (1835). The authority for the conserved name should be changed to accord with the type. It is not clear whether Paepalanthus Martius (1835) is accepted as a genus by the author or not. However, the conservation implies that the name has to be definitely accepted as validly published." In my opinion, this illustrates again the unfortunate difficulties which may arise when the principle of conservation of later names is accepted. If Dupatya, the earliest generic name applied to the group, were adopted, as principles of fairness unequivocally dictate, such legal maneuvering with its resulting confusion would not arise.

The genus Stephanophyllum Guill. is included in the synonymy of Paepalanthus by Jackson (1894) and, amazingly, by Airy Shaw (1966), but all of the species supposedly proposed in this genus are true members of the genus Leiothrix Ruhl., so the name can only go into the synonymy of the latter genus. The genus Lasiolepis Böck. is in part Paepalanthus and in part Eriocaulon; in fact, two of the three species proposed in this genus are members of the genus Eriocaulon and only one is a Paepalanthus. The homonymous genus Lasiolepis of Bennett is a synonym of Harrisonia R. Br. in the Rutaceae.

It should be mentioned here that the Lecomte (1908) reference in the bibliography above is cited as "1909" by Meikle & Baldwin (1952), the Müller (1860) reference is sometimes erroneously cited as "1858", and the Steyermark (1968) reference is sometimes cited in error as "1969". The Böckeler (1873) reference is sometimes cited as page "9" instead of "90"; the Silveira (1918) is sometimes cited to Löfgren, but the latter was only the editor, not the author; and the Niederlein (1890) reference is sometimes written "Bol. Mus. Prod. Argent. 31: 68. 1890" in some bibliographies. Böckeler's work (1873) is erroneously cited as volume "41" in Phytologia 1: 331 (1939) instead of volume "56". Ruhland (1903) mistakenly dates the Mantissa of Roemer & Schultes (1824) as "1817".

It should also be noted here that Sections III and IV of Eriocaulon, as considered by Steudel (1855), really belong in the genus Paepalanthus. It is most unfortunate that the present edition of the International Rules of Botanic Nomenclature forces us to use the generic name Paepalanthus instead of the name Dupatya, which was validly published ten years earlier (in actuality) or 16 years earlier if Kunth is to be given credit for it instead of Martius! The accepted name is taken from the Greek,

πασι παλη and ανθος, meaning "mealy flower", since many species have white-villous flower-heads. It is a complex genus of (as presently recognized) 572 species, subspecies, varieties, and named forms, widespread in tropical America, with its probable center of distribution in Minas Gerais, Brazil; one species also in Africa and Madagascar.

The type species of the genus originally was Eriocaulon corymbosum Bong. [=Paepalanthus corymbosus (Bong.) Kunth]. Under the present edition of the International Rules, however, the type has arbitrarily been changed to Paepalanthus lamarckii Kunth, based on Eriocaulon fasciculatum Lam. (1789), not E. fasciculatum Rottb., 1778.

The genus as a whole may be described in abbreviated fashion as follows: Annual or perennial herbs or subshrubs, the stems and branches very variable, from obsolete to woody and up to 2 m. long; leaves usually narrow, often grass-like, thin-membranous to thick-coriaceous, usually not fenestrate, entire, usually flat, sessile, more or less venose with few to many parallel veins, often rosulate at the base of the plant, often imbricate on stems and branches, sometimes deciduous, exstipulate; inflorescence capitate, axillary or terminal, often scapose; heads solitary or umbellate, sessile or subsessile to (usually) long-pedunculate, mostly white, sometimes gray, yellow, brown, or black, mostly villous, mostly less than 2 cm. wide; peduncles very slender or filiform, mostly stramineous, sheathed at the base, often greatly elongate, mostly several-costate and -sulcate, often more or less twisted, glabrous and shiny to variously pubescent; involucre usually conspicuous, its bractlets in few to many imbricate series, variously colored, smooth and shiny to ciliolate or variously pubescent; receptacle usually pilose; receptacular bractlets present; florets mostly polygamous, 2- or 3-merous; perianth (perigonium) double and involute; staminate florets with the sepals more or less connate toward the base, the petals connate into a membranous, hollow, glabrous (or rarely pilose within), slightly 2- or 3-lobed, non-glanduliferous, infundibular tube, which is finally almost always involute at the apex; stamens the same number as the petals (2 or 3) and opposite them, exserted during anthesis; anthers 4-celled, each composed of two thecae; and in the center a doubly or triply papillose rudimentary pistil; pistillate florets with the sepals usually connate at the very base and becoming rigid in age; petals free and non-glanduliferous; ovary 2- or 3-celled, the style-appendages mostly 2 or 3, papillose at the apex, inserted at about the same height as the stigmas and placed between them, the stigmas simple or more often bifid; the hairs of the receptacular bractlets and perigonium usually granulose within, almost always clavate-obtuse at the apex, often tuberculate.

The original description given by Kunth (1841) should be repeated here for comparison with that just given above since this is the description on which the "conserved" name is now based: "Eriocauli species auct. Flores capitati, androgyni, rarius di-

oeci, singuli bractea stipati, nunc centrales masculi, marginales feminei, nunc masculi femineis intermixtis (fide descr. Bong.); illi longiuscule pedicellati; calyx duplex, uterque subregularis; exterior trisepalus; sepala distincta, lateralia carinata, posticum (a bractea aversum) planiusculum; interior infundibularis, limbo 3 lobus, lobis plerumque involutis, interdum in sepala 3 magis minusve distincta dissolutus; tubus farctus. Stamina 3, calycis interioris limbo inserta, hujus lobis opposita, exserta. Antherae biloculares, introrsae. Pistilla 3 rudimentaria in centro summi tubi calycis interioribus. Flores deminei sessiles vel pedicellati; calyx duplex, uterque trisepalus, subregularis, persistens. Stamina effeta nulla. Ovarium sessile, tricoccum, pistillis 3 effetis distinctis, ex ejus centro prodeuntibus superatum; coccis uniovulatis. Stylus brevis vel bifida, pistilla effeta cingentia et cum his alternantia. Capsula tricocca, loculicide dehiscens. Semina plerumque costulata. Herbae hygrophilae, acaules vel caulescentes, interdum suffrutescentes. Folia angusta, integerrima, plana, nervosa. Capitula pedunculata, bracteis vacuis involucrata; pedunculi basi vaginati, solitarii vel umbellati, in acaulibus scapiformes, simplices et monocephali, rarius apice corymboso-pleiocephali. Vaginae integrae. Receptaculum pilosum (semper?). Flores interdum diandri, digyni, tunc calyx uterque disepalus." His genus Paepalanthus, of course, included species which we now call by that name as well as species of Leiothrix and Syngonanthus. He comments that Paepalanthus in his sense differs from Lachnocaulon only in that the latter genus has "antheris unilocularibus calyceque interiore femineo ad pilos creberrimos, ovarium cingentes redacto, masculo nullo".

Gleason, in his unpublished flora of Guyana, describes Paepalanthus as "Flowers 3-merous (in Guiana species); sepals distinct; petals of the staminate flowers more or less connate, of the pistillate flowers free; stamens 3; style mostly short, bearing 3 appendages inserted at the same level as the 3 erect, usually bifid stigmas. Stems abbreviated with rosulate or cespitose leaves, or elongate with scattered leaves; peduncles sheathed at base; heads small, densely hairy, globose or depressed to short-cylindric. (More than 200 species, chiefly in northern South America and Brazil)." He distinguished the Guyana species known to him as follows:

1. Leaves all rosulate, whorled, or densely cespitose.
   2. Leaves thin and flexuous, 6--12 cm. long.
      3. Leaves 0.5 mm. wide; petals of the pistillate flower spatulate, glabrous.....P. capillaceus.
      3a. Leaves 1--2 mm. wide; petals of the pistillate flower subulate, densely hirsute.....P. jenmani.
   2a. Leaves thick and rigid, 2--4 cm. long.
      4. Leaves about 1 mm. wide; bracts black, spreading or reflexed, exceeding the heads.....P. roraimae.
      4a. Leaves 2--3 mm. wide; bracts closely appressed, shorter than the heads.....P. fraternus.

2b. Leaves filiform, soft, 1--2 cm. long; heads 2--3 mm. in diameter.....P. subtilis.

1a. Leaves scattered along the stem, frequently more crowded distally.

5. Stem freely and subdichotomously branched; leaves less than 10 mm. long.

6. Heads nearly or quite sessile, nearly concealed among the erect imbricate leaves.....P. guianensis.

6a. Heads on peduncles 1--3 cm. long; leaves spreading..... P. dichotomus.

5a. Stem simple or nearly so.

7. Leaves ensiform-linear, 5--10 mm. wide, shining..... P. subcaulescens.

7a. Leaves narrowly linear, rarely more than 2 mm. wide.

8. Lowest flowers reflexed over the bracts and concealing them.

9. Heads subglobose and depressed, blackish; peduncles glabrous or nearly so.....P. lamarckii.

9a. Heads globose, becoming short-cylindric, pale-brown; peduncles thinly villous with long hairs..... P. fasciculatus.

8a. Lowest flowers not reflexed, the bracts conspicuous.

10. Principal bracts obovate, acute or obtuse..... P. subtilis.

10a. Principal bracts linear-lanceolate, acuminate..... P. bifidus.

It should be borne in mind that the P. jenmani of this key is now known as Carptotepala jenmani (Gleason) Moldenke and P. roraimae is now known as Rondonanthus roraimae (Oliv.) Herzog. Also, in the years since Gleason prepared this key, many additional taxa have been found in Guyana, including P. brunneus Moldenke, P. capillaceus var. proliferus Gleason, P. capillaceus var. spiralis Moldenke, P. filipes Moldenke, P. gleasonii Moldenke, P. griseus Moldenke, P. leucocyaneus Tutin, P. lilliputianus Moldenke, P. pauper Moldenke, P. perploxans Moldenke, P. plantaginioides (Hamilt.) Körn., P. roraimensis Moldenke, P. schomburgkii Klotzsch, and P. tatei Moldenke.

Vernacular names applied to members of the genus Paepalanthus as a whole in Brazil, where the group is most abundant, are "capipoatinga", "pepalanto", and "sempreviva da terra". The E. W. Nelson 3235, distributed to herbaria as Paepalanthus sp., is actually Eriocaulon ehrenbergianum Klotzsch.

PAEPALANTHUS ACANTHOLIMON Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 163--164, & 289. 1903; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 292. 1908; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 400. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41. 1930; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44.

1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Résumé 94 & 485. 1959.

This species is based on W. Schwacke 6711, collected in the Serra de Caparaó, Minas Gerais, Brazil, in the flowering condition in February, 1890, and is deposited in the herbarium of the Botanisches Museum at Berlin. Silveira (1928) cites A. Silveira 598 from Caraça, in the same state, collected in 1911. Mrs. Chase describes the species as forming mats in the open campo on a stony slope above timberline, at an altitude of 2000--2100 meters.

Citations: BRAZIL: Minas Gerais: M. A. Chase 9726 (W--1282206); Schwacke 6711 (B--type, Z--isotype).

PAEPALANTHUS ACANTHOPHYLLUS Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 6, 9, 184, 186, 189, & 289, fig. 1 G & 24. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Lützelb., Estud. Bot. Nordéste 3: 148. 1923; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 42 & 52. 1930; Stapf, Ind. Lond. 4: 518. 1930; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Phytologia 3: 501. 1951; E. Y. Dawson, Los Angeles Co. Mus. Contrib. Sci. 7: 5. 1957; Moldenke, Résumé 94 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Résumé Suppl. 8: 2. 1964.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 6 & 186, fig. 1 G & 24. 1903.

This species was based by Ruhland (1903) on Glaziou 22323, collected in sand between Rio Socho and Sobradinho, Goiás, Brazil, deposited in the herbarium of the Botanisches Museum at Berlin. He says of it "Species caule longo, rigido, simplici, dense foliis brevibus, pungentibus, rigidissimis, patentibus, aequalibus obtecto valde insignis et facillime dignoscenda". In spite of this statement, it seems to me that the Glaziou 19977, cited by Ruhland in another portion of his same monograph as a cotype of P. speciosus var. glaber Ruhl., is actually P. acanthophyllus, as are also at least the Brussels and New York specimens of Glaziou 22322. In the latter instance the confusion may be due to carelessness in copying labels, since the very next number, Glaziou 22323, is the type collection of P. acanthophyllus. Macbride photographed an isotype in the Copenhagen herbarium as his type photograph number 22276.

Lützelburg (1923) records the species from the Serra de Ituhita in central Bahia where, he says, it is typical of the cerrasco and constitutes ten percent of the total vegetation. Dawson found it growing in the wet sandy margins of sandstone outcrops, while Irwin and his associates describe it as 1 meter tall, with very light-gray flowering heads, growing in wet sand in the campos adjacent to cerrado with outcrops, at 1000 meters altitude. It has been collected in anthesis from March to May. Material has been distributed in herbaria misidentified as P. speciosus var. glaber Ruhl. and P. speciosus var. glabra Ruhl.

Additional citations: BRAZIL: Brasilia Federal District: Murça Pires, Silva, & Souza 9402 (B). Goiás: E. Y. Dawson 14615 (Z); Glaziou 22319 (B), 22322, in part (Br, N), 22323 [Macbride photos 22276] (B--type, N--photo of isotype, W--photo of isotype, Z--isotype); Irwin, Reis dos Santos, Souza, & Fonseca 24649 (Ac). Minas Gerais: Glaziou 19977 (B, Br, C); Heringer & Castellanos 6084 (B), 6141 (B); Mello Barreto 1047 [Brade 14478; Herb. Jard. Bot. Rio Jan. 28455] (B), 2487 [Herb. Jard. Bot. Belo Horiz. 8237] (N); L. B. Smith 7075 (N, W--2120226).

PAEPALANTHUS ACCRESCENS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 96--98 & 400, pl. 62 & 63 [a]. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 182. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Résumé 94 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 63 [a]. 1928.

This species is based on A. Silveira 560 from "Sub rupibus quartzitosis, locis siccis, prope Curraes, Serra do Cipó", Minas Gerais, Brazil, collected in flower in April, 1909, and deposited in the Silveira herbarium. The typical form of the species is known only from this original collection.

PAEPALANTHUS ACCRESCENS var. GLABRESCENS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 98 & 400. 1928; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Résumé 94 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 62. 1928.

Silveira (1928) says of this variety "Differt a forma typica caule perbreve seu parum elongato, foliis angustioribus rigidioribusque pilis minimis uniforme ciliatis, ceterum glabris". It is based on A. Silveira 561 collected "Inter saxa quartzitosa, campis arenosis, prope Bandeirinhas, Serra do Cipó", Minas Gerais, Brazil, flowering in April, 1909, and deposited in the Silveira herbarium. Although it is not so labeled, it is obvious that Silveira's plate 62 depicts the variety, rather than the typical form of the species. He comments that "Forma typica et varietas praecipue caule accrescente et indumento ac magnibus foliorum valde distinctas".

PAEPALANTHUS ACTINOCEPHALOIDES Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 135--136 & 400, pl. 84. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 182. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Résumé 94 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 84. 1928.

This species is based on A. Silveira 687, collected in fields near Diamantina, Minas Gerais, Brazil, flowering in April, 1918,

and deposited in the Silveira herbarium. Thus far the species is known only from the original collection.

PAEPALANTHUS ACULEATUS Alv. Silv.

Bibliography: Alv. Silv., Fl. Serr. Min. 65, pl. 24. 1908; Alv. Silv., Fl. Mont. 1: 270--271, pl. 179. 1928; Stapf, Ind. Lond. 4: 518. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Worsdell, Ind. Lond. Suppl. 2: 182. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Résumé 94 & 485. 1959.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 24. 1908; Alv. Silv., Fl. Mont. 1: pl. 179. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 360) in dry sandy fields near Vaccaria, in the Serra do Cipó, Minas Gerais, Brazil, in April, 1905, and is deposited in the Silveira herbarium. In his 1928 work Silveira refers to a plate "XXIII" in his 1908 work, but this is apparently an error for plate "XXIV". He notes that this species is one of those "ob bracteas involucrantes intus glabras in subgenere 'Xeractide' distinctissimae sunt". Irwin and his associates state that the stems were about 7 cm. tall, and found the plant growing among rocks on steep slopes. Mrs. Chase also found it on open rocky steep slopes, "common from middle to summit" of the mountain, and notes "plant with a little hummock-like base formed of the dead foliage bent downward about the stem; young plants without this base; no. 9222 about as old a plant as any seen". It has been collected at altitudes of 1100 to 1200 meters, flowering in March and April.

Citations: BRAZIL: Minas Gerais: M. A. Chase 9222 (W--1282187); Irwin, Maxwell, & Wasshausen 20385 (N, Z); A. Silveira 360 (B--isotype, Z--isotype).

PAEPALANTHUS ACUMINATUS Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 214, 217, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 401. 1928; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Alph. List Cit. 2: 412 & 490 (1948) and 3: 700. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Phytologia 3: 314 (1950) and 501. 1951; Moldenke, Résumé 94 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

The type of this species was collected by Henrique Carlos de Magalhães Gomes (Herb. Com. Geogr. e Geol. 1369) in the Serra de Ibitipoca, Minas Gerais, Brazil, in June, 1896, and is deposited in the herbarium of the Botanisches Museum at Berlin where it was photographed by Macbride as his type photograph number 10569. Silveira (1928) cites a Magalhães 240 from the same locality and collected in the same month and year, so this may be a part of the type collection, and the number may actually be the collector's own field number, or, instead, a Silveira herbarium number.

Ruhland (1903) comments as follows: "A P. pilifero, ad quem maxime accedit, differt foliis latioribus, densius pilosis, bracteis involucrantibus multo longioribus, florum partibus multo saturatius (fusce) coloratis, pilis hyalinis, apice non clavatis (ut in P. pilifero) etc."

Additional citations: BRAZIL: Minas Gerais: H. C. de Magalhães Gomes, Com. Geogr. & Geol. 1369 [Herb. Marie-Victorin 15831; Macbride photos 10569] (B—type, N—photo of type, N—photo of type, N—photo of isotype, W—photo of type, Z—isotype).

PAEPALANTHUS ACUMINATUS var. LONGIPILOSUS Moldenke

Bibliography: Moldenke, Phytologia 3: 314. 1950; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 242—243 & 303. 1956; Moldenke, Résumé 94 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

This plant has been collected in anthesis from January to April and has been found growing at 1000 meters altitude.

Citations: BRAZIL: Minas Gerais: Mello Barreto 15011 [Herb. Jard. Bot. Belo Horiz. 45180] (N—type); L. B. Smith 7040 (Z).

PAEPALANTHUS ACUTALIS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 258—259 & 401, pl. 170 [sec.]. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 182. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Résumé 94 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 170 [sec.]. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 689) in fields near Diamantina, Minas Gerais, Brazil, in April, 1918, and is deposited in the Silveira herbarium. Thus far, the species is known only from the original collection.

Ruhland (1903) notes "A P. Sennaeano Ruhl. pilis acutis et aliis characteribus differt".

It should be noted that Silveira's work (1928) has two plates labeled "CLXX", only the second of which represents P. acutalis. The first depicts P. chrysolepis Alv. Silv.

PAEPALANTHUS ACUTIPILUS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 165, 173—175, & 401, pl. 112. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 182. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Résumé 94 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 112. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 822) in fields near Itacambira, Minas Gerais, Brazil, in July, 1926, and is deposited in the Silveira herbarium. Silveira (1928) notes "Species a precedente [P. albiceps Alv. Silv.] valde affinis, sed pilis acutis caule piloso, etc. distinguitur".

Citations: BRAZIL: Minas Gerais: Magalhães Gomes & Schwacke 1329 [Herb. Jard. Bot. Belo Horiz. 26680] (N).

PAEPALANTHUS AEQUALIS (Vell.) J. F. Macbr.

Synonymy: Dupatya aequalis Vell., Fl. Flum. 36. 1825. Eriocaulon blepharocnemis Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 376, in syn. 1863. Paepalanthus blepharophorus var. α Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 376, in syn. 1863. Paepalanthus blepharocnemis Mart. ex Körn. in Mart., Fl. Bras. 3 (1): 376--377, pl. 48, fig. 3. 1863. Paepalanthus blepharocnemis var. α Körn. in Mart., Fl. Bras. 3 (1): 376 & 377. 1863. Paepalanthus blepharocnemis var. β Körn. in Mart., Fl. Bras. 3 (1): 377. 1863.

Bibliography: Vell., Fl. Flum. 36 (1825) and Icon. 1: pl. 85. 1827; Kunth, Enum. Pl. 3: 580. 1841; Körn. in Mart., Fl. Bras. 3 (1): 276, 281, & 376--377, pl. 48, fig. 3. 1863; Vell., Arch. Mus. Nac. Rio Jan. 5: 36--37. 1881; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 30. 1901; Ruhl. in Engl., Pflanzenreich 13 (4-30): 2, 12, 123, 128--130, [283], & 289. 1903; Alv. Silv., Fl. Mont. 1: 402. 1928; Stapf, Ind. Lond. 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41. 1930; J. F. Macbr., Field Mus. Publ. Bot. 11: 43. 1931; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 9, 28, 44, & 45. 1946; Moldenke, Alph. List Cit. 1: 223 (1946), 2: 364 (1948), and 4: 1180. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Phytologia 3: 501--502. 1951; Moldenke, Résumé 95, 279, 323, & 485. 1959; Moldenke, Résumé Suppl. 1: 19. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 401. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Thanikaimoni, Pollen & Spores 7: 181, 183, & 186, tab. 1. 1965.

Illustrations: Vell., Fl. Flum. Icon. 1: pl. 85. 1827; Körn. in Mart., Fl. Bras. 3 (1): pl. 48, fig. 3. 1863; Thanikaimoni, Pollen & Spores 7: 183, tab. 1. 1965.

Kunth (1841) was apparently very unsure of the true identity of Vellozo's species, for he asks "Quid Dupatya aequalis et hirsuta Velloz. Flor. Flumin. 1. t. 85 et 87?" The types, of course, of Vellozo's names are no longer in existence, but P. blepharocnemis was based by Körnicke on P. Clausen 159 & 174, G. Gardner 5267, Weddell 1239, and Widgren 828, the var. α on Widgren 818.

There appear to be a smooth and a hairy form of this species — Mosén 4450 is representative of the smooth form, while Brade 5530, Regnell II.290, and Widgren 19, 828, & s.n. are definitely the hairy form.

Körnicke (1863) divides this taxon into two varieties, but not based on pubescence or the lack of it. His P. blepharocnemis var. α was characterized as "Pedunculis folia subdupla superantibus" and is what he regarded as the typical form of P. blepharocnemis since it is the form he illustrates on pl. 48, fig. 3, for which

he gives as synonyms P. blepharocnemis Mart. and P. blepharophorus var. ♂ Kunth, and for which he cites P. Clausen 159, G. Gardner 5267, Sellow s.n. [prope Ouro Preto], and Weddell 1239, all from Minas Gerais. His P. blepharocnemis var. ♀ was characterized as "Pedunculis folia subaequantibus vel iis brevioribus" and for this he gives Dupatya aequalis Vell. as a synonym and cites R. E. Pohl s.n. [prope Barbacena] and Widgren 818 from Minas Gerais and Regnell s.n. [prope Mugy] and L. Riedel 1474 from São Paulo. Ruhland (1903) does not recognize these varieties, citing all the above-mentioned collections for what he called P. blepharocnemis Mart. with the addition of Glaziou 15555 from Minas Gerais and Glaziou 17849, Lund s.n., and Schwacke 6559 from São Paulo. Körnicke's unnumbered Regnell collection is doubtless the same as the Regnell II.290 cited by Ruhland.

It should be noted here that Kunth (1841) actually does not propose any var. ♂ as is claimed by Körnicke (1863), Ruhland (1903), and other later writers. He only describes a Paepalanthus blepharophorus and a var. ♀ . The variety is characterized by him as "humilis; foliis pedunculos subaequantibus" and for it he cites Eriocaulon blepharophorum Bong. "in Act. Petrop. 6. 1. 626. 2. 220, 7. 16" as a synonym and cites no collector but gives the phrase "in paludibus, Serra da Lapa", so one may assume that he refers here to the original Riedel collection cited by Bongard. It would appear from this that Kunth's Paepalanthus blepharophorus ♀ humilis is a synonym of the true P. blepharophorus (Bong.) Kunth, while what he described as the true P. blepharophorus and which later authors have ascribed to him as "var. ♂" is P. blepharocnemis. For this he states that the peduncles "folia duplo superantibus" and cites Sellow s.n. [prope Villa Rica].

Paepalanthus aequalis has been found growing in dry grassy fields, rocky ground, and at lakesides, at altitudes of 1600 to 1870 meters, flowering in April and September to November. Silveira (1928) cites A. Silveira 241 from the Serra do Ouro Branco, Minas Gerais, collected in 1908.

Material has been misidentified and distributed in herbaria under the name, P. tuberosus Kunth. The species bears great similarity, at least habitally, to P. cachambuensis Alv. Silv.

Additional citations: BRAZIL: Minas Gerais: P. Clausen 159 (Br), 174 (Br, N--photo, Z--photo); G. Gardner 5267 (N); Glaziou 15555 (Br); Mello Barreto 2565 [Herb. Jard. Bot. Belo Horiz. 8247] (N), 4669 [Herb. Jard. Bot. Belo Horiz. 17525] (N), 5180 [Herb. Jard. Bot. Belo Horiz. 18126] (N); Mosén 4450 (S, S); Regnell II. 290 [6/10/1815] (W—200756), II.290 [30/9/1869] (Er, S, S); Sellow B.1293 (Br), B.1293/C.267 (B, B); Weddell 1239 [35] (Br, N--photo, Z--photo); Widgren 19 (S), 818 (Ut—346), 828 (S), s.n. [1845] (S, S, S, W—936243), s.n. (S). São Paulo: Brade 5530 (S), 12230 (S);

Leite s.n. [V.1950] (N); Segadas-Vianna 2689 [Lev. Fitosociol. 510430-0103] (Ja). MOUNTED ILLUSTRATIONS: Mart., Fl. Bras. 3 (1): pl. 48, fig. 3 (B); drawings & notes by Körnicke (B).

PAEPALANTHUS AEREUS Alv. Silv.

Synonymy: Paepalanthus aerens Alv. Silv. ex Moldenke, Known Geogr. Distrib. Erioc. 44, sphalm. 1946. Paepalanthus oereus Alv. Silv. ex Moldenke, Résumé 327, in syn. 1959.

Bibliography: Alv. Silv., Fl. Mont. 1: 161--162 & 401, pl. 102. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 182. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Phytologia 2: 379 & 380. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Résumé 95, 323, 327, & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 102. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 585) among quartzite rocks at Pedreira do Guara, in the Serra do Cabral, Minas Gerais, Brazil, in January, 1910, and is deposited in the Silveira herbarium. Silveira (1928) notes that "Species a P. dasynemate Ruhl. affinis, sed vaginis pubescentibus, pedunculis glabris facile distincta".

PAEPALANTHUS ALBESCENS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 229--230 & 401, pl. 152. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 182. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 207. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 152. 1928.

The type of this species was collected by Joaquim Gomes Michaeli in sandy fields near Bareiras, in the Serra Geral, Minas Gerais, Brazil, in November, 1923, and is number 333 in the Silveira herbarium. On page 401 of his work, Silveira (1928) cites his herbarium number 33, collected in the same mountains in 1922. Whether this is a misprint, a correction, or an additional collection is not clear. He notes "Species a P. villoso Mart. valde proxima, sed foliis supra viridibus (non pruinosis) bracteis involucrantibus ciliatis, pilis pedunculorum bractearumque basi non bulbosis distinguenda".

PAEPALANTHUS ALBICEPS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 172--173 & 401, pl. 111. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 182. 1941; Moldenke, Known Geogr. Distrib. Erioc. 9 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 111. 1928.

The type of this species, and the only known collection of it, was gathered by Álvaro Adolpho da Silveira (no. 827) in fields near Grão Mogol, Minas Gerais, Brazil, in July, 1926, and is deposited in the Silveira herbarium. In his original description

of this plant, Silveira (1928) describes the leaves as "1-2 cm. medio lata", but this is surely a typographic error for "mm."

PAEPALANTHUS ALBO-TOMENTOSUS Herzog

Bibliography: Lützelb., Estud. Bot. Nordéste 3: 148. 1923; Herzog in Fedde, Repert. Sp. Nov. 20: 83. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 174. 1929; Moldenke, Known Geogr. Distrib. Erioc. 10 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Phytologia 3: 502. 1951; Moldenke, Résumé 95 & 485. 1959; Moldenke, Résumé Suppl. 12: 11. 1965.

This species was based on Lützelburg 488 from "Carrasco-Gebiet, Bom Jesus" and Lützelburg 279 from Rio Bromado in the Serra das Almas, Bahia, Brazil, collected at altitudes of 1000 to 1500 meters and deposited in the herbarium of the Botanische Staatssammlung at Munich. Macbride photographed the latter specimen at Munich as his type photograph number 18692. Herzog (1924) comments "Eine durch die weissfilzige Behaarung der Blätter und Scheiden schon ausserlisch ausgezeichnete Art! Charakteristisch sind ferner die grau behaarten Hullbrakteen, die linealische Form der kurzen Blütentragblätter und das aufgesetzte Spitzchen der Kelchblätter. Gestielte ♀ und ♂ Blüten vervollständigen die Summa der leichte fassbaren Merkmale. Dem P. Klotzschianus Koern. offenbar sehr nahe stehend, aber durch die Art des Indumentes, die riemenartig-schmalen stumpfen Blätter, die langeren Scheiden und die Form der Bracteae stipentes wohl gut unterschieden."

Additional citations: BRAZIL: Bahia: A. P. Duarte 5940 [Herb. Jard. Bot. Rio Jan. 113030] (Bd—15441), 6826 (Bd—24230); Lützelburg 279 [Macbride photos 18692] (N--photo of cotype, N--photo of cotype, W--photo of cotype).

PAEPALANTHUS ALBO-VAGINATUS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 233—234 & 401, pl. 155. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 182. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Phytologia 3: 502. 1951; Angely, Fl. Paran. 10: 12 & 14 (1957) and 12: 9. 1958; Moldenke, Résumé 95, 420, & 485. 1959; Angely, Fl. Paran. 16: 66 (1960) and 17: 24. 1961; Angely, Fl. Anal. Paran., ed. 1, 200. 1965.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 155. 1928.

The type of this pretty species was collected by Dr. Joaquim Gomes Michaeli "In Serra das Furnas (in vicinia ex Serra do Monte Negro), prope rivulo Guaricanga", Paraná, Brazil, in February, 1916, and is number 610 in the Silveira herbarium. On page 401 of Silveira's work (1928) he cites this same herbarium number 610 as from the Serra do Cipó in Minas Gerais, collected in 1915. Apparently this is erroneous. It seems unlikely that a species otherwise known only from southernmost Brazil would be found also in the Serra do Cipó of Minas Gerais.

The species has been found growing at altitudes of 840 to 1400

meters, flowering and fruiting in August, September, and November. The Dusén 6868 collection in the Stockholm herbarium is annotated as "n. sp. aff. P. spixianus" in an unknown hand. Silveira notes (1928) "Ob vaginas albo-membranaceas ab affinibus haec species distinguitur".

Additional citations: BRAZIL: Paraná: Braga s.n. [2/9/59; Herb. Inst. Hist. Nat. 5270] (Mm); Braga & Lange s.n. [30/8/59; Herb. Inst. Hist. Nat. 5272] (Mm); Dombrowski 1981 [Kuniyoshi 1706] (Rf); Duarte & Hatschbach s.n. [A. P. Duarte 5378; Herb. Brade. 13915] (Lw); Dusén 1031a (S), 6868 (S, S), 8568 (S), 15586 (S, S); Hatschbach 3759 (Z), 7302 (Ca), 22145 (Rf), 22800 (Ac); Hatschbach & Duarte 7123 (Ca); Jönsson 1031a (S), 1096a (S); Pabst 5928 [E. Pereira 6101; Herb. Brade. 21965] (Lw), 5933 [E. Pereira 6106] (Bd—21964). Santa Catarina: Reitz & Klein 4781 (Ok), 5300 (Ok); Smith & Klein 7400 (N, Ok), 8467 (Ok).

PAEPALANTHUS ALBO-VILLOSUS Alv. Silv.

Synonymy: Paepalantus albo-villosus Alv. Silv., Fl. Mont. 1: pl. 15, sphalm. 1928. Paepalanthus albovillosus Alv. Silv. apud Worsdell, Ind. Lond. Suppl. 2: 183. 1941.

Bibliography: Alv. Silv., Fl. Mont. 1: 33—34 & 401, pl. 15. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Moldenke, Known Geogr. Distrib. Erioc. 10 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Résumé 95 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 15. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 1769) in sandy fields between Serro and Diamantina, Minas Gerais, Brazil, in June, 1925, deposited in the Silveira herbarium. On page 401 of his work, however, Silveira (1928) cites a number 769 from the Serra Geral, collected in 1926; whether this is a misprint, or is a correction to the previous statement, or actually represents another collection is not clear. He comments "Species a P. pubescente Koern. proxima, sed indumento pedunculorum et bractearum involucrantium praecipue differt". The Glaziou collection cited below was annotated by Ruhland as Syngonanthus euschemus Ruhl. Probably this is a case of transposed labels during the mounting process. Glaziou 22303 appears to be a mixture with P. armeria Mart.

Citations: BRAZIL: Goiás: Glaziou 22303, in part (Br). Minas Gerais: Mendes Magalhães 435 [Herb. Jard. Bot. Belo Horiz. 34480] (N).

PAEPALANTHUS ALLEMANII C. Diogo

Bibliography: J. C. Diogo, Bol. Mus. Nac. Rio Jan. 1: [27]—28. 1923; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Moldenke, Known Geogr. Distrib. Erioc. 10 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Anon., U. S. Dept. Agr.

Bot. Subj. Index 5: 4227. 1958; Moldenke, Résumé 95 & 485. 1959.

The type of this species was collected by Francisco Freire Allemão e Cysneiros -- in whose honor it is named -- somewhere in Ceará, Brazil, and is probably his no. 1551 as represented in the Rio de Janeiro herbarium, where the type is deposited, although no number is actually cited in the original description.

Citations: BRAZIL: Ceará: Allemão 1551 [Herb. Mus. Nac. Rio Jan. 29469; U. S. Nat. Herb. photo 5890] (N--photo of isotype, N--photo of isotype, P--isotype, S--isotype, Z--isotype, Z--photo of isotype).

PAEPALANTHUS ALPINUS Körn.

Synonymy: Dupatya alpina (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya alpina Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 408--410. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 207, 208, [283], & 289. 1903; Thiselt.-Dyer, Ind. Kew. Suppl. 2: 401. 1904; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 5, 28, & 44. 1946; Moldenke, Alph. List Cit. 1: 28 & 221 (1946), 2: 609 (1948), 3: 664 (1949), and 4: 1075 & 1078. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 60 & 208. 1949; Moldenke, Phytologia 3: 502. 1951; Moldenke, Mutisia 6: [1]--2. 1952; Uribe, Mutisia 25: 28. 1956; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 67, 279, & 485. 1959.

The type of this high alpine species was collected by Jean Jules Linden (no. 1310) in swamps between Acansipo and Choconta, in the province of Tunja, Boyacá, Colombia, in March of 1843, and is deposited in the herbarium of the Botanisches Museum at Berlin. An isotype was photographed by Macbride in the herbarium of the Conservatoire et Jardin Botaniques at Geneva and is his type photograph number 25161. The species has been found growing in swamps, bogs, llanos, and moist páramos, at altitudes of 2500 to 3700 meters, flowering in February, March, May, August, and September. Langenheim describes it as "common"; Pennell describes it as an herb with a short stout caudex; Fosberg says that the rosettes are almost acaulescent, the flowering-heads gray, "common in wet places in transition between páramo and subpáramo on sloping benches". The Galen Smith, Idrobo, Jaramillo Mejía, & Mesa-Bernal 1105 collection is most interesting because of the tough 3-parted fruits falling out of the heads in huge numbers.

Ruhland, in the index to his monograph (1903), avers that this species is referred to on page "209" of the text, but this seems to be an error for page 208. He cites only the type collection (Linden 1310) and Karsten s.n., the latter from Cundinamarca, Colombia, and deposited in the herbarium of the Naturhistorisches Museum at Vienna, the former at Berlin.

Material has been misidentified and distributed in herbaria as Eriocaulon ensifolium Humb. On the other hand, the Killip &

Ariste-Joseph 11939, distributed as P. alpinus, is actually P. andicola Körn., while García-Barriga, Schultes, & Jaramillo Mejía 13595 is P. ensifolius (H.B.K.) Kunth.

Additional citations: COLOMBIA: Boyacá: Fassett 25033 (W--2166137, Ws); Langenheim 3631 (W--2266634); Linden 1310 [Macbride photos 25161] (B--isotype, N--photo of isotype, N--photo of isotype, W--photo of isotype). Cundinamarca: Ariste-Joseph A.72 (W--888750); F. R. Fosberg 20236 (N, N); Galen Smith, Idrobo, Jaramillo Mejía, & Mesa-Bernal 1105 (N, N, W--2047459); García-Barriga 16160 (N); Grant & Fosberg 9237 [U. S. Nat. Arb. 216612] (W--2166073); Killip 34120 (S); Køie 4647 (Cp), 5364 (Cp, Z); F. W. Pennell 2264 (F--485512, N, W--1042212); Philipson, Idrobo, & Fernandez 1285 (Bm, N, W--2026107); Sandeman 5796 (K); R. E. Schultes 1040 (N). LOCALITY OF COLLECTION UNDETERMINED: Lejeune s.n. [Am. equin.] (Br). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS ALSINOIDES C. Wright

Synonymy: Dupatya alsinoides (Wr. & Sauv.) Shafer ex Moldenke, Résumé 279, in syn. 1959.

Bibliography: Sauv., Anal. Acad. Ci. Habana 8: 49--50. 1871; Sauv., Fl. Cub. 163--164. 1871; Maza, Noc. Bot. Sist. 49. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Urb., Symb. Ant. 1: 484. 1900; Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 154--155, & 289. 1903; Prain, Ind. Kew. Suppl. 4, pr. 1, 170. 1913; O. E. Jennings, Ann. Carnegie Mus. 11: 89, pl. 17, fig. E--H. 1917; Moldenke, N. Am. Fl. 19: 39--40. 1937; Moldenke, Phytologia 1: 332, 351, 352, 355, 357, 361, & 363. 1939; Alain, Contrib. Ocas. Mus. Hist. Nat. Coleg. La Salle 7: 47 & 114. 1946; Moldenke, Known Geogr. Distrib. Erioc. 5, 28, & 44. 1946; Moldenke, Alph. List Cit. 1: 3, 63, 91, 92, 186, 187, 190, & 298 (1946), 2: 486, 583, 649, & 651 (1948), 3: 929 (1949), and 4: 1144, 1145, & 1304. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 44 & 208. 1949; Moldenke, Phytologia 3: 502. 1951; Prain, Ind. Kew. Suppl. 4, pr. 2, 170. 1958; Moldenke, Résumé 52, 279, & 485. 1959; Moldenke, Résumé Suppl. 1: 4. 1959.

The type of this species was collected by Charles Wright (no. 3743) in sandy pinewoods near La Grifa, Vuelta de Abajo, Pinar del Río, Cuba. Ruhland (1903) cites only the type collection, and so does Urban (1900). The Alain reference (1946) in the bibliography above is sometimes cited as "1947", but Brother Alain has assured me that the work was actually issued in 1946.

Ruhland (1903) comments that "Species foliis aciculari-rigidulis. Capitulorum structura illi Paepalanthi pilosi (pilis exceptis), haud dissimilis, cui inter species meridionali-americanas proxima esse videtur."

The Ekman 11254, distributed as P. alsinoides, is actually var. minimus Jennings, while C. Wright "P" is a mixture with that variety.

MISCELLANEOUS ADDITIONS AND REVISIONS TO THE FLOWERING PLANTS OF JAMAICA

C. D. Adams[1]

ATERAMNUS (EUPHORBIACEAE)

ATERAMNUS GLANDULOSUS (Sw.) C. D. Adams, comb. nov.
Excoecaria glandulosa Sw., Fl. Ind. Occ. 2: 1124. 1800
TYPE: Sloane, between Town Savanna and Two Mile Wood, St. Catherine, Jamaica.
Gymnanthes glandulosa (Sw.) Mull. Arg., Linnaea 32: 106. 1863.
Actinostemon jamaicensis Britton, Bull. Torr. Bot. Club 39: 7. 1912. TYPE: Harris & Britton 10643, Grant's Pen, St. Thomas, Jamaica.
Gymnanthes jamaicensis (Britton) Urb., Symb. Ant. 7: 516. 1913.

Rothmaler (1944) determined Patrick Browne's Aterammus foliis oblongis etc. (1756) as a validly published genus based on the generico-specific description of the common Caribbean plant later known as Gymnanthes lucida Sw. Aterammus P. Browne thus antedates and replaces Gymnanthes Sw. (1788), the original description of which included Gymnanthes lucida and G. elliptica Sw. Rothmaler transferred both these species to Aterammus but whether he conceived other generic distinctions or lacked sufficient material of A. glandulosus to confirm the generic placing of that species, he did not make that combination. I have been unable to trace any subsequent publication of this combination and have no reason to adopt any different concept from that of Urban (1913, above) or Fawcett & Rendle (1920). Aterammus glandulosus is reported also from Cuba.

AYENIA (STERCULIACEAE)

AYENIA LAEVIGATA Sw. var. ACUMINATA C. D. Adams, var. nov.
Folia apice plerumque acuminata, 5-11 cm longa, 2-4.5 cm lata.
Type Collection: R. W. Read 1909 (holotype UCWI; isotype BM), collected on drier parts of slopes in limestone woods, Donkey Trail Hill, Trelawny Parish, Jamaica, elev. 1779 feet, 26 May 1967.

Paratype: R. A. Howard & G. R. Proctor 14384 (IJ), collected on dry rocky hillside, Ramgoat Cave District, Trelawny Parish, Jamaica, elev. ca. 1500 feet, 4 July 1955; "Shrub of 9 feet with long scrambling branches ; fruit light green, 5-sided, carpels with soft spines."

This is one of the numerous inland vicariants of coastal or sublittoral species which are scattered so frequently and so hap-

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hazardly through the Jamaican flora; the conclusion that their existence is of great phytogeographical importance is inescapable, but how distribution and evolution are related in these cases has yet to be revealed. This variety, first found in the fruiting state, escaped accurate determination by pretending to belong to the Euphorbiaceae in spite of the correct observation by the collectors of the 5-merous capsule. The separated capsule valves, which always seem to separate on drying, are extraordinarily similar to those of members of the Euphorbiaceae. Plants in flower constitute the holotype material and other plants in both flower and fruit have been observed in the same general area. Typical Ayenia laevigata from dry limestone thickets in the south-east coastal area has much smaller blunt leaves.

CALLIANDRA (MIMOSACEAE)

CALLIANDRA PANICULATA C. D. Adams, sp. nov.

Anneslia Salisb., sect. 20 comosae Britton & Rose (1928) vel aff.

Inflorescentia ramis longis alternis bracteatis, pedunculis 12-18 mm longis verisimiliter unica est.

Frutex 1-2 m altus; rami hornotini temuiter pubescentes glabrescentes, veteres cinerascentes. Folia alterna vel ad ramulos laterales breves squamatos fasciculata, bipinnata eglandulosa. Petioli 9-15 mm longi; pinnae (1-)2-jugatae; foliola (5)7-10-jugata, elliptica, oblonga vel oblongo-oblanceolata, (4-)7-15(-18) mm longa, 2.5-5(-7) mm lata, ciliata, glabrescentia, inferne pallidiora, plerumque margine uno recto et altero curvo. Stipulae anguste ovatae et acuminatae vel deltatae, 2-3.5 mm longae, pubescentes, pauci-striatae, rigidae. Inflorescentiae axillares et terminales; raches bracteaeque temuiter pubescentes; paniculae rami primarii racemosi subalterni, 2-8 cm longi, bracteis stipulis consimilibus; pedunculi tenues, 12-18 mm longi. Flores in capitulo 2-5, sessiles, flavovirentes; calyx 1-3 mm longus, late cupulatus, breviter mucronato-dentatus, ciliatus; corolla tubuloso-campanulata, breviter deltato-dentata, glabra, 6 mm longa. Androecium, tubo incluso, 20-25 mm longum. Fructus (immaturus) ca. 6 cm longus et 7 mm latus, leviter arcuatus, canescens.

Type Collection: C. D. Adams 11154 (holotype UCWI; isotype BM), collected on arid limestone rocks between Two Rivers and Gut River, Manchester Parish, Jamaica, elev. 20 feet, 13 May 1962.

CASSIA (CAESALPINIACEAE)

CASSIA CAYMANENSIS C. D. Adams, nom. nov.

Chamaecrista riparia sensu Britton & Millspaugh, Bahama Flora: 169. 1920, non Cassia riparia Kunth, Nov. Gen. 6: 369. 1824.

Chamaecrista confusa Britton, N. Amer. Fl. 23(5): 292. 1930, non Cassia confusa Phil., Anal. Univ. Chil. 84: 438. 1894.

Britton pointed out the several occasions on which this Bahamian plant had been misidentified and then inadvertently made another misidentification in aligning it with Kunth's Cassia riparia. In

North American Flora, Britton rectified this by describing the new species Chamaecrista confusa restricted as then known to Bahamas and Grand Cayman, (TYPE: Britton & Brace 427 from New Providence, Bahamas). The current trend not to recognize the smaller segregate genera in the Cassia complex necessitates the invention of yet another name as Cassia confusa is preoccupied.

CASSIA JAMAICENSIS (Britton) C. D. Adams, comb. nov.
Chamaecrista jamaicensis Britton, Bull. Torr. Bot. Club 42: 515. 1915; N. Amer. Fl. 23(5): 280. 1930. TYPE: Harris 9615, Long Mountain, St. Andrew, Jamaica.
Cassia polyadena sensu Fawcett & Rendle, Fl. Jam. 4: 113. 1920, non DC., Pl. Rar. Jard. Genèv. 2: 12. 1824.

This species, also much misidentified, is restricted to arid thickets and limestone cliffs in a small area of the southern part of the parish of St. Andrew, Jamaica. The Bahamian record of Fawcett & Rendle refers to the more widespread Cassia lineata Sw., while the Leeward Islands plant (Antigua, Barbuda and Guadeloupe) is Cassia polyadena DC. The latter is very close to and has sometimes been combined with Cassia glandulosa L. and it is between this and Cassia lineata that Cassia jamaicensis lies both morphologically and ecologically.

FAGARA (RUTACEAE)

FAGARA HARRISII (P. Wilson) C. D. Adams, comb. nov.
Zanthoxylum harrisii P. Wilson ex Britton, Bull. Torr. Bot. Club 48: 340. 1922. TYPE: Harris 12878, St. Georges, Portland, Jamaica.

Fosberg (1959) has clarified the application of the names Zanthoxylum and Fagara and I quote from him as follows:- "For those who combine the genera with one or two perianth whorls the correct name is Zanthoxylum L. For those who separate them the tropical genus with two whorls has the correct name Fagara L. (nomen conservandum) with F. pterota L. as type and the temperate genus with one perianth whorl still bears the name Zanthoxylum L. typified by the plant now called Z. fraxineum Willd."

This rare species is known only from the type and a sterile specimen collected by A. D. Skelding in the same general wet forest area of Portland parish in 1962. It has the largest leaflets, up to 20 cm long, of any of our species of Fagara most of which live in decidedly drier habitats. Zanthoxylum harrisii was described too late for inclusion in the account of Zanthoxylum by Fawcett & Rendle (1920). All the other species included by them have validly published names in Fagara.

GARCINIA (GUTTIFERAE)

GARCINIA DECUSSATA C. D. Adams, nom. nov.
Rheedia pendula Urb., Symb. Ant. 1: 368. 1899, non Garcinia pendula Engl., Bot. Jahrb. 40: 557. 1908. TYPE of Rheedia pendula, Harris 7451, Vinegar Hill, Portland, Jamaica.

Garcinia decussata is endemic to Jamaica and restricted to damp shady woodlands in submontane situations. In allusion to the decussate rectangular branching of these small trees the common name of 'Hat Stand Tree' is quite appropriate.

GARCINIA HUMILIS (Vahl) C. D. Adams, comb. nov.
Rheedia lateriflora L., Sp. Pl. 2: 1193. 1753, non Garcinia lateriflora Blume, Bijdr.: 214. 1825.
Mammea humilis Vahl, Eclog. 2: 40, t.20. 1798. TYPE: Ryan, Montserrat.

This species is reported in the wild state from Jamaica, the Lesser Antilles (Montserrat to St. Vincent), Trinidad, Venezuela and Brazil. It has been maintained in cultivation in Jamaica and Puerto Rico for its edible fruit.

Robson (1958) has indicated the affinities of Rheedia and has suggested its mergence into Garcinia. Three species of Rheedia were reported for Jamaica by Fawcett & Rendle (1926) but the distinction of R. lateriflora and R. sessiliflora Planch. ex Vesque which those authors made on the basis of flower-size cannot be maintained. The male flowers are consistently smaller and more numerous than the female flowers. Vesque (1889) did not mention flower-size but used characters of leaf-shape and texture as well as pedicel-length to distinguish R. sessiliflora.

LASIOCROTON (EUPHORBIACEAE)

LASIOCROTON TRELAWNIENSIS C. D. Adams, sp. nov.
L. macrophylli Griseb. affinis, foliis elliptico-lanceolatis basibus breviter rotundatis marginibus denticulatis differt.
Frutex 4 m altus; rami juniores dense tomentulosi pilis stellatis flavis, vetustiores cicatricibus foliorum delapsorum prominentibus. Folia alterna; laminae elliptico-lanceolatae, basi rotundatae, apice acutae, marginibus denticulatis, 2.5-7 cm longae, 1-2.5 cm latae, superne pilis stellatis contiguis, inferne dense tomentosulae pilis flavis pallidiores et nervis venisque prominentibus, nervis proximis valde ascendentibus. Petioli usque ad 1 cm longi. Stipulae subulatae, ca. 1.5 mm longae, caducae. Inflorescentiae terminales; racemi feminei 3-6 cm longi, floribus 5-11; flores sessiles (nec feminei nec masculini in statu maturo vidi). Capsula oblongo-globosa trisulcata fulvo-tomentosa 5-6 mm longa; perianthium persistens, segmentis 5 deltato-ovatis ciliatis bracteis bracteolisque similibus; styli breves apicibus divisis breviter divergentibus.

Type Collection: G. R. Proctor 20746 (holotype IJ), collected on wooded limestone hilltop, Island View Hill, Wilson Valley District, 1.5 miles north of Warsop, Trelawny Parish, Jamaica, elev. 2000-2200 feet, 26 March 1960.

Lasiocroton trelawniensis differs from L. macrophyllus in having generally smaller narrower leaves with the bases narrowly rounded and not at all cordate.

TURNERA (TURNERACEAE)

TURNERA ZEASPERMA C. D. Adams & V. Bean, sp. nov.

T. ulmifoliae L. affinis sed foliis anguste elliptico-oblanceolatis, subglabris, saepe subintegris; bracteolis integris differt.

Suffrutex 0.3-1.2 m altus radice palari longa; rami laxi effusi, juniores saepe rubelli. Folia alterna; laminae elliptico-lanceolatae, basi longe cuneatae biglandulosae, marginibus subtiliter serrato-dentatis vel subintegris, apice acutae, subglabrae, 2.5-7.5 cm longae, 5-15 mm latae; petioli 4-10 mm longi. Flos homostylosus solitarius subsessilis ad petiolum adnatus pedicelli parte libera 2-3 mm longa; bracteolae duae calycis prope basin insertae, integrae subulato-lanceolatae 9-12 mm longae et ca. 1 mm latae, eglandulosae. Calyx ca. 20 mm longus lobis 13-18 mm longis imbricatis lanceolatis pallide viridibus. Petala libera obovata primulina (20-)27-34 mm longa, 16-30 mm lata. Stamina 5 antheris 2.5-5 mm longis. Styli 3 antheras superantes; stigmata penicillata. Capsula ovoidea apicem versus trivalvacea, ca. 8 mm lata. Semina oblongo-obovoidea plus minusve curvata, scrobiculata, ca. 2.5 mm longa, arillo unilaterali albido.

Type Collection: C. D. Adams 6969 (holotype UCWI; isotype M), collected on rocks, Cane River Gorge, St. Andrew Parish, Jamaica, elev. ca. 400 feet, 28 April 1960.

Paratypes: C. D. Adams & V. Elliott 11 (UCWI); V. Elliott 17 (UCWI); B. D. Morley s.n. (UCWI); A. von der Porten s.n. (IJ); D. Powell & W. Lewis 1111 (IJ), all from base of cliffs by river or rocky bed of river, Cane River Gorge, St. Andrew Parish, Jamaica, elev. ca. 300-500 feet; T. G. Yuncker 17384 (BM), collected on rocky bank of Hope River, ca. 1 mile east of Mona, St. Andrew Parish, Jamaica, elev. 500 feet, 14 November 1957.

This species differs from plants in the general very variable range of Turnera ulmifolia in Jamaica by the possession of a combination of features which includes thin wiry stems, narrow oblanceolate sometimes entire subglabrous leaves, subulate entire glandless bracteoles and an ovoid capsule.

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SOME CIRCUM-PACIFIC SCHISTOCHILACEAE

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Shortly after I began studies on Hawaiian Hepaticae, a packet apparently collected by C. M. Cooke on Molokai was given me for inspection at the Bishop Museum. Someone had written "?fern" on the packet - an understandable query because the plant it contained was frond-like and even larger than some small Hawaiian ferns. It belonged in the Schistochilaceae but was quite unlike any I had seen to that time. More recently, while preparing manuals for Hawaii and Micronesia, I have reviewed Schistochila again in relation to Pacific Island collections and have concluded that I have at least three well defined groups of species which can be appropriately recognized as distinctive, though related, genera. Accordingly, two genera which do not come to Schistochila appendiculata, the generitype, are proposed. Further study on a monographic basis may result in additional segregates within the Schistochilaceae.

The family Schistochilaceae, as recognized in recent publications, contains two genera, Schistochila and Schuster's (1963) recently described monotypic Paraschistochila. The genus Schistochila was described by Dumortier in 1835 with 5 species assigned to the genus - nobilis, lamellata, appendiculata, pinnatifolia, and thouarsii. Subsequently, Nees von Esenbeck (1844 in Gottsche, et. al) described Gottschea for the same species, and more, in the Synopsis Hepaticarum having overlooked Dumortier's Schistochila. A list and descriptions for 17 species accompanied the generic description of Gottschea in the Synopsis including all 5 species cited by Dumortier. As the concept was clearly the same for both Schistochila and Gottschea, it would seem advisable to name G. appendiculata (= Jungermannia appendiculata Hook.) as the lectotype so that the synonomy is unambiguous - but, unfortunately, this lovely escape is not open to us.

Montagne (1843) accepted the name Gottschea which had not yet appeared in the first part of the Synopsis Hepaticarum and rejected his own manuscript name of Notopterygium in favor of Nees' proposal to honor Gottsche. The first published description of Gottschea as a genus is that prepared by Montagne who credited only the name to

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Nees. Thus, the credit for the name and the citation must become:

Gottschea Nees ex Mont. Ann. Sci. Nat. Bot. 2,19: 245. 1843.

As the species cited are G. hombroniana, G. philippinensis, G. neesii and G. thouarsii, the lectotype for the genus must come from these. Therefore, in order to preserve the sense of Gottschea as closely as possible to that of Schistochila, the most appropriate lectotype is G. hombroniana Mont. This species is considered by many authors to be synonymous with Schistochila lehmanniana (Lindenb. in Lehm.) Steph. but, in any event, it does not affect the typification of Gottschea just proposed.

The general nature of the Schistochila-Gottschea name problem has been recognized since S. O. Lindberg's (1873) publication of his discovery of the long-overlooked Dumortier papers. Four years later, Trevisan (1877) called attention to Colla's (1836) genus Notarisia based on N. lycopodioides from "ins. Iuan Fernandez" and placed by Colla close to Lycopodium, apparently on account of misinterpretation of antheridia as sporangia. Trevisan brought a mixture of species to Notarisia but the genus was not accepted by subsequent workers (e.g., Schiffner, 1893-95), and was relegated to synonomy under Schistochila. Despite the relative antiquity of the specific epithet, it seems to have gotten lost and does not appear in either the Species Hepaticarum or in Herzog's report on the foliose Hepaticae of Juan Fernandez and Easter Islands. As underleaves are present according to the description, a new combination is required as follows:

Schistochila lycopodioides (Colla) H. A. Miller, comb. nov.
Notarisia lycopodioides Colla. Mem. R. Accad. Sci. Torino 1,39: 53; Tab. 75, fig. 2. 1836.

A review of the original species of Schistochila reflects the redefinitions within the family: 1) S. nobilis remains in the genus; 2) S. appendiculata is the lectotype for the genus (Grolle, 1966); 3) S. thouarsii was placed by Stephani under Schistochila sphagnoides; 4) S. lamellata goes to Fulfordistria gen. nov. along with 6 other species; and 5) S. pinnatifolia (= S. pinnatifida Mont. p. 243. 1843. lapsus) is the type for Paraschistochila.

Key to Genera of Schistochilaceae

1. Plants with amphigastria much wider than the stem-------2
1. Plants lacking amphigastria or, if present, vestigial and narrower than the stem----------3

2. Leaves and sometimes underleaves distinctly lamellate with more or less parallel, unistratose, lamellae up to several cells high on the surface----------Fulfordistria
2. Leaves plane without longitudinal lamellae----------Schistochila

3. Leaves with both segments distinctly lobed as well as toothed----------Paraschistochila
3. Leaves entire or variously ornamented, but not distally lobed----------Schistochilaster

SCHISTOCHILASTER, H. A. Miller, gen. nov.

Schistochila Dum. affine, a quo amphigastriis nullis vel rudimentariis differt. Folia caulina inaequaliter bilobata, simpliciter alata; lobus dorsalis integer vel apice solum fimbriatus; et lobus ventralis sine lamellis. Typus: Jungermannia aligera Nees.

The distinctiveness of this taxon was implied as long ago as 1844 in the Synopsis Hepaticarum. Except for Paraschistochila pinnatifolia, Schistochilaster includes all species in the family which lack underleaves or, more often, possess few-celled, vestigial, amphigastria narrower than the stem. In Schistochila, s. str., underleaves are broader than the stem and often elaborately ornamented as well. Emphasis has been placed on the gametophytic characters for the present because the species are mostly little known except for a few, often imperfect, herbarium specimens. Species which are transferred to this genus include:

1. Schistochilaster aligeraeforme (de Not.) comb. nov.
Gottschea aligeraeformis de Not. Mem. R. Accad. Sci. Torino 2, 28: 272. 1876.
Schistochila aligeraeformis (de Not.) Schiffn. Conspect. Hep. Arch. Ind. p. 213. 1898.

2. Schistochilaster aligerum (Nees) comb. nov.
Jungermannia aligera Nees. Nova. Acta. Acad. Leop.-Carol. 11: 135. 1823.
Gottschea aligera (Nees) Nees in GLN. Syn. Hep. 17. 1844.
Notarisia aligera (Nees) Trevis. Mem. R. Ist. Lombardo, Ser. 3, 4: 392. 1877.
Schistocheila (sic!) aligera (Nees) Jack & Steph. Hedwigia 31: 12. 1892.

3. Schistochilaster brotheri (Steph.) comb. nov.
Schistochila brotheri Steph. Spec. Hep. 4: 85. 1909.

4. Schistochilaster cheesmanii (Steph.) comb. nov.
Schistochila chessmani Steph. Spec. Hep. 4: 96. 1909.

5. Schistochilaster colensoanum (Steph.) comb. nov.
Schistochila colensoana Steph. Spec. Hep. 4: 87. 1909.

6. Schistochilaster conchophyllum (Hodgs. & Allison) comb. nov.
Schistophylla (lapsus pro Schistochila) conchophylla Hodgs. & Allison. Trans. Proc. Roy. Soc. New Zealand 71: 191. 1941.

7. Schistochilaster curtisii (Steph.) comb. nov.
Schistochila curtisii Steph. Spec. Hep. 4: 77. 1909.

8. Schistochilaster cuspidilobum (Steph.) comb. nov.
Schistochila cuspidiloba Steph. Spec. Hep. 4: 82. 1909.

9. Schistochilaster englerianum (Steph.) comb. nov.
Schistochila engleriana Steph. Spec. Hep. 4: 69. 1909.

No specimen is cited for this species in the Species Hepaticarum but it is listed under Africa. The specimen sketched in the Icones Ineditae from which the description was written is "Usambara, Kovai 2600 m, A. Engler."

10. Schistochilaster fleischeri (Steph.) comb. nov.
Schistochila fleischeri Steph. Spec. Hep. 4: 81. 1909.

11. Schistochilaster fragile (Steph.) comb. nov.
Schistochila fragilis Steph. Spec. Hep. 4: 84. 1909.

12. Schistochilaster graeffeanum (Jack & Steph.) comb. nov.
Schistocheila (sic!) (Gottschea) graeffeana Jack & Steph. Bot. Centralbl. 60: 97. 1894.

13. Schistochilaster integerrimum (Steph.) comb. nov.
Schistochila integerrima Steph. Spec. Hep. 6: 492. 1924.

14. Schistochilaster laceratum (Steph.) comb. nov.
Schistochila lacerata Steph. Spec. Hep. 6: 492. 1924.

15. Schistochilaster linearifolium (Jack & Steph.) comb. nov.
Schistocheila (sic!) linearifolium Jack & Steph. Bot. Centralbl. 60: 98. 1894.

16. Schistochilaster maximum (Steph.) comb. nov.
Schistochila maxima Steph. Spec. Hep. 6: 493. 1924.

17. Schistochilaster neesii (Mont.) comb. nov.
Gottschea neesii Mont. Ann. Sci. Nat. Bot. Ser. 2, 19: 244. 1843.
Schistochila neesii (Mont.) S.O. Lindb. J. Linn. Soc. Bot. 13: 194. 1873.

18. Schistochilaster philippinense (Mont.) comb. nov.
Gottschea philippinensis Mont. Ann. Sci. Nat. Bot. Ser. 2, 19: 244. 1843.
Notarisia philippinensis (Mont.) Trevis. Mem. R. Ist. Lombardo, Ser. 3, 4: 392. 1877.
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Schistochila commutata Steph. Spec. Hep. 4: 74. 1909. (fide Buch, 1939).
Schistochila sumatrana Steph. Spec. Hep. 4: 74. 1909. (fide Buch, 1939).
Schistochila confertifolia Steph. Spec. Hep. 4: 75. 1909. (fide Grolle, 1966).
Schistochila lauterbachii Steph. in Lauterbach & Schumann, Flora Deutsch. Schutzgeb. Südsee: 72. 1901. nomen nudum. (fide Grolle, 1966).

Older varietal names and mis-identifications applied to this species are listed by Buch.

19. Schistochilaster piligerum (Steph.) comb. nov.
Schistocheila (sic!) piligera Steph. Hedwigia 31: 213. 1892.

20. Schistochilaster spegazzinianum (Massal.) comb. nov.
Gottschea spegazziniana Massal. Nuovo Giorn. Bot. Ital. 17: 206. 1885.
Schistochila spegazziniana (Massal.) Steph. Spec. Hep. 4: 99. 1910.

21. Schistochilaster spinosum (Steph.) comb. nov.
Schistochila spinosa Steph. Spec. Hep. 6: 495. 1924.

22. Schistochilaster truncatilobum (Steph.) comb. nov.
Schistochila truncatiloba Steph. Denks. Math.-Naturwiss. Kl. K. Akad. Wissensch. Wien 88: 34. 1911.

23. Schistochilaster tuloides (Tayl.) comb. nov.
Jungermannia tuloides Tayl. London J. Bot. 3: 558. 1844.
Gottschea tuloides (Tayl.) GLN. Syn. Hep. 620. 1846.
Schistochila tuloides (Tayl.) Steph. Spec. Hep. 4: 89. 1909.
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Schistochila ramulosa (Colenso) Steph. Spec. Hep. 4: 92. 1909. (fide Hodgson, 1941).
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Schistochila homophylla (Colenso) Hodgs. Trans. Proc. Roy. Soc. New Zealand 71: 194. 1941. (fide Hodgson, 1941).

24. Schistochilaster viride (Steph.) comb. nov.
Schistochila viridis Steph. Spec. Hep. 6: 496. 1924.

FULFORDISTRIA, H. A. Miller, gen. nov.

Schistochila Dum. affine, a quo foliis cum lamellis parallelis superficiaribus differt. Amphigastria latiora quam caulis. Typus: Jungermannia lamellata Hook.

It is a pleasure to name this most distinctive Antarctic-Pacific genus in honor of Professor Margaret Hannah Fulford who has contributed so significantly to our knowledge of Fuegian Hepaticae. The rows of conspicuous, multicellular, toothed lamellae are a most striking feature even under low magnifications. Species transferred to the genus are:

1. Fulfordistria cookei H. A. Miller, sp. nov.
Fulfordistria lamellata similis, sed amphigastriis late ovatis et non profunde bifidis vel aliquoties segmentatis. Specimen typicum in insula Molokai, in insulis Hawaiianis, legit C. M. Cooke, Jr., 1903, in hb BISH. (Fig. 1)

2. Fulfordistria glaucescens (Hook.) comb. nov.
Jungermannia glaucescens Hook. Musci Exotici tab. 39. 1818.
Gottschea glaucescens (Hook.) Nees in GLN. Syn. Hep. 20. 1844.
Schistochila glaucescens (Hook.) Steph. Spec. Hep. 4: 92. 1909.

3. Fulfordistria lamellata (Hook.) comb. nov.
Jungermannia lamellata Hook. Musci Exotici tab. 49. 1818.
Schistochila lamellata (Hook.) Dum. Rec. d'Obs. 15. 1835.
Gottschea lamellata (Hook.) Nees in GLN. Syn. Hep. 20. 1844.

4. Fulfordistria lamellistipula (Steph.) comb. nov.
Schistochila lamellistipula Steph. Spec. Hep. 4: 94. 1909.

5. Fulfordistria laminigera (Tayl.) comb. nov.
Jungermannia laminigera Tayl. London J. Bot. 3: 456. 1844.
Gottschea laminigera (Tayl.) GLN. Syn. Hep. 623. 1846.
Schistochila laminigera (Tayl.) Schiffn. in Engler & Prantl. Natürl. Pfl.-fam. 1, 3: 111. 1895.

6. Fulfordistria reicheana (Steph.) comb. nov.
Schistochila reicheana Steph. Spec. Hep. 4: 95. 1909.

7. Fulfordistria savatieri (Steph.) comb. nov.
Schistochila savatieri Steph. Spec. Hep. 4: 94. 1909.

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Explanation of Figure 1

Fulfordistria cookei H.A. Miller. a. Habit sketch, X3; b. Underleaf, X16; c. Leaf, X16; d. Cells of the antical leaf margin, X480; e. Cells of the middle of the blade, X480. Drawn from the type specimen.

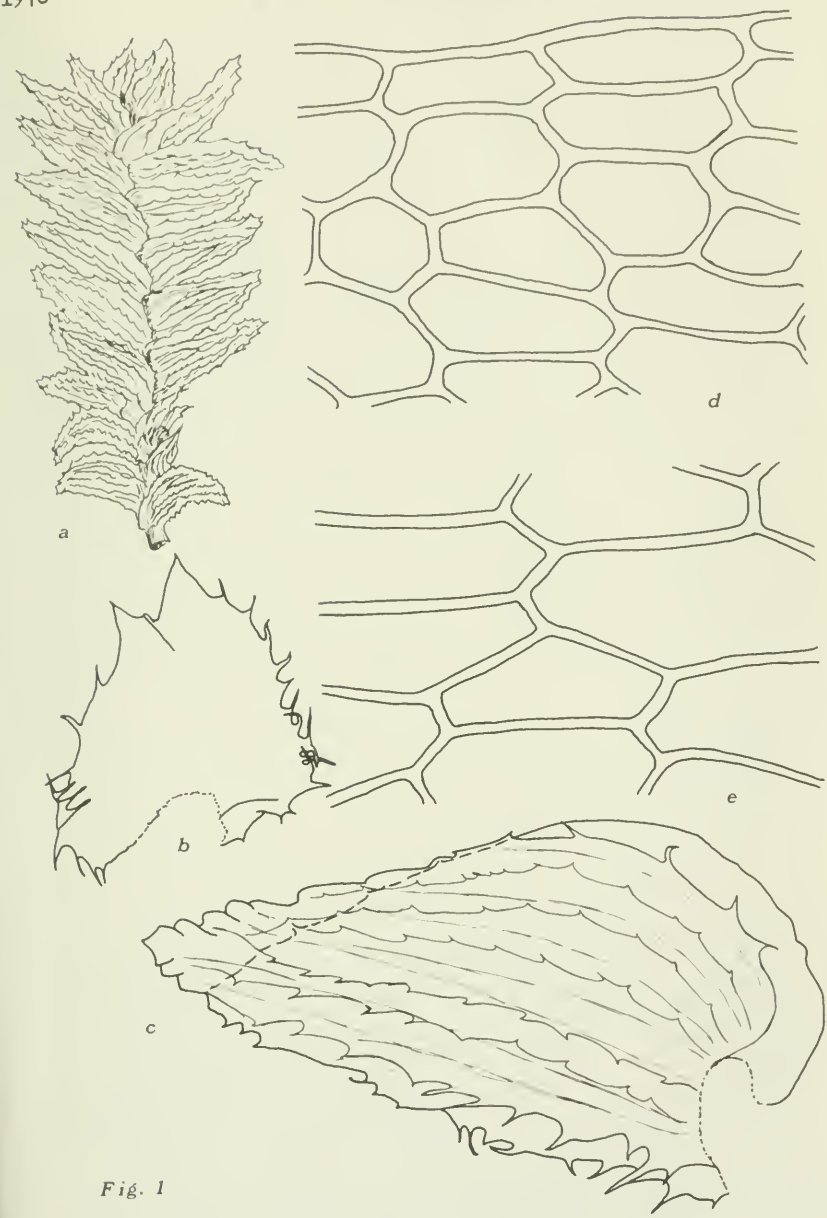

Fig. 1

REVIVAL OF NISSOLIA MICROPTERA (LEGUMINOSAE)

Velva E. Rudd

In the course of searching for types of Machaerium spp., many of which had originally been assigned to the genus Nissolia, I found, in Paris, material of one species that should have been retained in Nissolia, N. microptera Poir. Bentham transferred the species to Machaerium in June 1837, but with the notation that it was unknown to him and its affinities uncertain. In making this transfer he essentially followed DeCandolle (Prod. 2: 258. 1825), who had seen a specimen in the herbarium of Desfontaines and had placed N. microptera Poir. in Nissolia section Machaerium (Pers.) DC. In March 1837, however, Vogel (Linnaea 11: 178. 1837) in commenting on DeCandolle's treatment had expressed the opinion that N. microptera Poir. belonged not to Machaerium but to Nissolia.

Comparison of type specimens of N. microptera Poir., collected by Ledru in the Botanical Garden at Tenerife, Canary Islands, and of N. hirsuta DC., collected by Née (or Sessé & Mociño ?) in Mexico, shows the two species to be synonymous. The correct name, therefore, for this rather common Mexican legume would seem to be Nissolia microptera Poir. with synonymy and citations as follows:

NISSOLIA MICROPTERA Poir. in Lam. Encyc. Meth. Suppl. 4: 98. 1816. Lectotype at P ex Herb. Poiret.
Nissolia hirsuta DC. Prod. 2: 257. 1825. Holotype at G.
Machaerium micropterum (Poir.) Benth. Comm. Leg. Gen. 37. 1837; Ann. Wien. Mus. 2: 101. 1838.
Nissolia confertiflora S. Wats. Proc. Am. Acad. 21: 424. 1886. Holotype at GH.
Nissolia multiflora Rose, Contr. U. S. Nat. Herb. 5: 161. 1889 in part (see op. cit. 32: 192. 1956). Holotype at US.

The holotype of Nissolia hirsuta raises an interesting problem as to its collector. DeCandolle noted, "in Mexico propè Guanaxuato detexit cl. Née." According to Cavanilles Née did visit Guanajuato (Icones 4: 71. 1797 [1798]). The label on the specimen, however, bearing the legend "Nissolia N. E. De Guanajuato" resembles those of the Sessé and Mociño collections distributed by Pavón. That there is reason to question the citation of the collector is strengthened by the existence of several specimens that appear to be duplicates of the holotype, but that almost certainly were collected by Sessé and Mociño. Perhaps DeCandolle absentmindedly misread as Née the handwritten abbreviation for Nueva España, "N. E." ? Or might Pavon have distributed some of Née's Mexican collections, in addition to those of Sessé and Mociño ?

BOOK REVIEWS

Alma L. Moldenke

"BIOLOGIE DE L'AMÉRIQUE AUSTRALE", Volume IV, edited by Cl. Delamare Debouttenville (Paris) & Eduardo Rapoport (Caracas), 472 pp., illus., Centre National de la Recherche Scientifique, Paris 7. 1968. 120 francs.

This volume consists of scholarly and yet interesting biogeographic and ecological papers in French, Spanish or English about this continent concerning which so little is known and yet so much of its natural life and other resources is being annihilated. F. di Castri describes the ecological regions of Chile, maps them effectively and illustrates typical habitats in exquisitely reproduced photographs. E. H. Rapoport discusses some biogeographic problems of the neotropics. M. Th. Cerceau-Larrival presents a biogeographical study based on pollen analysis of modern and fossil Niphogeton, Azorella, Nothofagus and Araucaria. J. M. Cei discusses the geographic distribution and speciation of the batrachians. O. Reig presents a provocative paper on the speciation of vertebrate tetrapods. R. A. Ringuelet has a short paper on the fresh water copepods of Argentina. M. I. H. Scott discusses the biogeography of Patagonian mollusks. U. Scheller presents a taxonomic paper on Chilean and Argentinian pauropods. Both Z. Massaud and E. H. Rapoport write on the Antarctic collembols. The last paper is a detailed taxonomic treatment of the staphylinids in the broad sense by H. Coiffait and F. Saiz.

Each paper is well documented with its own bibliography and many are illustrated. There is no overall index to the volume.

"PLANTS: ADAPTATION THROUGH EVOLUTION" by Joan Eiger Gottlieb, xi & 114 pp., illus., Van Nostrand-Reinhold, Inc., New York, N. Y. 10022. 1969. Paper-back $2.25.

The series of "Selected Topics in Modern Biology" is planned to supplement the college texts in beginning biology and to enrich the offerings on the high school level. This one will be particularly helpful to the student so bewildered by the details in the ascendency of the sporophyte over the gametophyte story that its significance is lost. In a somewhat popularized writing style the gains made by the effective adaptations are stressed with ample illustrations from the aquatic algae, bryophytes (the amphibia of the plant kingdom), pteridophytes (botanical snakes) and through the "spectacular success" of the gymnosperms and angiosperms.

"THE MYXOMYCETES" by G. W. Martin & C. J. Alexopoulos, ix & 561 pp., illus., University of Iowa Press, Iowa City, Iowa 52240. 1969. $30.00.

For the teachers, readers, interested field naturalists and researchers who have been mourning the outdating and the inaccessibility of the classic work of the Listers in the field (A Monograph of the Mycetozoa, ed. 1 in 1894, ed. 2 in 1911 & ed. 3 in 1925) this careful extensive coverage will be a welcomed tool. And through them it will be introduced enthusiastically to others -- students, etc. Our government may well be proud that this work was made possible by National Science Foundation funds.

The bulk of the text is the detailed, keyed, taxonomic treatment. The Myxomycetes are considered the single class in subdivision Myxocotina of division Mycota and distinct from the subdivision Eumycotina with its filamentous (rather than plasmodial) assimilative stage and characteristic reproductive structures. The subordinate taxa in the Myxomycetes are the subclass Ceratiomyxomycetidae with its monotypic order, family and genus, and the subclass Myxogastromycetidae with orders Liceales, Echinosteliales, Trichiales, Stemonitales and Physarales and their accumulated 52 genera. There are 367 very neatly executed colored illustrations by Ruth McVaugh Allen on plates at the end of the text, but there are no electron microscope views. The book is rich in bibliography and all known names not accounted for in the taxonomic descriptions are dealt with in an appendix. All is satisfactorily indexed.

The excellent introduction discusses generally slime mold morphology, life history, physiology, lab culture, ecology and cosmopolitan geographic distribution, and specimen collection.

"POPULATION BIOLOGY AND EVOLUTION -- Proceedings of the International Symposium Sponsored by Syracuse University and New York State Science and Technology Foundation, June 7--9, 1967" edited by Richard C. Lewontin, vii & 205 pp., illus., Syracuse University Press, Syracuse, New York 13210. 1968. $8.00.

This book consists of the thirteen main speeches presented with bibliographies for each, no overall index, and none of the discussions which observers reported as spirited and interesting. The editor's introductory paper tells how the planners attempted to assemble those developmental biologists, ecologists and geneticists aware of the interdependence of their subjects as the ensuing papers show in part. They include Robertson's "Spectrum of Genetic Variation", Stebbins' "Integration of Development and Evolutionary Progress", Waddington's "Paradigm for the Evolutionary Process", Rendel's "Genetic Control of a Developmental Process", Levins' "Evolutionary Consequences of Flexibility", Crow's "Some Analyses of Hidden Variability in Drosophila Populations", Wallace's "Polymorphism, Population Size, and Genetic Load", Dobzhansky's "Adaptiveness and Fitness", Carson's "Population Flush and its Genetic Consequences", Harper's "Regulation of Numbers and Mass in Plant Populations", MacArthur's "Theory of

the Niche", Hutchinson's "When are Species Necessary?" and Slobodkin's "Toward a Predictive Theory of Evolution".

Botanists will find all of this material worthwhile reading.

"THE CACTI OF ARIZONA" by Lyman Benson, revised 3rd edition, xvii & 218 pp., illus., University of Arizona Press, Tucson, Arizona. 1969. $6.95.

This is one of those rare books that has something for everybody -- the bibliophile, the naturalist, the afecionado of our deserts and our Southwest, the teachers of systematic botany and their students, and the systematists. All this is possible between the covers of this formal monographic study of the Cactaceae because the very able teacher-systematist-field naturalist-author has an eye for beauty and a knack for sharing four decades of careful research enthusiastically with others through simple explanations.

The first edition of this work appeared in 1940, the second in 1950, and now this one is an almost wholly new work covering 68 species and their several varieties. The keys work facilely, the descriptions are clear-cut, the new Latin diagnoses are easy to read, the geographic distributions are given fully for each taxon and are also shown on county maps for Arizona, synonymy and common names are carefully recorded. It seems strange to hunt for and not find a bibliography, but most pertinent references are recorded in part or completely throughout the text. The copious, attractive illustrations are the glory of this book because they are well chosen and beautifully printed. There are brilliant color photographs, clear black/white ones and realistic plant drawings. There are comparative charts distinguishing the varieties of most species, and another locating quantitatively the known cactus species and their varieties among the following natural vegetation types in Arizona -- (1) Chihuahuan, (2) Colorado, (3) Arizona, (4) Mojavean, (5) Sagebrush and (6) Navajoan deserts, (7) desert and (8) Great Plains grasslands, (9) Juniper-Pinyon and (10) Southwestern Oak woodlands and chaparral, and (11) Rocky Mountain Montane forest. There are directions for the cultivation, care and preservation of cacti.

Everything about this book is of the highest quality except the price which is fantastically low.

"THE PLANT LIFE OF MARYLAND" by Forest Shreve et al., xiv & 533 pp., illus., authorized reprint of U. S. Floras, Vol. 5, edited by J. Cramer, Lehre, Germany, also distributed by Wheldon & Wesley, Ltd., Codicote, Herts, England, and Stechert-Hafner Service Agency, New York 10003. 1969.

This scientifically valuable work was first published in 1910 by the Johns Hopkins University Press as Special Publication Volume III of the Maryland Weather Service and has long since been out of print. In spite of additions to and subtractions from the flora and

also because of them, it is indeed fortunate to have this study available again for comparative purposes, for the wealth of its phytogeographical and historical information, and for its emphasis on ecology that is growing in popular interest today. The work is well indexed and illustrated, and well documented with bibliography. The map drawings are very clear; fortunately the 74 black/white habitat photographs have lost less definition in this reprinting than most works suffer.

The book is divided into 7 parts. Part I is introductory, dealing with the climatology, topography, mineralogy and soils of the eastern and the western shore districts of the coastal zone, the lower and upper districts of the midland zone, and the mountain zone. Parts II and III give still valuable detailed ecological plant geography data and descriptions for these respective zones. Part IV develops the relation of the natural vegetation to crop possibilities, while Part V describes the agricultural features of the state and Part VI the forests and their products. Part VII consists of the check list of 1400 plants collected or observed, arranged by families and recorded with county and other collection data and common names.

"FLOWERING PLANTS: FLOWERING RUSH TO RUSHES" by Robert H. Mohlenbrock, xiii & 272 pp., illus., Southern Illinois University Press, Carbondale, Illinois 62901, also Feffer & Simons, Inc., London & Amsterdam. 1970. $10.00.

"FLOWERING PLANTS: LILIES TO ORCHIDS" by Robert H. Mohlenbrock, xiii & 288 pp., illus., Southern Illinois University Press, Carbondale, Illinois 62901, also Feffer & Simons, Inc., London & Amsterdam. 1970. $10.00.

These are the first two volumes of the flowering plants in the "Illustrated Flora of Illinois" edited by and also authored by Dr. Mohlenbrock. Each is excellent and together they are a most promising substantial start at "this first attempt by any botanists in the country to produce a work which covers the whole range of plant groups." The volume on ferns by the same author has already been published. There are good keys and species descriptions, uniform county distribution maps, range and frequency notes, habitats, common names, and many other pertinent items of information. For each species there is an excellent line drawing that is both realistic and attractive and also shows diagnostic characteristics readily.

The "flowering rush to rushes" volume includes 116 species in 32 genera from the Alismales through the Commelinales.

The "lilies to orchids" volume includes 132 species in 53 genera in the Liliales and Orchidales.

These books will prove to be delightful companions to the amateur naturalist and to the beginning botany student because explanations are so clearly given and they will also prove to be valuable guides to the professional botanist and instructors because these selfsame explanations are so accurately and thoroughly rendered.

PHYTOLOGIA

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CONTENTS

ROBINSON, H., *Notes on the moss genera, Camptochaete, Physcomitrium and Ptychomnion,* in Chile 329

KING, R. M., & ROBINSON, H., *Studies in the Eupatorieae (Compositae). XXXII. A new genus, Neocuatrecasia* 332

ROBINSON, H., *South American species of Stomatanthes (Eupatorieae, Compositae)* 334

MOLDENKE, H. N., *A new Lantana from Honduras and some new names in Clerodendrum* 338

MOLDENKE, H. N., *Additional notes on the Eriocaulaceae. XXXIV* . . . 339

WURDACK, J. J., *Certamen Melastomataceis XV* 369

HANDRO, O., & SMITH, L. B., *A new combination in Hypocyrta, Gesneriaceae* 390

MOLDENKE, A. L., *Book reviews* 391

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NOTES ON THE MOSS GENERA, CAMPTOCHAETE, PHYSCOMITRIUM AND PTYCHOMNION, IN CHILE

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The following notes on the Chilean moss flora are a partial result of study of numerous collections from both the mainland and the Juan Fernandez islands.

Camptochaete orbiculata (Thér.) H.Robinson, comb. nov.
Weymouthia orbiculata Thér., Rev. Bryol. Lichenol. 7: 180. 9. 1935.
Camptochaete arbusculans Broth. ex Bartr., Farlowia 2(3): 316. 1946.

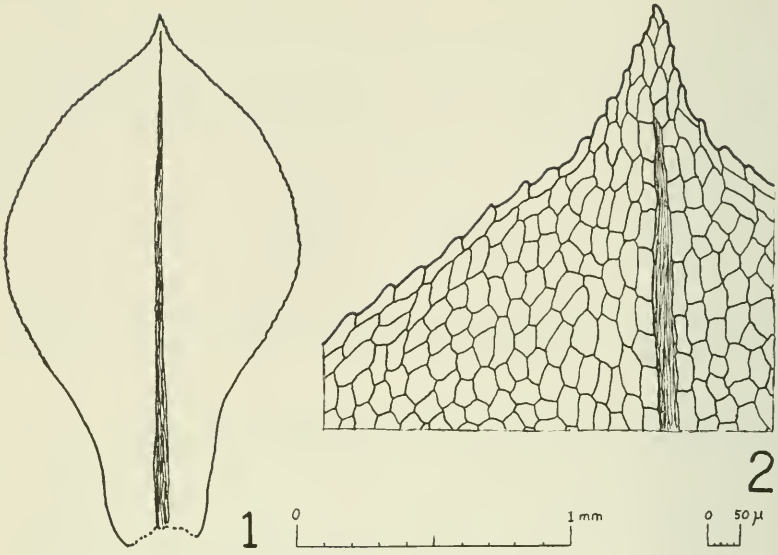
Bartram (1946) following Brotherus correctly recognized the species as a Camptochaete, the only american representative of the genus. The species had been named previously, however, by Thériot.

Physcomitrium mahui H.Robinson, sp. nov. (figures 1-2).

Planta synoica, minuta, ad 5 mm alta, pallide viridis, laxe caespitosa. Caules perbreves, pauce ramosi, in basi radiculosi. Folia superiora late obovata ad 4 mm longa et 2 mm lata, sensim breviter acuminata, margine superne serrulata; nervis tenuibus, infra apicem evanidis; cellulis marginalibus vix dissimilibus, cellulis mediis rectangularibus vel rhomboideis, ad 40 μ latis et 80 μ longis, cellulis basilaribus ad 60 μ latis et 140 μ longis. Calyptrae campanulatae, basi lobatae. Setae breves, 0.5-1.0 mm longae. Capsulae immersae, hemisphaericae; collis brevibus; cellulis exothecialibus laxissimis ad 40 μ diam., non incrassatis, sub ore in 8-10 seriebus vix oblatis. Opercula obtuse apiculata, aliquantum conica ubi immatura. Sporae sphaericae, dense papillosae, 30-35 μ diam.

Chile: Aconcagua: Balneario Papudo, en una charca. 8-12-1969. Manuel Mahu M. 4835 (holotype US).

The new species is a member of the subgenus Cryptopyxis and is closely related to the recently described P. delicatulum Crum & Anderson of Mexico. Both species have the distinctive broadly ovate "spathulate" leaves and wide hemispherical capsules. The mexican species differs by having leaves more nearly entire and bordered with 2-3 rows of narrow thickened cells.



Figures 1-2. Physcomitrium mahui n. sp. 1. Upper leaf. 2. Leaf tip showing cells.

The beautiful austral genus, Ptychomnion, contains a number of distinct species that have been inadequately characterized in the past. Recent attempts to determine specimens from the Chilean area have resulted in the concepts contained in the following key.

1. Leaf apices very shortly acute or acuminate with small marginal serrations.
 2. Leaves widely spreading from base, usually flattened with rather distinct longitudinal plications; cell walls very thin P. ptychocarpon
 2. Leaves becoming squarrose from a sheathing base, rather concave distally with a short twisted apex; cell walls wider than the lumens P. densifolium
1. Leaf apices distinctly and often abruptly elongate with few to many large sharp teeth.
 3. Leaves not distinctly concave, serration rather remote; cell walls as wide as cell lumens P. subaciculare
 3. Leaves in part concave, serrations strong and close-set; cell walls not as wide as cell lumens.
  4. Leaves mostly spreading from base, very broadly ovate with very abrupt attenuate apex P. aciculare
  4. Leaf bases somewhat imbricated, leaves ovate-lanceolate.

5. Leaf apices gradually tapering, leaf margins in basal half strongly recurved; cell walls very slightly thickened P. fruticetorum
5. Leaf apices rather attenuate, leaf margins not or weakly recurved in basal half; cell walls distinctly thickened P. cygnisetum

Ptychomnion aciculare (Brid.) Mitt. occurs widely in the Australian region and the south Pacific. There are reports from Chile but I have seen no material. The Juan Fernandez endemic, P. falcatulum Broth. in Skottsb. as described and illustrated is very close, having been distinguished by secund leaves. Dixon's species, P. gracillimum, is also very close. The latter is said to be smaller but the few measurements given by Dixon overlap with P. aciculare.

Ptychomnion cygnisetum (C.Müll.) Kindb. seems to be primarily in southern South America. I have seen reports but no material from the Australian region.

Ptychomnion densifolium (Brid.) Jaeg. occurs on islands of the southern Atlantic and Indian Oceans. It is also reported from the southern tip of South America. Brotherus and Kaal have described P. ringianum from Possession Island which is very like P. densifolium with the possible exception of the weakly recurved lower leaf margin.

Ptychomnion fruticetorum C.Müll. is known only from southern Brazil. The strongly squarrose leaves from sheathing bases with strongly recurved basal margins and evenly tapered tips are reminiscent of P. densifolium. The latter is a much smaller plant with much thicker cell walls, however. If the other species cited for southern Brazil, P. latifolium Aongstr., is not distinct, the Aongström name will have priority.

Ptychomnion ptychocarpon (Schwaegr.) Mitt. is restricted to southern South America. This is the most distinctive member of the genus, having little superficial resemblance to the other species.

Ptychomnion subaciculare Besch. is restricted to but widely distributed in southern South America including the Juan Fernandez Islands. As described and illustrated, P. horridum, Card. and Broth. is the same. Perhaps Brotherus realized this fact since he excluded the species from later treatments.

Literature Cited

Bartram, E. B. 1946. New mosses from Tierra del Fuego. Farlowia 2(3): 309-319.

STUDIES IN THE EUPATORIEAE (COMPOSITAE). XXXII.

A NEW GENUS, NEOCUATRECASIA.

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Microscopic examinations have revealed a distinctive group of four closely related species in the Central Andes of South America. The plants all have a carpopodium with rather large quadrate cells and thin walls with beaded thickenings, and slender stalked corollas with very papillose inner lobed surfaces, both characters reminiscent of Ageratina. Though no closer relationship than Ageratina can be suggested at this time, the four species are very distinct in having densely hairy bases on the styles and distinct annular thickenings in the anther collar.

We take great pleasure in naming this new genus in honor of Dr. Jose Cuatrecasas, who has added greatly to our knowledge of the flora of the Andes.

Neocuatrecasia R.M.King and H.Robinson, genus novum Compositarum (Eupatorieae). Plantae herbacea erectae vel laxe procumbentia. Caulis teneris. Folia plerumque opposita, ovata vel deltoidea, distincte vel breve petiolata, integra ad dentata ad lobata. Inflorescentiae laxe corymbosae. Involucri squamae ca. 10-13 subaequales oblanceolati-oblongae obtusae vel acutae; receptacula convexa glabra. Flores 17-30 in capitulo; corollae inferne angustae superne profunde campanulatae, extus glanduliferae, lobis intus dense papillosis extus nonpapillosis breve setosis; filamento antherarum in parte superiore angusta, cellulis parietibus transverse annulatis, appendicibus antherarum longe triangularibus; styli inferne valde nodulosi hirsuti, appendicibus densi papillatis; achaenia prismatica 5-costata dense setifera; carpopodia breve rotundata, cellulis plerumque quadratis, parietibus tenuibus; pappi setiformes scabri persistentes.

Species typica: Eupatorium lobatum B.L.Robinson

Our studies indicate that the genus contains the following four species.

Neocuatrecasia dispar (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium dispar B.L.Robinson, Contr. Gray Herb. n.s. 67:14. 1926. Peru.

Neocuatrecasia lobata (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium lobatum B.L.Robinson, Proc. Amer. Acad. 55: 21. 1919. Bolivia.

Neocuatrecasia mancoana (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium mancoanum B.L.Robinson, Contr. Gray Herb. n.s. 90: 28. 1930. Peru.

Neocuatrecasia thymifolia(Britton) R.M.King & H.Robinson, comb. nov. Eupatorium thymifolium Britton, Bull. Torrey Bot. Club 29: 1. 1892. Bolivia.

Acknowledgement

This study was supported in part by the National Science Foundation Grant GB - 20502 to the senior author.

Note on the genus Ayapana. The following species is to be added to those included in the recent review of the genus (King & Robinson, 1970).

Ayapana ornithophora (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium ornithophorum B.L.Robinson, Proc. Amer. Acad. 54:254. 1918.

King, R.M. & H.Robinson 1970. Studies in the Eupatorieae (Compositae). XXX, The genus Ayapana. Phytologia 20(3):210-212.

SOUTH AMERICAN SPECIES OF STOMATANTHES (EUPATORIEAE, COMPOSITAE)

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The concept of Stomatanthes R.M.King & H.Robinson, originally described from Africa, is extended here to include twelve species from South America having hairs on the base of the style, often enlarged tips on the style branches, short thick filaments on the stamens, and sometimes stomates on the corolla. The species are erect herbs and subshrubs from the campos of eastern Brazil, Bolivia and Uruguay, and show clear indication of close relationship in spite of some differences in habit and corolla and leaf pubescence. The concept includes material previously referred to under the herbarium name Microconia P.Dusen (King & Robinson, 1970a) and others which have a greater number of flowers and phyllaries than are found in the type species S. africanus.

The expanded style branches found in some of the South American species of Stomatanthes are basically like those found in many Critonioids though in some cases more extreme. Still, the hairy style base and stomates on the corolla are not known in the Critonioid genera. Stomatanthes actually belongs in the Eupatorioid series where stomates are found on the corollas of Eupatoriadelphus R.M.King & H.Robinson. The blunt tips on the pappus setae of S. hirsutus are reminiscent of both Eupatorium L. of the North Temperate region and Austroeupatorium R.M.King & H.Robinson of South America. Both these genera differ from Stomatanthes by having only glands on the achene and by their more slender anther filaments. Eupatorium is further distinct by the inornate anther collars, and Austroeupatorium by the enlarged and large-celled carpopodium.

The occurrence of stomates on the corollas of Eupatorieae has been mentioned in previous papers on Stomatanthes (King & Robinson, 1970a) and Eupatoriadelphus (King & Robinson, 1970b). Such stomates are often difficult to see, especially in the South American species where they are scarce, small or hidden by glands. Stomates have been seen on corollas of S. dictyophyllus, S. oblongifolius, S. loefgrenii, S. subcapitatus and S. trigonus. In spite of repeated efforts no such stomates have been found in any of the closely related group including S. corumbensis, S. dentatus, S. hirsutus or S. pinnatipartitus. Further examination of S. africanus indicatus stomates may be completely lacking on corollas of some specimens of that species.

Stomatanthes R.M.King & H.Robinson, Phytologia 19: 430. 1970.

Plants perennial, herbaceous or subshrubs. Stems erect or ascending, sparingly to densely branching. Leaves alternate, opposite or sometimes near the base nearly ternate, elliptical, oblanceolate or ovate to orbicular, entire to grossly dentate. Inflorescence usually paniculate-corymbose. Involucre with 5-12 narrowly oblong or lanceolate subimbricate scales in 2-3 series; receptacle scarcely convex, glabrous. Heads with 4-11 flowers; corollas tubular or funnelform, glabrous inside, glabrous or glandular with few to many hairs outside, outer surface of lobes often with stomates, cells narrow with sinuous walls; anther filaments very thick throughout, inserted well above corolla base, collar with two layers of transversely or irregularly banded cells, anther appendage elongate or short with rather large cells; style base without enlarged node, with numerous hairs, style appendages usually with short sharp papillae, tips of appendages sometimes slightly or greatly enlarged with smooth surfaces; achenes prismatic, 5-8 costate, densely setiferous and sometimes glanduliferous; carpopodia usually distinct, cells rather small and subquadrate with rather thin nodulose walls; pappus of numerous scabrous setae, apical cells of setae acute or obtuse.

Type species: Eupatorium africanum Oliv. & Hiern.

Chromosome number known only for S. africanus, x = 10 (Turner & Lewis, 1965).

Key to Species of Stomatanthes

1. Plants with long scapose inflorescence; leaves glabrous, without glands or hairs S. oblongifolius
1. Plants with large paniculate-corymbose inflorescence; leaves with glands and at least a few indistinct hairs.
2. Tip of style branch not or scarcely enlarged; anther appendage as long as wide or longer.
3. Phyllaries obtuse S. africanus
3. Phyllaries narrowly acute to caudate tipped.
4. Leaves ovate to spathulate or oblanceolate.
5. Leaves spathulate-oblanceolate, pinnate-veined, not obviously reticulated, often subopposite or alternate S. polycephalus
5. Leaves ovate to obovate, somewhat 3-nerved, closely and obviously reticulated, mostly opposite S. pernambucensis
4. Leaves broadly ovate to orbicular.
6. Leaves with few sparse hairs S. warmingii
6. Leaves densely pubescent below S. dictyophyllus
2. Tip of style branch distinctly enlarged; anther appendage usually much shorter than wide.
7. Corolla glabrous S. subcapitatus
7. Corolla lobes densely glandular.
8. Leaves broadly ovate to orbicular, serrate or entire.

9. Heads with 5 flowers S. trigonus
9. Heads with 6-8 flowers S. loefgrenii
8. Leaves narrow or strongly lobed.
10. Leaves 1 cm or less in length, margins strongly lobed S. pinnatipartitus
10. Leaves 2 cm or more in length, dentate to entire.
11. Apical cells of pappus setae very blunt; leaves sharply dentate S. hirsutus
11. Apical cells of pappus setae subacute to acute; leaves serrate to entire.
12. Leaf blade lanceolate, lower surface covered with fine dense pubescence and appearing much paler than upper surface; heads with 9-11 flowers S. corumbensis
12. Leaf oblanceolate to spathulate, covered with very coarse hairs, lower surface scarcely grayer than upper; head with usually 4 flowers S. dentatus

Studies have shown that the following twelve South American species should be added to the genus.

Stomatanthes corumbensis (B.L.Robinson) H.Robinson, comb. nov. Eupatorium corumbense B.L.Robinson, Contr. Gray Herb. n.s. 104: 15. 1934. Brazil (Matto Grosso).

Stomatanthes dentatus (Gardn.) H.Robinson, comb. nov. Eupatorium dentatum Gardn., Hook. Lond. Journ. Bot. 6: 443. 1847. Brazil (Goyaz, Matto Grosso, Minas Gerais, São Paulo); Bolivia.

Stomatanthes dictyophyllus (A.P.Decandolle) H.Robinson, comb. nov. Eupatorium dictyophyllum A.P.Decandolle, Prodr. 5: 153. 1836 (as dyctiophyllum). Brazil (Dist. Fed., Goyaz, Minas Gerais, São Paulo).

Stomatanthes hirsutus H.Robinson, sp. nov.

Plantae suffrutescentes. Caules dense pilosi. Folia plerumque opposita, membranacea, ad 6 cm longa 2 cm lata, elliptica vel oblanceolata, in dimidio distali grosse dentata, laxe reticulata, inferne erecte hirsuta parum canescentia, superne breve pubescentia. Inflorescentiae laxe paniculatae. Involucri squamae lanceolatae acutae. Flores ca. 7 in capitulo; corollae extus dense glandulosae, lobis estomatophoris?; appendicibus antherarum brevibus; styli ad apicem distincte latiores; pappi interdum in monadis dehiscentes, cellulis apicalibus obtusis.

Brazil: Distrito Federal: Gama, Cerrado by Rio Gama (field A-43), 7 March 1965, L.B.Smith 15063 (holotype US).

The species is related to S. dentatus and S. corumbensis but the leaves lack the stout hairs of the former or the dense matted abaxial pubescence of the latter. The number of flowers

per head is also different. The most distinctive feature of S. hirsutus is the blunt apical cells of the pappus setae that can be seen under the compound microscope.

Stomatanthes loefgrenii (B.L.Robinson) H.Robinson, comb. nov. Eupatorium loefgrenii B.L.Robinson, Contr. Gray Herb. n.s. 104: 18. 1934. Brazil (São Paulo).

Stomatanthes oblongifolius (Schultz-Bip. ex Baker) H.Robinson, comb. nov. Eupatorium oblongifolium Schultz-Bip. ex Baker in Mart., Fl. Bras. 6(2): 333. 1876. Brazil (Rio Grande do Sul); Uruguay.

Stomatanthes pernambucensis (B.L.Robinson) H.Robinson, comb. nov. Eupatorium pernambucense B.L.Robinson, Contr. Gray Herb. n.s. 90: 31. 1930 (nom. nov. E. bracteatum Gardn. not Hook. & Arn.). Brazil (Pernambuco).

Stomatanthes pinnatipartitus (Schultz-Bip. ex Baker) H.Robinson, comb. nov. Eupatorium pinnatipartitum Schultz-Bip. ex Baker in Mart., Fl. Bras. 6(2): 338. 1876. Brazil (São Paulo).

Stomatanthes polycephalus (Schultz-Bip. ex B.L.Robinson) H.Robinson, comb. nov. Eupatorium polycephalum Schultz-Bip. ex B.L.Robinson, Contr. Gray Herb. n.s. 77: 30. 1926. Brazil (Minas Gerais).

Stomatanthes subcapitatus (Malme) H.Robinson, comb. nov. Eupatorium subcapitatum Malme, Kgl. Svensk. Vet.-Akad. Handl. ser. 3. 12(2): 45. 1933. Brazil (Paraná).

Stomatanthes trigonus (Gardn.) H.Robinson, comb. nov. Eupatorium trigonum Gardn., Hook. Lond. Journ. Bot. 6: 446. 1847. Brazil (Goyaz, Minas Gerais, São Paulo).

Stomatanthes warmingii (Baker) H.Robinson, comb. nov. Eupatorium warmingii Baker in Mart., Fl. Bras. 6(2): 339-340. 1876. Brazil (Minas Gerais).

Literature Cited

King, R. M. & H. Robinson 1970a. Studies in the Eupatorieae (Compositae). XXIV. A new genus Stomatanthes. Phytologia 19: 429-430.

_____ & _____ 1970b. Studies in the Eupatorieae (Compositae). XXV. A new genus Eupatoriadelphus. Phytologia 19: 431-432.

Turner, B. L. & W. H. Lewis 1965. Chromosome numbers in the Compositae. IX African species. Journ. S. African Bot. 31(3): 207-217.

A NEW LANTANA FROM HONDURAS AND SOME NEW NAMES IN CLERODENDRUM

Harold N. Moldenke

LANTANA HIRTA f. CAERULEA Moldenke, f. nov.

Haec forma a forma typica speciei corollis caeruleis recedit.

This form differs from the typical form of the species in having blue corollas.

The type of the form was collected by Fred A. Barkley & Julio Hernández R. (no. 40502) in the cloud forest in the mountains east of La Esperanza, at an altitude of about 7000 feet, Intibucá, Honduras, on May 22, 1970, and is deposited in my personal herbarium at Plainfield, New Jersey. The collectors describe the plant as 0.5 meter tall.

CLERODENDRUM PHILIPPINUM f. CORYMBOSUM (Lam & Bakh.) Moldenke, comb. nov.

Clerodendron fragrans f. corymbosa Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 88. 1921.

CLERODENDRUM PHILIPPINUM var. SIMPLEX Moldenke, var. nov.

Haec varietas a forma typica speciei corollis simplicibus (non plenis) recedit.

This variety differs from the typical form of the species in having its corollas simple, not partly nor wholly "doubled" with supernumerary petals formed of transformed stamens and pistil.

The type of this variety was collected by F. Floto (no. 7634) at Ban Musseo, between Tak and Mae Sot, at an altitude of 400 meters, Thailand, on July 21, 1959, and is deposited in my personal herbarium at Plainfield, New Jersey.

It is unfortunate that a strict interpretation of the present edition of the International Rules of Botanical Nomenclature forces us to discard the well-known name of C. fragrans var. pleniflorum Schau. for the double-flowered form of this plant and actually forces us to regard this double-flowered form as the "typical" form of the species in the nomenclatural sense. The biologically original single-flowered form then has to become a nomenclatural variety of the double-flowered form. An exactly similar case is seen in Spiraea prunifolia Sieb. & Zucc. and S. prunifolia f. simpliciflora Nakai.

ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXXIV

Harold N. Moldenke

My purpose in publishing these fragmentary and miscellaneous notes from time to time is to place on record in a single series of papers and in a single journal all the information available to me at the time of publication concerning members of this interesting plant family, especially in regard to nomenclature, synonymy, bibliography, misidentifications, and the citation of specimens and illustrations. Since in the limited space available, not all of the information can be repeated here, it has been thought most important to cite as complete a bibliography of the family and of each genus, species, and named subspecific entity as possible, so that future workers interested in a given genus or species may quickly be led to all known sources of information on the subject.

The group has not been thoroughly monographed in its entirety since 1903, and I have no time to attempt it. Instead, it is my purpose to make available to the next monographer as much information as possible and as complete a list of sources where he/she may obtain more information as is possible for me to provide at this time. For this reason, additional bibliographic citations are listed as they are discovered by me or as they are reported to me. Individually the specific paragraphs may seem of hardly any value, but when added to the paragraphs previously published in this series about the given taxon, their value may be better realized.

ERIOCAULACEAE Lindl.

Additional & emended bibliography: L., Gen. Pl., ed. 5, pr. 1, 38 & [509]. 1754; Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 1—71, pl. 1—5. 1835; Klotzsch in M. R. Schomb., Reisen Brit.-Guian. [Vers. Fauna & Fl. Brit.-Guian.] 3: 896 & 1063—1064. 1848; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 26—33. 1901; Arech., Anal. Mus. Montevid. 4 (1): 19—24, [153], & [154]. 1902; Lutz & Machado, Mem. Inst. Oswaldo Cruz 7: 15, pl. 10. 1915; Malmanche, Contrib. Étud. Anatom. Eriocaul. [thesis] 159. 1919; Saunders, Ann. Bot. 39: 157 & 158, fig. 68 & 69. 1925; H. A. Gleason, Bull. Torr. Bot. Club 58: 328—330. 1931; Perrier de la Bâthie, Cat. Pl. Madag. in Acad. Malg. 22. 1934; J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 489—494, i, & ii. 1936; Perrier de la Bâthie, Biogéogr. Pl. Madag. 47. 1936; Jacques-Félix, Bull. Soc. Bot. France 94: [143]—151 & 461. 1947; Moldenke in Maguire & al., Bull. Torr. Bot. Club 75: 194—203. 1948; Hare, Journ. Linn. Soc. Lond. Bot. 53: 422—448, fig. 6—40, pl. 22. 1950; J. A. Steyerm., Fieldiana Bot. 28: 824—825 & 1188. 1957; H. Hess, Bericht. Schweiz. Bot. Ges. 67: 83—90. 1957; Ohwi, Journ. Jap. Bot. 33: 209—213. 1958; Hisauchi, Excerpt. Bot. A.2: 194. 1960; Stauffer, Excerpt. Bot. A.2: 84. 1960; L., Gen. Pl., ed. 5, pr. 2 [Cramer & Swann, Hist. Nat. Class. 2], 38 &

[509]. 1960; Tomlinson, Journ. Linn. Soc. Lond. Bot. 59: 163—173. 1964; Sharma, Palynolog. Bull. 1: 45—48, fig. 1—7. 1965; Chanda, Gran. Palynolog. 6: 387. 1966; Hansen, Excerpt. Bot. A.12: 520. 1967; Sahtapau, Excerpt. Bot. A.11: 1967; Kramer, Excerpt. Bot. A. 11: 163. 1967; Hocking, Excerpt. Bot. A.11: 552. 1967; Deb, Gupta, & Malick, Bull. Bot. Soc. Bengal 22: 210. 1968; Sharma, Journ. Palynolog. Spec. Vol. 34 & 49. 1968; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146]—192, fig. 30—39. 1969; R. G. West in Walker & West, Stud. Veg. Hist. Brit. Isles 8. 1970; Van Steenis-Kruseman, Fl. Males. Bull. 5, Ind. LV. 1970; Moldenke, Phytologia 20: 243—269. 1970.

The Martius work cited in the bibliography above is often listed as "1833", and, indeed, the manuscript was "Der Akademie mitgetheilt den 6. Juli 1833", but the late Dr. John H. Barnhart, noted botanical biographer and bibliographer, says "I can find no evidence that this paper was published until 1835".

BLASTOCAULON Ruhl.

Additional bibliography: Saunders, Ann. Bot. 39: 157. 1925; Moldenke in Maguire & al., Bull. Torr. Bot. Club 75: 202. 1948; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 158, 184, 186—188, & 191. 1969; Moldenke, Phytologia 20: 244—245. 1970.

BLASTOCAULON ALBIDUM (Gardn.) Ruhl.

Additional synonymy: Blastocaulon albidum Ruhl. apud Prain, Ind. Kew. Suppl. 3: 26. 1908.

Additional bibliography: Moldenke, Phytologia 20: 245. 1970.

BLASTOCAULON PROSTRATUM (Körn.) Ruhl.

Additional synonymy: Blastocaulon prostratum Ruhl. apud Prain, Ind. Kew. Suppl. 3: 26. 1908.

Additional bibliography: Moldenke, Phytologia 20: 245. 1970.

BLASTOCAULON RUPESTRE (Gardn.) Ruhl.

Additional synonymy: Blastocaulon rupestre Ruhl. apud Prain, Ind. Kew. Suppl. 3: 26. 1908.

Additional bibliography: Saunders, Ann. Bot. 39: 157. 1925; Moldenke in Maguire & al., Bull. Torr. Bot. Club 75: 202. 1948; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 184, 186—188, & 191. 1969; Moldenke, Phytologia 20: 245. 1970.

The Mello Barreto 10129 [Herb. Jard. Bot. Rio Jan. 24419], distributed and previously cited by me as Blastocaulon rupestre, is actually Paepalanthus bryoides (Riedel) Kunth. Schwacke 8486 appears to be a mixture with Paepalanthus bryoides.

Emended citations: BRAZIL: Minas Gerais: Schwacke 8486 [Herb. Jard. Bot. Belo Horiz. 26666; Herb. Magalhães Gomes 2962] (B, N).

CARPTOTEPALA Moldenke

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 175, 178, 179, 184—187, & 191, fig. 37 A & B. 1969; Mol-

denke, Phytologia 20: 245—246, 296, & 297. 1970.

CARPTOTEPALA JENMANI (Gleason) Moldenke

Additional synonymy: Carptotepala jenmanii (Gleason) Moldenke ex Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 175, 178, 179, 184—187, & 191, fig. 37 A & B. 1969; Moldenke, Phytologia 20: 246, 296, & 297. 1970.

Illustrations: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 178, fig. 37 A & B. 1969.

ERIOCAULON Gron.

Additional synonymy: Eriocavlon Raeusch., Nom. Bot. 30. 1797.

Additional & emended bibliography: L., Gen. Pl., ed. 5, pr. 1, 38 & [509]. 1754; Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): [3], 4, 6, 7—13, 15, 16, 22, 24, 27, 29, 31, 33, 38, 40, 41, 51, 55, 57, 58, & 63, pl. 1, fig. 2, pl. 2, fig. 2, & pl. 5. 1835; Klotzsch in M. R. Schomb., Reisen Brit.-Guian. [Vers. Fauna & Fl. Brit.-Guian.] 3: 896 & 1063—1064. 1848; Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 32—33. 1901; Arech., Anal. Mus. Montev. 4 (1): 20—23 & [153]. 1902; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 284—287, 293—295, & 299, fig. A & B. 1908; Saunders, Ann. Bot. 39: 157. 1925; J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 489—493 & 1. 1936; Jacques-Félix, Bull. Soc. Bot. France 94: [143] & 144. 1947; Moldenke in Maguire & al., Bull. Torr. Bot. Club 75: 194—196. 1948; Hare, Journ. Linn. Soc. Lond. Bot. 53: 422—448, fig. 6—40, pl. 22. 1950; H. Hess, Bericht. Schweiz. Bot. Ges. 67: 83—90. 1957; Ohwi, Journ. Jap. Bot. 33: 209—213. 1958; Hisauchi, Excerpt. Bot. A.2: 194. 1960; Stauffer, Excerpt. Bot. A.2: 84. 1960; L., Gen. Pl., ed. 5, pr. 2 [Cramer & Swann, Hist. Nat. Class. 3], 38. 1960; Tomlinson, Journ. Linn. Soc. Lond. Bot. 59: 169 & 173. 1964; Sharma, Palynolog. Bull. 1: 45—48, fig. 1—7. 1965; Hansen, Excerpt. Bot. A.12: 520. 1967; Kramer, Excerpt. Bot. A.11: 163. 1967; Santapau, Excerpt. Bot. A.11: 176. 1967; Hocking, Excerpt. Bot. A.11: 552 (1967) and A.13: 506 & 510. 1968; Deb, Gupta, & Malick, Bull. Bot. Soc. Bengal 22: 210. 1968; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146]—149, 154—163, 166—177, & 180—192, fig. 32 A—K, 33 J & L, 35 A—E & J—L, 36 A—D & K—N, 38 A—D & G—K, & 39 E—J. 1969; R. G. West in Walker & West, Stud. Veg. Hist. Brit. Isles 9. 1970; Van Steenis-Kruseman, Fl. Males. Bull. 5, Ind. LV. 1970; Moldenke, Phytologia 20: 246—248, 250, 253—257, 259, 263—265, 267, 268, 277, 278, 280, 281, 287, 294, 295, 297, 302, 303, & 307. 1970.

Raeuschel (1797) records the German vernacular name "Ekkenhalm" for members of this genus. The Martius work cited in the bibliography above is often listed as published in "1833", and, indeed, the manuscript was submitted for publication on July 6, 1833, but the noted botanical bibliographer, John H. Barnhart, says "I can find no evidence that this paper was published until 1835".

ERIOCAULON ACANTHOCEPHALUM Griff.
Additional bibliography: Moldenke, Phytologia 18: 76. 1969; Moldenke, Biol. Abstr. 50: 6336. 1969.

ERIOCAULON ACHITON Körn.
Additional bibliography: Hansen, Excerpt. Bot. A.12: 520. 1967; Moldenke, Phytologia 20: 6. 1970.

ERIOCAULON ADAMESII Meikle
Additional & emended bibliography: Moldenke, Phytologia 3: 143 & 181 (1949) and 17: 477. 1969.

ERIOCAULON AFZELIANUM Wikstr.
Additional & emended bibliography: Körn., Linnaea 27: 582, 586, & 680—682. 1856; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161, 171, & 189. 1969; Moldenke, Phytologia 19: 323. 1970.

ERIOCAULON ALPESTRE Hook. f. & Thoms.
Additional & emended bibliography: Moldenke, Phytologia 2: 376 & 377 (1947), 2: 493 (1948), and 3: 144 & 181. 1949; K. U. Kramer, Excerpt. Bot. A.6:33. 1963; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171, 172, 184, 187, 189, & 191. 1969; Moldenke, Phytologia 19: 323, 341, 412, & 482. 1970.

ERIOCAULON ALPESTRE var. AMPULLARIUM Van Royen
Synonymy: Eriocaulon alpestre var. ampullerium Kramer, Excerpt. Bot. A.6: 33, sphalm. 1963.
Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 14. 1969.

ERIOCAULON ALPINUM Van Royen
Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 323 & 481. 1970; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970.

ERIOCAULON AMBOENSE Schinz
Additional bibliography: Moldenke, Phytologia 19: 65—66 (1969) and 19: 246. 1970.

ERIOCAULON ANDONGENSE Welw.
Additional bibliography: Moldenke, Phytologia 19: 15 (1969) and 19: 469. 1970.

ERIOCAULON ANGUSTIFOLIUM Körn.
Additional & emended bibliography: Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 494—496 & 507. 1863; Moldenke, Phytologia 19: 323 & 481. 1970.

ERIOCAULON ANGUSTISEPALUM H. Hess
Additional bibliography: H. Hess, Bericht. Schweiz. Bot. Ges. 67: 83 & 89. 1957; Moldenke, Phytologia 19: 15. 1969.

ERIOCAULON ANNAMENSE H. Lecomte
Additional bibliography: Moldenke, Phytologia 2: 377. 1947; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161 & 189. 1969; Moldenke, Phytologia 19: 323. 1970.

ERIOCAULON ANNUUM Milne-Redhead
Additional & emended bibliography: Moldenke, Phytologia 3: 143 & 181--182 (1949), 19: 16 (1969), and 19: 476. 1970.

ERIOCAULON ANTUNESII Engl. & Ruhl.
Additional bibliography: Moldenke, Phytologia 19: 324, 345, 446, & 468. 1970.

ERIOCAULON AQUATILE Körn.
Additional & emended bibliography: Körn., Linnaea 27: 600. 1856; Körn. in Mart., Fl. Bras. 3 (1): 495--496 & 507. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 42, 49, 57, 284, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 401 (1946) and pr. 3, 2: 401. 1960; Moldenke, Phytologia 19: 16. 1969.

ERIOCAULON ARECHAVALETAE Herter
Additional & emended bibliography: Arech., Anal. Mus. Montev. 4 (1): 21--23 & [153]. 1902; Moldenke, Phytologia 2: 375 & 377. 1947; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 180, 181, 186, 187, & 191, fig. 38 G. 1969; Moldenke, Phytologia 19: 324 (1970) and 20: 25. 1970.
Additional illustrations: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 180, fig. 38 G. 1969.

ERIOCAULON ARENICOLA Britton & Small
Additional & emended bibliography: Moldenke, Phytologia 1: 311, 350, & 352 (1939) and 19: 324. 1970.

ERIOCAULON ARFAKENSE Van Royen
Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 66. 1969; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970.

ERIOCAULON ARISTATUM H. Hess
Additional & emended bibliography: H. Hess, Bericht. Schweiz. Bot. Ges. 67: 83--84 & 89. 1957; Moldenke, Phytologia 19: 324 & 489. 1970.

ERIOCAULON ATABAPENSE Moldenke
Additional bibliography: Moldenke, Phytologia 19: 324, 456, & 485. 1970.

ERIOCAULON ATRATUM var. MAJOR Thwaites
Additional bibliography: Moldenke, Phytologia 2: 379 (1947) and 19: 324. 1970.

ERIOCAULON AUSTRALE R. Br.
Synonymy: Eriocaulon austeral Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 169, sphalm. 1969.
Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 156, 159--163, 168, 169, 171, 172, 175, 180--187, & 189--191, fig. 33 J, 35 L, 38 D, & 39 E--H. 1969; Moldenke, Phytologia 20: 6 & 23. 1970.
Additional illustrations: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 156, 168, 180, & 182, fig. 33 J, 35 L, 38 D, & 39 E--H. 1969.

ERIOCAULON BARBA-CAPRAE Fyson
Additional bibliography: Moldenke, Phytologia 2: 377 (1947) and 17: 482. 1969.

ERIOCAULON BAURI N. E. Br.
Additional & emended bibliography: N. E. Br. in Thiselt.-Dyer, Fl. Cap. 7: 53--55 & 776. 1897; Moldenke, Phytologia 19: 326. 1970.

ERIOCAULON BEAUVERDI Moldenke
Additional & emended bibliography: Beauverd, Bull. Herb. Boiss., sér. 2, 8: 283--285, fig. 9 A 1--14 (1908) and 8: 987--988, fig. 1 H & J. 1909; Moldenke, Phytologia 2: 373, 374, & 377 (1947), 19: 326 (1970), and 20: 281. 1970.
Emended illustrations: Beauverd, Bull. Herb. Boiss., sér. 2, 8: 285, fig 9 A 1--14 (1908) and 8: 987, fig. 1 H & J. 1909.

ERIOCAULON BENTHAMI Kunth
Additional synonymy: Eriocaulon benthami Hook. ex Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969.
Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171, 172, 184, 186, 189, & 191. 1969; Moldenke, Phytologia 20: 6. 1970.

ERIOCAULON BIFISTULOSUM Van Heurck & Muell.-Arg.
Additional bibliography: H. Hess, Bericht. Schweiz. Bot. Ges. 67: 87--89. 1957; Stauffer, Excerpt. Bot. A.2: 84. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 166, 167, 171, & 189. 1969; Moldenke, Phytologia 20: 6--7. 1970.

ERIOCAULON BONI H. Lecomte
Additional bibliography: Moldenke, Phytologia 2: 377 (1947) and 19: 20. 1969.

ERIOCAULON BRACHYPEPLON Körn.
Additional & emended bibliography: Körn., Linnaea 27: 586 & 665--667. 1856; Moldenke, Phytologia 2: 376 (1947) and 19: 326. 1970.

ERIOCAULON BREVIPEDUNCULATUM Merr.

Additional bibliography: Hocking, Excerpt. Bot. A.7: 455. 1964; Moldenke, Phytologia 20: 7 & 13. 1970.

ERIOCAULON BROMELIOIDEUM H. Lecomte

Additional bibliography: Moldenke, Phytologia 2: 377 (1947) and 19: 21. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171, 172, & 189. 1969.

ERIOCAULON BROWNIANUM Mart.

Additional bibliography: Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 29 & 41. 1835; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171, 172, 185, 186, & 189. 1969; Moldenke, Phytologia 20: 7. 1970.

The Martius reference cited above is often listed as "1833" in bibliographies, which was the date of its submission and acceptance as a manuscript, but according to the late Dr. John H. Barnhart, it was apparently not published until 1835.

ERIOCAULON BRUNONIS Britten

Additional bibliography: Moldenke, Phytologia 20: 7 & 23. 1970.

ERIOCAULON BUCHANANII Ruhl.

Additional synonymy: Eriocaulon buchananii Schlecht. ex Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 189. 1969.

Additional & emended bibliography: Moldenke, Phytologia 3: 143 & 184. 1949; H. Hess, Bericht. Schweiz. Bot. Ges. 67: 84 & 90. 1957; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171 & 189. 1969; Moldenke, Phytologia 19: 327 & 470. 1970.

ERIOCAULON BUERGERIANUM Körn.

Additional & emended bibliography: Moldenke, Phytologia 2: 375 & 376 (1947) and 3: 143, 144, & 184. 1949; Koyama in Ohwi, Fl. Jap. 266 & 268. 1965; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161, 171, 172, 185, 186, & 189. 1969; Moldenke, Phytologia 19: 327 & 417. 1970.

Koyama (1965) records the vernacular name "ō-hoshi-kusa" and says that the plant in Japan grows in rice paddy fields.

ERIOCAULON BURCHELLII Ruhl.

Additional bibliography: Moldenke, Alph. List Cit. 1: 12 (1946) and 4: 1072. 1949; Moldenke, Phytologia 17: 486. 1969.

ERIOCAULON CAAGUAZUENSE Ruhl.

Additional & emended synonymy: Eriocaulon caaguazuensis Ruhl. in Urb., Engl. Bot. Jahrb. 37: 519. 1906. Eriocaulon caaguazensis Ruhl. ex Moldenke, Bull. Jard. Bot. Brux. 27: 134, in syn. sphalm. 1957.

Additional bibliography: Anon., U. S. Dept. Agr. Bot. Subj. Index 5: 4227. 1958; Moldenke, Phytologia 17: 486. 1969.

ERIOCAULON CABRALENSE Alv. Silv.
Additional bibliography: Moldenke, Phytologia 2: 378 (1947) and 18: 171. 1969.

ERIOCAULON CAESIUM Griseb.
Additional bibliography: Moldenke in Maguire & al., Bull. Torr. Bot. Club 75: 196. 1948; Moldenke, Alph. List Cit. 2: 460 (1948) and 4: 1188 & 1229. 1949; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 184, 186, & 191. 1969; Moldenke, Phytologia 18: 172. 1969.
This species resembles in its general habit Paepalanthus brunneus Moldenke of Venezuela and Guyana.

ERIOCAULON CAPITULATUM Moldenke
Additional bibliography: Moldenke, Phytologia 2: 378. 1947; Moldenke, Alph. List Cit. 2: 370 (1948) and 4: 1255. 1949; Moldenke, Phytologia 19: 23. 1969.

ERIOCAULON CARSONI F. Muell.
Additional bibliography: Moldenke, Phytologia 2: 376 (1947) and 19: 328 & 452. 1970.

ERIOCAULON CAULIFERUM Mak.
Additional bibliography: Moldenke, Phytologia 2: 378 (1947) and 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 266 & 267. 1965; Moldenke, Phytologia 19: 23. 1969.
Koyama (1965) describes this as a very rare plant, found only in Tatara-numa, Kozuke Province, on Honshu island, Japan, the vernacular name for it there being "takano-hoshi-kusa".

ERIOCAULON CELEBICUM Van Royen
Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 17: 453 (1968) and 19: 21 & 23. 1969.

ERIOCAULON CEYLANICUM Körn.
Additional & emended bibliography: Körn., Linnaea 27: 586 & 667--669. 1856; Moldenke, Phytologia 2: 377 & 379 (1947) and 19: 328 & 451. 1970.

ERIOCAULON CHINOROSSICUM Komarov
Additional bibliography: Moldenke, Phytologia 2: 375 & 378 (1947) and 19: 24. 1969.

ERIOCAULON CHRISTOPHERI Fyson
Additional bibliography: Moldenke, Phytologia 2: 378 (1947) and 19: 11 & 24. 1969.

ERIOCAULON CINEREUM R. Br.
Additional synonymy: Eriocaulon cinereum var. sieboldianum (Sieb. & Zucc.) Koyama in Ohwi, Fl. Jap. 266. 1965. Eriocaulon sexangulare sensu auct. Japon. ex Koyama in Ohwi, Fl. Jap. 266, in syn. 1965.

Additional bibliography: Hare, Journ. Linn. Soc. Lond. Bot. 53: 443. 1950; Koyama in Ohwi, Fl. Jap. 265—267. 1965; Deb, Gupta, & Malick, Bull. Soc. Bot. Bengal 22: 210. 1968; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 184, 186, & 191. 1969; Moldenke, Phytologia 20: 7—8, 11, 23, & 31. 1970.

Koyama (1965) lists the vernacular name "hoshi-kusa" for this plant and records it from "wet lowlands; Honshu, Shikoku, Kyushu, Korea, Ryukyus, Formosa, China, Philippines, Malaysia, Indochina, India, and Africa. The typical phase is Australian". Deb and his associates (1968) describe E. cinereum as a "small tufted herb", flowering in December, and cite Sengupta 1114 from Bhutan.

ERIOCAULON CIPOENSE Alv. Silv.

Additional bibliography: Moldenke, Phytologia 2: 373 & 378 (1947) and 19: 26. 1969.

ERIOCAULON COERULEUM Van Royen

Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 26. 1969.

ERIOCAULON COLLETTII Hook. f.

Additional bibliography: Moldenke, Phytologia 19: 26—27 & 100. 1969.

ERIOCAULON COLLINUM Hook. f.

Additional bibliography: Santapau, Excerpt. Bot. A.11: 176. 1967; Moldenke, Phytologia 19: 329 & 420. 1970.

ERIOCAULON COMPRESSUM Lam.

Additional bibliography: Muenscher, Aquat. Pl. U. S. 192—194 & 367, fig. 84 K & L, map 205. 1944; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 149, 159, 161, 162, 170, 172, 176, 177, 180—183, 185, 186, & 190, fig. 36 M, 38 J, & 39 I & J. 1969; Moldenke, Phytologia 20: 8, 9, 39, 41, & 52. 1970.

Additional illustrations: Muenscher, Aquat. Pl. U. S. 193, fig. 84 K & L. 1944; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 176, 180, & 182, fig. 36 M, 38 J, & 39 I & J. 1969.

ERIOCAULON COMPRESSUM var. HARPERI Moldenke

Additional & emended bibliography: Moldenke, Phytologia 1: 313, 349—352, 356, 358, 359, & 362 (1939) and 19: 330. 1970.

ERIOCAULON COMPTONII Rendle

Additional bibliography: Moldenke, Phytologia 2: 378 (1947) and 19: 28 & 93. 1969.

ERIOCAULON CONGOLENSE Moldenke

Additional bibliography: Moldenke, Phytologia 17: 493. 1969; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970.

ERIOCAULON CONICUM (Fyson) C. E. C. Fischer

Additional bibliography: Moldenke, Phytologia 2: 378 (1947) and

19: 29. 1969.

ERIOCAULON CRASSISCAPUM Bong.
Additional bibliography: Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 32. 1901; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161, 162, 171, 172, 186, ' 189—191. 1969; Moldenke, Phytologia 20: 8—9, 94, & 105. 1970.

ERIOCAULON CRISTATUM Mart.
Additional bibliography: Santapau, Excerpt. Bot. A.11: 176. 1967; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171—173, 186, 189, & 191. 1969; Moldenke, Phytologia 20: 9. 1970.

ERIOCAULON CRISTATUM var. BREVICALYX C. H. Wright
Additional bibliography: Moldenke, Phytologia 19: 30 (1969) and 19: 330. 1970.

ERIOCAULON CRISTATUM var. MACKII Hook. f.
Synonymy: Eriocaulon cristatum var. mackii Hook. ex Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969.
Additional bibliography: Moldenke, Phytologia 18: 83. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969.

ERIOCAULON CUBENSE Ruhl.
Additional bibliography: Moldenke, Phytologia 1: 350 & 355 (1939) and 19: 331. 1970

ERIOCAULON CUSPIDATUM Dalz.
Additional bibliography: Körn., Linnaea 27: 581, 583, 586, & 684—685. 1856; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 189. 1969; Moldenke, Phytologia 19: 331 (1970) and 20: 31. 1970.

ERIOCAULON DALZELLII Körn.
Additional & emended bibliography: Körn., Linnaea 27: 578, 584, 586, & 605—606. 1856; Moldenke, Phytologia 2: 375 & 376 (1947) and 19: 331. 1970.

ERIOCAULON DECANGULARE L.
Additional synonymy: Eriocavlon decangulare Raeusch, Nom. Bot. 30. 1797. Eriocavlon serotinum Raeusch., Nom. Bot. 30. 1797.
Additional bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, 2: 206. 1791; Holm, Bot. Gaz. 31: 17—37. 1904; Muenscher, Aquat. Pl. U. S. 192—194 & 367, fig. 84 A—D, map 204. 1944; Hare, Journ. Linn. Soc. Lond. Bot. 53: 423, 436, 438, & 443. 1950; Santapau, Excerpt. Bot. A.11: 176. 1967; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146], 149, 154, 155, 159, 161—163, 168—170, 172, 173, 175—177, 180, 181, 185, 186, 189, 190, & 192, fig. 32 A—F, 35 A—E, 36 B—D & N, & 38 H & I. 1969; Moldenke, Phytologia 20: 8—10, 12, 22, 39, & 41. 1970.
Additional illustrations: Muenscher, Aquat. Pl. U. S. 193, fig. 84 A—D. 1944; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 154,

168, 176, & 180, fig. 32 A—F, 35 A—E, 36 B—D & N, & 38 H & I. 1969.

The Correll & Wasshausen 27567 and Cory 50789, distributed and the former previously cited as typical E. decangulare, now appear to me to be f. parviceps Moldenke

Additional citations: NEW JERSEY: Burlington Co.: Stuckey 2696 (Mi).

PAEPALANTHUS ALBO-VAGINATUS Alv. Silv.

Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146], 170, 178, 179, 186—188, & 191, fig. 37 C—E. 1969; Moldenke, Phytologia 20: 305—306. 1970.

Additional illustrations: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 178, fig. 37 C—E. 1969.

PAEPALANTHUS ALPINUS Körn.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 409—410 & 508. 1863; Moldenke, Phytologia 20: 307—308. 1970.

PAEPALANTHUS ALSINOIDES C. Wright

Additional bibliography: Tomlinson, Journ. Linn. Soc. Lond. Bot. 59: 169—172, fig. 18—28. 1964; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146], 148, 149, 152, 153, 159—163, 166, 167, 173, 174, 187, & 191, fig. 31 A—K. 1969; Moldenke, Phytologia 20: 308. 1970.

Additional citations: CUBA: Oriente: León & Marie-Victorin 18697 (Vi). Pinar del Río: Ekman 11143 (S), 16781 (S), 17284 (S), 17918 (Er, S); León 19403 (Vi, Vi); Marie-Victorin 58375 (Vi); Marie-Victorin & Alain 371 (Vi); Moldenke & Moldenke 19881 (B, Bi, Bm, Bs, Ca, Fg, Fy, Gg, Hk, Hw, Le, Lm, Lw, Mi, Mm, Ok, Rf, Rs, Sm, Ss, Ss, Ut, Z); C. Wright "P", in part (S).

PAEPALANTHUS ALSINOIDES var. MINIMUS Jennings

Bibliography: O. E. Jennings, Ann. Carnegie Mus. 11: 89, pl. 17, fig. E—H. 1917; Moldenke, N. Am. Fl. 19: 40. 1937; Moldenke, Phytologia 1: 332, 351, 352, 355, 357, 361, & 363. 1939; Alain, Contrib. Ocas. Mus. Hist. Nat. Coleg. La Salle 7: 47 & 114. 1946; Moldenke, Known Geogr. Distrib. Erioc. 5 & 44. 1946; Moldenke, Alph. List Cit. 1: 92 & 186 (1946), 2: 583, 649, & 651 (1948), 3: 929 (1949), and 4: 1144. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 44, 45, & 208. 1949; Moldenke, Phytologia 3: 502 (1951) and 4: 134. 1952; Moldenke, Résumé 52, 54, & 485. 1959; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969; Moldenke, Phytologia 20: 308. 1970.

Illustrations: O. E. Jennings, Ann. Carnegie Mus. 11: pl. 17, fig. E—H. 1917.

The type of this variety was collected by Otto Emery Jennings (no. 387) on gravelly soil in the pinebarrens one mile north of Los Indios, Isla de Pinos, Cuba, on May 19, 1910. The distinguished author of the name notes (1917) that "This plant is evi-

dently to be regarded as a derivative of the Cuban Paepalanthus alsinoides. It was found growing on the coarse, glistening, white quartzose gravel in the pine-barrens north of Los Indios, and it was associated with a number of plants with decided inclinations toward a habitat of acid soil: Pinguicula filifolia, Kalmia sp., Xyris ambigua". He continues: "The variety differs from the typical species in that it has leaves only half as long as the latter, the peduncles only about one-third as long, and the hairs of the flowers scarcely or not at all granulose on the inside surface of the cell-wall. In most of the other characters the variety agrees well with the species. The flowers were too far past maturity to be studied satisfactorily, but were seen to be about 1.8 mm. long, the three outer segments 1 mm. long, obcuneate, the truncate apex piliferous and erose, the inner segments as long, united into a slender tube with the small lobes and, after maturity, strongly infolded."

Recent collectors have found this plant growing in sandy pinelands, pure white sand, white siliceous sand, and "the very whitest sand beneath pines", flowering and fruiting in February, April, June, October, and November.

The paper by Alain (1946), cited in the bibliography above, is sometimes listed at "1947", but Brother Alain assures me personally that the work was issued in the year 1946.

Material of this variety has been misidentified and distributed in herbaria under the names P. alsinoides C. Wright, P. retusus C. Wright, and Dupatya alsinoides (Wr. & Sauv.) Shafer.

Additional citations: CUBA: Pinar del Río: Ekman 11034 (S), 11254 (Ca—491272, S); Shafer 10682 (Ut—27703); C. Wright "P", in part (S). ISLA DE PINOS: Alain & Killip 2209 (W—1959545); Britton, Britton, & Wilson 14144 (S); Ekman 11965 (S), 12100 (S); Killip 42857 (Le), 42879 (Le, N), 44752 (N, Z), 45147 (B), 45388 (B); León & Marie-Victorin 18852 (W—1784924); Marie-Victorin & Alain 168 (Vi).

PAEPALANTHUS AMOENUS (Bong.) Körn.

Synonymy: Eriocaulon amoenum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 316, [pl. 56]. 1831. Eriocaulon (Paepalanthus) longipes Mart., Flora 24, Beibl. 2: 35. 1841. Eriocaulon longipes Mart. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 276 & 334. 1855. Paepalanthus amoenus Körn. in Mart., Fl. Bras. 3 (1): 282, 291, & 292. 1863. Dupatya amoena (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya amoena Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus longipes Mart. ex Moldenke, Résumé Suppl. 1: 21, in syn. 1959. Paepalanthus armoenus (Bong.) Körn. ex Rennó, Levant. Herb. Inst. Agron. 69, sphalm. 1960.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 637, [pl. 56]. 1831; Bong., Ess. Monog. Erioc. 37. 1831; Steud.,

Nom. Bot., ed. 2, 1: 585. 1840; Mart., Flora 24, Beibl. 2: 35. 1841; Kunth, Enum. Pl. 3: 578, 580, & 612. 1841; D. Dietr., Syn. Pl. 5: 268. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 276, 283, 333, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 282, 291, 292, 316—318, 499, & 506, pl. 42. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 24. 1888; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 & 878 (1893) and 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 5, 12, 26, 184, 188—189, [283], 284, 286, & 289. 1903; Lutz & Machado, Mem. Inst. Oswaldo Cruz 7: 15, pl. 10. 1915; Alv. Silv., Fl. Mont. 1: 192 & 401. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 42 & 52. 1930; Stapf, Ind. Lond. 4: 518. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 & 878 (1946) and 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 10, 28, 32, 36, & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Alph. List Cit. 4: 1203. 1949; Moldenke, Phytologia 4: 134. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 95, 279, 285, 289, 323, & 485. 1959; Moldenke, Résumé Suppl. 1: 21. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 & 878 (1960) and 2: 401. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Résumé Suppl. 3: 34 (1962) and 11: 4. 1964; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 160, 161, 163, 166, 174, 184, 186, 187, & 189—191. 1969.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: [pl. 56]. 1831; Körn. in Mart., Fl. Bras. 3 (1): pl. 42. 1863; Lutz & Machado, Mem. Inst. Oswaldo Cruz 7: pl. 10. 1915.

The type of this species was collected by Ludwig Riedel "an kiesigen, grasigen Bergstellen" near Capanema, Minas Gerais, Brazil, and is deposited in the Leningrad herbarium. Eriocaulon longipes Mart. is apparently based on Martius 878, also from Minas Gerais, deposited in the Meisner herbarium.

Bongard's original description of this taxon is (1831) as follows: "Caulescens; caule erecto simplici folioso; foliis amplexicaulibus lato-lanceolatis acuminatis adpressis glabris; pedunculis fasciculatis glabris; vaginis caulescentibus bifidis. Tab. LVI. Habitat in glareosis graminosis prope Capanema. Floret Februario. 4."

Ruhland (1903) cites from Goiás Glaziou 22312, and from Minas Gerais P. Clausen 22 & 1156, Glaziou 15517, Martius 878, L. Riedel 1476, Schwacke 7227, 9301, 12169, & 12193, and Sellow B.1299 C.279. Silveira (1928) cites A. Silveira 264 from the Serra do Ouro Branco, Minas Gerais, collected in 1905.

The plate 56, originally prepared for Bongard's work (1831), was apparently never published, at least according to Kunth (1841), and probably exists only in the Leningrad library and/or herbarium.

Recent collectors describe this plant as an erect herb, 0.8—2.5 meters tall, the flower-heads and flowers white, growing on open rocky slopes and in wet places on campos, at altitudes of

1000 to 1300 meters, flowering in every month of the year. Mrs. Chase describes it as "characteristic of upper altitudes". Material has been misidentified and distributed in herbaria under the names P. bongardianus Mart., P. speciosus (Bong.) Körn., and P. variabilis Alv. Silv.

Additional citations: BRAZIL: Federal District Brasilia: Heringer 7887/81 (Z), 10431 (N); Philcox & Onishi 4892 (N). Goiás: Glaziou 22312 (B, Br); Heringer 7887 [Herb. Brad. 23117] (Lw); Maguire, Maguire, & Murça Pires 44790 (N). Minas Gerais: Andrade 1120 [Emmerich 1081] (Bd—16657); Black & Magalhães 51-11883 (Z); Black, Magalhães, & Graflinger 51-12220 (Z); M. A. Chase 9221 (W—1282186); P. Clausen 3 (P), 11 (Br, Br), 22 (B, B), 156 (B), 267 (Br), s.n. [1840] (S), s.n. (Br, N); Glaziou 15517 (B, Br), s.n. [14 juin 1884] (N); Irwin, Maxwell, & Wasshausen 20239 (N, Rf); A. Lutz s.n. [Herb. Lutz 1] (Ja); Martius 878 [39] (B, Br, Er, M, S); Mello Barreto 2521 [Herb. Jard. Bot. Belo Horiz. 7873; Herb. U. S. Nar. Arb. 236374] (W—2109988), 2522 [Herb. Jard. Bot. Belo Horiz. 4079; Herb. U. S. Nat. Arb. 236399] (N, W—2109989); Mendes Magalhães 1216 [Herb. Jard. Bot. Belo Horiz. 39602] (N); Murça Pires & Black 2830 (Z), 3303 (Z), 3359 (Z); L. Riedel s.n. [Caxoeira do Campo, 1834] (Br, Br); Schwacke 9301 (B); Segadas-Vianna 6009 (Ja); Sellow B.1299 C.279 (B); Williams & Assis 6699 (N, S, Vi, W—1932778), 7161 (Ca—744429, W—1932924), 7265 (W—1932953). State undetermined: Dupré s.n. [Bresil merid. 1842] (N); Sellow s.n. [Brasilia] (B). MOUNTED ILLUSTRATIONS: Mart. Fl. Bras. 3 (1): pl. 42 (B); drawings & notes by Körnicke (B).

PAEPALANTHUS AMOENUS var. CURRALENSIS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 401. 1928; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

The type of this variety was collected by Álvaro Adolpho da Silveira (no. 348) in the Serra do Curral, Minas Gerais, Brazil, in 1905, and is deposited in the Silveira herbarium. Thus far the variety is known to science only from the original collection.

PAEPALANTHUS ANDICOLA Körn.

Synonymy: Dupatya andicola (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya andicola Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 408, 502, & 508. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 207, [283], & 289. 1903; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 6, 28, & 44. 1946; Moldenke, Phytologia 2: 373. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 60, 63, 70, & 208. 1949;

Moldenke, Alph. List Cit. 3: 974. 1949; Moldenke, Phytologia 4: 134. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 67, 71, 80, 279, & 485. 1959; Moldenke, Résumé Suppl. 5: 5 (1962) and 18: 4. 1969; Moldenke, Phytologia 20: 308. 1970.

Ruhland (1903) cites only the type collection of this species, Funck & Schlim 811, from Trujillo, Venezuela, of which Macbride photographed an isotype in the herbarium of the Conservatoire et Jardin Botaniques at Geneva as his type photograph number 25162. The species has been found growing at altitudes of 2500 to 3600 meters, flowering and fruiting in February, July, August, October, and November. Core found it growing in tufts in wet soil, the flowers gray, while Fosberg describes it as growing in small groups of rosettes, the underground stems branching, the peduncles flat, inhabiting páramo slopes with white sand, oozing water here and there, brushy hillsides, and rocky ridges and ledges. Material has been misidentified and distributed in herbaria as P. alpinus Körn. and P. ensifolius (H.B.K.) Kunth.

Additional citations: COLOMBIA: Cauca: E. L. Core 997 (N). Cundinamarca: Cuatrecasas, Idrobo, Jaramillo, & Mora 25624 (Fg); Killip & Ariste-Joseph 11939 (W—1140022); R. E. Schultes 18792 (W—2172259, Z). Méta: Garcia Barriga 18034 (N, N). Norte de Santander: F. R. Fosberg 19174 (N). VENEZUELA: Trujillo: Funck & Schlim 811 [Macbride photos 25162] (N--photo of isotype, N—photo of isotype, W--photo of isotype); Jahn 19 (W—602213). ECUADOR: Loja: J. A. Steyermark 54409 (S).

PAEPALANTHUS ANDICOLA var. VILLOSUS Moldenke

Bibliography: Moldenke, Phytologia 2: 416. 1948; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 60 & 208. 1949; Moldenke, Phytologia 4: 134. 1952; Moldenke, Résumé 67 & 485. 1959.

Saint John found this plant growing on open páramos, at 3215 meters altitude, and describes it as having white flowers in September.

Additional citations: COLOMBIA: Boyacá: H. St. John 20805 [Herb. U. S. Nat. Arb. 227102] (Ca—44044, N, W--2163889).

PAEPALANTHUS APACARENSIS Moldenke

Bibliography: Moldenke in Maguire & Wurdack, Mem. N. Y. Bot. Gard. 9: 408. 1957; Moldenke, Résumé 71 & 485. 1959; G. Taylor, Ind. Kew. Suppl. 13: 98. 1966.

Citations: VENEZUELA: Bolívar: J. A. Steyermark 75864 (Z—type).

PAEPALANTHUS APPLANATUS Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 3, 5, 7, 26, 168--170, & 289, fig. 2 D. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 156. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41 & 43, fig. 16 D. 1930; Moldenke, Known Geogr. Distrib. Erioc. 10 & 44. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Résumé 95 &

485. 1959; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 160 & 190. 1969.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 7, fig. 2 D. 1903; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 43, fig. 16 D. 1930.

Ruhland (1903) cites only the type, Glaziou 19973, collected on campos in the Serra do Cipó, Minas Gerais, Brazil, flowering in February, and deposited in the herbarium of the Botanisches Museum at Berlin, where it was photographed by Macbride as his type photograph number 10570. Ruhland notes "Ab affinibus habitu robustissimo et pedunculis crassis, in sicco compressis et capitulis duris, fere verticaliter elongatis facillime diognoscenda. Speciebus quibusdam Actinocephali haud dissimilis." Thus far, the species is known only from the type collection.

Citations: BRAZIL: Minas Gerais: Glaziou 19973 [Macbride photos 10570] (B--type, N--photo of type, N--photo of type, W--photo of type, Z--isotype).

PAEPALANTHUS ARBORESCENS Alv. Silv.

Synonymy: Paepalanthus arborecens Alv. Silv., Fl. Mont. 1: pl. 135, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 205--206 & 401, pl. 135. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 44. 1946; Moldenke, Phytologia 2: 379. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Résumé 95, 323, & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 135. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 773) in sandy campos "secus rupes gres vocatas", near Milho Verde, in the Serra Geral, Minas Gerais, Brazil, in June of 1925, and is deposited in the Silveira herbarium. The original description (1928) states that the stems are "2,5 mm altus", but this is obviously a misprint for 2.5 meters. Ruhland (1903) comments that the "Species propter magnitudinem caulis ramorumque valde notabilis et inter omnes Eriocaulaceas maxima".

PAEPALANTHUS ARCHERI Moldenke

Synonymy: Paepalanthus archerii Moldenke ex Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Bibliography: Moldenke, Bull. Torr. Bot. Club 68: 67. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Alph. List Cit. 1: 12 (1946) and 4: 1072. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Phytologia 4: 134--135. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Anon., U. S. Dept. Agr. Bot. Subj. Index 5: 4227. 1958; Moldenke, Résumé 95 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Résumé Suppl. 3: 34. 1962.

The type of this species was collected by William Andrew Archer (no. 3677) -- in whose honor it was named -- at 1800 meters altitude in the Serra do Cipó, Minas Gerais, Brazil, on August 5, 1936,

and is deposited in the United States National Herbarium at Washington.

Additional citations: BRAZIL: Minas Gerais: Mendes Magalhães 2541 [Herb. Jard. Bot. Belo Horiz. 43821] (N).

PAEPALANTHUS ARENICOLA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 144—145 & 401, pl. 90. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 90. 1928.

This species is based on A. Silveira 552, collected in sandy places on the campos near Bandeirinhas, in the Serra do Cipó, Minas Gerais, Brazil, in April of 1909 and is deposited in the Silveira herbarium. Silveira (1928) says of it "Species primo aspectu illa precedente [P. gibbosus Alv. Silv.] simillima, sed forma capitulorum, pilis rufis receptaculi, colore et indumento bractearum perigoniorumque certe facileque distincta". Recent collectors refer to it as an herb 75 cm. tall, with gray inflorescence-heads, growing on rocky slopes at 1000 meters altitude, flowering and fruiting in March.

Citations: BRAZIL: Minas Gerais: Irwin, Reis dos Santos, Souza, & Fonseca 24936 (Ac); Maguire, Mendes Magalhães, & Maguire 49276 (N, Z).

PAEPALANTHUS ARETIOIDES Ruhl.

Synonymy: Leiothrix aretioides Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41, nom. nud. 1930.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 163, 164, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 292. 1908; Alv. Silv., Fl. Mont. 1: 401. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41. 1930; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Résumé 95 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Phytologia 20: 88. 1970.

This species was based by Ruhland (1903) on Schwacke 8488 & 8501 and Glaziou 20003 & 20004, collected at Diamantina, Biribiry, and Formação, Minas Gerais, Brazil -- the Schwacke specimens in April of 1892 -- all deposited in the herbarium of the Botanisches Museum at Berlin, where Macbride photographed Glaziou 20004 as his type photograph number 22278. Ruhland (1903) notes that the "Species habitu Leiothrici lanuginosae subsimilis, sed florum structura etc. valde diversa". Silveira (1928) cites A. Silveira 534 from Quartel, near Diamantina, collected in 1905.

Citations: BRAZIL: Minas Gerais: Glaziou 20003 (B—cotype, Br—cotype, N—cotype), 20004 [Macbride photos 22278] (B—cotype, N—photo of cotype, W—photo of cotype); Mello Barreto 9520 [Herb. Jard. Bot. Belo Horiz. 24527] (N); Schwacke 8488 (B—cotype, B—

cotype), 8501 (B—cotype).

PAEPALANTHUS ARGENTEUS (Bong.) Körn.

Synonymy: Eriocaulon argenteum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 631, [pl. 52]. 1831 [not E. argenteum Heyne, 1959, nor Mart., 1832]. Dupatya argentea (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Paepalanthus argenteus Körn. apud Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894. Dupatya argentea Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus argentens (Bong.) Körn. ex Rennó, Levant. Herb. Inst. Agron. 69, sphalm. 1960.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 631, [pl. 52]. 1831; Bong., Ess. Monog. Erioc. 31. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 558, 575, 577, & 612. 1841; D. Dietr., Syn. Pl. 5: 267. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 282 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 343 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 (1893) and 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 6, 213, 215, 284, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 34. 1908; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40, 44, & 53. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 (1946) and 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 10, 28, 32, & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Phytologia 4: 135. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 95, 279, 285, & 485. 1959; G. Taylor, Ind. Kew. Suppl. 12: 11. 1959; Rennó, Levant, Herb. Inst. Agron. 69. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 (1960) and 2: 401. 1960; Moldenke, Phytologia 17: 458 (1968) and 18: 429 & 433. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 148 & 190. 1969.

Bongard's original description (1831) of this species is merely "acaule; foliis erectis e basi lata lanceolato-acuminatis, acutis pedunculisque sericeo-argenteis; vaginis oblique fissis obtusis. Tab. LII. Habitat et floret cum praecedente, cui affine." The preceding species, to which he refers here, is what is now known as P. serralapensis Moldenke. The type, not designated by Bongard, is probably the Riedel s.n. cited by Ruhland (1903) "an trockenen, kiesigen Stellen der Serra da Lapa", Minas Gerais, Brazil, deposited in the Leningrad herbarium. Ruhland cites also Glaziou 19969 and Schwacke 8500, both also from the state of Minas Gerais.

According to Kunth (1841), the plate "52" of Bongard's work was never actually published, and this is borne out by the fact that it is not listed by Stapf (1930). Probably it exists only in the Leningrad library or herbarium. Kunth also tells us that Eriocaulon argenteum is closely related to E. gracile Mart., but he is doubtless here referring to E. argenteum Mart., which is

now regarded as a synonym of E. quinquefolium L., of which E. argenteum Heyne is also a synonym.

Ruhland (1903) notes "Jam indumento pulcherrimo argenteo a praecedente [P. lanato-albus Mart.] differt." Macbride photographed Glaziou 19964 in the herbarium of the Botanisches Museum at Berlin as his type photograph number 10571, but this collection, as so many others which he photographed, is not actually a type number of any sort.

Recent collectors have found Paepalanthus argenteus growing on campos, in dry rocky ground, and on white gravel in stony cerrado in an area of sandy cerrado and thickets with sandy pockets in outcrops, at altitudes of 1265 to 1500 meters, flowering and fruiting in April and from November to January. They describe it as up to 60 cm. tall, with dry inflorescence-heads.

Additional citations: BRAZIL: Minas Gerais: Black & Magalhães 51-11782 (Z); Brade 13600 [Herb. Jard. Bot. Rio Jan. 25394] (B); M. A. Chase 10423 (W—1495696); Glaziou 19964 [Macbride photos 10571] (B, Br, N, N--photo, N—photo, W—photo, Z); Irwin, Reis dos Santos, Souza, & Fonseca 22781 (Z); Maguire, Maguire, & Murça Pires 44744 (N); Maguire, Mendes Magalhães, & Maguire 49185 (N); Mendes Magalhães 1900 (Be—13878); Sampaio 6845 (S); Schwacke 8500 (B).

PAEPALANTHUS ARGILLICOLA Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 108—110 & 401, pl. 67. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 67. 1928.

This species was apparently based on two collections: "In pratis humidis argillosisque in serra da Moeda, Minas, Maio 1910 et in campis humidis ferruginosisque in serra do Mascate, prope Congonhas do Campo, Minas Geraes, Dec. 1912, ligit Alvaro da Silveira; n. 571 in herbario Silveira". Williams & Assis found the species growing in meadows and wet meadows, at altitudes of 1400 to 1600 meters, flowering in February and April, but distributed their material as P. bryoides (Bong.) Kunth. Williams & Assis 6636 is a mixture with a species of Eleocharis.

Citations: BRAZIL: Minas Gerais: Williams & Assis 5798 (W—1932611), 6556 (N, N, S), 6636, in part (Ca—744423).

PAEPALANTHUS ARGYROLINON Körn.

Synonymy: Paepalanthus argyrolinum Körn. ex Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888. Dupatya argyrolinon (Körn.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya argyrolinon Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 278, 299, 374,

& 507. 1863; Benth. & Hook. f., Gen. Pl. 3 (2): 1023. 1883; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 11, 173, 177—179, & 289, fig. 20. 1903; Stapf, Ind. Lond. 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40, 41, 44, & 51. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 81 & 208. 1949; Moldenke, Phytologia 4: 135. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 95 & 485. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 401. 1960; Moldenke, Résumé Suppl. 18: 13. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146], 158, 174, & 190. 1969.

Illustrations: Ruhl. in Engl., Pflanzenreich 13 (4-30): 177, fig. 20. 1903.

This species is based on G. Gardner 5260, collected somewhere in Minas Gerais, Brazil, deposited in the herbarium of the Botanisches Museum at Berlin. Macbride photographed an isotype in the herbarium of the Naturhistorisches Museum at Vienna as his type photograph number 29989. Ruhland (1903) cites only the type collection. The specific epithet is sometimes uppercased.

Additional citations: BRAZIL: Minas Gerais: G. Gardner 5260 [Macbride photos 29989] (B—type, N—photo of isotype, S—isotype, W—photo of isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS ARGYROPUS Alv. Silv.

Bibliography: Alv. Silv., Fl. Serr. Min. 36. 1908; Alv. Silv., Fl. Mont. 1: [21]—22 & 401. 1928; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Mendes Magalhães, Anais V Reun. Amual Soc. Bot. Bras. 242—243. 1956; Moldenke, Résumé 95 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 7. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 354) "In campis paludosis prope Serrinha da Lapinha, in serra do Cipó", Minas Gerais, Brazil, in April of 1905 and is deposited in the Silveira herbarium. Irwin and his associates describe the plant as a cespitose rosette herb, the inflorescence 50—85 cm. tall, the leaves fleshy, and the flower-heads white, growing in meadows in areas of grassy meadows and adjacent sandy campos and in wet campos bordering meadows and slow creeks with adjacent outcrops, at 1300 meters altitude. It has also been found in marshy fields, flowering and fruiting in January, April, and October. Irwin, Reis dos Santos, Souza, & Fonseca 22020 was originally mixed with P. comans Alv. Silv., evidently indicating that the two species were growing together. Silveira (1928) says

"Species pedunculis argenteis distinctissima".

Citations: BRAZIL: Minas Gerais: Archer & Mello Barreto 4926 [Herb. Jard. Bot. Belo Horiz. 17522; Herb. U. S. Nat. Arb. 177445] (N, N, W—2121739); Black & Mendes Magalhães 51-11917 (Be—69741); Heringer & Castellanos 6088 (Z); Irwin, Reis dos Santos, Souza, & Fonseca 22020 (Ac, Rf), 22549 (Rf); A. Lutz 1582, in part (Ja); Mello Barreto 2537 [Herb. Jard. Bot. Belo Horiz. 8238] (N); Mendes Magalhães 42624 (N); Murça Pires & Black 3346 (Be—63790); A. Silveira 354 (B—isotype).

PAEPALANTHUS ARGYROPUS var. BREVIFOLIUS Alv. Silv.

Synonymy: Paepalanthus argyropus var. brevifolia Alv. Silv., Fl. Mont. 1: 22 & 401. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 22 & 401. 1928; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95, 323, & 485. 1959.

This variety is based on two collections from "In campis in Serra do Cabral, Minas: Alv. Silveira, Jun. 1910, et in campis prope Milho Verde, in Serra Geral, Minas.: Alv. Silveira, Jun. 1925; no. 591 in herbario Silveira". Silveira (1928) describes the plant as "Folia nunc glabra nunc supra patenti pubescentia demum glabra, 4 cm longam 2 mm medio lata". It is known thus far only from the original collections.

PAEPALANTHUS ARGYROPUS var. PUBESCENS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 22 & 401. 1928; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

The type of this variety was collected by Álvaro Adolpho da Silveira (no. 357) in fields in the Serra do Cipó, Minas Gerais, Brazil, in April of 1905 and is deposited in the Silveira herbarium. Silveira (1928) describes the plant as "Folia utrinque pubescentia, 3—4 mm medio lata". It seems to be very closely related to P. barbiger Alv. Silv.

Additional citations: BRAZIL: Minas Gerais: A. P. Duarte 6530 [Herb. Brad. 22967] (Lw); Mendes Magalhães 18937 [Herb. Brad. 25706] (N, Z).

PAEPALANTHUS ARISTATUS Moldenke

Bibliography: Moldenke, Phytologia 7: 122—123. 1960; Moldenke, Biol. Abstr. 35: 2177. 1960; Moldenke, Résumé Suppl. 2: 4, 10, & 15. 1960; Hocking, Excerpt. Bot. A.4: 593. 1962; G. Taylor, Ind. Kew. Suppl. 13: 98. 1966.

Citations: VENEZUELA: Amazonas: Wurdack & Adderley 42861 (N—type, S—isotype).

PAEPALANTHUS ARMERIA Mart.

Synonymy: Dupatya armeria (Mart.) Kuntze, Rev. Gen. Pl. 2: 745.

1891. Dupatya armeria Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus armeria Körn., in herb.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 299, 377--378, & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 168, 171, [283], & 289. 1903; Alv. Silv., Fl. Mont. 1: 401. 1928; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10, 28, & 45. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 401. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 209. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 95, 279, & 485. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 401. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Résumé Suppl. 11: 4. 1964.

The type of this species was collected by Johann Emanuel Pohl at Chapada de São Marcos, Goiás, Brazil, and is probably deposited in the herbarium of the Botanische Staatssammlung at Munich, this specimen having been photographed by Macbride as his type photograph number 18693. Ruhland (1903) cites this type collection and also Glaziou 22303 & 22308, all from Goiás. He comments that "Habitu, praesertim bracteis involucrantibus flores haud paullo superantibus insignis. Rami fertiles brevissimi. Specimina a cl. Glaziou collecta a descriptione Koernickeana stylis quam germen perspicue longioribus abhorrent". Körnicke (1863) noted "Habitu P. helichrysoidi Kth. affinis sed florum valde diversus". Silveira (1928) cites A. Silveira 435 from the Serra da Caraça in Minas Gerais, collected in 1906.

The specific epithet in this binomial is often uppercased. The species has been found in anthesis in March and July. The labels accompanying the Macbride photograph, mentioned above, indicate Martius as the collector of the type, but this is apparently erroneous, as a reading of the original description clearly shows. Glaziou 22303 appears to be a mixture with P. albo-villosus Alv. Silv.

Citations: BRAZIL: Federal District Brasilia: Heringer 8486/680 (Z); Irwin & Soderstrom 5825 (N). Goiás: Glaziou 22303, in part (Br, N), 22308, in part (S); Heringer 8486 [Herb. Brad. 23118] (Lw); J. E. Pohl s.n. [Chapada de S. Marcos; Macbride photos 18693] (Br--isotype, N--isotype, W--photo of type, W--photo of type). Minas Gerais: Mendes Magalhães s.n. [Herb. Jard. Bot. Belo Horiz. 42624] (N).

PAEPALANTHUS ASCENDENS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 237--238 & 401, pl. 158. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 158. 1928.

The type of this species was collected in sandy fields between Serro and Diamantina, in the Serra Geral, Minas Gerais, Brazil, by Álvaro Adolpho da Silveira (no. 799) in June of 1925 and is deposited in the Silveira herbarium. On page 401 of his work (1928) Silveira cites an A. Silveira 770 from the Serra Geral, collected in 1926 — whether this is meant to be the recording of another collection or is an intentional correction of the data given on page 238 of the same work, or is just an error, is not clear. Silveira comments that the "Species ob caulem ascendentem ad affinibus distincta". No other collections of the taxon are known to date.

PAEPALANTHUS ASPER Alv. Silv.

Bibliography: Alv. Silv., Fl. Serr. Min. 64. 1908; Alv. Silv., Fl. Mont. 1: 265—266 & 401, pl. 176. 1928; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Alph. List Cit. 2: 412 (1948) and 3: 935. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Phytologia 4: 135. 1952; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 176. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 350) in dry sandy fields in the Serra do Cipó, Minas Gerais, Brazil, in April of 1905 and is deposited in the Silveira herbarium. Silveira (1908) notes that the "Species cum. P. latifolio (Bong.) Koern. valde affinis, sed foliis non lanceolatis, ciliatis atque basi dilatatis facile distinguenda" — the species here referred to is now known as P. serralapensis Moldenke.

Additional citations: BRAZIL: Minas Gerais: A. Silveira 350 [Herb. Marie-Victorin 15834] (N—photo of isotype, Z—photo of isotype).

PAEPALANTHUS ATER Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 247—249 & 402, pl. 165. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Alph. List Cit. 2: 412 (1948) and 3: 935. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Phytologia 4: 135. 1952; Moldenke, Résumé 95 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 165. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 932) in fields near Morro do Breu, in the Serra do Cipó, Minas Gerais, Brazil, in April or 1905 and is deposited in the Silveira herbarium; however, on page 402 of his work (1928) Silveira cites A. Silveira 329 from the Serra do Cipó, collected in the same year. Whether this entry is intended as the recording of a second collection or if it represents a correction of the type number given on page 249 of the same work, or if it is a typographic error, is not clear. He also comments that the "Spe-

cies ob bracteas involucrantes atras, petala florum femineorum et alias characteres P. superbo Ruhl. differt; ab aliis affinibus magnitudine capitulorum, indumento foliorum etc. etiam valde distincta." To me the species seems to be very closely related to P. comans Alv. Silv.

The Mendes Magalhães 2558 & 2559 [Herb. Jard. Bot. Belo Horiz. 43861 & 43862], distributed as P. ater, are actually P. complanatus Alv. Silv.

Additional citations: BRAZIL: Minas Gerais: Duarte & Graziela Barroso 7917 [Herb. Brad. 27768] (N, Z); Macedo 2952 (N, S); A. Silveira 329 [Herb. Marie-Victorin 15843] (N--photo of isotype, Z--photo of isotype).

PAEPALANTHUS ATROVAGINATUS Ruhl.

Synonymy: Paepalanthus gracilipes Alv. Silv., Fl. Serr. Min. 45, pl. 11. 1908. Paepalanthus atro-vaginatus Ruhl. ex Alv. Silv., Fl. Mont. 1: 91. 1928.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 152, 156--157, & 289. 1903; Alv. Silv., Fl. Serr. Min. 45, pl. 11. 1908; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 91, 102--103, & 407, pl. 2. 1928; Stapf, Ind. Lond. 4: 518. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10, 12, 45, & 49. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 84, 208, & 209. 1949; Moldenke, Résumé 95, 98, 420, 485, & 487. 1959; Moldenke, Résumé Suppl. 1: 6, 20, & 25. 1959.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 11. 1908; Alv. Silv., Fl. Mont. 1: pl. 2. 1928.

The type and only collection of P. atrovaginatus cited by Ruhland (1903) is Schwacke 14329, collected in sandy soil among boulders on the summit of the Serra São Frasão, at 1100 meters altitude, Minas Gerais, Brazil, flowering in March, and deposited in the herbarium of the Botanisches Museum at Berlin. The type of P. gracilipes was collected by Dr. Alfredo Baeta Neves among rocks near Ouro Preto, Minas Gerais, in March of 1907 and is number 482 in the Silveira herbarium. Of the latter Silveira (1928) says "Species P. scirpeo proxima, sed foliis majoribus, vagina barbata, pedunculis longe pilosis et summitate eorum non corrugata differt. A Paepalanthis sectionis 'Variabiles' Ruhlandii capitulis interdum proliferis et allis characteribus facile distinguitur".

Citations: BRAZIL: Minas Gerais: Baeta Neves s.n. [Herb. Silveira 482] (B); Schwacke 14329 (B--type, Z--isotype), s.n. [Herb. Mus. Nac. Rio Jan. 29466] (N, S), s.n. [Itabiro, 28-12-1888] (N).

PAEPALANTHUS AUREUS Alv. Silv.

Synonymy: Paepalanthus anreus Alv. Silv., Fl. Mont. 1: pl. 181, sphalm. 1928. Paepalanthus aurens Alv. Silv. ex Rennó, Levant. Herb. Inst. Agron. 69, sphalm. 1960.

Bibliography: Alv. Silv., Fl. Serr. Min. 66, pl. 25. 1908; Alv. Silv., Fl. Mont. 1: 271—273 & 402, pl. 180 & 181. 1928; Stapf, Ind. Lond. 4: 518. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Phytologia 2: 379. 1947; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82. 1949; Moldenke, Résumé 95, 323, & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Résumé Suppl. 3: 34. 1962.

Illustrations: Alv. Silv., Fl. Serr. Min., pl. 25. 1908; Alv. Silv., Fl. Mont. 1: pl. 180 & 181. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 359) in dry fields at Capão dos Palmitos, in the Serra do Cipó, Minas Gerais, Brazil, in April of 1905 and is deposited in the Silveira herbarium. Silveira (1908) says of it: "Species propter bractearum involucrantium colorem et formam ad affinibus valde distincta". Collectors have found the plant in flower in January and April.

Citations: BRAZIL: Minas Gerais: Archer & Mello Barreto 4409 [Herb. U. S. Nat. Arb. 177565] (W—2121732); Mello Barreto 2571 [Herb. Jard. Bot. Belo Horiz. 8225] (N); Murça Pires & Black 2959 (Be—63513); A. Silveira 359 (B—isotype), s.n. [Herb. Magalhães Gomes 4089; Herb. Jard. Bot. Belo Horiz. 26631] (N); L. B. Smith 7072 (N, W—2120222, Z), 7090 (Z).

PAEPALANTHUS AUYANTEPUIENSIS Moldenke

Bibliography: Moldenke, Act. Biol. Venez. 2: 47—48. 1957; Anon., Biol. Abstr. 32: 2917. 1958; Moldenke, Résumé 71 & 485. 1959; G. Taylor, Ind. Kew. Suppl. 13: 98. 1966.

This plant has been collected at 2300 meters altitude, flowering in April. J. A. Steyermark 93957 was originally a mixture with a many-headed species, P. scopulorum var. auyantepuiensis Moldenke, which Steyermark says came from the same population. The latter has been re-assigned the number 93957a.

Citations: VENEZUELA: Bolívar: J. A. Steyermark 93957 (Lw, N, S), 93981 (N, Z), 94052 (Lw, N); Vareschi & Foldats 4892 (N), 4895 (Ve—type, Z—isotype).

PAEPALANTHUS BABYLONIENSIS Alv. Silv.

Synonymy: Paepalanthus babylonensis Alv. Silv. ex Worsdell, Ind. Lond. Suppl. 2: 183. 1941.

Bibliography: Alv. Silv., Fl. Mont. 1: 188—189 & 402, pl. 121. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 121. 1928.

This species is apparently based on A. Silveira 428, collected in sandy fields near Passos, in the Serra da Babylonia, Minas Gerais, Brazil, in April of 1925, and deposited in the Silveira herbarium. Silveira, on page 402 of his work (1928), cites an A. Sil-

veira 741 from the same locality and collected in the same year. It is not clear if this is intended as the citation of a second collection, as a correction of the collection number given on page 189 of the same work, or is a typographic error.

PAEPALANTHUS BAHIENSIS (Bong.) Kunth

Synonymy: Eriocaulon bahiense Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 622. 1831. Paepalanthus bahiensis Kunth ex G. Gardn. in Hook., Icon. Pl. 6 [ser. 2, 2]: pl. 527. 1843. Dupatya bahiensis (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya bahiensis Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Eriocaulon bahiensis Bong. apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 191, sphalm. 1903.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 622. 1831; Bong., Ess. Monog. Erioc. 22—23. 1831; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 3: 545, pl. 20. 1835; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 517, 572, 612, & 624. 1841; G. Gardn. in Hook., Icon. Pl. 6 [ser. 2, 2]: pl. 527. 1843; D. Dietr., Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 274 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 322—323 & 506. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 (1893) and 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 189, 191, [283], 284, & 289. 1903; Alv. Silv., Fl. Mont. 1: 220. 1928; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10, 28, 32, & 45. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 (1946) and 2: 401. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 95, 279, 286, & 485. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 (1960) and 2: 401. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: [146], 175, 184, 186, & 191. 1969.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 3: pl. 20. 1835.

The original description of this taxon by Bongard (1831) reads as follows: "caulibus caespitosis simplicibus; foliis radicalibus lanceolato-acuminatis obtusiusculis pilosis ciliatis; pedunculis persistentibus pilosis; vaginis bifidis glabriusculis. Tab. XX. Habitat prope Rios dos Contos, provinciae Bahiensis. Floret Februario. 4 Differt a praecedente [P. ciliatus (Bong.) Kunth] praeter notas allatas: 1) habitu diverso; 2) foliis angustioribus pilosis, minus dense ciliatis; 3) pedunculis longioribus, crassioribus, pilosis, non pedicuis; 4) capitulis triplo majoribus". Ruhland (1903) cites only this type collection, for which he notes "an sandigen, etwas feuchten Stellen bei Camamú und Rio de Contas (Riedel)" — the actual type doubtless deposited in the Leningrad herbarium. The M. A. Chase 8011, distributed as P. bahiensis, is actually P. coutoënsis Moldenke.

PAEPALANTHUS BALANSAE Ruhl.

Synonymy: Paepalanthus scholiophyllus var. balansae Ruhl. ex Moldenke, Résumé Suppl. 3: 34, in syn. 1962.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 128, 151--152, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Moldenke, Known Geogr. Distrib. Erioc. 20 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 99 & 208. 1949; Moldenke, Phytologia 4: 135. 1952; Moldenke, Résumé 117 & 485. 1959; Moldenke, Résumé Suppl. 3: 13 & 34. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Angely, Fl. Anal. Paran., ed. 1, 200. 1965; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 184, 186, 187, & 191. 1969.

The type of this species was collected by, and named in honor of, Benedict Balansa (no. 568) "auf etwas trockenen Triften" at Pastoreo-mi, in the eastern part of the Cordillera Villarica, Paraguay, and is deposited in the herbarium of the Botanisches Museum at Berlin. Macbride photographed an isotype in the Delessert Herbarium at the Conservatoire et Jardin Botaniques in Geneva as his type photograph number 25164. Ruhland (1903) cites only the type collection and notes that the "Species bracteis involucrantibus insignis". Paepalanthus scholiophyllus var. balansae is apparently based on Hassler 9499, also from Paraguay, deposited in the Stockholm herbarium.

The species has been collected in anthesis in September and October. Balansa describes the flowers as whitish, while Hassler describes the plant as an herb 0.2--0.3 m. tall, with woody stems, and white petals, growing in sandy places. Material has been misidentified and distributed in herbaria as P. scholiophyllus Ruhl.

Citations: PARAGUAY: Balansa 568 [Macbride photos 25164] (B—type, Br—isotype, Er--isotype, N—isotype, N--photo of isotype, P--isotype, S--isotype, W--photo of isotype); Hassler 4448 (Ca--944900, N, S), 9499 (Ca—930338, Mi, N, S, V--7010, W—2055382).

PAEPALANTHUS BALANSAE var. DENSIFLORUS Moldenke

Bibliography: Moldenke, Phytologia 8: 162. 1962; Moldenke, Résumé Suppl. 3: 13. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Angely, Fl. Anal. Paran., ed. 1, 200. 1965; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969.

Citations: BRAZIL: Paraná: Braga & Lange 92 (N—isotype, Z—type).

PAEPALANTHUS BARAUNENSIS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 112--113 & 402, pl. 70. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 70. 1928.

This species is based on A. Silveira 642, collected in fields in the Serra de Diamantina, Minas Gerais, Brazil, in April of

1916 and deposited in the Silveira herbarium. Silveira (1928) cites plate "LXVIII" for this species in his text, but the plate is actually labelled "LXX" (plate 68 depicts P. capanemae Alv. Silv., as it should according to page 111 of the text). He comments that the "Species ab affinibus facile distinguenda".

PAEPALANTHUS BARBIGER Alv. Silv.

Synonymy: Paepalanthus barbigerus Alv. Silv. ex Moldenke, Résumé 323, in syn. 1959.

Bibliography: Alv. Silv., Fl. Serr. Min. 47, pl. 16. 1908; Alv. Silv., Fl. Mont. 1: 152—154 & 402, pl. 96. 1928; Stapf, Ind. Lond. 4: 518. 1930; A. W. Hill, Ind. Kew. Suppl. 8: 169. 1933; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95, 323, & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Phytologia 20: 97 & 359. 1970.

Illustrations: Alv. Silv., Fl. Serr. Min. pl. 16. 1908; Alv. Silv., Fl. Mont. 1: pl. 96. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 352) in dry sandy fields near Morro do Breu, in the Serra do Cipó, Minas Gerais, Brazil, in April of 1905 and is deposited in the Silveira herbarium. Silveira (1928) says of it: "Soecies ab affinibus, P. trichopefalo Alv. Silv. excepto, florum femineorum sepalis hirsutis differt; ab illo ipsorum sepalorum forma et ramis haud brevissimis differt".

The species has been found by collectors at 1200 meters altitude, and, in my opinion, is very closely related to P. argyropus var. pubescens Alv. Silv. The Segadas-Vianna 6008 and Segadas-Vianna & Lorêdo Serra II.1097, distributed as P. barbiger, are actually P. complanatus Alv. Silv.

Citations: BRAZIL: Minas Gerais: Macedo 2972 (N, S, S); Mello Barreto 2545 [Herb. Jard. Bot. Belo Horiz. 6245] (N); Mendes Magalhães 18967 [Herb. Brad. 25714] (N, Z); Murça Pires & Black 2970 (Z); Segadas-Vianna & Lorêdo Serra 1090 (Ja); A. Silveira 352 (B—isotype, Z—isotype).

PAEPALANTHUS BARBULATUS Herzog

Bibliography: Lützelburg, Estud. Bot. Nordéste 3: 148. 1923; Herzog in Fedde, Repert. Sp. Nov. 20: 83—84. 1924; A. W. Hill, Ind. Kew. Suppl. 7: 174. 1929; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Phytologia 4: 135. 1952; Moldenke, Résumé 95 & 485. 1959.

This species is apparently based on two collections made by Freiherr Philipp von Lützelburg — no. 212 and s.n. — since the original description by Herzog (1924) has this comment "Staat Bahia: Serra das Almas, 1800 m. Fels. no. 212 (1914) und Itubira, Sandstein, 1700 m." He continues "Aus der Verwandtschaft von P. leucoblepharus Koern., von dem sich die neue Art durch die

rosettig ausgebreiteten bis zurückgeschlagenen, an der Spitze dicht weiss gebarteten Blätter, die spitzen, auf dem Rücken behaarten Hüllbrakteen, die schmäleren und nur an der Spitze mit kugelig endenden Keulenhaaren besetzten Sepalen und die viel mächtiger entwickelten Petalen der ♂ Blüte unterscheidet. Die Sepalen der ♂ Blüte von P. leucoblepharus sind durch ihre auch am Rücken und gegen der Spitze hin lange und dichte Behaarung fast quastig, die Kronröhre kürzer und mit schwach entwickelten Randabschnitten, die Antheren dunkel gefarbt und exsert".

Smith collected this plant in anthesis in April. Macbride photographed Lützelburg 212 in the herbarium of the Botanische Staatssammlung at Munich as his type photograph number 18694.

It should be noted here that P. barbulatus Alv. Silv. is a synonym of P. coutoënsis Moldenke.

Citations: BRAZIL: Bahia: Lützelburg 212 [Macbride photos 18694] (N—photo of cotype, W—photo of cotype). Minas Gerais: L. B. Smith 6836a (Z).

PAEPALANTHUS BARKLEYI Moldenke

Bibliography: Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 60 & 208. 1949; Moldenke, Phytologia 3: 114—115 & 142 (1949) and 4: 135. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 175. 1953; Moldenke, Résumé 67 & 485. 1959; Moldenke, Résumé Suppl. 18: 4. 1969.

Smith describes this plant as growing in a small colony in dense shade of grasses on wet slopes in springy muck, sandstone soil, and soft chaparral formation. Collectors have found it at altitudes of 1300 to 2700 meters, flowering and fruiting in June, September, and December.

Additional citations: COLOMBIA: Boyacá: Uribe Uribe 3919 (W—2486184). Cundinamarca: S. G. Smith 1018 (Ca—1341403, W—2047393).

PAEPALANTHUS BARREIRENSIS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 260—261 & 402, pl. 172 [bis]. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 172 [bis]. 1928.

This species was typified by Silveira (1928) as follows: "In campis arenosis inter Diamantine et Barreiras, Minas Geraes: dr. J. Michaeli, Nov. 1923; n. 731 in herbario Silveira", but on page 402 of the same work he seems to cite a J. Michaeli 721, also from near Barreiras, collected in 1923. It is not clear if this represents a typographic error, a correction of the previous citation, or the citation of a second collection. He comments "Ab affine P. homomallo Mart. et ab illa precedente [P. gonçalensis Alv. Silv.] foliis haud crassis, utrinque dense pubescentibus et longioribus praecipue differt".

It should also be noted here that Silveira (1928) in his text cites plate "CLXXII" as illustrating this species [P. barreirensis], and, indeed, it seems as though this is the number that should have appeared beneath the plate. However, the plate is actually the second plate so numbered, the first one so numbered illustrating P. gonçalensis Alv. Silv. (which in his text he cites as plate "CLXXI"), There seems to be no plate 173 at all.

PAEPALANTHUS BATATALENSIS Alv. Silv.

Synonymy: Paepalnnthus batatalensis Alv. Silv., Fl. Mont. 1: 77, sphalm. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 77—79 & 402, pl. 45. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 45. 1928.

This species was based on three collections, described by Silveira (1928) as follows: "In campis prope Capanema in Serra do Batatal, Minas; Apr. 1906; in Serra do Cipó, Apr. 1905 et in Serra do Riacho de Vento, Apr. 1918: Alvaro da Silveira; n. 340 in herbario Silveira". On page 402 of the same work he cites A. Silveira 340 from Serra do Batatal, collected in 1908.

PAEPALANTHUS BATOCEPHALUS Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 201, 211, 212, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Alv. Silv., Fl. Mont. 1: 402. 1928; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

The type of this species was collected by Auguste François Marie Glaziou (no. 7993) at Campos da Bocaina, Vacca Cahio, São Paulo, Brazil, and is deposited in the herbarium of the Botanisches Museum at Berlin, where it was photographed by Macbride as his type photograph number 10572. The printed label accompanying this collection is inscribed "Rio de Janeiro". Silveira (1928) cites A. Silveira 599 from the Serra de Ibitipoca, Minas Gerais, collected in 1907.

The species has been collected in anthesis in February. Ruhland (1903) comments that the "Species pulchra, P. puberulo proxima, a quo statim habitu in omnibus partibus graciliore differt. Insignia praeterea folia utrinque persistenter molliterque pubescentia et vaginae indumento simili instructae. Margines foliorum in nostra specie numquam tenui-membranaceae evadunt." It also seems to have considerable habital resembrance to P. itatiaiensis Ruhl.

Citations: BRAZIL: São Paulo: Glaziou 7993 [Macbride photos 10572] (B—type, N—photo of type, N—photo of type, W—photo of type); B. Lutz s.n. [Herb. Mus. Rio Jan. 29524] (N, S).

CERTAMEN MELASTOMATACEIS XV.

John J. Wurdack
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Under the auspices of the Smithsonian Research Foundation, five months were spent during the winter of 1969-70 in European herbaria working on various problems in neotropical melastomes. I am much indebted to the Old World taxonomic community (BM, BR, C, FI, G, K, LD, M, MA, OXF, P, S, SBT, W) for both scientific and social hospitality, as well as subsequent loans of selected materials. Without the generous assistance of numerous curators, the break-even point in publishable results (i.e., the number of already known taxonomic problems resolved equaling the total of both old and newly discovered ones unsettled) would not have been reached.

MACAIREA MAGUIREI Wurdack, sp. nov.

Ut videtur M. arirambae Huber affinis, ramulorum foliorum subtus inflorescentiarumque pilis erectis calycis lobis longioribus differt.

Ramuli sicut petioli foliorum venae primariae subtus inflorescentiaque dense setulosi pilis plerumque 1.2-1.8 mm longis basim versus expansis non glandulosis. Petioli 0.8-1.2 cm longi; lamina 3.5-7 X 1.5-3 cm elliptico-oblonga vel ovato-oblonga apice obtuso vel rotundato basi obtusa vel rotundata, rigida et robuste ciliolato-serrulata, supra modice bullulato-setulosa pilorum apicibus tenuibus 1.5-2 mm longis persistentibus, subtus dense appresso-setulosa pilorum basibus incrassatis et muriculatis, 3-nervata vel paulo 3-plinervata pari exteriore 1-2 mm inframarginali nervis secundariis supra invisis subtus paulo obscuris ca. 2 mm inter se distantibus nervulis ob pilos occultis. Panicula 7-12 cm longa multiflora, bracteis prominentibus ovalibus vel ellipticis ca. 1 cm longis caducis, bracteolis ellipticis 2-4 mm longis caducis, pedicellis 5-6 mm longis. Hypanthium 2.5-3 mm longum densiuscule laxeque strigosum pilis gracilibus ca. 1.5 mm longis; calycis tubus 0.2 mm longus, lobis lanceatis ca. 3.5 mm longis intus apicem versus sparse strigulosis extus modice strigulosis. Petala 9-10 X 7.5-8 mm apice subtruncato et ciliolato. Stamina dimorphica; filamenta 6.5-7 vel 3.5-4 mm longa apicem versus modice glanduloso-setulosa pilis 0.1-0.15 mm longis; antherarum thecae 3.2-3.4 X 0.25 mm, connectivis 1.8-2.5 vel 0.3-0.5 mm prolongatis, appendicibus 0.8 X 0.7 vel 0.5 X 0.5 mm. Stigma punctiforme; stylus sparse glanduloso-strigulosus; ovarium 4-loculare apicem versus modice glandulis sessilibus vel paullulo stipitatis armatum.

Type Collection: Bassett Maguire, J. J. Wurdack, & W. M. Keith 41800 (holotype US 2342590; isotypes NY, P), collected at edges of Sabana El Venado, left bank of Caño Pimichín 2 km above

Pimichín, Terr. Amazonas, Venezuela, elev. 120-140 m, 10 Oct. 1957. "Shrub 1-1.5 m. Petals pink."

Macairea arirambae has appressed pubescence and calyx lobes only ca. 2.5 mm long, as well as shorter upper leaf surface hairs. The Pimichín collection had been distributed as Macairea cf. radula (Bonpl.) DC.; that species, of which the holotype (Ferreira s. n., P) has been examined, has longer (2.5-3 mm) mostly gland-tipped stem pubescence, 5-nerved leaves (the inner pair of primary veins 4-6 mm from the blade margins), and the hairs on the lower leaf surfaces gland-tipped and without expanded bases. Formerly I had thought that M. radula and M. foveolata Cogn. might be exactly synonymous; however, the latter species (known also from Jobert 1232, P-- "inter Theresina et Caxias," Maranhão-- perhaps collected on a joint trip with Schwacke) has the lower leaf surfaces only very sparsely strigose (albeit densely glandular-setulose) and longer rather more patent cauline hairs (3-5 mm, rather than 2.5-3 mm). The distinctness of the two species is still somewhat clouded, the Ferreira holotype being badly mildewed.

MACAIREA THERESIAE Cogn., Bot. Centralbl. 66: 369. 1896.

M. glabrescens Pilger, Verh. Bot. Ver. Brand. 47: 165. 1905.

Ule 6153 (G-DEL) is the same in all features as Therese von Bayern s.n. (M) except that Cogniaux' species has large stamens with connectives prolonged (below the thecae to the filament insertion) ca. 4 mm rather than 1-1.5 mm. Both types were collected in the same general region on the lower Rio Negro. Recent collections from the Manaos region show the same extremes, as well as intermediates, of connective prolongation.

SANDEMANIA HOEHNEI (Cogn.) Wurdack, comb. nov.

Comolia hoehnei Cogn., Comm. Linh. Tel. M. Grosso Ann. 5 Bot. pt. 3: 9. 1912.

Sandemania glandulosa Wurdack, Phytologia 5: 53. 1954.

Cogniaux originally placed his novelty in Comolia Sect. Tricentrum; however, Hoehne (Anex. Mem. Inst. But. 1, fasc. 5: 90. 1922) noted that the ovary was bilocular. A syntype examined of C. hoehnei (Hoehne 1829, BR) is quite compatible (the upper leaf surface at length glabrescent) with Froes 22658, Egler & Raimundo 830 (Rio Cururu, Tapajós, Pará), and Pires, Black, Wurdack, & Silva 6096 (Serra Cachimbo, Pará), all having glandular cauline pubescence. Two other Brazilian forms of S. hoehnei have recently been collected: Prance et al 3732 and 4876 (Km. 202, Manaos-Itacoatiara Highway near Rio Urubú), with glabrous upper leaf surfaces and loosely appressed eglandular cauline hairs; Egler & Raimundo 958 (Rio Cururú, Tapajós, Pará), with branchlets and primary leaf veins beneath sparsely strigulose (hairs eglandular, 0.3-0.5 mm long) and hypanthia essentially glabrous (very sparsely strigulose at the base). Since the Urubú form agrees vegetatively with photographs of S. cogniauxii (Ule) Wurdack, the Cururú collection is from the same region as typical material of S. hoehnei, and no Peruvian materials of Sandemania

are at hand for another evaluation, no subspecific adjustments are now being made. It seems quite probable that all the collections of the genus represent variants of a wide-ranging monotype, the oldest available binomial being S. hoehnei.

TIBOUCHINA RHYNCHANTHERIFOLIA Cogn.

Recent Peruvian collections from Puno (Asalaya, Sandia, Vargas 14829; ....., Sandia, Vargas 16375) and Ayacucho (eastern massif of Cordillera Central opposite Cordillera Vilcabamba, Dudley 11831) have been identified (ex descr.) as T. rhynchantherifolia. The Puno specimens have a very few glandular hypanthial hairs, while the Ayacucho gathering has more abundant gland-tipped pubescence; both populations have the sepals sparsely puberulous within and the style setulose, features not noted in the original description.

TIBOUCHINA WEBERBAUERI Cogn.

After examining another "isotype" (G-DEL) of this species, I believe that the original collection was a mixture. The left-hand sprig of the destroyed Berlin sheet (Macbride Photo 16808) corresponds to my earlier interpretation (Phytologia 13: 67. 1966), while the right-hand branchlet as well as the G-DEL specimen are T. decora Gleason. Since the Cogniaux herbarium specimen (BR) also agrees with the 4-merous element (showing also a tendency in the larger leaves to plinervation, as well as sparser lower surface pubescence), it seems best to continue my previous interpretation rather than treating T. weberbaueri as a nomen confusum. Since both taxa need comparison with Bolivian species and the consequences of such a study are impalpable to me, no typification is now done.

TIBOUCHINA GEITNERIANA (Schlecht.) Cogn.

T. schumannii Cogn., DC. Mon. Phan. 7: 256. 1891.

T. moritziana Cogn., DC. Mon. Phan. 7: 259. 1891.

Cogniaux differentiated T. geitneriana and T. schumannii from all other congeners because of the 1-3 dorsal setulae on the connective at the filament juncture; these enations are more prominent on the Karsten collection. In all other respects, the types of the three taxa are alike. I feel that these setulae are abnormalities and am treating only one species for the Flora de Venezuela. Authentic collections have been examined for T. geitneriana (Geitner s. n., W), T. schumannii (Karsten s. n., BR), and T. moritziana (Karsten s. n., BR, Moritz 291 and 937). As might be inferred from the placement in Cogniaux' monograph, the interpretation of taxa in this part of the genus has extra-Venezuelan complications in both Central America (Mexico, Guatemala, Costa Rica) and the southern Andes (Peru, Bolivia), such ramifications needing extensive field observation of populations. No information about Geitner could be found in the standard references on collectors, perhaps the best suggestion (from J. Ewan) being that he may have been a German or Austrian businessman or consul.

ACIOTIS ANNUA (DC.) Triana

A. dysophylla (Benth.) Triana, Trans. Linn. Soc. Bot. 28: 52. 1871.

The two Martius collections at München both have narrowly oblong anthers 1-1.3 mm long; Cogniaux' description of A. annua in Flora Brasiliensis must have been drawn from insect-truncated anthers as so often happens in the melastomes. Otherwise, Cogniaux-cited specimens of A. dysophylla are quite compatible with A. annua. Among more recent collections, excellent matches for the Martius specimens are C. F. Baker 133 and Antonio Silva 92 from Brazil and Wurdack & Adderley 43416 from Venezuela. Macbride's equation of A. cordata (Vell.) Macbride with A. dysophylla was inadvisable; the range of A. annua does not extend as far south as Vellozo's region. Many recent Peruvian collections cited in the Flora of Peru as A. cordata are referable to other species, especially A. aequatorialis Cogn. At München, I noted that Spruce 338 is the same vegetatively as the Martius collections of A. annua, but the fruit are rather more distant (2-4 mm) on the inflorescence branchlets; Spruce 2123 is not A. annua, having short dense glandular indument on the leaves and stems below the inflorescences.

ADELOBOTRYS PERMIXTA Wurdack, sp. nov.

A. adscendenti (Sw.) Triana et A. rotundifoliae Triana affinis, foliis maioribus crassioribus calycis dentibus exterioribus maioribus differt.

Caulis scandens primum sicut foliorum subtus venae primariae inflorescentia hypanthiaque modice caduceque strigulosa, pilis gracillimis asymmetrice malpigheis 0.2-0.4 mm longis. Petioli (1-)3-6 cm longi; lamina 10-20 X 6-13 cm, late ovato-elliptica vel elliptica apice breviter acuminato basi obtusa vel truncata, coriacea et integra vel obscure undulato-serrulata, dense subpersistenterque ciliata pilis gracillimis ca. 1.5 mm longis, 5(-7)-nervata nervis secundariis 0.5-0.8 cm inter se distantibus nervulis obscuris. Panicula laxe multiflora, pedunculo usque ad 20 cm longo, pedicellis ad anthesim 0.4-0.8 cm longis demum usque ad 1.5 cm longis. Hypanthium (ad torum) 5-6 mm longum paulo costulatum; calycis tubus 2-2.5 mm longus, lobis interioribus 0.7-1 mm longis late ovatis, dentibus exterioribus prominentibus robustis 1.3-2 mm eminentibus. Petala 10.5-11.5 X 6.5 mm obovato-oblonga apice truncato-rotundato. Stamina paulo dimorphica glabra; filamenta 7.5-8 mm longa aequalia; antherarum thecae 7.7-8 vel 6.5 X 0.7 mm subulatae, dente basali 0.7-0.9 mm longo robusto acuto, appendice adscendenti 3.6-3.7 mm libera apice per 1.2-1.6 mm caudato-bifido. Stigma non expansum; stylus glaber 11 X 0.35-0.4 mm; ovarium 5-loculare glabrum apice paulo (0.2-0.3 mm) emarginato; hypanthium fructiferum (ad torum) 10 mm longum.

Type Collection: Albert S. Pinkus 35 (holotype US 1775924; isotypes widely distributed as A. ciliata), collected at Membaru Creek, upper Mazaruni River, British Guiana, 27 Sep. 1938. "Liana; petals and pistil white; anthers yellow."

Paratypes: British Guiana: S. S. & C. L. Tillett 45522, Kako River, upper Mazaruni River basin, elev. 500 m; S. S. & C. L. Tillett 45636, Akapai, Kamarang River, elev. ca. 470 m. Venezuela, Edo. Bolívar: B. Maguire, J. A. Steyermark, & C. K. Maguire 46752 (fruiting), Alto Río Cuyuni 10-15 km below La Escalera, elev. 100 m.

Both suggested relatives have smaller thinner leaves, smaller flowers or fruit, and external calyx teeth not or scarcely projecting. Adelobotrys praetexta Pilger, with similar heavily ciliate leaves and flowers still unknown, has much smaller fruiting hypanthia and minute non-projecting external calyx teeth. Gleason (Brittonia 1: 140-141. 1932) had treated A. permixta as A. ciliata (Naud.) Triana; however, the holotype and recent French Guiana material of A. ciliata differ in the smaller thinner leaves with margins moderately (but somewhat caducously) appressed-ciliate with both stout whitish hairs (to 2 mm long) and very fine brown trichomes as well as the smaller flowers with external calyx teeth projecting only 0.5-1 mm. Collections of true A. ciliata are known from Venezuela (Steyermark 89564), Suriname (Sagot 237, Kappler 1682, Cowan & Lindeman 39181, BW 6287), and French Guiana (Melinon s. n. ann. 1855, Melinon s. n. ann. 1867, Oldeman B-1099).

Unfortunately Gleason's combination, A. guianensis (DC.) Gleason, seems to have been unnecessary, both the holotype (G-DC) and isotype (P) being typical A. adscendens (Sw.) Triana, with inframarginal external calyx teeth and stamens as dimorphic as in Jamaican collections; Leprieur s. n. ann. 1847 is an excellent match for the Patris type. The treatment of the variants of A. adscendens (Sarmentaria decora Naudin, the holotype a fragmentary specimen with caducously fine-ciliolate leaves and very large fruit--the fruiting hypanthium 9-10 mm long, the calyx limb 2.5-3 mm long, the external calyx teeth inframarginal and less than 1 mm long; A. multiflora Pilger, with very small flowers) remains for a monographer; also among the British Guiana collections is a probable variant with slightly projecting external calyx teeth.

ADELOBOTRYS MARGINATA Brade

The Manaos collection (Spruce s. n., "Macairea?," P, W) cited by Cogniaux as A. fuscescens Triana, is actually referable to A. marginata. The Chocó species may be distinguished by the denticulate leaves and much finer hypanthial pubescence. Two recent collections of A. marginata are Prance, Pena, & Ramos 3111 (Manaus-Caracarai road, Amazonas, Brazil) and Schultes, Rauffauf, & Soejarto 24052 (Leticia, Amazonas, Colombia).

AXINAEA OBLONGIFOLIA (Cogn.) Wurdack, comb. nov.

Meriania oblongifolia Cogn., DC. Mon. Phan. 7: 429. 1891.

Axinaea merianiae auct., non Chastanaea merianiae DC.

The Grisar holotype (P) and type fragments (BR) have been studied and are quite equatable with recent collections from southern Ecuador (Loja) and northern Peru (Piura), showing

bulbous connective appendages. It is fortunate that the species was already described and the epithet available (vide infra).

AXINAEA MERIANIAE (DC.) Triana

A. lepidota (Benth.) Triana, Trans. Linn. Soc. Bot. 28: 69. 1871.

Chastanaea coriacea Naudin, Ann. Sci. Nat. ser. 3 Bot. 4: 55. 1845.

It was puzzling to find the fragment (G-DC) of A. merianiae with the squamate foliage of A. lepidota sensu Cogniaux, but this was dismissed as a collection mixup until the holotype and three other Bonpland specimens of Chastanaea merianiae were seen in Paris, all being the same as A. lepidota. The holotype of A. merianiae from Richard's herbarium has a hypanthium (dry) 5 mm long and calyx 2 mm long, instead of the shallow (1.5-2 mm long, dry) hypanthium (plus calyx 1-1.5 mm long) of A. oblongifolia. The plate published in Delessert's Icones Selectae Plantarum (vol. 5, pl. 2. 1846) is probably of A. oblongifolia, drawn according to Naudin's mistaken interpretation of A. merianiae.

CALYPTRELLA GRACILIS Triana

Miconia consimilis Pilger, Verh. Bot. Ver. Brand. 47: 170. 1905.

An isotype (Ule 6543, G-DEL) of Pilger's species has been examined. The current note is an extension of previous synonymy (Phytologia 9: 413. 1964).

LEANDRA PUBISTYLA Wurdack, nom. et stat. nov.

L. melastomoides Raddi var. paulina Cogn., Mart. Fl. Bras. 14(4): 85. 1886.

As previously indicated in the Melastomataceae of Santa Catarina (Sellowia 14: 177-178) and now confirmed by examination of Raddi collections (4 specimens, FI, G-DEL), L. melastomoides is not conspecific with Cogniaux' variety. The Raddi collections, however, are of the same species as L. scabra DC. (1828), this then being a synonym of L. melastomoides (1820). In the publication of L. scabra, L. melastomoides was cited with a query in the synonymy. Raddi later (1829) renamed L. melastomoides as L. involucrata Raddi (non DC., 1828), this name being doubly untenable (a homonym and superfluous). The other variants of L. melastomoides described in Flora Brasiliensis (var. longifolia Cogn., which perhaps might be construed as being var. melastomoides; var. major Cogn.) must necessarily be reevaluated in the future. The use of the epithet paulina was prempted in the Prodromus for a quite different species, L. paulina DC. No formal lectotype for L. pubistyla has been chosen, only a Sellow syntype being immediately at hand, but the species is amply represented also by modern collections.

Incidentally L. melastomoides best conforms to the original generic description (1820) and should be regarded as the generotype; the other species published then, L. hirta Raddi, has 5-merous (not, as mistakenly noted by Raddi, 6-merous)

flowers. Raddi later (1829) modified the generic concept to encompass a miscellany, including species now placed in Ossaea, Clidemia, and Miconia. Among recent Brazilian collections, the Raddi material of L. melastomoides is best matched by Fuad Atala 292 (Floresta de Tijuca, Guanabara), Smith & Vieira 1378 (Corcovado, Guanabara), and Wilkes s. n. ("Rio Janeiro").

LEANDRA NIANGA (DC.) Cogn.

Raddi correctly made the combination, L. agrestis (Aubl.) Raddi for a rare French Guiana species. However, his own Brazilian collections (FI) identified by him as L. agrestis and the bases of his detailed description (Mem. Mod. 20: 157-158. 1829) are actually L. nianga.

LEANDRA REVERSA (DC.) Cogn.

The Raddi collection (FI) of L. hirsutissima Raddi (Mem. Mod. 20: 152. 1829) is actually identifiable with L. reversa sensu Cogniaux. Cogniaux had doubtfully placed L. hirsutissima in the synonymy of L. australis (Cham.) Cogn. Certainly however, judging from the Macbride photograph (25915) of L. reversa, ambiguity remains as to the correct use of this name; if Clidemia reversa DC. proves to be a synonym of L. nianga (DC.) Cogn. or one of its allies, Raddi's name will be the available one for the southeast Brazilian species with secund flowers.

LEANDRA ECHINATA Cogn., Mart. Fl. Bras. 14(4): 607. 1888.

L. horrida Cogn., DC. Mon. Phan. 7: 1185. 1891.

L. wettsteinii Rechinger, Denkschr. Kais. Akad. Wiss. Math.-Naturw. (Wien) 79: 255, pl. 22. 1908.

L. horrida Cogn. var. reitzii Brade, Sellowia 12: 143, pl. 4, fig. 1-7. 1960.

The above-cited synonymy has been confirmed by examination of type collections of L. echinata (Glaziou XXI, BR, which is the same collection as Glaziou 16002, C, P) and L. wettsteinii (W). Glaziou 16002 is in bud, thus accounting for Cogniaux' small floral dimensions. The "Glaziou" type collection was actually made by Puiggari (s. n.) at Apiahy in May, 1886 and adopted into the Glaziou number sequence, with fallacious collection data of first "Pirecicaba, S. Paulo, 26 fevrier 1886" and later "Serra do Picu, R. Janeiro, 4 mai 1886"; Puiggari had earlier collected material at anthesis ("Apiahy, Sitio de João Coelho, Junio 1885," Puiggari 3062, P), but this collection was not seen by Cogniaux. On the Paris isosyntype of L. horrida (Ule 1462), Glaziou had written "1339" and "11254" (no altered locality indicated), but did not include this collection in his published "Liste". Brade's remarks (Sellowia 12: 143) about the affinity with L. longisetosa Cogn. raised the suspicion of still another synonym for L. echinata; however, examination of Glaziou 8691 (P) showed that L. longisetosa is a distinct species with long-decurrent leaf blade bases. Apart from the materials cited in the Melastomataceae of Santa Catarina (Sellowia 14: 184. 1962, q. v. for floral details), L. echinata

has recently been collected also in Paraná (Hatschbach 7104, 7156, 8670, 21682), the species thus ranging from southern São Paulo to Santa Catarina.

LEANDRA MICROPHYLLA Cogn.

Type fragments (BR) of both L. microphylla and L. dusenii Cogn. have been studied. In describing L. dusenii, Cogniaux did not mention the intimate affinity with L. microphylla. Apart from the difference in development of external calyx teeth, L. microphylla has the torus sparsely setulose within, the style glabrous, and the anthers relatively narrow and (usually) long (1.6-2 mm dry); L. dusenii has a glabrous torus, sparsely strigulose style, and plump anthers (1.2-1.4 mm dry). Both species have sparsely strigulose ovary apices, despite Cogniaux' description (L. dusenii). Recent collections of L. microphylla (some earlier determined by me as L. dusenii), all from Paraná, include Smith, Klein, & Hatschbach 14492 (Carambei, Mun. Castro; excellent match for the type), Hatschbach 14653 (Anfiteatro, Mun. P. Grossa), and Reitz & Klein 17462 (Rodovia de Café, Mun. Palmeira). For L. dusenii, recent topotypical specimens (Vila Velha, Mun. Ponta Grossa, Paraná) are Smith, Klein, & Hatschbach 14449 (excellent match for the type), Dombrowski, Saito, & Pereira 900, and Dusen 8063. While the cited specific differences seem striking, I am not at all sure that morphologic intermediates do not exist and indeed am hesitant about identifying several other collections in this microphyllous species-group. As implied in the synonymy under L. acutiflora (Naud.) Cogn. (Sellowia 14: 193. 1962), the later homonym L. dusenii Brade has no affinity with L. dusenii Cogn.

LEANDRA QUINQUEDENTATA (DC.) Cogn.

Triginia parviflora Jacques-Felix, Bull. Mus. Hist. Nat. Paris (2)8: 110. 1936.

Miconia africana Jacques-Felix, Bull. Mus. Hist. Nat. Paris (2)10: 642. 1938.

The Guiral holotype (P) is matched exactly by Vainio 33476 (US) from Carassa, Minas Gerais, Brazil, having finer leaf veinlet reticulation and smaller flowers than typical for L. quinquedentata; these differences from the typical form are bridged by the large series of other recent Brazilian collections. No information about the itinerary of the Guiral expedition could be found in Paris, Madrid, or London. Three possibilities concerning the Guiral collection exist: the collection is truly from Spanish Guinea and is another example of Afro-American disjuncts or represents an introduced waif; the labels were mixed in museum processing and the collection is actually from Brazil but from another collector; or the Guiral expedition actually visited Brazil, but the locality data on the type is incorrect. The first conjecture seems improbable to me because of the exact morphologic match found in truly Brazilian material and because Leandra species are unlikely and unknown otherwise as casual introductions anywhere.

Thus it still seems true that no genus (and no species) of Melastomataceae is native to both the New and Old Worlds, although of course Tibouchina urvilleana (DC.) Cogn., Heterocentron subtriplinervium (L. & O.) A. Braun & Bouché, and Clidemia hirta (L.) D. Don have become naturalized in parts of the palaeotropics.

LEANDRA DIVARICATA (Naud.) Cogn.

L. rhamnifolia (Naud.) Cogn. var. macrodon (Naud.) Cogn., Mart. Fl. Bras. 14(4): 195. 1886.

Examination of Naudin's holotype (P) has confirmed the synonymy suggested by Gleason in his melastome notebook. The Venezuelan collections of L. divaricata conform to the type collection, lacking gland-tipped hypanthial hairs. The hierarchal status of the Bahia element (L. rhamnifolia, the type of the typical variety perhaps a Sellow collection) in this complex has not been decided; as noted earlier (Mem. N. Y. Bot. Gard. 10, 5: 164-165. 1964), many British Guiana collections (but not the type) of L. divaricata show varying proportions (up to ca. 50%) of glandular hypanthial hairs, while Bahia collections essentially lack eglandular hypanthial pubescence. In both the Bahia and Suriname-Pará (Brazil) samples of L. divaricata and L. rhamnifolia are specimens with quite divaricate cauline and hypanthial trichomes. Also the type of L. rhamnifolia var. grandifolia Cogn., not matched in modern collections, has much finer hypanthial pubescence than the typical variety and would merit subspecific recognition.

The type collection (3 sheets, M) of L. secundiflora (DC.) Cogn. has been examined; my earlier allusion as to possible synonymy with L. divaricata does not seem warranted at present. The Martius collections differ in the linear to linear-lanceate (rather than narrowly oblanceate) bracteoles 4-5 (rather than 2-3) times longer than wide and the plump anthers less than 1 mm long (dry) and only 2-2.8 times as long as wide (rather than linear-oblong, 1.3-1.7 mm long, 4-5 times as long as wide); vegetatively the two species are not reliably distinguishable and both have 5-merous flowers (with glabrous 3-celled ovaries) despite Cogniaux' differentiation. Collections referable to L. secundiflora include the Martius collections (M) from "prov. R. Negri" (one labelled "Manacarú"), Traill 257 (P) from "Jacatajuba, Santarem, R. Jutahi," and Schultes & Cabrera 13636 (US) from Soratama, Río Apaporis, Colombia. Cogniaux' synonymy under L. secundiflora needs restudy, the Gay holotype (P) of Clidemia quadrisulca Naud. having 5-merous flowers (as indicated by Naudin) but very fine (in part gland-tipped) hypanthial pubescence and certainly not being conspecific with L. secundiflora.

LEANDRA ARISTIGERA (Naud.) Cogn.

After comparison with the holotype (P), two recent collections seem referable to this rarity: Prance, Steward, Ramos, & Farias 9591, Auaris, Terr. Roraima, Brazil; Steyermark, Bunting,

& Blanco 101738, Reserva Forestal San Camilo, Edo. Apure, Venezuela. Both collections have somewhat longer caducous hairs on the upper leaf surface than in Gay's specimen. Gay's collection surely is not from "prope Lima", but more probably from the lowlands of Depto. Cuzco, Peru. The three gatherings all differ from Schwacke 9812 (cited by Cogniaux) in the longer cauline and petiolar pubescence (ca. 2 mm rather than 1 mm); Jobert 756 (P), from "Potomayo (Amazone)", matches exactly the Schwacke material.

As noted in the original description, L. lasiopetala Cogn. is very closely related to L. aristigera, but has external calyx teeth projecting only ca. 0.3 mm (rather than 1-1.1 mm) and the external corolla mucro projecting only 0.2-0.4 mm (rather than 0.8-1.4 mm), as well as cauline pubescence only 0.3-0.5 mm long; recent collections of the Costa Rican species include Webster, Miller, & Miller 12410 (Río Sonador, Puntarenas), Schnell 14 (Volcán, San José), and Molina, Burger, Jimenez, & Wallenta 17992 (Río Convento, San José). Both species show "incipient" formicaria in the leaf blade bases. Unfortunately for my taxonomic equanimity, by the above criteria Schultes & Cabrera 15520 (Río Apaporis, Amazonas, Colombia) seems better as L. lasiopoda than as L. aristigera, while Schunke V.5874 (Rondos, Huánuco, Peru) has corolla mucros 1 mm long but short (ca. 0.4 mm) external calyx teeth and cordulate leaf bases. Perhaps there is only one wide-ranging species (with recognizable infraspecific permutants), but either more material or better taxonomic intuition is needed. The holotype (G-BOISS; Macbride photograph 34166) of L. boissieriana Cogn. has been examined; in floral features it agrees with the holotype of L. aristigera and is probably only a nearly glabrous (vegetatively) variant.

MICONIA JUCUNDA (DC.) Cogn.

Graffenrieda brevicalcarata Mgf., Notizbl. Bot. Gart. Berlin 10: 53. 1927.

A specimen of the type collection, Luetzelburg 341 (M), has been studied. Although collected in Bahia (the type locality of M. jucunda var. jucunda), the Luetzelburg material agrees better with M. jucunda var. selloana (Cham.) Cogn., matching well recent Paraná specimens (Hatschbach 5603). Martius also had mistakenly placed this species in the genus Graffenrieda as G. jucunda (DC.) Mart.

MICONIA DONAEANA Naud.

M. longicaudata Cogn., DC. Mon. Phan. 7: 738. 1891.

M. leucantha Gleason, Bull. Torrey Club 63: 534. 1936.

The species is somewhat variable in pedicel length, flower size, and development of connective glands; however, all this variability is encompassed within the numerous Costa Rican collections. The Peruvian population was characterized by the short pedicels, with the Pavón type showing connectives moderately gland-edged from the base up to about the half-point

of the thecae; the Venezuelan type collection of M. longicaudata shows pedicels 1-3 mm long and the connective glabrous or very sparsely gland-edged basally. As here amplified, M. donaeana is known from Honduras (Molina 7131), Costa Rica (Hatheway 1697; Pittier 10611, 11063, 11955; Schnell 72; Skutch 2353, 2500, 3905, 4731; Tonduz 4952, 6873, 7577, 7612), Venezuela (both Coastal Cordillera and Andes: Bernardi 1772, 1965, 6250; Funck & Schlim 1503; Pittier 15526; Steyermark et al 89904, 94767, 101272), and subandean eastern Peru (see citations in Flora of Peru; also Schunke A118, Vargas 5339). Certainly M. caudata (Bonpl.) DC. is very closely related to M. donaeana, but has dense persistent pulverulence on the lower leaf surfaces and oblongish scarcely subulate anthers (although this latter feature is approached in some Costa Rican collections of M. donaeana); except perhaps for Tonduz 7801, M. caudata seems to be lacking from Costa Rica, but has been collected in Mexico (Chiapas, Shilom Ton 3878), Guatemala, and Panama (Chiriquí), as well as Colombia. No material referable to M. donaeana has been seen from either Colombia or Ecuador, the Ecuadorian analogue being M. littlei Wurdack.

MICONIA SYLVATICA (Schlecht.) Naud.

Acinodendron glandulosum O. Ktze., Rev. Gen. Pl. 1: 244. 1891.

Miconia glandulosa (O. Ktze.) R. Knuth, Fedde Rep. Beih. 43: 531. 1928, non M.? glandulosa (Sw.) Naud., Ann. Sci. Nat. ser. 3 Bot. 16: 244. 1851.

After several years' intermittent struggle with species 102-108 of Cogniaux' monograph and still no evident and practical complete solution, for purposes of the Flora de Venezuela I have partially copped out. Among these species, M. mendoncaei Cogn., a variant of M. prasina (Sw.) DC. with obtuse leaf bases (but plinerved leaves and small petals), and M. smithii Cogn. ex Gleason, actually Sect. Cremanium with biporose (or subquadriporose) anthers, may be excluded from consideration. The flower glomerules (usually triads) in the other taxa are actually on much shortened branchlets, generally giving the aspect of a panicle of racemes. At one end of the species-group spectrum in Central American M. sylvatica, these branchlets on the lower portions of the main branches reach 2-3 mm in length and the plants are lacking in simple leaf surface and inflorescence hairs; at the other end, the branchlets are 0.5 mm or less in length and the simple hairs are abundant. In species delimitation, certainly the treatment in the Flora of Guatemala is realistic for Central America, both M. bourgeana Cogn. and M. carioana Cogn. (the latter having sparse simple hairs on the lower leaf surface veinlets despite Cogniaux' implied distinction from M. bourgeana: Bernouilli & Cario 2868, BR) being synonymous with M. desmantha Benth. After noting the vegetative and floral resemblances of Acinodendron glandulosum to M. laevigata (L.) DC., a search among the Cogniaux-cited synonyms of the linnaeon uncovered a Schiede &

Deppe isotype of M. sylvatica (G-DEL, ex herb. Moricand). Schlechtendal's original description (Linnaea 13: 422. 1839) was very perceptive and indeed the distinction from M. laevigata is primarily in inflorescence pattern, the latter have secund spaced flowers on the ultimate inflorescence branchlets rather than a triad glomerule. Among Central American collections of M. sylvatica are: Balls 4305 (Orizaba, US), Berlandier 378 (Tampico-Real del Monte, G-DEL, P), Bilimek 153 (Orizaba, P), Botteri 477 (Orizaba, P), Bourgeau 2247, 2247 bis, 2248 (all "Vallée de Cordova", P), Ehrenberg s. n. (Jalapa, US), Galeotti 2905, 2910, 2923 (all Vera Cruz, G-DEL), Kerber 350 (Fortin, C, P), Liebmann 37 (US), 38 (P), 39 (Mirador, C), 40 (Mirador, C, P), Linden 603 (Jalapa, G-DEL) and 1291 (Mirador, Vera Cruz, G-DEL), Reiche 606 (Jalapa, M), Rose & Hay 6151 (Jalapa, US), Seler 924 (US), all from Mexico; Rojas 341 (US), from Chillaui, Guatemala; Standley 55858 (US), from Comayagua, Honduras; and Calderón 1180 (US) and Standley 23030 (US), from El Salvador.

Among the species at the hairy end of the morphologic spectrum, M. lindenii Naud. does not seem separable from M. aeruginosa Naud., the types of both taxa having essentially non-emergent external calyx teeth. The only "species" with emergent (0.4-1 mm) external calyx teeth, M. chaetodon Naud., generally also has longer cauline pubescence (2.5-3.5 mm long, but on the type only ca. 2 mm long) than in M. aeruginosa. I have not seen the collections of M. desmantha cited in the Flora of Trinidad and Tobago; probably they are similar to sporadic Venezuelan specimens (Gines 228, Killip 37833, Gehriger 404) which I am including in M. aeruginosa, these collections having sparser and usually shorter simple foliar hairs than in "typical" M. desmantha from Colombia. Perhaps the above display of analytic incompleteness will inspire detailed field observations in the Venezuelan Coastal Cordillera and a true sorting of the ecotypes; expediency and a distaste for transient new combinations are the only real defenses for the current treatment.

MICONIA SERIALIS DC.

M. tomentella Cogn., Mart. Fl. Bras. 14(4): 284. 1887.

The holotype of M. serialis (P), collected by Ferreira and annotated by A. P. de Candolle, also seen by Naudin (Ann. Sci. Nat. ser. 3 Bot. 16: 147. 1851) but not by Cogniaux, represents the same species later described by Cogniaux. Miconia serialis is known definitely from Suriname and French Guiana; I have also tentatively identified a post-mature fruiting collection (Steyermark 86890) from the Río Paragua, Bolívar, Venezuela as this species. Perhaps Ferreira's collection came from his trip to the upper Rio Branco drainage.

MICONIA LOURTEIGIANA Wurdack, sp. nov.

M. seriali DC. affinis, foliis bene petiolatis non plinervatis differt.

Frutex vel arbor parva 3-12 m; ramuli teretes sicut folia

subtus inflorescentia hypanthiaque indumento arachnoideo non discreto omnino occulti. Petioli 1-2.3 cm longi, basibus linea paulo elevata nodali connexis; lamina (8-)10-15(-20) X (3-)4-7 (-8.5) cm elliptica apice subgradatim acuminato basi acuta, submembranacea et essentialiter integra, supra glabra, 3-nervata (pari inframarginali tenui excluso) nervis secundariis plerumque 2.5-4 mm inter se distantibus nervulis subtus planis et dense reticulatis ob pilos occultis. Panicula 6-10 cm longa multiflora ramis primariis saepius bifurcatis; flores 5-meri secundi sessiles, bracteolis ca. 1 mm longis lanceatis persistentibus. Hypanthium (ad torum) ca. 1.7 mm longum; calycis tubus 0.2-0.3 mm longus, lobis interioribus 0.4-0.5 mm longis late triangularibus, dentibus exterioribus obscuris non eminentibus. Petala 2 X 1.4-1.7 mm alba minutissime granulosa obovato-oblonga apice rotundato. Stamina paulo dimorphica glabra; filamenta 1.5 mm longa; antherarum thecae 1.6-1.8 mm longae anguste oblongae apice paulo emarginato poro ventraliter inclinato; connectivum non vel vix (0.1 mm) prolongatum, appendice basali magna cordiformi vel trilobulata. Stylus glaber apicem versus expansus; stigma 0.7 mm diam.; ovarium 3-loculare $\frac{1}{2}$ inferum, apice glabro collo 0.2-0.3 mm alto.

Type Collection: J. J. Wurdack 1919 (holotype US 2404359; 7 isotypes, distributed as M. serialis), collected on a ridge crest of Quebrada Chuivi (above Km 278 of Marañón road), valley of Río Marañón near Cascadas de Mayasi, Prov. Bagua, Depto. Amazonas, Peru, elev. 500-550 m, 10 Sep. 1962.

Paratypes: VENEZUELA. Apure: Reserva Forestal San Camilo, J. A. Steyermark, G. S. Bunting, & C. Blanco 101449. Bolívar: Río Paramichi, J. A. Steyermark 90570. COLOMBIA. Caquetá: Florencia, J. Cuatrecasas & R. S. Cowan 27227. PERU. Loreto: lower Río Huallaga, Llewelyn Williams 3836 and 4718; Yurimaguas, Poeppig 2407B, Killip & Smith 27544, 27948, and 28077, Klug 36; Mishuyacu, Killip & Smith 29995, Klug 465; Iquitos, Sandeman 2250 and 2266, Killip & Smith 29857, Asplund 14031. San Martín: Tocache, Poeppig 1863. Cuzco: Asunción, Paucartambo, Vargas 11023. Puno: San Govan, Lechler 2467. BRAZIL. Amazonas: Boca de Acre, Prance, Pena, Ramos, & Videcki 2461. Acre: Cruzeiro do Sul, Prance, Pena, & Ramos 2745; Sena Madureira, Prance, Coelho, Ramos, & Farias 7569. BOLIVIA. La Paz: Mapiri, R. S. Williams 760 (distributed as M. argyrophylla DC.); San Bartolome near Calisaya, Krukoff 10106. Pando: Abuña, Prance, Coelho, Ramos, & Farias 7569.

While this belated description of a widely distributed species with no available synonyms is somewhat unfortunate for non-taxonomic bibliography, it is nonetheless pleasurable to honor Alicia Lourteig, who is the doyenne of neotropical taxonomy and history of collections in Paris, has forwarded the researches of innumerable visitors (including myself), and has demonstrated leonine courage (fortified by la logique francaise) in her own taxonomic efforts in nearly impossible plant families. Miconia lourteigiana was misinterpreted by Cogniaux as M. serialis (vide supra).

MICONIA APPENDICULATA Triana

The holotype of this Colombian species, Triana 4059, had long been filed at the British Museum (Natural History) under "M. macrotis Tr." (non M. macrotis Cogn.); however, in his collection notes, Triana had lined out his original unpublished epithet and substituted that under which the species was published, but did not do so on the specimen label. Two recent collections, Cuatrecasas 10586 (Puerto Porvenir, Río Putumayo, Com. Putumayo, 230-250 m elev., 17 Nov. 1940) and Perez Arbelaez 664 (Florencia, Caqueta, 420 m elev., XII-1930), especially the former, are comparable to Triana 4059. Miconia appendiculata is related to M. trinervia (Sw.) Don ex Loud. (M. scorpioides of Cogniaux' monograph), differing in the rather formless (squamate) early-caducous pubescence, the terete non-ancipital branches, the sessile leaves with cordate-auriculate bases and somewhat denser veinlet reticulation, and the not-at-all prolonged anther connectives (seen on the Cuatrecasas collection). Triana's excursions into the eastern lowlands of Colombia did not include the southeast; as yet I have seen no collections of M. appendiculata from the Villavicencio region where he did collect. Another species in this relationship (which also includes M. goudotii Naud. and ex char. M. paspaloides Gleason) is M. pterocaulon Triana, known from several recent Colombian and Venezuelan collections but artificially keyed by Cogniaux some 24 species away from this complex.

MICONIA AFFINIS DC.

M. microcarpa DC., Prodromus 3: 189. 1828.

M. planinervia Naudin, Ann. Sci. Nat. ser. 3 Bot. 16: 160. 1851.

M. cecidophora Naudin, Ann. Sci. Nat. ser. 3 Bot. 16: 166. 1851.

M. pusilliflora Beurl., Act. Holm 130. 1854 (non Naudin, 1851).

M. beurlingii Triana, Trans. Linn. Soc. Bot. 28: 107. 1871.

M. cayumbensis Gleason, Bull. Torrey Club 66: 416. 1939.

The two extremes in this complex differ only slightly in foliage and flower size. Miconia affinis and M. planinervia have leaf blades large, firm, oblong-elliptic, and very shortly blunt-acuminate and anther thecae (dry) 2.3-2.5 mm or 2 mm long; M. microcarpa, M. beurlingii, and M. cayumbensis (ovary 3-celled, not 2-celled as in the original description) have somewhat thinner elliptic and rather long-acuminate leaf blades and anther thecae (dry) 1.8-2 mm or 1.4-1.7 mm long; M. cecidophora is rather intermediate in foliar and floral features. Urban (Ark. Bot. 22A: 33. 1929) commented on the foliar and fruit extremes in naming Puerto Rican collections. The salient species features are the definite interpetiolar lines on the stellulate-puberulent branchlets, the caducously sparse-stellulate lower leaf surfaces with lax plane veinlets,

the opposite inflorescence branches and branchlets, the stellulate-puberulous hypanthia and triangular calyx lobes, and slightly dimorphic stamens with the connective usually slightly (to 0.5 mm) prolonged below the larger thecae. I have seen type material of all the species synonymized under M. affinis.

Miconia affinis (only representative collections cited) ranges from Mexico (Vera Cruz, J. V. Santos 2305; Oaxaca, Llewelyn Williams 9157 and 9400), Guatemala (Izabel, Standley 25058; Alta Verapaz, von Tuerckheim 8685), British Honduras (Stann Creek, Gentle 1917; Toledo, Gentle 4006), Honduras (Atlantida, Yuncker, Koepper, & Wagner 8306; Cortes, Williams & Molina 17948), Nicaragua (Zelaya, Molina 2385; Bluefields, Proctor, Jones, & Facey 27306), Costa Rica (Puntarenas, Allen 5881; San José, Skutch 4289; Cartago, Schnell 680), Panama (San José Island, Johnston 762; Bocas del Toro, von Wedel 2065; Canal Zone, Christopherson 205; Darien, Duke 15531), and Puerto Rico to Colombia (Santander, Uribe 4699; Meta, Appolinaire s. n.; Putumayo, Cuatrecasas 11286; Amazonas, Schultes 8171; Chocó, Killip 35042), Venezuela (Zulia, Carabobo, Delta Amacuro, Bolívar), Trinidad, French Guiana (but strangely enough not British Guiana or Suriname), Brazil (Amapá, Irwin 48678, distributed as M. prasina; Pará, Archer 7779; Amazonas, Krukoff 5998; Acre, Prance, Coelho, Ramos, & Farias 7708; Rondonia, Prance & Ramos 7158), and Peru (Loreto, Killip & Smith 27084 and 27936, Llewelyn Williams 3823 and 3839; San Martín, Belshaw 3442; Huánuco; Junín; Madre de Díos, Vargas 18829).

Miconia egensis Cogn. and M. panicularis Gleason (which is perhaps synonymous with M. egensis) have rather the same aspect as M. affinis, but coarser cauline pubescence and often whorled inflorescence branchlets. Most of the material currently filed in herbaria as M. hyperprasina Naudin is actually M. affinis; Naudin's species is apparently a rare one, known to me only from southern Mexico, Guatemala (von Tuerckheim 7624 and 8517), and Costa Rica (Tonduz 3755 and 4971), and is distinguished by the lack of interpetiolar ridges on the branchlets, the very sparsely and caducously strigulose upper leaf surfaces, and the anther connectives bilobulate-thickened at the base. The material at hand of M. nematophora Urb. & Ekm. does not show flowers at anthesis; certainly the cauline and inflorescence pubescence is rather coarser than in M. affinis, but the foliar tips referred to in the specific epithet are not species-diagnostic. It is doubtful if the Bahia collection cited by Triana and Cogniaux under M. cecidophora is convarietal with the Castelnau type; this specimen has (ex Macbride photo 17033) quite coarse pinoid inflorescence hairs and seems to be matched by Pereira 10161 (Minas Gerais).

MICONIA POEPPIGII Triana

M. congesta Cogn., Fedde Rep. 8: 2. 1910.

M. darienensis Pittier, Contr. U. S. Nat. Herb. 18: 248. 1917.

M. surinamensis Gleason, Rec. Trav. Bot. Néerl. 32: 212. 1935.

The branchlet quadrangulation, pubescence quantity on the branchlets, leaves, and inflorescences, and pedicel length vary in a continuous spectrum and there are no floral differences in the synonyms suggested above; the stamens and style of Pittier 5478 are glabrous (mildew-ridden, however) and the hypanthium is sparsely stellulate-puberulous. The inclusive species ranges from Guatemala (Izabal, Jones et al 3026 and 3235) and Panama (Darien) to Colombia (Santander, Romero Castañeda 4852 and 4953; Meta, Philipson et al 1468; Chocó, Duke 11593; Vaupés, Schultes & Cabrera 19639, Schultes, Baker, & Cabrera 18048, Molina & Barkley 18Va022, Garcia-Barriga 13882; Amazonas, Schultes 8210), Venezuela (Apure, Amazonas, Bolívar), Suriname, French Guiana (Irwin et al 48461; Melinon s. n., distributed as M. melinonis and as Macbride photo 17108), Brazil (Amapá, Pires et al 51284; Amazonas, Ducke 1276, Krukoff 6324, 6822, and 7933, Aluisio 187, Froes 26141; Maranhão, Froes 1973, distributed as M. pyrifolia; Rondonia, Prance et al 6288 and 6552), Peru (Loreto), and Bolivia (Pando, La Paz). Gleason (Flora of Peru, p. 440 ex Macbride) had already (and correctly) included M. congesta in the synonymy of M. poeppigii, but incorrectly included M. darienensis under M. prasina (Sw.) DC. (Flora of Panama, p. 290). Miconia pyrifolia Naud. (vide infra) differs from M. poeppigii in the generally larger leaves with broader bases, promptly glabrate stems, glabrous hypanthia, short styles, and non-expanded stigmas.

MICONIA PYRIFOLIA Naudin

The type collection of M. pyrifolia (Blanchet 3412) shows shortly plinerved leaves and calyx limb more-or-less (albeit slightly) regularly lobed; unfortunately for better evaluation, no recent Bahia collections seem to exist. The Riedel Manaos collections referred to M. pyrifolia by Cogniaux have calyces closed in bud, breaking into 3-4 ovate segments at anthesis. A large series of recent Brazilian collections (many from the recent Royal Society Expedition to Mato Grosso and several from N. Y. Botanical Garden trips to Serra do Roncador; Prance et al 2211, Manaos-Itacoatiara Highway and Prance et al 8222, Labrea, both Amazonas; Prance et al 9865, Auaris, Roraima) and several Venezuelan collections (Steyermark 94169, Bolívar; Berti 460 and 624, Delta Amacuro) are conspecific with the Riedel specimens and will be treated as M. pyrifolia for the Flora de Venezuela.

Miconia phaeophylla Triana resembles M. pyrifolia vegetatively but lacks interpetiolar ridges on the branchlets, has persistently stellulate-puberulous branchlets and hypanthia, and shows regularly lobed calyces (obvious in bud) and smaller costate fruit; the first Central American collections of M. phaeophylla known to me are (all Prov. Panama, Panama) Ebinger 395, Dwyer & Hayden 8053, and Dwyer & Stimson 8059 (the latter two distributed as M. hondurensis Donn. Sm.). Another simulator

of both M. phaeophylla and M. pyrifolia is M. kappleri Naudin, with quite fine (areoles 0.3 mm or less, rather than 1-2 mm) veinlet reticulation on the lower leaf surfaces (but rather persistently stellulate-puberulous hypanthia, truncate or shallowly undulate-lobed calyx limb, and basally nerved leaves). Currently I am uncertain as to the true identity of the recent Suriname collections referred to M. kappleri, as well as several Reserva Florestal Ducke (Amazonas, Brazil) specimens; these collections are perhaps best regarded as glabrate forms of M. phaeophylla, with true M. kappleri (except for the type ?, not cited in the Flora of Suriname, the locality "fl. Carouany" not in the current gazetteers) restricted to French Guiana (Wachenheim 137; Aubreville 248).

Miconia cinnamomifolia (DC.) Naud. is exceedingly close to M. pyrifolia, but has well-developed interpetiolar flaps (rather than just a ridge) and smaller petals and anthers. The holotype (G-DC) of M. martiusiana DC. (see Gleason photo 46-2) has been examined and does not differ from other material of M. cinnamomifolia. Anthers were seen by de Candolle for M. martiusiana, but not for Cremanium cinnamomifolium; despite the relative inadequacy of the type, it seems best to use the better-known name M. cinnamomifolia for this southeast Brazilian species (which is sympatric with and apparently more common than M. pyrifolia in Bahia). The Amazonian collections referred to M. martiusiana by Cogniaux are probably all conspecific with the Riedel collections (vide supra) of M. pyrifolia.

MICONIA CARASSANA Cogn.

M. compacta Gleason, Bull. Torrey Club 58: 230. 1931.

M. semota Mgf., Notizbl. Bot. Gart. Berlin 12: 177. 1934.

The Martius holotype (M), originally annotated "Melastoma carassana", had a subsequent note by Chamisso: "Hoc specimen non est M. carassana"; Schrank & Martius's MSS name was cited by Cogniaux (and earlier by de Candolle as Clidemia carassana) in the synonymy of Leandra carassana (DC.) Cogn. Obviously this purported duplicate is the result of a label mixup between Martius's Minas Gerais and Amazon valley collections since the holotype of L. carassana, a well-known species from the Brazilian Planalto, is quite different. Thus M. carassana, known from southern Venezuela (Amazonas), Colombia (Vaupés), Ecuador (Napo-Pastaza), Peru (Loreto), and Brazil (Amazonas) joins the long series of plant species with geographically misleading epithets. The synonymy of Markgraf's name was noted earlier by Gleason (Bull. Torrey Club 72: 477. 1945).

A very close relative of M. carassana is M. cinchonaefolia DC., described 59 years previously; that species, still known to me only from the Martius holotype (M), also has sparsely glandular-puberulous filaments and style and the anther connective bases densely beset with sessile glands, as well as the calyx limb entire in bud but splitting into segments at anthesis, but larger plinerved leaves. Indeed, the Manacurú specimen may yet prove to represent a minor foliar aberrancy. In foliar form

and primary venation, M. cinchonaefolia resembles M. phanerostila Pilger; that species, known from several recent Brazilian collections by Prance and his colleagues, has finer foliar pubescence (stellate hairs 0.3-0.5 mm diam. rather than 1-1.3 mm) and smaller granulose (rather than smooth) petals (isotype, G-DEL).

MICONIA BOXII Wurdack, sp. nov.

Sect. Amblyarrhena. M. ferreyrae Wurdack affinis, pubescentia pinoidea foliis 5-nervatis brevioribus calycis dentibus exterioribus manifestis ovarii apice 8-alato in collo circum stylum protracto differt.

Rami obscure rotundato-quadrangulati (nodis paulo incrassatis) demum teretes, sicut foliorum costa supra et venae primariae subtus inflorescentiaque modice vel sparse pilis pinoideis 0.1-0.2 mm longis demum caducis armati. Folia sessilia; lamina 5.5-1 X 2-3.5 cm oblongo-lanceata apice gradatim acuminato basi paulo (0.2-0.5 cm) cordata, subrigida et obscurissime serrulata, utrinque in nervulis superficieque maturitate glabra, 5-nervata nervis secundariis ca. 1.5-2 mm inter se distantibus supra crebre insculptis subtus crebre elevatis nervulis subtus planis laxiuscule reticulatis areolis ca. 0.7-1 mm latis. Panicula multiflora 6.5-8 X 4-8 cm; flores 4-meri sessiles in ramulorum brevium apicibus 3-5(-7)-aggregati, bracteolis ca. 1 mm longis anguste oblongis vel lanceatis subpersistentibus. Hypanthium (ad torum) 2.2 mm longum extus obscure furfuraceum; calycis tubus 0.2-0.3 mm altus, lobis interioribus semicircularibus ca. 0.6 mm altis, dentibus exterioribus crassis lobos interiores aequantibus vel paulo brevioribus; torus intus glaber. Petala 3 X 1.6 mm glabra paulo pruinosa obovato-oblonga apice rotundato. Stamina isomorphica glabra; filamenta 2-2.1 mm longa; antherarum thecae 4-loculares 1.7-1.9 X 0.4 X 0.5 mm oblongae apice dorsaliter curvato minute uniporoso, connectivo nec appendiculato nec prolongato. Stigma truncatum non expansum; stylus 6 X 0.25 mm glaber in ovarii apice immersus; ovarium 4-loculare 2/3 inferum glabrum apice valde 8-alato.

Type Collection: H. E. Box & A. Alayon V. 3745 (holotype BM; isotype VEN), collected on wooded slopes below Páramo de la Negra, Edo. Tachira, Venezuela, elev. ca. 2600 m, 22 March 1947. "Shrub 2-2.5 m high."

The suggested Peruvian relative has evanescent appressed-stellate pubescence, much longer (15-25 cm) leaves, external calyx teeth completely adnate and essentially indistinguishable, and a truncate ovary apex. In pubescence type and floral details, M. albertii Gleason is closely related, but has distinctly petiolate plinerved leaves with cuneate to obtuse bases. It is curious that the same region (Tachira) has also another sessile-leaved species of the same section (in press, based on Steyermark, Dunsterville, & Dunsterville 100904 and 98698), but with pedicellate 5-merous flowers. Pittier had indicated (in herb.) M. boxii as an undescribed species, but

never published on it.

MICONIA SPINULOSA Naudin

For the Venezuelan flora, Gleason's treatment of this complex (Phytologia 3: 347-349. 1950) is generally being followed, with M. inaperta Naudin being included under M. spinulosa (free petioles slightly longer) and M. aegrotans Naudin under M. ulmarioides Naudin. Another synonym of M. spinulosa is M. octoscenidium Cogn. (isotypes BR, W), varying only in the leaf shape (relatively wider, narrowly obtuse rather than acute at the base). Certainly serrulation and bullation of the leaves and size of the flowers are too variable to permit specific recognition. I have seen no material of M. spinulosa var. subintegrifolia Cogn. The only extra-Venezuelan collection of M. spinulosa known to me is Seifriz 80 (US), from Mount San Lorenzo near Santa Marta, Colombia. I am by no means satisfied with the specific treatment for this complex.

Cogniaux included in this species-group M. barbeyana; Gleason had already noted that the holotype showed 5-merous flowers and actually the species seems to be a small-flowered relative of M. terera Naudin. Gleason later added to the group M. albertii Gleason (now known from Norte de Santander, Santander, Boyacá, and Cundinamarca) and M. prasinifolia Gleason; the latter, at least as to one paratype (Killip & Hazen 10136, in very young bud, erroneously cited in the original description as Killip & Smith 10136) does not seem at all related to the M. spinulosa complex and is perhaps a species of Clidemia (but bearing a strong resemblance vegetatively to Leandra consimilis Gleason). Two additional species (vide supra; one in press) are being added to the complex by me. The recently described M. nubicola Proctor is also surely a part of the alliance and reemphasizes the curious direct phytogeographic linkage of Jamaica with the Venezuelan Cordillera Costal.

Leandra ossaeoides (Naud.) Cogn. bears a remarkable resemblance to the M. ulmarioides-M. arbutifolia group, differing obviously only in the lanceate acute petals (3.8 X 0.9 mm). In Naudin's original description, the flowers were noted as variable but usually 5-merous and the ovary 3-celled. Examination of three isotypes (BM, LE, P) showed all of the mature flowers with 4 petals, but dissection difficulties hindered accurate determination of ovary-cell number. One modern collection, Steyermark & Rabe 97396 (Boconó-El Batatal, Trujillo, Venezuela) matches well vegetatively Funck & Schlim 747, but the buds have obtusish petals and the ovary is definitely 4-celled. For the Flora de Venezuela, the species has been retained in Leandra with misgivings.

CATOCORYNE LINNAEOIDES Hook. f.

This monotypic genus has long been known only from the Lobb holotype (K) from "Peruvia." An overlooked collection, originally determined by K. Rechinger, is Lehmann s. n. (W),

collected "an Erdabbrüchen über Pilenan auf 1000 m am Wege von Barbacoas nach Pasto in Colombien, 16 Juli 1879" ("Blümen rosa"). Thus the type is probably another of the Lobb misdirections indicated by Killip (Smiths. Misc. Coll. 87, 1: 1-13. 1932). Unfortunately no listing of "Pilenan" could be found in the standard gazetteers; Lehmann's field notes (typescript copy, US) are of no help, the first Colombian collection entered there being in June, 1880.

CLIDEMIA RUDDAE Wurdack, sp. nov.

C. submontanae Rose ex Gleason et C. laxiflorae (Schlecht.) Walp. affinis, foliis minoribus non acuminatis calycis dentibus exterioribus brevioribus differt.

Ramuli teretes sicut petioli inflorescentiae ramique pilis laevibus gracilibus erectis 2-3 mm longis modice induti pilis brevioribus laevibus glanduliferis sparse intermixtis et sicut foliorum venae primariae subtus hypanthiaque pilis stellulatis vel barbellatis usque ad 0.5 mm longis sparsiuscule vel modice puberuli. Petioli (2-)4-8 cm longi; lamina (4-)6-10 X (3-)4-6.5 cm subrotundo-ovata apice late acuto basi rotundata vel paulo (0.4 cm) cordata, membranacea et ciliolato-serrulata dentibus ca. 0.5-1 mm profundis, supra pilis laxis laevibus ca. 2-2.5 mm longis modice armata, subtus pilis laevibus gracilibus laxis ca. 1-1.5 mm longis densiuscule puberula, 7-nervata nervis secundariis 2-3 mm inter se distantibus nervulis subtus planis obscuris. Inflorescentia ca. 4-5 X 5-8 cm e basim ramosa ramis divaricatis; flores 5-meri, pedicellis 2-4 mm longis, bracteolis inconspicuis 0.5-1 mm longis persistentibus. Hypanthium (ad torum) 4 mm longum extus pilis gracilibus laevibus 1-1.5 mm longis erectis modice indutum; calycis tubus 0.5 mm longus, lobis interioribus ovato-rotundatis 1.2 mm altis, dentibus exterioribus ca. 0.5 mm eminentibus setuliferis; torus glaber. Petala 5.2-5.5 X 3-3.2 mm glabra obovato-oblonga apice rotundato. Stamina isomorphica glabra; filamenta 2.5 mm longa; antherarum thecae 2.2 X 0.7 X 0.6 mm oblongo-subulatae poro terminali ca. 0.35 mm diam., connectivo ad basim paullulo (0.2-0.3 mm) prolongato exappendiculato. Stigma truncatum non expansum; stylus glaber 6 X 0.3 mm; ovarium 5-loculare 0.8 inferum, apice late conico sparse setuloso setulis glanduliferis 0.15 mm longis; semina numerosa ca. 0.9 X 0.4-0.5 mm muriculata.

Type Collection: J. J. Wurdack 2638 (holotype US 2576250A; isotypes to be distributed), grown at Beltsville, Maryland from seed of Rudd 3019. "Subshrub 0.3 m. Corolla white. Flowering May-August 1970."

Paratypes (both Nayarit, Mexico): Velva E. Rudd, Patricia M. Bauer, & Adrien C. Fox 3019, collected on north slope of pine-oak forest between Tepic and Sta. Isabela, at turnoff to La Mojonera, elev. 1150 m, 13 Dec. 1968. "Low shrub with blue berries"; R. McVaugh & J. Sooby Jr. 13370, from "rocky hills in oak forest 5 miles southeast of San Leonel (ca. 20 miles SE of Tepic)," elev. ca. 1250 m, 6 Oct. 1952

"Small shrub to 25 cm long, occasional, only in crevices of shaded rocks."

Clidemia submontana has all the cauline and hypanthial hairs at least basally roughened, shorter hairs on the lower leaf surfaces (averaging less than 1 mm long), and very shortly pedicellate larger (petals 9-10 mm long) flowers with external calyx teeth projecting 3.5-5 mm; an excellent series of this species has recently been collected by McVaugh in Nayarit (18843) and Jalisco (15993, 20311). Clidemia laxiflora has inflorescence and hypanthial pubescence less than 1 mm long, external calyx teeth projecting ca. 2 mm, and anthers only 1.5-1.7 mm long; the Guatemalan collections ascribed to this species are probably not conspecific with those from Vera Cruz (Mexico). Probably also at least some subspecific differentiation is needed in C. petiolaris (S. & C.) Schlecht. ex Triana, sensu the Flora of Guatemala; that widespread complex differs from C. ruddae in the absence of underlying stellulate and pinoid hairs on the stems and inflorescences, as well as in the 5-nerved acuminate leaf blades. The general aspect of C. ruddae is somewhat like that of Miconia saxicola Brandegee, which however differs at least in the much shorter cauline, foliar, and hypanthial pubescence as well as the considerably larger flowers. The two collections of C. ruddae from the wild are both fruiting, so the cultivated (for chromosome number) flowering material was chosen as the type; the species has been named in recognition of the well-known feminine student of Leguminosae, not the Columbia University male dissident.

CLIDEMIA ALLARDII Wurdack

Poeppig 1794 (W) from Tocache, Peru, was cited by Triana as Calophysa tococoidea DC. "forma hirsutior" and by Cogniaux as Maieta tococoidea (DC.) Cogn. The Poeppig specimen actually represents C. allardii and thus C. tococoidea (DC.) Gleason may be eliminated from the Peruvian flora.

A NEW COMBINATION IN HYPOCYRTA, GESNERIACEAE

Oswaldo Handro and Lyman B. Smith

The authors who contributed to Martius' Flora Brasiliensis largely ignored the names of Vellozo or, according to the custom of their time, placed them in the synonymy of later species. In the latter case it has been a simple matter to give the Vellozo names the precedence to which their priority entitles them, but in many instances the identity of the Vellozo species has never been established.

In writing the Gesneriaceae for the Flora Brasiliensis, Hanstein placed Orobanche fissa in Hypocyrta (adnot. p. 412) but did not equate it with any of the species that he described there. However, the relatively short calyx and the long narrow corolla with its inconspicuous gibbosity are the characters that isolate Hypocyrta selloana from the remaining species and are definitely indicated in the Vellozo illustration.

It might appear a dubious procedure to identify Hypocyrta selloana described from Santa Catarina with a species from the vicinity of Rio de Janeiro. However, the species has been collected in Paraná, and at Ubatuba in São Paulo, which is quite near to Parati in Rio de Janeiro, the type locality of so many Vellozo species.

HYPOCYRTA FISSA (Vell.) Handro & L. B. Smith, comb. nov.
Orobanche fissa Vell. Fl. Flum. 257. 1825; Icon. 6: tab. 69. 1831.
Hypocyrta selloana Kl. & Hanstein in Mart. Fl. Bras. 8, pt. 1: 409, tab. 67, fig. 1. 1864.

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BOOK REVIEWS

Alma L. Moldenke

"RHYTHMIC PHENOMENA IN PLANTS" by Beatrice M. Sweeney. Experimental Botany: An International Series of Monographs, Volume 3, ix & 147 pp., illus., Academic Press, New York, N. Y., & London W.1. 1969. 47 s. 6 d. or $7.00.

This book provides an effective succinct exposition of biological clocks in the plant world, stressing mechanisms, biological functions and what little is known about control. The book starts with a helpful dictionary for students of rhythms and then describes those that match such environmental periodicities as circadian (leaf movements, flower opening, bioluminescence, etc.), as tidal, semi-lunar and lunar (algal movements in tidal flats mud, egg production in Dictyota, etc.) and as annual (long-day, short-day plants, seed germination, etc.) and those that do not match any environmental periodicities (beating of flagella, flowering of bamboo). Cell division cycles and possible mechanisms for the generation of oscillations are discussed. Each chapter is well documented with experimental material.

This book will prove to be an excellent directive for those who wish to survey this field as well as for those whose wish is to do research in it.

"NIGHTSHADES: THE PARADOXICAL PLANTS" by Charles B. Heiser, Jr., 200 pp., illus., W. H. Freeman and Company, San Francisco, California 94104. 1969. $5.95.

The author, a competent botanist and botany professor, writes that "The nightshade family, as far as I know, has never been the subject of a book before, but it richly deserves such treatment" "for it ranks near the top of any list of plant families that serve mankind". Now the Solanaceae owes a debt of gratitude to Dr. Heiser as will all readers — alert public, botany students (especially those of economic botany), botanists and other biologists. The reading is easy, interesting and rich in historical lore.

The food plants discussed are the various Capsicum peppers, the Solanum potato and eggplant, the garden tomato, the husk tomato, the tree tomato, the hilo and the pepino. The longest chapter is devoted to a Sherlock Holmes treatment of Burbank's sunberry or wonderberry which turned out to be neither Solanum nigrum nor the hybrid this plant breeding genius (though not a careful scientist using recorded and controlled experimentation) claimed it was.

The solanaceous drug and/or medicinal plants include the mandrake, the thornapple, the henbane and belladonna whose powerful alkaloids have also proven deadly poisonous. Among historically early users tobacco was an important medicinal plant. Now this

"dirty weed or divine plant" provides narcotic soothing to our social ills the world over.

The ornamentals in the family add beauty to our gardens -- various species and varieties of the plants already here are in the genera Petunia, Salpiglossis, Browallia, Lycium, Nierembergia, Schizanthus and Brunfelsia.

"THE OXFORD BOOK OF FOOD PLANTS" text by S. G. Harrison, G. B. Masefield & M. Wallis, illustrations by B. E. Nicholson, viii & 206 pp., illus., Oxford University Press, London W.1, & New York, N. Y. 10016. 1969. $11.00.

What a bargain! There are almost a hundred beautiful, colorful, accurate plates depicting 420 different kinds of edible plants. If you have seen any of the other botanical works in the series -- "The Oxford Book of Wild Flowers", "The Oxford Book of Garden Flowers", "The Oxford Book of Flowerless Plants," all illustrated by the same gifted artist -- you know the format of concise and yet almost encyclopedic information on the left-hand pages about the plants so naturally shown on the right-hand pages. Worldwide cereal, sugar, oil, nut, legume, other fruit, beverage, spice, salad, leaf-, stem-, root-vegetable, algal and fungal crops are described along with their botanical names, geographic distribution, origin and nutritional value.

This book should prove of great value in schools from primary through university level, as well as in libraries, private and public, the world over.

Only one spelling slip was noted: Convolvulaceae.

"ORGANIZATION AND CONTROL IN PROKARYOTIC AND EUKARYOTIC CELLS" edited by H. P. Charles & B. C. J. G. Knight, xi & 457 pp., Cambridge University Press, London N.W.1 & New York, N. Y. 10022. 1970. $16.00.

This book is the publication for the 20th Symposium of the Society for General Microbiology held at the Imperial College, London, this spring. There are 17 important papers with bibliographies and a well developed glossary.

The former contrast and compare the genetic code, ribosomes, lysine metabolic pathways, membranes, organelles, photosynthetic mechanisms and apparatus, virus entry and growth, the establishment of diploidy, evolution, plasmids and chromosomes of the non-nuclear organized cells of bacteria, bluegreen algae and actinomycetes with the nucleated cells of all other organisms. Vogel, Thompson and Shockman jointly propose "bacteria are no fission fungi; fungi are no plants; water moulds are no moulds; and euglenoids are no algae". Evans and Whatley hold that the bluegreens occupy a middle position between the photosynthetic bacteria and the greens and higher plants. Echlin and others present the presently available pros and cons for endogenous versus exogenous chloroplast development.

The latter helps to limit correctly those concepts that the

authors are presenting. Some of these terms are quite new to the literature, as lomasome, viropexis; some are old but have recently detailed meanings because of electromicroscopy, etc., as woronin bodies; some have been given entirely different meanings (perhaps ill advisedly), as cilium, flagellum.

There is much of value in this book, and it is readily available because of the general index provided.

"STUDIES IN THE VEGETATIONAL HISTORY OF THE BRITISH ISLES" edited by D. Walker and R. G. West, 266 pp., illus., Cambridge University Press, London N.W.1 and New York, N. Y. 10022. 1970. $25.00.

The eleven essays that comprise this book have been written to honor Dr. Harry Godwin who has recently retired from the Chair of Botany at Cambridge University, and they do credit to his leadership. The topics discussed are: Pleistocene History of the British Flora, History of the Ericaceae in Ireland during the Quaternary Epoch, Land/Sea Level Changes in Scotland, Vegetational History in the North-west of England, Influence of Mesolithic and Neolithic Man on British Vegetation, Post-Neolithic Disturbance of British Vegetation, Direction and Rate in some British Postglacial Hydroseres, Ecological History of Blelham Bog National Nature Reserve, Maximum Summer Temperature in Relation to the Modern and Quaternary Distributions of certain Arctic-montane Species in the British Isles, Cambridge Pollen Reference Collection, and Study of Plant Macrofossils in British Quaternary Deposits.

All this valuable material is well printed and well indexed, and each paper has its own bibliography.

"THE EARLY NATURALISTS — Their Lives and Work 1580—1789" by L. C. Miall, xi & 396 pp., facsimile copy of 1912 edition by Macmillan & Company, Ltd., Hafner Publishing Company, Darien, Connecticut 06820 & London. 1969. $16.00.

It is good indeed, even if inflationarily expensive, to have easy access again to this compendium of valuable and interesting notes about the founders of natural history who are important for some of the biological facts which they discovered and for the ideas which they presented as well as for serving as biohistorical landmarks. Of the fourscore people mentioned special emphasis is given to (1) the revival of botany as part of the "new" biology because of Brunfels, Bock, Fuchs, Cordus, Gesner, L'Obel, Cesalpini, Belon, Rondelet, (2) such early English naturalists as Turner, Gerard, Caius, Moufet, Butler, (3) Ray and his followers, Willughby and Lister, (4) the micro-anatomists Hooke, Malpighi, Grew, Swammerdam, Leeuwenhoek, (5) the comparative anatomists Redi, Perrault, (6) Frisch and Reamur and their group including Trembley, Bonnet, Lyonet, Rosenhof, (7) Linnaeus, (8) the Jussieus, and finally (9) Buffon.

"A FLORA OF THE MARSHES OF CALIFORNIA" by Herbert L. Mason, viii & 879 pp., illus., University of California Press, Los Angeles & Berkeley, California 94720. Second printing 1969. $15.00.

This valuable book, written with very great care and much detail by an excellent botanist, first came off the presses in 1957 after a floristic survey - field study of the feeding and resting areas along the major flyways of aquatic birds throughout the state. Now the various interested readers, as well as library shelves, may hold copies of this fine work again.

The bulk of the text consists of keys to the families, then to the genera, and finally to the species which are described well, located geographically, and illustrated with marked clarity. Some common synonyms are included. Among the Verbenaceae Verbena litoralis H.B.K. is listed. However, this species does not occur in the state; V. brasiliensis Vell. is the plant referred to. True V. hastata L. does not occur either in California; the representative there is V. hastata var. scabra Moldenke.

The glossary has an excellent illustrated section and really helpful definitions.

With the growing emphasis among scientists, political leaders and the general public on ecology, the use of this book will certainly be increased.

"JOHN TORREY: A STORY OF NORTH AMERICAN BOTANY" by Andrew Denny Rodgers III, 352 pp., illus., facsimile reproduction of the 1942 edition by Princeton University Press, Hafner Publishing Company, Darien, Connecticut 06820. 1965. $7.50.

Having read with real pleasure and appreciation the original edition of this work when it first appeared, I thought that I would only devote a couple of hours to leafing through this facsimile. I found that I soon became inexorably absorbed in rereading the whole book because of the interesting writing and the fascinating and carefully documented subject matter.

The book starts with Torrey's formative years and early career, ends with his last years, and intermittently tells of his associations with other botanists — especially Asa Gray, with the New York State Survey, and with the plant collectors of the time -- and their collections -- from the Far Western, Florida, Mexican, Salt Lake and Pacific Railroad Expeditions, and of his own trips abroad to the famous herbaria of Europe and to our own west. Also the book tells of his valuable contributions to the academic societies — including the Torrey Botanical Club to which the book is dedicated — institutions, and universities. It lists some of the plants named in his honor, as well as Torrey's Peak high on the Continental Divide. There is a bibliography of his important publications and another of the author's sources. All is well indexed.

"He arranged, assorted, diagnosed, named, and described plants by the thousands". His life was "like a bibliography of early

North American botanical exploration and discovery" even though he did not personally participate in the expeditions. "His were the thrills and adventures of research — the excitement of the microscope -- the joys which strict compliance with the requisites of minute analysis may bring -- the joys of accompanying overawing and enriching verves of imagination, the imagination that can see a verdant meadow in a dried specimen, a whole scheme of life from a tabulation of a genus and its species"...."New synonymies have altered much of his labors. Nevertheless, none, having been witness to his accomplishments, forget his work, veritably a giant's in the science."

"THE BIOLOGY OF HIGHER CRYPTOGAMS" by William T. Doyle, vii & 163 pp., illus., Collier-Macmillan, Ltd., Toronto & London; Macmillan Company, New York, N. Y. 10022. 1970.

This is another worthwhile contribution to student and general reading in the "Current Concept in Biology Series". It is clearly written, copiously and helpfully illustrated, and well documented with original sources. Like a few other modern writings, it certainly should help to dispel the too long persistent confusion about the alternation of generations. It presents the cryptogamic and phanerogamic fossil and living land plants (Subdivision Embryophytina) as a natural evolutionary group from the green algae (Subdivision Chlorophycophytina) or their progenitors all in the same Division Chlorophyta because of the possession of chlorophylls a & b, of "true" starch with amylose and amylopectin macromolecules, and of "whiplash" flagella. The book directs itself to the interrelations of structures and their functions and to the common features in the hornworts, liverworts, mosses, psilopsids, lycopsids, sphenopsids and pteropsids.

The chapters on adaptations to life on land and on reproduction are especially well done. On p. 131 the male symbol is inadvertently used for monoecious organisms.

"FLORA OF UTAH AND NEVADA" by Ivar Tidestrom, 665 pp. & 15 plates, authorized reprint of Contributions from the United States National Herbarium 1925, edited by J. Cramer, Lehre, Germany and Stechert-Hafner Service Agency, Darien, Connecticut 16820. 1969. $16.50.

It has been a long time since the statement appended to the index of this work has been true: "Additional copies of this publication may be procured from the Superintendent of Documents, Government Printing Office, Washington, D.C., at 80 cents per copy". This present facsimile is Volume 3 of "Reprints of U. S. Floras" and is welcomed for its botanical and historical value, and for the author's excellent keys to and valuable notes on the recorded spermatophytes. Additionally there are two valuable articles — "Plant Communities in Utah and Nevada" by H. L. Shantz, describing the following plant formations: alpine grassland, spruce-fir forest,

western yellow pine forest, pinyon-juniper woodland, northern desert shrub, salt desert shrub, and southern desert shrub -- and "Foothill-Montane-Alpine Flora and its Environment" by A. W. Sampson, describing the following vegetational belts: pinyon-juniper from 5,000 to 6,500 feet, yellow pine and oak brush from 6,200 to 7,600 feet, aspen-fir from 7,400 to 9,500 feet, spruce-fir from 9,000 to 11,000 feet, and arctic-alpine above timberline on the Uinta and Wasatch Mountain peaks.

Small items of criticism do not affect the botanical value of this work: a line is inverted on p. 13, the vegetation map is inserted upside down, the pages were uncut in the copy reviewed.

"FLORA OF TURKEY AND THE EAST AEGEAN ISLANDS", Volume 3, edited by P. H. Davis, xvii & 628 pp., illus., University Press, Edinburgh & Aldine Publishing Company, Chicago, Ill. 60605. 1970. $33.50.

The two preceding volumes were reviewed admiringly in recent previous issues of this journal. The present volume is of similar excellent calibre, dealing exclusively with the Leguminosae. Various specialists and herbaria were consulted but not one from the United States.

This work includes keys to genera and species with their subdivisions, modern literature and illustration references, synonymy, succinct descriptions including habitat, flowering and fruiting times, citation of types and of specimens by grids, phytogeographical data and general distributions shown by text and on almost a hundred maps. The Addenda include Latin diagnoses for new taxa and a list of the new name combinations proposed in the text. All the material is well indexed.

"PLANT STRUCTURE AND DEVELOPMENT -- A Pictorial and Physiological Approach" by T. P. O'Brien & Margaret E. McCully, viii & 114 pp., illus., Collier-Macmillan, Ltd., London & Toronto, and Macmillan Company, New York, N. Y. 10022. 1969. Second printing 1970. $5.50 paperback, $9.95 cloth-bound.

What beautifully detailed illustrations! What clearcut, modern, concise companion text! The former resulted in part from fixing sections for optical microscopy essentially like those for electron microscopy with the yield of much greater clarity of outline and contrast in staining. The appendix describes the methods of specimen preparation. The latter resulted from presenting plant structures from whole organs to subcellular organelles as functional entities in seedlings as well as in mature plants. The topics included are: the cell and its divisioning (mitosis), the root, the shoot, the leaf, the reproductive tissues (meiosis and fertilization) and the seed. Each chapter has its own bibliography, and all the material is simply indexed.

This book is "highly appropriate for modern-style courses in dynamic anatomy.....More broadly, however, it should serve as an

introduction to the structure of the living and developing plant for everyone interested in biology from beginners upward". This statement in the foreword by Kenneth V. Thimann is heartily endorsed herewith.

"RESEARCH METHODS IN PLANT SCIENCE" by Richard M. & Deana T. Klein, xi & 756 pp., illus., Natural History Press, Garden City, New York 11530. 1970. $20.00.

In this excellent comprehensive methodology text there is developed by the highly competent authors a survey of the main techniques used by the various kind of plant scientists in the world today. It is organized efficiently, presented succinctly and provided richly with pertinent literature references for the following main topics: (1) acquisition and maintenance of plant collections from bacteria on up, (2) structure from gross anatomy through the gamut of microtechniques, (3) environmental control of growth, (4) measurements including statistics, (5) water relations and mineral nutrition, (6) cultivation procedures with culture media, microbiological testing and growing in vivo, (7) separation and analysis of components by electrophoresis, chromatography, isotope analysis, etc., (8) hormone and vitamin growth factors and antibiotics, (9) metabolic studies of respiration, photosynthesis and protein synthesis, (10) reproduction, (11) pathology, (12) preparation of manuscripts, and (13) miscellany including pH studies and valuable conversion factor tables.

Despite the tremendous amount of figures used, the printing seems to be basically free of errors. On p. 586 the diagram fails to show water in the beaker, but since the apparatus is so simple and the experiment so commonly used, no one will be misled. On p. 630 an "of" in the legend should have been "or".

The book is of greatest value to teachers of general courses in botany and biology whether they do any research work themselves or not (perhaps more so for those in the latter category). It is of great value to both instructors and students of all levels in plant physiology under whatever guise it is being presented. For the college student who wonders whether he (or she) would like to work in some phase of the botanical world, it offers modern vistas in how what is done.

"THE WOODY PLANTS OF OHIO" by E. Lucy Braun, 362 pp., illus., facsimile of the first edition by Ohio State University Press in 1961 by Hafner Publishing Company, Darien, Connecticut 06820. 1969. $16.50.

This book, fortunately available again, is a contribution toward "The Vascular Flora of Ohio" including all the verified records of trees, shrubs and woody climbers native, naturalized and escaped, but not cultivated, in the state. There are workable keys, excellent copious drawings of leaf, fruit and twig structure, uniform county distribution maps, and species descriptions clear enough for the amateur or beginning student and yet accurately de-

tailed enough for the trained botanist. There is a fine description of the vegetation of Ohio (that was originally 40,000 square miles of magnificent hardwood forest) with helpful maps and references. Since this work is hardly a decade old the taxonomy is still basically up-to-date.

"CELL BIOLOGY" by John W. Kimball, 199 pp., illus., Addison-Wesley Publishing Company, London, Ontario, Menlo Park, California 94025, and Reading, Massachusetts 01867, first printing 1968, second printing 1970.

For students wanting or needing more exposure for understanding or special interest in this topic this book provides up-to-date, well explained, considerably detailed subject matter that has been virtually "lifted" from the author's text "BIOLOGY." With one exception the diagrams are fine and the electron microphotographs are superb. On pp. 86, 89 and 100 ameba diagrams differ from each other and show only the pertinent structures indicated in the legends without any mention that they are not meant to be complete.

There is almost an entire semester's fine work embodied in this booklet alone.

"MORPHOLOGY AND SYSTEMATICS OF CORALLINE ALGAE WITH SPECIAL REFERENCE TO CALLIATHRON" by H. William Johansen, vii & 98 pp., illus., University of California Publications in Botany, Volume 49, University of California Press, Los Angeles & Berkeley, California 94720. 1969. $3.50, paper.

This is a careful, morphological, developmental and taxonomic study of the genus Calliathron, especially as it appears along our Pacific coast. Intergenicular and genicular structures (mostly fixed in Susa solution) and growth of the frond, as well as reproductive conceptacles, tetrasporangia, spermatogonia and carpogonia are all well described and illustrated by means of fine drawings and photographic plates. There are well constructed keys to the 7 subfamilies or tribes of the Corallinaceae with detailed descriptions and with keys to and descriptions of the genera. A logical phylogenetic diagram for the Corallinoideae includes the three articulated corallines.

It is a pity that the cover page, but not the title page, did not complete the spelling of the word "systematics".

"AUSTRALIAN SEASHORES IN COLOUR" by Keith Gillett & John Yaldwin, 112 pp., illus., Charles E. Tuttle Co., Rutland, Vermont 05701. 1970. $5.00.

In 49 exquisite black/white and 64 beautiful color photographs and simple companion text more zoological than botanical natural history is arrayed most attractively. What a delightful souvenir for one who has been there or only hopes to go!

"PHYTOCHEMICAL PHYLOGENY" edited by J. B. Harborne, 335 pp. & xiii pp., Academic Press, London W.1. & New York, N. Y. 10003. 1970. 110 sh. or $5.50.

This modestly priced, well printed book contains the suitably indexed proceedings of the Phytochemical Society Symposium held at the University of Bristol in April 1969. The thirteen papers by competent leaders survey the impact of phytochemistry on plant phylogeny.

In applying phytochemistry to paleobotany "who can fail to be intrigued by evidence for photosynthesis in the isolation of isoprenoid hydrocarbons from fossil specimens 3.1 billion years old" or for the chemical analysis of sporopollenins from the outer coats of both present day and fossil pollen grains?

In applying phytochemistry to modern plants for phylogenetic interpretation, the following are some of the topics considered--fungal cell wall composition, algal lipids and chloroplasts, mung bean cytochrome C, molecular approaches to infraspecific level population problems, enzyme evolution and the environment.

R. L. Watts offers a thought-provoking definition of "life as a part of the natural universe which has both a genotype and a phenotype, and the means to convert the one into the other."

"PHOTOSYNTHESIS" by Isaac Asimov, 193 pp., illus., Basic Books, Inc., London & New York, N. Y. 10016. 1969. $5.95.

This is another of the author's several, interesting, simple and accurate books explaining certain scientific subjects. It should prove to be a helpful exposition for the general reader and the beginning or perplexed student. Asimov describes the photosynthetic and allied processes as "the great cycle that keeps life going indefinitely. If it works perfectly food, oxygen, carbon dioxide and water are used up and formed.....over and over again, and can in theory last forever." In separate chapters he describes with modern biochemistry and biophysics the members, the intermediate and end products, the driving force, the studies with isotopes and the probable beginnings of this cycle.

"THE ECOSYSTEM CONCEPT IN NATURAL RESOURCE MANAGEMENT" edited by George M. Van Dyne, xii & 383 pp., illus., Academic Press, London W.1 & New York, N. Y. 10003. 1969. $16.50.

In contrast to many of the modern writings in this field that tend to emphasize very detailed mathematical analysis of limited and/or hypothetical data, these authors prefer to depend upon much more detailed study of the various components of ecosystems. Most of these authors will be recognized as practical biologists who have had years of field experience.

The book is arranged in four sections: the first deals with the meaning, origin and importance of ecosystem concepts; the second with applying ecosystem concepts to specific examples as grasslands, watersheds and the arctic tundra; the third with eco-

system concepts in natural resource management of forests, fish and game, watersheds; and the last with implementing the ecosystem concept in training at all levels in the various natural resource sciences.

Each chapter is well supplied with references; the whole text is indexed. Some diagrams show effectively in pseudo-3-dimensional level a series of changes in natural pasture ecosystems.

"Any kind of information on ecosystems can be referred to a general and fundamental matter-energy coordinate system of multi-dimensional ecosystem space. The most important of these ecosystem coordinates are the regimes of moisture, nutrients, air, heat, light, and mechanical energy with all their components."

This is a worthwhile book.

"FLOWERING VINES OF THE WORLD" by Edwin A. Menninger, xvii & 410 pp., illus., Hearthside Press, Inc., New York, N. Y. 10016. 1970. $25.00.

Fifty botanical collaborators assisted this well known author ("Flowering Trees of the World", "Fantastic Trees", "Seaside Plants of the World") in compiling what he accurately subtitles "An Encyclopedia of Climbing Plants" as a unique and welcome contribution to horticulture, botany and beauty. After an introduction to the world of vines, their varied climbing mechanics, their uses, espaliers and the greatest beauties among them, hundreds of vines are interestingly described, geographically located and organized alphabetically by their plant families.

There are about 200 gorgeous color plates, even more very clear black/white photographs and several helpful line drawings. The print is clean and easy to read. All is carefully indexed and provided with a consulting bibliography.

The following few items detract little from what is really an excellent book deserving of wide circulation: the index inaccurately cites p. 369 for Vitex. Since plates 285 and 286 both depict the same unifoliolate plant, the legend "Vitex trifolia" is not correct for the second one. Plate 279 should have been labeled Clerodendrum umbellatum var. speciosum. On p. 328 "spatulate" is misspelled.

"THE CHEMISTRY OF LIFE" edited by Joseph Needham, xxx & 214 pp., illus., Cambridge University Press, Cambridge, & New York, N.Y. 10022. 1970. $9.50.

This book consists of the editor's long spanning, worldwide, biohistorical introduction and of 8 interesting, factually rich lectures given at Cambridge 1958--1961 as historically oriented accounts of photosynthesis, enzymes, biological oxidations, microbiology, neurology, zoohormones, vitamins, foundations of modern biochemistry, and some of 19th century pioneers. It is all indexed and enriched by well reproduced portrait photographs.

PHYTOLOGIA

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CONTENTS

AGOSTINI, G., *Notes on Myrsinaceae. I. Generic assignment of Conomorpha sodiroana Mez, Ardisia ambigua Mart., and related species* 401

MOLDENKE, H. N., *Additional notes on the Eriocaulaceae. XXXV* 404

RUDD, V. E., *Etaballia dubia (Leguminosae), a new combination* 426

LITTLE, E. L., *Names of New World cypresses (Cupressus)* 429

KASAPLIGIL, B., *A new combination in Osmanthus Lour. (Oleaceae) from the Caucasian region* 446

KOYAMA, T., *Eine neue Hypolytrum-Art aus Ceylon* 449

AMARATUNGA, K. L. D., *Notes on the flowering plants of Muturajawela* 452

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NOTES ON MYRSINACEAE. I
GENERIC ASSIGNMENT OF *CONOMORPHA SODIROANA* MEZ, *ARDISIA AMBIGUA* MART., AND RELATED SPECIES.*

Getulio Agostini
The New York Botanical Garden

While studying the Myrsinaceae I have found that a group of species, which were placed by Mez (in Engler, Pflanzenreich 4, 236. 1902) under the genera *Conomorpha* and *Stylogyne*,need reinterpretation as to their generic assignment. These species differ from the typical species of both genera in a combination of characters, on which they better approach the genus *Geissanthus*, except for the obviously imbricate sepals. Mez considered *Geissanthus* to be a natural group differing from other genera in that the sepals are at first closed, and rupture into 2 to 8(usually 3 to 6) regular or irregular segments.

At present, the generic limits in the family are not clear. Both the genera *Geissanthus* and *Stylogyne* stand, for the most part, as rather coherent groups. The genera *Comomyrsine* (a segregate of *Weigeltia*), *Conomorpha*, *Cybianthus* and *Weigeltia* are no longer separable by the characters used by Mez in his generic key. As to the new taxa published since 1902 their generic assignments have been based mostly on single characters. This apparently artificial treatment has led to a rather vague concept of the genera. Several examples in which authors do not agree as to the interpretations of generic limits could be cited.

In 1908 A. Grosse (in Bot. Jahrb. 41 (5), Beibl. Nr. 96: 1 - 46. 1908) reviewed the anatomy of the family. Despite the fact that the number of names published now doubles that known in 1908, no further contribution has been made to the morphology and anatomy of the American representatives. At present we see no solution regarding the delimitation of the genera *Comomyrsine*, *Conomorpha*, *Cybianthus*, and *Weigeltia*. It is advisable that the generic assignment of new taxa and the transfers of names among these four genera be avoided until we reach a reasonable agreement.

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* Publication of this paper is supported by National Science Foundation Grant No. GB-5953X.

The following key may separate Geissanthus and Stylogyne from Conomorpha and its relatives:

1. Inflorescence a terminal panicle. Flowers sessil or on short and stout, rarely elongate and never umbellate pedicels. Calyx lobes first closed, rupturing into 2-8, usually 3-6 regular or irregular segments in anthesis, rarely free and imbricate. Petals valvate or imbricate, usually 1/3 or more connate. Anthers elongate. Style short or long and stout with a capitulate stigma

Geissanthus

1. Inflorescence axillary, rarely terminal or pseudo terminal, but in the latter cases the pedicels umbellate and/or the petals conspicuously twisted

2. Inflorescence an umbelliform raceme or a panicle. Flowers mostly with umbellate and slender pedicels. Calyx lobes usually dextrocontorted. Petals contorted, usually obviously twisted and connate only at base. Anthers elongate. Style elongate or slender with an inconspicuous stigma

Stylogyne

2. Inflorescence a raceme, rarely a panicle; pedicels never umbellate. Petals imbricate or valvate. Anthers short or elongate. Style short or absent

Comomyrsine, Conomorpha, Cybianthus & Weigeltia

In the present paper a group of species, most of which have traditionally been placed in Conomorpha, are transferred to Geissanthus. They are characterized by a paniculate terminal inflorescence; an elongate style with a capitate stigma; stamens with an elongate and free or almost free filament; and by elongate anthers, dehiscing by longitudinal slits reaching the cordate base.

Geissanthus ambiguus (Mart.) Agost., comb. nov.
Ardisia ambigua Martius in A.DC., Prodr. 8: 122. 1844
Stylogyne ambigua (Mart.) Mez in Engler, Pflanzenreich Myrsinaceae 4, 236: 266. 1902

Geissanthus longistylus (Cuatr.) Agost., comb. nov.
Conomorpha longistyla Cuatrecasas, Rev. Acad. Colombiana 8 (31): 319-320. 1951

Geissanthus mezianus Agost., nom. nov.
Conomorpha sodiroana Mez in Engler, Pflanzenreich 4, 236: 254. 1902
The specific epithet is preoccupied (Mez, Bull. L'Herb. Boissier, 2 serie, 5: 534. 1905), and therefore a new name is given in honor of Carl Mez, the author of the monographic work in the family.

Geissanthus myrianthus (Mansf.) Agost., comb. nov.
Conomorpha myriantha Mansf., Notizbl. Bot. Gart. Berlin 9: 467. 1925

Geissanthus pyramidatus (Mez) Agost., comb. nov.
Conomorpha (?) pyramidata Mez in Fedde, Rep. Spec. Nov. 3: 102. 1906

ADDITIONAL NOTES ON THE ERIOCAULACEAE. XXXV

Harold N. Moldenke

ERIOCAULON DECANGULARE var. LATIFOLIUM Chapm.

Additional & emended bibliography: Moldenke, Phytologia 1: 316, 349, 350, 356, & 360 (1939) and 19: 332—333. 1970.

ERIOCAULON DECANGULARE var. MINOR Moldenke

Additional bibliography: Moldenke, Phytologia 19: 332, 333, 460, & 461. 1970.

ERIOCAULON DECANGULARE f. PARVICEPS Moldenke

Additional bibliography: Moldenke, Phytologia 20: 9—10, 22, & 349. 1970.

Recent collectors describe this plant as "infrequent in open pinewoods, growing to 6 dm. tall. It has also been found on savannas, the inflorescence-heads described as white, flowering and fruiting in June and November. Cory reports the common name of "pipewort" for it, this being a name applied generally to all members of the family.

Additional citations: TEXAS: Hardin Co.: Correll & Wasshausen 27567 (Mi); Cory 50789 (Mi).

ERIOCAULON DECEMFLORUM Maxim.

Additional bibliography: Moldenke, Phytologia 3: 143 & 144. 1949; Koyama in Ohwi, Fl. Jap. 266. 1965; Moldenke, Phytologia 19: 333—334. 1970.

Koyama (1965) records "ko-inu-no-hige" as the vernacular name for this plant, records it as growing "in wet places in lowlands and mountains" and states [along with Satake (1940)] that the species may grow also in China. I have personally seen a collection from Manchukuo, but not from China proper.

ERIOCAULON DECEMFLORUM f. COREANUM (H. Lecomte) Nakai

Additional bibliography: Moldenke, Phytologia 2: 378 (1947) and 19: 34. 1969.

ERIOCAULON DECIPIENS N. E. Br.

Additional bibliography: Moldenke, Phytologia 3: 143 (1949) and 19: 34. 1969.

ERIOCAULON DEHNIAE H. Hess

Additional bibliography: H. Hess, Bericht. Schweiz. Bot. Ges. 67: 84—87 & 89, fig. 1. 1957; Stauffer, Excerpt. Bot. A.2: 84. 1960; Moldenke, Phytologia 18: 48. 1968.

Illustrations: H. Hess, Bericht. Schweiz. Bot. Ges. 67: 85, fig. 1. 1957.

ERIOCAULON DEIGHTONII Meikle
Additional bibliography: Moldenke, Phytologia 19: 334 & 469. 1970.

ERIOCAULON DEMBIANENSE A. Chiov.
Additional bibliography: Moldenke, Phytologia 18: 49 (1968) and 19: 471. 1970.

ERIOCAULON DESLANDESII Alv. Silv.
Additional bibliography: Moldenke, Phytologia 3: 142 (1949) and 19: 334. 1970.

ERIOCAULON DIAGUISSENSE Bourdu
Additional bibliography: Jaques-Félix, Excerpt. Bot. A.1: 72. 1959; Moldenke, Phytologia 19: 34—35. 1969.

ERIOCAULON DIANAE Fyson
Additional bibliography: Moldenke, Phytologia 2: 375 & 376. 1947; Santapau, Excerpt. Bot. A.11: 176. 1967; Moldenke, Phytologia 19: 334, 420, 421, 443, & 477. 1970.

ERIOCAULON DIANAE var. LONGIBRACTEATUM Fyson
Additional bibliography: Moldenke, Phytologia 19: 35—36 (1969) and 19: 246, 443, & 478. 1970.

ERIOCAULON DICTYOPHYLLUM Körn.
Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 485, 486, & 507. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 2: 401. 1894; Ruhl. in Engl., Pflanzenreich 13 (4-30): 43, 51, 59, 285, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 2: 401. 1946; Moldenke, Phytologia 2: 374. 1947; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 2: 401. 1960; Moldenke, Phytologia 19: 334—335. 1970.
Hunt & Ramos describe this plant as a "white-flowered herb, one of [the] dominants with grass 5876", flowering and fruiting in June at 600 to 1000 meters altitude.
Additional citations: BRAZIL: Mattogrosso: Hunt & Ramos 5874 (N).

ERIOCAULON DIMORPHOELYTRUM Koyama
Additional bibliography: Koyama in Ohwi, Fl. Jap. 266 & 269. 1965; Moldenke, Phytologia 18: 85. 1969.
Koyama (1965) states that this species is found only in peat bogs of the Ozegahara Moor on Honshu island and records the vernacular name variant "yuki-imu-no-hige".

ERIOCAULON DIMORPHOPETALUM Moldenke
Additional bibliography: Moldenke, Phytologia 2: 378. 1947; Moldenke, Alph. List Cit. 3: 975. 1949; Moldenke, Phytologia 18: 56. 1968.

ERIOCAULON DIOECUM Ruhl.
Additional & emended bibliography: Moldenke, Phytologia 1: 316, 350, & 355. 1939; Moldenke, Alph. List Cit. 1: 186. 1946; Moldenke, Phytologia 18: 56. 1968.

ERIOCAULON DREGEI Hochst.
Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161, 172, & 189. 1969; Moldenke, Phytologia 20: 10. 1970.

ERIOCAULON EBERHARDTII H. Lecomte
Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171, 172, & 189. 1969; Moldenke, Phytologia 19: 335. 1970.

ERIOCAULON ECHINACEUM Van Royen
Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 37. 1969.

ERIOCAULON ECHINOSPERMOIDEUM Ruhl.
Additional & emended bibliography: Moldenke, Phytologia 1: 316 & 350. 1939; Moldenke, Alph. List Cit. 1: 187. 1946; Moldenke, Phytologia 18: 58. 1968.

ERIOCAULON ECHINOSPERMUM C. Wright
Additional & emended bibliography: Moldenke, Phytologia 1: 316, 350, 352, 355, 361, & 363 (1939) and 19: 335. 1970.

ERIOCAULON ECHINULATUM Mart.
Additional bibliography: Ohwi, Journ. Jap. Bot. 33: 211. 1958; Hisauchi, Excerpt. Bot. A.2: 194. 1960; Koyama in Ohwi, Fl. Jap. 265 & 266. 1965; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171 & 189. 1969; Moldenke, Phytologia 20: 10. 1970.
Koyama (1965) says that "the typical phase [of this species] occurs in s. China, Indochina, and India".

ERIOCAULON EDWARDII Fyson
Additional bibliography: Moldenke, Phytologia 18: 85 & 104. 1969.

ERIOCAULON EDWARDII var. CLARKEI Haines
Additional bibliography: Moldenke, Phytologia 18: 85 & 104. 1969.

ERIOCAULON EHRENBERGIANUM Klotzsch
Additional bibliography: Rzedowski & McVaugh, Contrib. Univ. Mich. Herb. 9: 76 & 89. 1966; Moldenke, Phytologia 20: 10, 14, & 297. 1970.
The Andersons found this plant "abundant" in gently running water below a seeping hillside in a pine-oak forest.
Additional citations: MEXICO: México: Anderson & Anderson 5023 (Mi). HONDURAS: Gracias a Dios: F. A. Barkley 40585 (Ac).

ERIOCAULON EKMANNII Ruhl.
Additional & emended bibliography: Moldenke, Phytologia 1: 317 & 350 (1939) and 19: 335. 1970.

ERIOCAULON ELICHRYSOIDES Bong.
Additional synonymy: Eriocaulon helicrysoides Hare, Journ. Linn. Soc. Lond. Bot. 53: 423, sphalm. 1950.
Additional & emended bibliography: V. A. Pouls., Medd. Naturf. Foren. Kjøb. 1888: 221—388. 1888; Beauverd, Bull. Herb. Boiss., sér. 2, 8: 284—285, fig. 9 A 1—14 (1908) and 8: 987 & 988. 1909; Hare, Journ. Linn. Soc. Lond. Bot. 53: 423. 1950; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 148, 160, 161, 170—173, 186, 187, & 189. 1969; Moldenke, Phytologia 20: 10. 1970.

ERIOCAULON EQUISETOIDES Van Royen
Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 38—39 (1969) and 19: 234, 236, & 244. 1970.

ERIOCAULON EURYPEPLON Körn.
Additional & emended bibliography: Körn., Linnaea 27: 581, 583, 586, & 685—686. 1856; Körn. in Mart., Fl. Bras. 3 (1): 285 & 298. 1863; Moldenke, Phytologia 19: 336. 1970.

ERIOCAULON FENESTRATUM Bojer
Additional & emended bibliography: Körn., Linnaea 27: 586 & 671—672. 1856; Körn. in Mart., Fl. Bras. 3 (1): 505. 1863; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161, 172, 187, & 189. 1969; Moldenke, Phytologia 19: 336. 1970.

ERIOCAULON FLUVIATILE Trimen
Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 171, 172, & 189. 1969; Moldenke, Phytologia 19: 40. 1969.

ERIOCAULON FRIESIORUM Bullock
Additional bibliography: Moldenke, Phytologia 19: 336 & 487. 1970.

ERIOCAULON FULIGINOSUM C. Wright
Additional bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 186 & 191. 1969; Moldenke, Phytologia 20: 11. 1970.

ERIOCAULON FUSIFORME Britton & Small
Additional & emended bibliography: Moldenke, Phytologia 1: 317-318, 351, & 352. 1939; Moldenke, Alph. List Cit. 1: 64. 1946; Moldenke, Phytologia 18: 92—93. 1969.

ERIOCAULON GIBBOSUM Körn.
Additional bibliography: Malme, Bih. Svensk. Vet. Akad. Handl. 27 (3), no. 11: 32. 1901; Tomlinson in C. R. Metcalfe, Anat. Mono-

cot. 3: 171, 172, & 189. 1969; Moldenke, Phytologia 20: 11. 1970.

Hunt & Ramos describe this plant as a "white-flowered rosette herb, in wet campo between campo cerrado and gallery forest", at 600 to 1000 meters altitude, flowering and fruiting in June.

L. Riedel s.n. [Brasilia Prov. Goyas], distributed as typical E. gibbosum, seems to be var. longifolium Körn.

Additional citations: BRAZIL: Mattogrosso: Hunt & Ramos 6296 (N).

ERIOCAULON GIBBOSUM var. LONGIFOLIUM Körn.

Additional bibliography: Moldenke, Phytologia 19: 68. 1969.

Hunt & Ramos describe this plant as a common white-flowered herb on waterlogged campos, at 600 to 1000 meters altitude, flowering and fruiting in June.

Additional citations: BRAZIL: Goiás: L. Riedel s.n. [Brasilia Prov. Goyas] (S). Mattogrosso: Hunt & Ramos 5903 (N).

ERIOCAULON GIBBOSUM f. VIVIPARUM Moldenke

Additional bibliography: Moldenke, Biol. Abstr. 50: 12948. 1969; Moldenke, Phytologia 19: 41. 1969.

ERIOCAULON GILGIANUM Ruhl.

Additional bibliography: Moldenke, Phytologia 19: 337, 452, & 489. 1970.

ERIOCAULON GLABERRIMUM Miyabe & Satake

Additional synonymy: Eriocaulon atrum var. glaberrimum (Satake) Koyama in Ohwi, Fl. Jap. 270. 1965.

Additional bibliography: Koyama in Ohwi, Fl. Jap. 270. 1965; Moldenke, Phytologia 18: 98 (1969) and 20: 247. 1970.

ERIOCAULON GLAUCUM Griff.

Additional bibliography: Moldenke, Phytologia 18: 177 (1969) and 19: 451. 1970.

ERIOCAULON GLAZIOVII Ruhl.

Additional bibliography: Moldenke, Phytologia 2: 492 (1948), 18: 178 (1969) and 19: 29. 1969.

ERIOCAULON GRAPHITINUM F. Muell. & Tate

Additional bibliography: Moldenke, Phytologia 2: 376 & 378 (1947) and 19: 42. 1969.

ERIOCAULON GREGATUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 579, 584, & 606—607. 1856; Moldenke, Phytologia 19: 337. 1970.

ERIOCAULON GRISEUM Körn.

Additional & emended bibliography: Körn., Linnaea 27: 599. 1856; Körn. in Mart., Fl. Bras. 3 (1): 288, 292, 475, 479, 500, & 507, pl. 60, fig. 3. 1863; Moldenke, Phytologia 19: 35 & 43. 1969.

ERIOCAULON GUADALAJARENSE Ruhl.

Additional & emended bibliography: Moldenke, Phytologia 1: 318, 350, & 360 (1939) and 19: 337. 1970.

ERIOCAULON GUYANENSE Körn.

Additional bibliography: Moldenke, Phytologia 20: 11 & 12. 1970.

While Körnicke first proposed Eriocaulon guianense as the name for this plant in Linnaea 27: 288 (1856), this was a nom. nud., with no description and merely a reference to his paper in Mart., Fl. Bras., which was apparently then in preparation but not yet published. In the latter work, when finally published, he described the species and wrote the specific epithet "guyanense". These binomials are not invalidated by the Eriocaulon guianense A. Dietr. of 1855 because this name was published only in synonymy by Steudel (Syn. Pl. Glum. 2: [Cyp.] 269 & 334).

ERIOCAULON HAMILTONIANUM Mart.

Additional & emended bibliography: Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): 41, pl. 1, fig. 2. 1835; Moldenke, Phytologia 20: 11--12. 1970.

Emended illustrations: Mart., Nov. Act. Physico-med. Acad. Caes. Leopold.-Carol. Nat. Cur. 17 (1): pl. 1, fig. 2. 1835.

The Martius work (1835) cited above is often cited as "1833", the date of its submission to the Academy for publication, but the late botanical bibliographer, Dr. J. H. Barnhart, says "I can find no evidence that this paper was published until 1835".

ERIOCAULON HANANOEGOENSE Masamune

Additional synonymy: Eriocaulon atrum var. hananoegoense (Masamune) Koyama in Ohwi, Fl. Jap. 270. 1965.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 270. 1965; Moldenke, Phytologia 19: 44 (1969) and 20: 247. 1970.

Koyama (1965) records the vernacular variant "yakushima-hoshi-kusa" for this plant and states that the species is known thus far only from the island of Yakushima and that it differs from E. atrum only in being more dwarf in stature.

ERIOCAULON HELEOCHARIOIDES Satake

Synonymy: Eriocaulon heleocharoides Satake ex Koyama in Ohwi, Fl. Jap. 267. 1965.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 266 & 267. 1965; Moldenke, Phytologia 18: 108--109. 1969.

Koyama (1965) avers that this is a very local species, growing on the wet sandy banks of the Motoara River in Musashi Province, on Honshu island, only. The common names, "kosigaya-hosikusa" and "koshigaya-hoshi-kusa", are recorded for it. The type is Y. Satake s.n. from Kosigaya, Musashi Province, Honshu, Japan, collected in October, 1938, and deposited in the herbarium of Tokyo Univer-

sity; another collection from the same locality is F. Maekawa s. n. [Sept. 1938].

ERIOCAULON HENRYANUM Ruhl.
Additional bibliography: Moldenke, Alph. List Cit. 3: 702, 858, & 859 (1949) and 4: 1222. 1949; Hansen, Excerpt. Bot. A.12: 520. 1967; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 161. 171—173, & 189. 1969; Moldenke, Phytologia 19: 44 (1969) and 19: 245. 1970.
Van Beusekom & Phengkhlai found this plant growing in open forests of Pinus khasya and Dipterocarpus tuberculatus, inhabiting boggy places, with whitish flowers in June, and distributed specimens of it to herbaria as a member of the Compositae.
Additional citations: THAILAND: Van Beusekom & Phengkhlai 1153 (Ac).

ERIOCAULON HERZOGII Moldenke
Additional bibliography: Moldenke, Phytologia 19: 44—45 (1969) and 19: 238. 1970.

ERIOCAULON HETERODOXUM Moldenke
Additional bibliography: Moldenke, Phytologia 2: 378. 1947; Moldenke, Alph. List Cit. 3: 701 & 894. 1949; Moldenke, Phytologia 18: 112. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 184, 186, & 191. 1969.

ERIOCAULON HETEROLEPIS Steud.
Additional bibliography: Moldenke, Phytologia 20: 12 & 28. 1970.

ERIOCAULON HETEROLEPIS var. NIGRICANS Körn.
Additional bibliography: Moldenke, Phytologia 19: 46 (1969) and 19: 477. 1970.

ERIOCAULON HETEROPEPLON Alv. Silv.
Additional bibliography: Moldenke, Phytologia 2: 374 & 378 (1947) and 19: 46. 1969.

ERIOCAULON HETEROPETALUM Ruhl.
Additional & emended bibliography: Moldenke, Phytologia 1: 318, 351, & 355. 1939; Moldenke, Alph. List Cit. 1: 187. 1946; Moldenke, Phytologia 18: 180. 1969.

ERIOCAULON HEUDELOTII N. E. Br.
Additional bibliography: Moldenke, Phytologia 19: 338, 450, & 489. 1970.

ERIOCAULON HIRSUTULUM Moldenke
Additional bibliography: Moldenke, Phytologia 18: 181. 1969; G. Taylor, Ind. Kew. Suppl. 14: 54. 1970.

ERIOCAULON HONDOENSE Satake

Additional synonymy: Eriocaulon miqueliamum sensu auct. Japon. ex Koyama in Ohwi, Fl. Jap. 268, in syn. 1965.

Additional bibliography: Moldenke, Phytologia 2: 493 & 494 (1948) and 3: 143 & 144. 1949; Koyama in Ohwi, Fl. Jap. 266, 268, & 269. 1965; Moldenke, Phytologia 19: 409, 454, & 456. 1970; Moldenke, Biol. Abstr. 51: 9023. 1970.

Koyama (1965) describes this species as "common" in wet lowlands of Hokkaido, Honshu, Shikoku, and Quelpaert Island, and records the vernacular names "hoshizaki-inu-no-hige" and "nippon-inu-no-hige".

ERIOCAULON HONDOENSE var. PILOSUM Satake

Additional bibliography: Moldenke, Phytologia 2: 493 & 494 (1948) and 18: 184. 1969.

ERIOCAULON HONDOENSE var. STELLATUM Satake

Additional synonymy: Eriocaulon hondoense f. stellatum (Satake) Koyama in Ohwi, Fl. Jap. 268. 1965.

Additional bibliography: Moldenke, Phytologia 2: 493 & 494. 1948; Koyama in Ohwi, Fl. Jap. 268. 1965; Moldenke, Phytologia 18: 184--185. 1969.

ERIOCAULON HOOKERIANUM Stapf

Additional synonymy: Eriocaulon hookeriana Stapf, in herb.

Additional bibliography: Moldenke, Phytologia 20: 12. 1970.

Additional citations: INDONESIA: GREATER SUNDA ISLANDS: Sabah: Clemens & Clemens 50643 (N).

ERIOCAULON HOOKERIANUM var. MICROPHYLLUM Van Royen

Additional bibliography: K. U. Kramer, Excerpt. Bot. A.6: 33. 1963; Moldenke, Phytologia 19: 69--70 & 88. 1969.

ERIOCAULON HUIANUM Ruhl.

Additional bibliography: Moldenke, Phytologia 18: 187 (1969) and 19: 246. 1970.

ERIOCAULON HUMBOLDTII Kunth

Additional bibliography: Kuntze, Rev. Gen. Pl. 3 (2): 329. 1898; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 160, 161, 163, 172, 187, & 189. 1969; Moldenke, Phytologia 20: 8, 9, 11, & 12. 1970.

Hermann encountered this plant in open boggy soil on llanos.

Additional citations: COLOMBIA: Vichada: F. J. Hermann 11047 (W--194352). BRAZIL: Mattogrosso: Maguire, Murça Pires, Maguire & Silva 56270 (S).

ERIOCAULON HUMILE Moldenke

Additional bibliography: Moldenke, Phytologia 18: 189 (1969) and 19: 478. 1970.

ERIOCAULON INFIRMUM Steud.
Additional bibliography: Hansen, Excerpt. Bot. A.12: 520. 1967; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 148, 171, 172, & 189. 1969; Moldenke, Phytologia 20: 12--13 & 356. 1970.

ERIOCAULON INFIRMUM var. KURZII (Fyson) Moldenke
Additional bibliography: Moldenke, Phytologia 19: 337 & 339. 1970.

ERIOCAULON INFIRMUM var. PUBERULENTUM (Moldenke) Van Royen
Additional bibliography: Moldenke, Phytologia 19: 337, 339--340, & 478. 1970.

ERIOCAULON INSULARE Ruhl.
Additional & emended bibliography: Moldenke, Phytologia 1: 318, 351, 352, & 355 (1939) and 19: 340. 1970.

ERIOCAULON INTERMEDIUM Körn.
Additional & emended bibliography: Körn., Linnaea 27: 578, 584, & 601--603. 1856; Körn. in Mart., Fl. Bras. 3 (1): 476, 501, & 505. 1863; Moldenke, Phytologia 2: 379 (1947) and 19: 340. 1970.

ERIOCAULON INUNDATUM Moldenke
Additional bibliography: Moldenke, Phytologia 18: 245 (1969) and 19: 450. 1970.

ERIOCAULON INYANGENSE Arwidsson
Additional bibliography: Moldenke, Phytologia 3: 143 (1949) and 18: 245. 1969.

ERIOCAULON JAPONICUM Körn.
Additional bibliography: Moldenke, Phytologia 2: 494 (1948) and 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 266--268. 1965; Moldenke, Phytologia 19: 340. 1970.
Koyama (1965) records the vernacular name "yamato-hoshi-kusa" for this species and states that the plant is "very local and scarce" in Kadzusa Province on Honshu Island, Japan.

ERIOCAULON KINABALUENSE Van Royen
Additional bibliography: Moldenke, Phytologia 20: 7 & 13. 1970.
Merrill annotated a specimen of Clemens & Clemens 51120 as "Eriocaulon brevipedunculatum Merr., alpine form".
Additional citations: INDONESIA: GREATER SUNDA ISLANDS: Sabah: Clemens & Clemens 51120 (N).

ERIOCAULON KIUSIANUM Maxim.
Additional bibliography: Moldenke, Phytologia 19: 341, 417, & 482. 1970.

ERIOCAULON KLOTZSCHII Moldenke
Additional bibliography: Körn., Linnaea 27: 601. 1856; Körn.

in Mart., Fl. Bras. 3 (1): 496—498 & 507. 1863; Moldenke, Phytologia 19: 341 & 455. 1970.

ERIOCAULON KOERNICKEI Britten

Emended synonymy: Eriocaulon pygmaeum Körn., Linnaea 27: 588, nom. nud. 1856; in Mart., Fl. Bras. 3 (1): 477—478. 1863 [not E. pygmaeum Dalz., 1851, nor Mart., 1841, nor Soland., 1809].

Additional & emended bibliography: Körn., Linnaea 27: 588. 1856; Körn. in Mart., Fl. Bras. 3 (1): 288, 291, 475, 477—478, 500, & 506, pl. 60, fig. 2. 1863; Moldenke, Phytologia 19: 72 (1969) and 20: 27, 416, & 417. 1970.

ERIOCAULON KÖRNICKIANUM Van Heurck & Muell.-Arg.

Additional & emended bibliography: Moldenke, Phytologia 1: 318, 350, 356, & 360 (1939) and 2: 153. 1946; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 191. 1969; Moldenke, Phytologia 19: 341 (1970) and 20: 41. 1970.

ERIOCAULON KUNTHII Körn.

Additional & emended bibliography: Körn. in Mart., Fl. Bras. 3 (1): 482—483 & 507. 1863; Moldenke, Phytologia 2: 494. 1948; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 172, 173, 187, 189, & 191. 1969; Moldenke, Phytologia 19: 341. 1970.

Additional citations: BRAZIL: Paraná: Hatschbach 22965 (Ac).

ERIOCAULON KURTZII Tomlinson

Bibliography: Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 186—188. 1969.

This bibomial is not recorded in the Index Kewensis or any of its supplements and I do not know to what taxon it applies.

ERIOCAULON KUSIROENSE Miyabe & Kudo

Additional synonymy: Eriocaulon sachalinense var. kushiroense (Miyabe & Kudo) Koyama in Ohwi, Fl. Jap. 266 & 270. 1965.

Additional bibliography: Moldenke, Phytologia 3: 144. 1949; Koyama in Ohwi, Fl. Jap. 266 & 270. 1965; Moldenke, Phytologia 18: 255 & 449. 1969.

Koyama (1965) states that this plant is known only from Kushiro Province on Hokkaido island, Japan, and that E. sachalinense Miyabe & Nakai differs from it only in always having "2-lobed pistillate calyces and 2 stigmas". He records the vernacular name "kushiro-hoshi-kusa" for it.

ERIOCAULON LACUSTRE Ruhl.

Additional & emended bibliography: Moldenke, Phytologia 1: 318, 351, & 355. 1939; Moldenke, Alph. List Cit. 1: 187. 1946; Moldenke, Phytologia 18: 256. 1969.

ERIOCAULON LANATUM H. Hess

Additional & emended bibliography: H. Hess, Bericht. Schweiz. Bot. Gesell. 65: 137—139, 145, & 181, pl. 8, fig. 1, 2, & 4.

1955; Moldenke, Phytologia 19: 72—73. 1969.

PAEPALANTHUS BELLUS Moldenke

Synonymy: Paepalanthus bellis ? Hocking, Excerpt. Bot. A.6: 455, nom. provis. 1963.

Bibliography: Moldenke, Résumé Suppl. 4: 5. 1962; Moldenke, Phytologia 8: 391. 1962; Hocking, Excerpt. Bot. A.6: 455. 1963; Moldenke, Biol. Abstr. 42: 1517. 1963; Angely, Bibl. Veg. Paran. 197. 1964; Moldenke, Résumé Suppl. 12: 11. 1965; Angely, Fl. Anal. Paran., ed. 1, 200. 1965; G. Taylor, Ind. Kew. Suppl. 14: 97. 1970.

Citations: BRAZIL: Paraná: Hatschbach 7394 (Z—type).

PAEPALANTHUS BENEDICTI Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 238—240 & 402, pl. 159. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 159. 1928.

The type of this species was collected by Dr. Benedicto Quintino dos Santos in fields near Marins, at an altitude of 2422 meters, in the Serra da Mantiqueira, Minas Gerais, Brazil, in July of 1922 and is number 635 in the Sulveira herbarium. Silveira (1928) notes that the "Species ab affine P. oligocephalo Koern. valde distincta ob folia glabra, pedunculos validiores, bracteas involucrantes ab inicio dorso glabras, et alios characteres". Thus far, the species is known only from the original collection.

PAEPALANTHUS BIFIDUS (Schrad.) Kunth

Synonymy: Eriocaulon bifidum Schrad. in Roem. & Schult., Mant. 2: 468. 1824. Eriocaulon fasciculatum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 624. 1831 [not E. fasciculatum Lam., 1789, nor Rottb., 1778, nor Willd., 1959]. Eriocaulon bifidum Schrank ex Steud., Nom. Bot., ed. 2, 1: 585. 1840. Eriocaulon (Paepalanthus) pygmaeum Mart., Flora 24, Beibl. 2: 60. 1841. Eriocaulon caespitosum Poepp. ex Kunth, Enum. Pl. 3: 612, in syn. 1841 [not E. caespitosum Wikstr., 1820]. Eriocaulon caespitosum (Wikstr.?) Poepp. ex Kunth, Enum. Pl. 3: 506, in syn. 1841. Eriocaulon fasciculare Weigelt ex Kunth, Enum. Pl. 3: 506 & 613, in syn. 1841. Eriocaulon villosum Salzm. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 334. 1855 [not E. villosum El., 1968, nor Michx., 1803, nor Willd., 1854]. Eriocaulon pygmaeum Mart. ex Steud., Syn. Pl. Glum. 2: [Cyp.] 334. 1855 [not E. pygmaeum Dalz., 1851, nor Körn., 1863, nor Soland., 1809]. Eriocaulon acrotrichum Steud., Syn. Pl. Glum. 2: [Cyp.] 277 & 333. 1855. Paepalanthus bifidus Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 297. 1863. Paepalanthus schraderi Körn. in Mart., Fl. Bras. 3

(1): 360. 1863. Eupaepalanthus schraderi Körn. ex V. A. Pouls., Vidensk. Meddel. Kjøbenh. 1888: 332. 1888. Dupatya bifida (Schrad.) Kuntze, Rev. Gen. Pl. 2: 746. 1891. Eriocaulon bifida Schrad. ex Kuntze, Rev. Gen. Pl. 2: 746, in syn. 1891. Paepalanthus fasciculatus Kunth apud Ruhl. in Urb., Symb. Ant. 1: 483, in syn. 1900. Dupatya bifida Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus bifidus var. exappendiculata Ruhl. in Urb., Symb. Ant. 1: 483. 1900. Eriocaulon fasciculatum Weig. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959. Paepalanthus bifidus Schrad. ex Moldenke, Résumé 323, in syn. 1959. Paepalanthus fasciculatum Weigelt, in herb. Paepalanthus fasciculatus f. pygmaea Körn., in herb.

Bibliography: Raeusch., Nom. Bot. 30. 1797; Roem. & Schult., Mant. 2: 468. 1824; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 624. 1831; Bong., Ess. Monog. Erioc. 3, 5, & 6. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 506, 511, 512, 612, 613, & 624. 1841; Mart., Flora 24, Beibl. 2: 60. 1841; Klotzsch in M. R. Schomb., Reisen Brut.-Guian. [Vers. Fauna & Fl. Brit.-Guian.] 3: 896. 1848; D. Dietr., Syn. Pl. 5: 260. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 277, 282, 333, & 334. 1855; Körn. in Mart., Fl. Bras. 3 (1): 297, 360—362, 505, & 507, pl. 60, fig. 2. 1863; Benth. & Hook. f., Gen. Pl. 3 (2): 1024. 1883; V. A. Pouls., Vidensk. Meddel. Kjøbenh. 1888: 332. 1888; Kuntze, Rev. Gen. Pl. 2: 746. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877—879 (1893) and 2: 401 & 402. 1894; Ruhl. in Urb., Symb. Ant. 1: 483. 1900; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 21, 152—154, [283]—285, & 287—291. 1903; Alv. Silv., Fl. Mont. 1: 402. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 51. 1930; J. F. Macbr., Field Mus. Publ. Bot. 13 (363): 490 & 491. 1936; Moldenke, N. Am. Fl. 19: 43. 1937; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Moldenke, Known Geogr. Distrib. Erioc. 5—7, 10, 28, 32—34, 39, 41, 45, 48, 53, & 54. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877—879 (1946) and 2: 401 & 402. 1946; Moldenke, Alph. List Cit. 1: 155, 156, 222, & 239. 1946; Moldenke, Phytologia 2: 379. 1947; Moldenke in Maguire & al., Bull. Torr. Bot. Club 75: 195. 1948; Moldenke, Alph. List Cit. 2: 353, 460, 544, 582, & 645 (1948), 3: 701, 710, 731, 814, 855, 891, & 956 (1949), and 4: 1169. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 60, 66—68, 82, & 208. 1949; Moldenke, Phytologia 4: 135—136. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 57, 67, 75, 77, 78, 95, 279, 285, 286, 288, 291, 293, 294, 323, 325, 327, 328, & 485. 1959; Moldenke, Résumé Suppl. 1: 6 & 17 (1959) and 2: 5. 1960; Rennó, Levant. Herb. Inst. Agron. 71. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877—879 (1960) and 2: 401 & 402. 1860; Moldenke, Résumé Suppl. 3: 12 & 34 (1962), 6: 6 (1963), and 11: 4. 1964; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 159, 160, 162, 167, 173, 174, 184, & 189. 1969; Moldenke, Phytologia

18: 250 & 428 (1969), 19: 331 & 332 (1970), and 20: 27, 39, & 297. 1970.

Kunth (1841), quoting Schrader, describes this species as follows: "Caule subbifido, folioso; foliis lineari-subulatis, recurvatis, pilosis; pedunculis terminalibus, angulatis, hirtis; involucri foliolis capitulum aequantibus calycibusque pilosis. Schrad. Eriocaulon bifidum Schrad. in Roem. et Schult. Mant. 2. 468. — Brasilia. — Caules caespitosi, 1 1/2 — 2 pollicares, tenues, erecti, saepe bifidi, rarius bis bifidi, dense foliosi. Folia 3—5 lin. longa. Pedunculi capillares, 5—8-pollicares. Capitulum magnitudine grani piperis. Involucri foliola 9—12, caulinis similia, longitudine capituli. Receptaculum pilosum. (Schrad.)" He also states that P. flaccidus (Bong.) Kunth is related to P. bifidus "sed recedit: caule non caespitoso, nec bifido, statura multo altiore". This same author, in making the new combination, Paepalanthus fasciculatus, apparently erroneously united Rottbøll's Eriocaulon fasciculatum (1778) with Bongard's Eriocaulon fasciculatum (1831), but the specimens he cites and on which he bases most of his description are all P. bifidus. For this reason his binomial was regarded by Ruhland (1903) as being based on Eriocaulon fasciculatum Bongard, rather than on Eriocaulon fasciculatum Rottb., and is placed in the synonymy of P. bifidus. Under this interpretation Kunth's P. fasciculatus would invalidate the P. fasciculatus credited to Körnicke (1863) by Ruhland, since the latter would be a later homonym and therefore invalid under the present edition of the International Rules of Botanical Nomenclature, and the widespread species now known by that binomial would have to receive a new binomial name. It would seem more practical to me to regard Kunth's combination as being based on the earliest of the name-bringing synonyms which he cites, namely, Eriocaulon fasciculatum Rottb., regardless of the description which he gave and the specimens which he cited, and therefore to retain that binomial, as Paepalanthus fasciculatus (Rottb.) Kunth, for the plant which Ruhland designated as P. fasciculatus (Rottb.) Körn.

It should also be noted here that plate 60, figure 2, of Mart., Fl. Bras. 3 (1) [1863] is sometimes cited as depicting P. bifidus, but actually it depicts Eriocaulon koernickei Britten.

It is also worth noting here that Ruhland (1900, 1903) cites Klotzsch's work (1848) as "in R. Schomb. Reise in Br. Guian. VIII (1848), 96", he dates Körnicke's work (1863) as "1871" and Roemer & Schultes' work (1824) as "1817", and erroneously gives p. "516" instead of "506" for the place of publication of Kunth's P. fasciculatus.

Gleason, in his unpublished Flora of British Guiana, describes P. bifidus as "Hirsute; stems erect, simple, 5—15 cm. tall; leaves crowded, especially near the summit, thin, spreading, 1—3 cm. long; peduncles numerous, 2—5 cm. long, the sheaths equaling the leaves; heads subglobose, about 3 mm. in diameter, pale brown;

bracts about uniform in length, somewhat exceeding the flowers, linear-lanceolate, long-acuminate". He avers that it is abundant in sandy soil throughout Guyana and cites Alston 41, Appun 656, De la Cruz 1700, 1750, 1849, 2525, & 3435, H. A. Gleason 633, A. S. Hitchcock 17075, ImThurn B.9 & 365, Jenman 2197, 5287, 5803, & 7886, Lang s.n., Leechman IV, Parker s.n., M. R. Schomburgk 96, 139, & 183. He, as well as Ruhland (1903) and Macbride (1936), records the species from Colombia, but this record is based on Wallis 13, a collection not as yet seen by me and only doubtfully from Colombia. Similarly, Ruhland (1903) records the species from the island of Hispaniola on the basis of a Meyerhoff collection, which, again, is doubtfully from that island and is more probably from French Guiana, as previously suggested by me (1937). In his 1900 work Ruhland comments as follows: "Hab. in Hispaniola (an re vera ex hac insula, anne e. Guiana?): Mayerhoff s.n. -- Praeterea in America meridionali divulgata ab oris Surinami et Guianae anglicae usque ad provinciam Bahia. Varietas nostra [var. exappendiculata] fluvium Amazonum non transfredi videtur". In his 1903 work he apparently abandons this variety although he fails to account for the name in his synonymy anywhere.

Macbride (1936) cites Weberbauer 4607 from San Martín, Peru, and even assures us that this identification was made by Ruhland himself. I have personally not seen any material of the species from Hispaniola, Colombia, or Peru. Silveira (1928) cites A. Silveira 1898 from the Serra Geral of Minas Gerais, Brazil.

Eriocaulon caespitosum Poepp. is based on Poeppig 2969 from Coiares at the mouths of the Amazon river in Pará, E. pygmaeum Mart. is based on Martius 558 from Bahia (collected by Luschnath), and E. villosum Salzm. is based on Salzmann s.n., collected "in sabulosis aridis, Bahia" and deposited in the herbarium of the Jardin Botanique de l'Etat at Brussels. It should be noted that E. caespitosum Wikstr. is the name-bringing synonym of what is now known as Syngonanthus caespitosus (Wikstr.) Ruhl.; E. villosum Willd. is a synonym of E. decangulare L., while the homonyms attributed to Ellis and to Michaux are synonyms of Lachnocaulon anceps (Walt.) Morong; E. fasciculatum Lam. is now known as P. lamarckii Kunth, while E. fasciculatum Rottb. now goes under the name P. fasciculatus (Rottb.) Kunth; E. pygmaeum Soland. is a valid species, but E. pygmaeum Dalz. is now known as E. xeranthemum Mart. and E. pygmaeum Körn. is E. koernickei Britten.

Jackson (1893) reduces Eriocaulon fasciculare Weigelt to what he calls Paepalanthus congestus Kunth [now in the synonymy of P. fasciculatus (Rottb.) Kunth].

Ruhland (1903) cites the following specimens deposited at Berlin except where otherwise noted: HISPANIOLA: Mayerhoff s.n. COLOMBIA: Wallis s.n. [im Hochland]. GUYANA: M. R. Schomburgk 139 [96] (V). SURINAM: Hostmann 823, Kegel s.n. [near Mariepas-

ton], Roland s.n., Splitgerber s.n., Weigelt s.n. FRENCH GUIANA: Mélinon 49. BRAZIL: Amazonas: Schwacke 4087, Spruce 1564. Bahia: Blanchet 184, 1650 (V), 2599 (V), Lhotzky s.n., Luschnath 24, 32, L. Riedel s.n., Salzmann s.n., Sellow s.n. [between Vittoria and Bahia], Wallis s.n. [Obidos], Wied-Neuwied s.n. [Viçosa]. Minas Gerais: Martius 555, 558, Mendonça 321, Schwacke 8494, Sena s.n. [Herb. Schwacke 14544]. Pará: Huber 1267, Poeppig 2969, s.n. [Rio Pará], Spruce s.n. [Pará]. Pernambuco: Schwacke 4269. He comments that "Appendices styli adsunt vel desunt".

Collectors have found this plant growing in dry sand, dry sandy or gravelly places, or sandy soil in general, in low scrub on white sand, in low wet white sand areas, and in dry sand clearings, at altitudes of 300 to 1100 meters, flowering and fruiting from March to December. Schomburgk states that it flowers throughout the year. Collectors describe the plant as a small herb, to 4 inches tall, with whitish or brownish inflorescences. The only vernacular name recorded for it is "capim mortinha". Maguire and his associates refer to the plant as "common", "locally frequent", or "a locally common weedy annual".

Material has been misidentified and distributed in herbaria under the names Eriocaulon caespitosum Wikstr., Eriocaulon fasciculatum Lam., Eriocaulon fasciculatum Rottb., Paepalanthus caulescens Kunth, P. congestus Kunth, P. fasciculatus Körn., P. lamarckii Kunth, and Syngonanthus caulescens (Poir.) Ruhl. Coêlho de Moraes 2215, cited below, is a mixture with P. minutulus Mart., Maguire & Fanshawe 23560 and Murça Pires & Silva 4708 are both mixtures with P. fasciculatus (Rottb.) Kunth, and Snethlage 8187 is a mixture with P. fasciculatus f. sphaerocephalus Herzog.

Additional citations: VENEZUELA: Bolívar: Maguire, Steyermark, & Maguire 53598 (N); J. A. Steyermark 89671 (Mi, N). GUYANA: Archer 2439 (W—1663174); C. D. K. Cook 10 (K); J. S. de la Cruz 1700 (Ca—279741, Mi, W—1190180), 1750 (Ca—280788, W—1190224), 1849 (Ca—280290, W—1190307), 2525 (Ca—298797, Mi, W—1231307), 3435 (Ca—300590, Mi, W—1282691); H. A. Gleason 633 (N); S. G. Harrison 554 (K); A. S. Hitchcock 17075 (S, W—1056251); Jenman 5287 (W—200888, W—936244); H. Lang s.n. [Bartica, Oct. 4, 1922] (W—1199193); Maguire & Fanshawe 23560, in part (N), 32204 (N), 32562 (N); Robertson & Austin 248 (N); M. R. Schomburgk 96 (B), 183 (B); L. B. Warren s.n. [Georgetown, 1924] (W—1280098). SURINAM: Collector undetermined 1126a [326] (Ut—44077a); Essed s.n. [Sept. 1914] (N, Ut—44076a); Focke 480 (Ut—344), 1382 (Ut—343); Hostmann 823 (B, Ut—344); Kramer & Hekking 2441 (N); Lanjouw 162 (Ut—44075a); Lanjouw & Lindeman 2985 (Ut—17881b); Versteeg 29 (Ut—345); Weigelt s.n. [1827] (B, Mi); Wullschlägel 1645 (Br). FRENCH GUIANA: Mélinon 49 (B), 65 (B, N); Sagot 354 (Br, Er, S).

BRAZIL: Amapá: Irwin, Egler, & Murça Pires 47324 (N); Murça Pires & Cavalcante 52143 (N). Amazônas: Forero, Prance, Pena, & Ramos 4682 (Rf); Prance, Pena, Forero, & Ramos 4684 (N, S); Prance, Ramos, Farias, & Philcox 4835 (N, Rf); E. Santos 1475 [Fromm 1453; Sacco 1710; Trinta 379; Herb. Brad. 25625] (Lw); Spruce 1504 (S, S). Bahia: Belém 1684 (Ac); Blanchet 2599 (M), 6038 [Herb. Mus. Goeldi 3347] (Bs); Collector undetermined s.n. [Bahia] (Ut--342); A. P. Duarte 5949 [Herb. Brad. 15443] (Lw); Glocker 332 (S); Luschnath 32 [Martius 558] (Br, Br, M, N--photo, Z--photo), 36 (Br), 38 [Martius 555] (Br, Br, Br, S); A. Lutz 1261 (Ja); Salzmann s.n. [Bahia] (Br, N); Sellow 50 C (S), 565 (Br, Br, N--photo, Z--photo). Ceará: O. Martin 2537 (Bs), 2540 (Bs); Swallen 4555 (W--1592043). Guanabara: Alston & Lutz 132 (Ac, Ja--113693, Ja, Ut--43032a); W. Pereira 3852 [Herb. Brad. 6485] (Sm); Pereira, Liene, Sucre, & Duarte s.n. [E. Pereira 3852] (Bd--6484); N. Santos 5403 (Ja). Minas Gerais: Mexia 5816 [Herb. Leonard 8345] (B, Go, Mi, N, Qu, S, Ut--50247a, W--1571893); L. Riedel s.n. (Br); Schwacke 8494 [Herb. Jard. Bot. Belo Horiz. 26668] (N). Pará: G. A. Black 54-16152 (Ca--29925, Z); Drouet 2106 (Mi); Ducke 10805 (Bs), 11655 (Bs), 12087 (Bs); Goeldi 1102 (W--1199321); Huber 1617 (Bs); Killip & Smith 30700, in part (N, W--1480210); D. A. Lima 53-1604 (Be--81051); Murça Pires 4077 (Z); Murça Pires & Black 19 (Ca--743859); Murça Pires, Black, Wurdack, & Silva 6161 (N); Murça Pires & Silva 4708, in part (N, Ut--73001, W--2252820); Poeppig 2969 (B), s.n. [Rio Pará] (B); A. Silva 210 (Be--13107, N, W--2278333); Snethlage 8187, in part (Bs); Spruce s.n. [prope Santarem, 1850] (S, S); Zerny s.n. [13 Mai 1927] (V--10786). Paraíba: Coêlho de Moraes 2215, in part (Mm); Tavares 1070 (W--2407871). Pernambuco: Ridley & Lea s.n. (S); Tavares 828 (W--2403785), 829 (W--2403786), 835 (W--2403792). Rio Grande do Norte: Tavares 422 (Bd--24140). LOCALITY OF COLLECTION UNDETERMINED: Herb. J. Gay s.n. [5 Oct. 1862] (W--152104).

PAEPALANTHUS BIFRONS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 206--208 & 402, pl. 136 & 254. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Angely, Fl. Paran. 10: 4. 1957; Moldenke, Résumé 95 & 485. 1959.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 136 & 254. 1928.

The type of this species was collected by Álvaro Adolpho da Silveira (no. 681) in fields at Chapada do Couto, Minas Gerais, Brazil, in April of 1918 and is deposited in the Silveira herbarium. The plate 254, cited above, purports to show this species

in situ on Marinheiros Island, Rio Grande do Sul. Thus far the species is known only from the original collection and from the photograph referred to above, which is not sufficiently clear to enable one to verify the identification.

PAEPALANTHUS BIFRONS var. FUSCIOR Alv. Silv.

Synonymy: Paepalanthus bifrons var. fusciora Alv. Silv., Fl. Mont. 1: 207. 1928.

Bibliography: Alv. Silv., Fl. Mont. 1: 207--208 & 402. 1928; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Résumé 95, 323, & 485. 1959.

Silveira (1928) describes this taxon as having "Bracteae involucrantes fuscae, ciliatae, dorso glabrae vel glabriusculae. Perigonium fuscum." The type is A. Silveira 682 from fields at Chapada do Couto, Minas Gerais, Brazil, collected in April, 1918, and deposited in the Silveira herbarium. It is known thus far only from the original collection.

PAEPALANTHUS BLEPHAROPHORUS (Bong.) Kunth

Synonymy: Eriocaulon blepharophoron Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 626. 1831. Eriocaulon blepharophorum Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 2 (3): pl. 16. 1832. Paepalanthus blepharophorus β humilis Kunth, Enum. Pl. 3: 499. 1841. Paepalanthus blepharophorus Kunth ex Körn. in Mart., Fl. Bras. 3 (1): 281, 376, 377, & 507. 1863. Dupatya blepharophora (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya blepharophora Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus blepharophorus (Bong.) Körn. ex Ruhl. in Engl., Pflanzenreich 13 (4-30): 130. 1903. Paepalanthus blepharophorus var. humilis Kunth apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 130, in syn. 1903.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 626. 1831; Bong., Ess. Monog. Erioc. 26 (1831) and 66--68 & 229--231, pl. 16. 1832; Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 2 (3): 229--231, pl. 16. 1832; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 499, 522, 574, 612, & 624. 1841; D. Dietr., Syn. Pl. 5: 259. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 278 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 281, 376, 377, & 507. 1863; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 (1893) and 2: 401. 1894; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 8, 12, 123, 128, 130, [283], 284, & 289. 1903; Alv. Silv., Fl. Mont. 1: 69. 1928; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41 & 43. 1930; Stapf, Ind. Lond. 3: 90. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 (1946) and 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 10, 28, 32, & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, pr.

3, 145. 1959; Moldenke, Résumé 95, 279, 286, 323, & 485. 1959; Moldenke, Résumé Suppl. 1: 6, 16, 19, & 25. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 (1960) and 2: 401. 1960; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 190. 1969.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 2 (3): pl. 16. 1832; Bong., Ess. Monog. Erioc. pl. 16. 1832.

The type of this species was collected by Ludwig Riedel (no. 1041) in marshes at Villa Rica, in the Serra da Lapa, Minas Gerais, Brazil, flowering in November, and deposited in the Leningrad herbarium. An isotype in the herbarium of the Botanisches Museum at Berlin was photographed there by Macbride as his type photograph number 10573. The specific epithet is uppercased by Silveira (1928). Bongard's original (1831) description is "foliis pedunculos subaequantibus confertis lineari-lanceolatis acutis dense ciliatis; pedunculis caespitosis pubescentibus; vaginis brevissimis apice barbatis. Tab. XVI. Habitat in paludibus Serra da Lapa. Flor. Novembri." Kunth (1841) places Bongard's binomial in the synonymy of what he calls variety humilis with "foliis pedunculos subaequantibus", while what he apparently regarded as the typical form of the species is described as having "pedunculis....folia duplo superantibus" and is what we now call P. aequalis (Vell.) J. F. Macbr. Kunth also states that P. blepharophorus is related to P. lingulatus (Bong.) Kunth, which, he claims, "Differt a P. blepharophoro, cui affinis, praeter notas in charactere receptas: statura humiliora, foliis ad insertionem nudis (nec piloso-lanatis) et margine pilis longis distantibus ciliatis, qui in P. blepharophoro breves et densi". Ruhland (1903) cites only the type collection, and this is still the only known collection, as far as I am aware.

Citations: BRAZIL: Minas Gerais: L. Riedel 1041 [Macbride photos 10573] (B--isotype, Br--isotype, N--isotype, N--isotype, N--photo of isotype, N--photo of isotype, S--isotype, Ut--347--isotype, W--photo of isotype). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS BOMBACINUS Alv. Silv.

Bibliography: Alv. Silv., Fl. Mont. 1: 82--83 & 402, pl. 49. 1928; A. W. Hill, Ind. Kew. Suppl. 9: 199. 1938; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Phytologia 4: 136. 1952; Mendes Magalhães, Anais V Reun. Anual Soc. Bot. Bras. 234. 1956; Moldenke, Résumé 95 & 485. 1959; Rennó, Levant. Herb. Inst. Agron. 69. 1960.

Illustrations: Alv. Silv., Fl. Mont. 1: pl. 49. 1928.

This species was apparently based on two collections made by Álvaro Adolpho da Silveira in Minas Gerais, Brazil -- the first "In campis altis inter Serro et Pouso Alto locis arenosis humidisque" in April, 1908, and the second "In Chapada do Couto" in April, 1918 -- comprising no. 513 in the Silveira herbarium. Sil-

veira (1928) comments that "A P. fastigiato (Bong.) Koern. cum quo indumento foliorum accedit, magnitudine pedunculorum et bracteis involucrantibus haud albo-marginatis sed densissime pilis albis longisque extus obsitis differt". The species has been collected on campos, flowering from April to June.

Additional citations: BRAZIL: Minas Gerais: Black & Mendes Magalhães 51-12094 (Be—69918); Brade 13598 [Herb. Jard. Bot. Rio Jan. 25386] (B); Maguire, Mendes Magalhães, & Maguire 49036 (N); Mello Barreto 2534 [Herb. Jard. Bot. Belo Horiz. 6228] (N); Williams & Assis 6926 (Ca—744428).

PAEPALANTHUS BONGARDI Kunth

Synonymy: Eriocaulon repens Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 623 & 628, pl. 7. 1831 [not E. repens Lam., 1791]. Eriocaulon repens (Lam.?) Bong. ex Kunth, Enum. Pl. 3: 572, in syn. 1841. Eriocaulon decumbens Steud., Syn. Pl. Glum. 2: [Cyp.] 276. 1855. Dupatya bongardii (Kunth) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya bongardii Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902. Paepalanthus bongardii Kunth apud Ruhl. in Engl., Pflanzenreich 13 (4-30): 173, in syn. 1903. Paepalanthus prostratus Mart. ex Moldenke, Résumé 327, in syn. 1959 [not P. prostratus Körn., 1863]. Eriocaulon decumbens Bong. ex Moldenke, Résumé Suppl. 1: 17, in syn. 1959. Paepalanthus prostratus Kunth, in herb.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 623 & 628, pl. 7. 1831; Bong., Ess. Monog. Erioc. 3, 16, 17, 23—24, & 48—49, pl. 7. 1831; Guill. in Deless., Icon. Sel. 3: 59. 1837; Kunth, Enum. Pl. 3: 519, 572, 573, 614, & 624. 1841; Steud., Syn. Pl. Glum. 2: [Cyp.] 276, 333, 334, & 342. 1855; Körn. in Mart., Fl. Bras. 3 (1): 277, 372—373, & 507. 1863; Hieron. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 2 (4): 22. 1888; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 878 (1893) and 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 173—175, [283], 285, 287, & 289. 1903; Stapf, Ind. Lond. 3: 91. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 878 (1946) and 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 10, 29, 34, 39, & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Alph. List Cit. 4: 1301. 1949; Moldenke, Phytologia 4: 136. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 95, 279, 287, 291, 327, & 485. 1959; Moldenke, Résumé Suppl. 1: 17 & 19. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 878 (1960) and 2: 401. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Phytologia 18: 242. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 173, 174, & 189. 1969.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér.

6, 1: pl. 7. 1831; Bong., Ess. Monog. Erioc. pl. 7. 1831.

The original description of this species, according to Kunth (1841), is "Caule decumbente, ramoso; foliis amplexicaulibus, linearibus, subcanaliculatis, basi pilosis, recurvis; pedunculis axillaribus, subfasciculatis vaginisque pubescentibus". The type was collected by Ludwig Riedel in shady moist sandy places in the Serra da Piedade, Minas Gerais, Brazil, and is deposited in the Leningrad herbarium. Interestingly, Kunth (1841), after quoting Bongard's original diagnosis, adds the note "Eriocaulon repens Bongard in Act. Petrop. 6. 1. 623. 648. t. 7. (excl. Lam.)..... Nostra planta bene convenit cum icone et descriptione Lamarckianis, sed recedit pedunculis et vaginis brevioribus. (Bong.)" On the same page, under Paepalanthus microphyllus (Guill.) Kunth, he notes for the latter taxon "Accedit ad Eriocaulon repens Bong.; differt pedunculis multo minoribus, aequalibus, glabris, crebrioribus, foliis brevioribus, magis recurvatis. (Guill.)" Ruhland (1903) maintains that it is related to P. brachyphyllus Ruhl. and P. scandens Ruhl.

The type of Paepalanthus prostratus, cited in the synonymy above, is a specimen collected by Peter Clausen (no. 182) near Cachoeira do Campo, Minas Gerais, Brazil, "Aug.-April 1840", and is deposited in the herbarium of the Jardin Botanique de l'État at Brussels. The P. prostratus Körn., referred to in the same synonymy above, is the name-bringing synonym of Blastocaulon prostratum (Körn.) Ruhl., while Eriocaulon repens Lam. is now known as Paepalanthus repens (Lam.) Körn. Stapf (1930) erroneously cites Bongard's plate 7 (1831) under Eriocaulon repens Lam.

Unfortunately, in all my previous publications I blindly followed Ruhland's orthography (1903) of the specific epithet of this taxon, but I see now that Kunth's original spelling of it was with only a single terminal "i". It seems to me that, notwithstanding recent recommendations in the Rules, the original orthography should be retained, as it was by Steudel (1855), Körnicke (1863), Hieronymus (1888), Jackson (1893, 1894), and Durand (1902).

The species has been collected in anthesis in January, February, May, and September, growing in marshy ground and in shady damp places in sandy soil. Ruhland (1903) cites P. Clausen 1182 [probably an error for "182"], L. Riedel s.n., and Warming s.n. from Minas Gerais, and L. Riedel 1482 from São Paulo, all deposited in the herbarium of the Botanisches Museum at Berlin.

Material has been misidentified and distributed in herbaria under the name Eriocaulon repens Lam. On the other hand, the Wainio s.n. [Carassa, IV.1885], distributed as P. bongardi, is actually P. flaccidus (Bong.) Kunth.

Additional citations: BRAZIL: Minas Gerais: P. Clausen 15 (N), 38 [U. S. Nat. Herb. photo 5899] (N--photo, P), 182 (B, Br, N--photo, Z--photo), 267 (Br, N), 269 (S), s.n. [Brazil] (Br, Mi);

L. Riedel s.n. [S. da Piedade] (B--isotype, M--isotype, S--isotype). São Paulo: L. Riedel 1482 (B, Ut—348). MOUNTED ILLUSTRATIONS: drawings & notes by Körnicke (B).

PAEPALANTHUS BOREALIS Körn.

Bibliography: Körn. in Mart., Fl. Bras. 3 (1): 508. 1863.

Nothing is known to me of this taxon. It is very possible that the binomial is one which Körnicke intended to use validly and later abandoned. Further examination of the Berlin herbarium material may reveal more on this matter. In the original publication (1863) the plant is said to be native to "Boreali-Americana", but there is no formal description. Possibly it is what we now know as Syngonanthus flavidulus (Michx.) Ruhl.

PAEPALANTHUS BRACHYPHYLLUS Ruhl.

Bibliography: Ruhl. in Engl., Pflanzenreich 13 (4-30): 173, 175, & 289. 1903; Prain, Ind. Kew. Suppl. 3: 126. 1908; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 40. 1930; Moldenke, Known Geogr. Distrib. Erioc. 10 & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Phytologia 3: 142 (1949) and 4: 136. 1952; Moldenke, Résumé 95 & 485. 1959.

This species was based by Ruhland (1903) on two collections: (1) Glaziou 5453 from dry campos on the summit of Itatiaia, Rio de Janeiro, and (2) Schwacke 13871 from moist places by brooks on the Morro de São Sebastião, Minas Gerais, Brazil, both deposited in the herbarium of the Botanisches Museum at Berlin, where the first-mentioned was photographed by Macbride as his type photograph number 10574. The species has been collected in anthesis in June and October. Ruhland (1903) cites only the two original collections and comments that "Species P. scandenti Ruhl., Bongardii Kunth etc. affinis, sed an eis capitulis minoribus, foliis brevibus, obtusis eorumque in caule dispositione differt".

Additional citations: BRAZIL: Minas Gerais: Schwacke 13871 (B--cotype). Rio de Janeiro: Glaziou 5453 [Macbride photos 10574] (B--cotype, N--photo of cotype, N--photo of cotype, W—photo of cotype, Z--cotype).

PAEPALANTHUS BRACHYPUS (Bong.) Kunth

Synonymy: Eriocaulon brachypus Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 622 & 646, pl. 6. 1831 [not E. brachypus Van Heurck & Muell.-Arg., 1870]. Paepalanthus brachypus Kunth apud Körn. in Mart., Fl. Bras. 3 (1): 322. 1863. Dupatya brachypus (Bong.) Kuntze, Rev. Gen. Pl. 2: 745. 1891. Dupatya brachypus Kuntze apud Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902.

Bibliography: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: 622 & 646, pl. 6. 1831; Bong., Ess. Monog. Erioc. 22 & 46--47, pl. 6. 1831; Steud., Nom. Bot., ed. 2, 1: 585. 1840; Kunth, Enum. Pl. 3: 511, 516--517, 572, 576, 612, & 624. 1841; D. Dietr.,

Syn. Pl. 5: 261. 1852; Steud., Syn. Pl. Glum. 2: [Cyp.] 274 & 333. 1855; Körn. in Mart., Fl. Bras. 3 (1): 322 & 507. 1863; Kuntze, Rev. Gen. Pl. 2: 745. 1891; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 1, 1: 877 (1893) and 2: 401. 1894; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 145. 1902; Ruhl. in Engl., Pflanzenreich 13 (4-30): 189—191, [283], 285, & 289, fig. 25. 1903; Saunders, Ann. Bot. 39: 158, fig. 69. 1925; Alv. Silv., Fl. Mont. 1: 402. 1928; Stapf, Ind. Lond. 3: 90 (1930) and 4: 518. 1930; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 41, 51, & 52, fig. 19. 1930; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 2, 145. 1941; Worsdell, Ind. Lond. Suppl. 2: 183. 1941; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 2, 1: 877 (1946) and 2: 401. 1946; Moldenke, Known Geogr. Distrib. Erioc. 10, 29, 33, & 45. 1946; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 82 & 208. 1949; Moldenke, Phytologia 4: 136. 1952; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 3, 145. 1959; Moldenke, Résumé 95, 279, 286, & 485. 1959; Moldenke, Résumé Suppl. 1: 19. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., pr. 3, 1: 877 (1960) and 2: 401. 1960; Rennó, Levant. Herb. Inst. Agron. 69. 1960; Moldenke, Phytologia 18: 304. 1969; Tomlinson in C. R. Metcalfe, Anat. Monocot. 3: 148, 149, 159, 161, 163, 173, 174, 184, 186, 187, & 189. 1969.

Illustrations: Bong., Mém. Acad. Imp. Sci. St. Pétersb., sér. 6, 1: pl. 6. 1831; Bong., Ess. Monog. Erioc. pl. 6. 1831; Ruhl. in Engl., Pflanzenreich 13 (4-30): 190, fig. 25. 1903; Saunders, Ann. Bot. 39: 158, fig. 69. 1925; Ruhl. in Engl. & Prantl, Nat. Pflanzenfam., ed. 2, 15a: 51, fig. 19. 1930.

The type of this species was collected by Ludwig Riedel (no. 1182) in sandy places near Cachoeira do Campo, Minas Gerais, Brazil, and is deposited in the Leningrad herbarium. Bongard's original description (1831) is "caulibus caespitosis simplicibus foliosis; foliis radicalibus linearibus pilosis; pedunculis pubescentibus vaginis glabriusculis. T. VI. Hab. in arenosis prope Cachoeira. Floret Decembri. ⊙." Ruhland (1903) cites only this original collection and Glaziou 19978, also from Minas Gerais. Silveira (1928) cites A. Silveira 485 from near Diamantina in the Serra da Raiz, Minas Gerais, collected in 1908.

The Eriocaulon brachypus Van Heurck & Muell.-Arg., referred to in the synonymy above, is a synonym of E. microcephalum H.B.K. The specific epithet of Dupatya brachypus is uppercased for some reason not obvious to me by Durand & Jackson (1902).

Recent collectors describe this plant as cespitose, the heads sordid-white, growing in sandy places, on dry campos, among low brush in wet sand and clay campos, and on the campos in areas of grassy meadows with adjacent sandy campos, at altitudes of 1300 to 1500 meters, flowering in January, March, and December. Material has been misidentified and distributed in herbaria as P. compactus Gardn.; in fact, the M. A. Chase 10418 is said to have been collected at the type locality of that species. The two taxa are certainly very closely related.

Additional citations: BRAZIL: Minas Gerais: M. A. Chase 10418 (Mi, W—1495695); Glaziou 19978 (B).

ETABALLIA DUBIA (LEGUMINOSAE), A NEW COMBINATION

Velva E. Rudd

For some time I have suspected that Etaballia guianensis Benth. and Hecastophyllum dubium H.B.K. might be synonymous, and examination of the types has confirmed that suspicion. Because the specific epithet dubium has priority, a new combination is needed, and the specific name becomes Etaballia dubia (H.B.K.) Rudd.

Hecastophyllum dubium H.B.K., published in 1824, was based on a fruiting specimen gathered by Humboldt and Bonpland in Venezuela. It was included by De Candolle in his Prodromus (2: 420. 1825), but without notation of a specimen's having been seen. Bentham, in his "Synopsis of the Dalbergieae" (Jour. Linn. Soc. Bot. 4, suppl.: [1]-134. 1860) made no mention of the species, nor did Pittier in any of his numerous publications dealing with the flora of Venezuela (e. g. Bol. Tecn. M. A. C. Serv. Bot. 5. 1944; Cat. Fl. Venez. 1. 1945).

Etaballia Benth. and E. guianensis Benth. were described as a new genus and species in 1840, based on flowering material collected by Robert Schomburgk in British Guiana, nos. 169 and 706. A "second species, E. macrophylla, from the island of St Vincent" was cited but later (Hook. Icon. 453, 454. 1842) was "suppressed, having originated in a mistake." It "proved to be a cultivated specimen of Inocarpus edulis" [I. fagiferus (Parkins.) Fosberg] (Jour. Linn. Soc. Bot. 6: 146. 1862). Etaballia was assigned to the "Tribe Bauhiniae" of the "Suborder Caesalpiniae" and was so maintained by Bentham until 1865 when he reduced Etaballia to Inocarpus Forst., a genus of tropical Asia and the Pacific Islands (in Bentham & Hooker, Gen. Pl. 1: 552). Inocarpus was put as a "genus anomalum" at the end of the "Tribe Dalbergieae" in the "Subordo I. Papilionaceae." Taubert (in Engler & Prantl, Nat. Pflanzenfam. 3, 3: 348. 1894) followed Bentham, but Dalla Torre & Harms (Gen. Siphon. 241. 1900-1907) gave Etaballia independent status in the Dalbergieae. Ducke, in "As Leguminosas da Amazonia Brasileira" (Bol. Tecn. I. A. N. no 18: 207. 1949), cited Etaballia as a monotypic genus of the Dalbergieae. Kuhlmann (Lilloa 17: 57-60. 1949), after a systematic and morphologic study, concluded that Etaballia was a possible intermediate between the "Papilionatae" and the "Mimosoideae." In more recent treatments, Melchior (in Engler, Syllabus de Pflanzenfamilien 2. 1964) has made no mention of Etaballia or Inocarpus, and Hutchinson (Gen. Fl. Pl. 1: 316. 1964) has followed Bentham's reduction of Etaballia to Inocarpus but has placed the combined genus in the "Tribe Cadieae" of the "Fabaceae."

Etaballia is, indeed, anomalous. The fruit has been compared with that of Moutouchi suberosa Aubl. [Pterocarpus officinalis Jacq.], which it does resemble very closely. The unifoliolate leaves resemble those of Dalbergia spp. The long, ribbon-like, bright yellow petals have been characterized as resembling those of Hamamelis, as well as those of leguminous genera such as Inocarpus, Myroxylon, Riedeliella, and Bauhinia. Comprehensive and

comparative studies of Etaballia and the putative related genera, utilizing techniques of anatomy, cytology, palynology, and chemistry, are needed to elucidate the problem. However, although the correct placement remains uncertain, I believe that Etaballia should be maintained as a separate genus. Following is a brief résumé of its single species, E. dubia.

ETABALLIA DUBIA (H.B.K.) Rudd, comb. nov.
Hecastophyllum dubium H.B.K. Nov. Gen. & Sp. Pl. 6: 388. 1824. Type: Humboldt & Bonpland, Caicara, Bolívar, Venezuela (P).
Etaballia guianensis Benth. Jour. Bot. Hooker 2: 99. 1840; Hook. Icones 453, 454. 1842. Lectotype: Robert Schomburgk 169, Essequebo R., British Guiana (K). Syntype: Robert Schomburgk 706 (K). Isosyntypes: NY, US.

Tree, to ca 30 m tall; young stems glabrous, unarmed; leaves unifoliolate; leaflets ovate to ovate-oblong, ca 3-15 cm long, 2-7.5 cm wide, acute to acuminate, rounded or subcordate at the base, glabrous above, glabrous or nearly so below; immature inflorescence cone-like, later catkin-like; flowers 10-15 mm long; calyx tubular, pubescent, 3-3.5 mm long with 5 deltoid lobes ca 0.5 mm long; petals yellow to orange, 5, rarely 6, linear, subequal, 10-15 mm long, 1 mm wide, glabrous; stamens 10, rarely 11, the filaments alternately long and short, united at the lower half, separate above, the anthers uniform, minute, subspherical, dorsifixed, dehiscing laterally; ovary pubescent, 1-3-ovulate, the style about 1 mm long, glabrous, the stigma truncate; fruit pubescent, glabrescent, subreniform or sublunate, laterally compressed, longitudinally rugose, indehiscent, commonly 1-seeded.

GUYANA (British Guiana): Kartabo Pt., Mazaruni R., Sandwith 1537 (NY). Mazaruni R., Takutu Cr. to Puruni R., For. Dept. B. G. 4879 Fanshawe 2143 (NY, US). Mazaruni R., Shiparimaina Falls, For. Dept. B. G. 5627, Fanshawe 2828 (NY, US). Bartica, For. Dept. B. G. 6879, Fanshawe 3350 (NY, US).
VENEZUELA: Guarico: Pto. de Parmana, Tamayo 4016 (NY, US). Apure: Pto. Páez, Velez 2639 (US). Bolívar: Pto. Ordaz, Aristeguita 5874 (US, VEN). Amazonas: Pto. Ayacucho, Ll. Williams 13048 (US); Holt & Blake 814 (NY, US). Alto Río Orinoco, Caño Yapacana, Maguire & Wurdack 34589 (NY, US). Río Ventuari, near Los Carmelitos, Cowan & Wurdack 31582 (NY, US).
BRAZIL: Rio Branco: Caracarahy, J. G. Kuhlmann [RB] 2799 (US) Fróes 23032 (NY). Igarapé Agua Boa, Rio Mucajaí, Prance, Forero, Pena, & Ramos 4048 (NY, US). Amazonas: Igarapé Jandiatuba, Fróes 24038 (NY, US). Humayta, near Livramento, Krukoff 6614 (US). Humayta, near Tres Casas, Krukoff 6215 (US). Pará: Rio Takutu, opp. St. Ignatius Mission, Mather s. n. (NY). Fordlandia, Black 48-2320 (NY, US). Rio Faro, Ducke [MG] 15916 (US). Rio Xingú, Altamira, Ducke [MG] 16616 (US). Rio Xingu, Victoria, Ducke [MG] 16588 (US). Oriximina, Ducke [MG] 15708 (US). Rio Tapajoz, Boburé, Ducke [MG] 16773 (US). Villa Braga, Ducke [MG] 16900 (US).

LOCAL NAMES: Brasil, sangrito (Venezuela); mututi, poyu (Brazil).

Fig. 1 - Etaballia guianensis Benth. Copy of plates 453, 454. Hooker's Icones Plantarum. 1842. (Drawing by J. D. Hooker)

NAMES OF NEW WORLD CYPRESSES (CUPRESSUS)

ELBERT L. LITTLE, JR.

Under a conservative interpretation, 8 species of cypress, genus Cupressus L. (family Cupressaceae or Pinaceae), are native in the New World. Three can be divided further into a total of 10 varieties to make 15 distinguishable taxa, which have been regarded also under a narrow concept as 15 species. In this summary of the classification and nomenclature, 2 new combinations are made. Also, a few notes including range extensions have been compiled and added here.

In the New World the genus Cupressus L. (cypress) is native from southwestern Oregon and California to the Chisos Mountains of Trans-Pecos Texas and south through Mexico to Honduras. As interpreted here, the United States has 7 native species, all represented in California. Oregon, Arizona, New Mexico, and Texas have 1 species each. Mexico has 3 species, of which 2 are also in the United States and the third extends southward in mountains to Guatemala and Honduras.

The ancient coniferous genus Cupressus L. (cypress) is represented now by many disjunct, scattered or isolated, apparently relic populations, few enough to be counted. Among these groves morphological differences of varying degrees have been recorded. Many names, mostly at rank of species and variety, have been proposed. A re-evalution of the nomenclature is needed for forthcoming Forest Service studies, including "Atlas of United States Trees, Volume 1, Conifers and Important Hardwoods" now in press and the revision of "Woody-plant Seed Manual" (Forest Service, U. S. Dep. Agr. Misc. Pub. 654, 416 p., illus. 1948).

A comprehensive monograph, based on detailed studies of both wild and cultivated plants, was prepared by Carl. B. Wolf (Taxonomic and distributional studies of the New World cypress. Aliso 1: 1-250, illus. 1948; Horticultural studies and experiments on the New World cypresses. Aliso 1: 325-444, illus. 1948). Few native tree genera in the United States have been studied as intensively in the field and garden. Full field notes were published. Herbarium specimens cited were mostly those relating to nomenclature, including types, and collections by the author. Though specimens were annotated, those in a few large herbaria apparently were not examined.

The problem of specific concepts in Cupresses was discussed by Wolf (1948, p. 4-5, 17). He quoted Willis Linn Jepson (Man. Fl. Pl. Calif. 57. 1923): "The species depend for their

separation on characters that are too vague and it might be better to receive a less number of them. Their history is as yet little known and new stations are still being discovered." Wolf agreed "that the species rest or rather insecure morphological features..." He rejected as unsatisfactory "The most drastic treatment" of lumping all the material into 7 species. If no subspecies were recognized, then horticulturists would need an elaborate set of other names. Or if numerous subspecies were recognized, the number of taxonomic units would be about the same, except that a number of new combinations would be needed.

For the New World cypresses, Wolf accepted 15 species (1 with 2 subspecies), including 12 in the United States and 10 in California. Two species and 1 subspecies were proposed as new. However, only Cupressus stephensonii was really new, the others having been collected for many years. No additional taxa of Cupressus native in the United States have since been named. This monograph has been followed in local floras in California, as well as the State flora by a colleague, Philip A. Munz (Calif. Flora 59-62. 1959).

Wolf apparently considered use of the rank subspecies. A few herbarium specimens bear his annotation labels of a species reduced to a subspecies, but the new combination was never published. Also, Maximino Martínez (Los Cupressus de México. Méx. Inst. Biol. An. 18: 71-141, illus. 1947) wrote (p. 119), as follows: "El doctor C. B. Wolf del Jardín Botánico de Santa Ana, Anaheim, Cal., quien se ha ocupado en estudiar los Cupressus norteamericanos, considera en el arizonica Greene dos subespecies: la subspecie typica y la subespecie glabra Sudw. Su trabajo está inédito."

In contrast, two outstanding California botanists, authors of floras, actually reduced their own species. Cupressus nevadensis Abrams (Torreya 19: 92. 1919) became C. macnabiana nevadensis (Abrams) Abrams (Illus. Fl. Pacif. States 1: 73. 1923). C. bakeri Jepson (Fl. Calif. 1: 61. 1909; "bakeri") was united as C. macnabiana var. bakeri (Jeps) Jeps. (Man. Fl. Pl. Calif. 58, fig. 50c. 1923).

Almost doubling the number of accepted species in a native tree genus does suggest the desirability of further study. If the species concept is to remain stable, excessive splitting of familiar tree species in the United States is to be discouraged. The "rather insecure morphological features" are emphasized in Wolf's key (1948, p. 48-51). In transferring 4 species as varieties of a fifth, I commented (Varietal transfers in Cupressus and Chamaecyparis. Madroño 18: 161-167. 1966.), as follows: "His key to species illustrated the scarcity of well-defined qualitative morphological characters. Many characters used, such as color of foliage, size of parts, and bark, would not be of specific value in related genera. As Wolf observed, there has

been confusion in taxonomic literature of Cupressus and disagreements on ranks and synonymy. And the same author has changed his concepts."

Clayton E. Posey and James F. Goggans (Observations on species of cypress indigenous to the United States. Auburn Univ. Agr. Exp. Sta. Cir. 153, 190., illus. 1967) made detailed field studies in a project on genetic improvement of cypresses for growing Christmas trees in the Southeast. In 1954 they visited stands of all 13 kinds of cypress accepted by Wolf as native in the United States, using the scientific nomenclature of Little (1966), 7 species and 4 additional varieties, also 2 kinds with common names. They observed a tremendous amount of variation in most morphological characteristics in trees both within a grove and among groves. A few additional stations were recorded along with descriptive notes on the cypress trees in different stands.

These investigations were continued by the same authors, Posey and Goggans (Variation in seeds and ovulate cones of some species and varieties of Cupressus. Auburn Univ. Agr. Exp. Sta. Cir. 160, 23 p., illus. 1968). They made quantitative statistical studies of variation in seeds and cones from the different species, varieties, and geographic sources native in the United States. In spite of the tremendous amount of variation found in most morphological characteristics within and among groves, few taxa or geographic sources could be distinguished by extremes in seed weight and cone weight. Cones of Cupressus macrocarpa could separated from all others by the larger number of cone-scales. Slight differences in seed color were observed also. It was suggested that there may have been one widespread species throughout the Southwest. Environmental conditions changed faster than the species could evolve; thus the species has retreated to a few small environmental niches still suitable for growth and reproduction. Decreased population size, geographic isolation, and different selection pressures have produced enough variation so that some groves are now classified as different species.

Names accepted for New World cypress (Cupressus) by several authors are summarized in Table 1. The nomenclature adopted here is in the column at left. Blank spaces show that some works were limited in geographic coverage or were published before the taxa were named. Charles Spragus Sargent (Silva 10: 97-110, illus. 1896) accepted for the continent north of Mexico 4 species of Cupressus and 3 others afterwards placed universally in the segregate genus Chamaecyparis. Later, Sargent (Man. Trees No. Amer. ed. 2, 69-75, illus. 1922; also ed. 2, corr. 1926) distinguished 6 species, 1 with a nemed variety. George B. Sudworth (Check List Forest Trees U. S. 36-38. 1927) listed 7 species. Nathaniel L. Britton and John A. Shafer (No. Amer. Trees 97-102. 1908) recognized 5 species, mentioning also C. guadalupensis S. Wats. from Lower California and "two or three others in Mexico."

For California, Willis Linn Jepson (Fl. Calif. 57-58. 1923) had 7 species, also 1 variety reduced from his own species. Leroy Abrams (Illus. Fl. Pacif. States 1: 72-73. 1923) described and illustrated 5 species, 1 with a trinomial from his own binomial.

It is significant to note from Table 1 the general agreement among authors in accepting the first named, well defined species of Cupressus published before 1900. These, in chronological order, are: lusitanica (1768), macrocarpa (1847-49), goveniana (1849), macnabiana (1855), guadalupensis (1879), arizonica (1882). The specific rank of later binomials has been questioned.

While working in Arizona from 1953 to 1941, I learned of the uncertainty among local foresters whether there were one or two species of Cupressus. I united C. glabra with C. arizonica, stating that the two were separated only by bark characters and different range (Amer. Jour. Bot. 31: 592-593. 1944).

My conservative compilation differing only slightly from Sargent (1922) and Sudworth (1927) accepted 6 species of Cupressus without varieties (Check List Native Naturalized Trees U. S. U. S. Dept. Agr., Agr. Handb. 41: 170-172. 1953). This classification, following "the most drastic treatment" that Wolf (1948, p. 4-5) could conceive, was practical but not entirely satisfactory. For example, foreigners seeing the other specific names in print, would ask for seeds under those names. Though foresters commonly designate seed collections by locality, names for minor variations often are useful. Thus, I transferred 4 species as varieties of a fifth, Cupressus arizonica Greene (Varietal transfers in Cupress and Chamaecyparis. Madroño 18: 161-167. 1966). Also, I accepted a seventh species, C. sargentii Jeps., one of the most widespread species in California known by about 20 or more groves.

Here I am adopting the intermediate treatment mentioned by Wolf, the smaller number of species with minor variations as varieties (not subspecies, as he suggested). Incidentally, usage by some authors of the rank subspecies for geographic variations is confusing. Other, including the Forest Service, retain the classical rank variety for geographic as well as other variations. Still others use both ranks. Originally, the subspecies was intended to be an optional intermediate rank used mainly in species with a large number of varieties.

The classification accepted here in Table 1 is almost the same as Wolf's with about the same number of taxa (actually 1 less) but with slightly different nomenclature and some trinomials. Fortunately, the epithets are identical and the changes in nomenclature are minor. This classification has 8 species, 3 further divided into 7 varieties besides the 3 typical varieties. It seems more natural, with species concepts similar to those of

	Little (1970)	Little (1953)	Wolf (1948)	Sudworth (1927)
1.	arizonica	arizonica		
	var. arizonica	(arizonica)	arizonica	arizonica
	var. glabra	(arizonica)	glabra	glabra
	var. montana		montana	
	var. nevadensis	(arizonica)	nevadensis	(macnabiana)
	var. stephensonii	(arizonica)	stephensonii	
2.	bakeri	bakeri	bakeri	(macnabiana)
3.	goveniana	goveniana		goveniana
	var. goveniana	(goveniana)	goveniana	
	var. abramsiana	(goveniana)	abramsiana	
	var. pigmaea	(goveniana)	pygmaea	(goveniana)
4.	guadalupensis	guadalupensis		guadaloupensis
	var. guadalupensis	(guadalupensis)	guadalupensis	
	var. forbesii	(guadalupensis)	forbesii	(guadaloupensis)
5.	lusitanica		lusitanica	
6.	macnabiana	macnabiana	macnabiana	macnabiana
7.	macrocarpa	macrocarpa	macrocarpa	macrocarpa
8.	sargentii	(goveniana)	sargentii	sargentii

	Sargent (1922)	Sargent (1896)	Abrams (1923)	Jepson (1923)	Jepson (1909, 1910)
1.	arizonica	arizonica			
	var. bonita				
	(macnabiana)		macn. nevad.	nevadensis	
2.	(macnabiana)		(macnabiana)	macn. v.bakeri	bakeri
3.	goveniana	goveniana	goveniana	goveniana	goveniana
	(goveniana)		(goveniana)	pygmaea	
4.	guadaloup.	guadalup.	guadalup.		
	(guadaloup.)		(guadalup.)	forbesii	
5.					
6.	macnabiana	macnabiana	macnabiana	macnabiana	macnabiana
7.	macrocrapa	macrocarpa	macrocarpa	macrocarpa	macrocarpa
8.	sargentii		sargentii	sargentii	sargentii

Table 1. Names accepted for New World cypresses (Cupressus) by different authors. The lower half of the table is a continuation of the right edge of the upper half.

other genera of conifers.

One taxon was first published as variety, Cupressus goveniana var. pigmaea Lemm. (Handb. W.-Amer. Cone-bearers. Ed. 3, 77. 1895; as "pigm a" but corrected in ink to "pigmaea"). Four varietal transfers were made earlier (Little 1966), and the other 2 are published below.

CUPRESSUS GOVENIANA Gord. Gowen cypress
Cupressus goveniana Gord., Hort. Soc. London Jour. 4: 295, fig. 1849.

CUPRESSUS GOVENIANA Gord. var. GOVENIANA Gowen cypress (typical)

This species, the second to be named from California, is known in its typical variety from 2 groves in Monterey County, California, near the 2 groves of the related first species, Cupressus macrocarpa Hartw., Monterey cypress. Wolf (1948, p. 211, etc.) noted also the close relationships with C. pygmaea, C. abramsiana and C. sargentii. Unfortunately, one grove was reported in 1969 to be endangered by gravel operations.

CUPRESSUS GOVENIANA var. PIGMAEA Lemmon Mendocino cypress
Cupressus goveniana var. pigmaea Lemm., Handb. W.-Amer. Cone-bearers. Ed. 3, 77. 1895; as "pigm a" but corrected in ink to "pigmaea."

This taxon is confined to 2 main coastal areas near Fort Bragg and Mendocino City, Mendocino County, California. It grows on the Medocino White Plains or Pine Barrens. Some plants on the sterile white sandy soil over a hard clay are dwarf, flowering when only 1-2 feet high but others are shrubs, slender poles, and trees becoming more than 150 feet high. Thus the names pygmy cypress and dwarf cypress are misleading.

Type collection: As noted by Wolf (1948, p. 200), the Lemmon Herbarium (UC) has 3 sheets (I saw also a fourth) of which the following was designated as the holotype: J. G. Lemmon and wife s. n., 188-, "Cupressus Goveniana, var. pygmaea n. var. ined. White, ashy plains, near Mendocino" (UC 185946).

A similar example is noted in Pinus contorta Dougl., shore pine or lodgepole pine. On the pine barrens of Medocino County, Calif., are slender dwarf plants only 2-5 feet high, with very small cones. These dwarf pines have been designated as a variety, var. bolanderi (Parl.) Vasey, or subspecies, ssp. bolanderi (Parl.) Critchfield, or are not distinguished by name. They are not accepted as a separate species. Likewise, the cypress plants on the same site originally named Cupressus goveniana var. pigmaea Lemmon are better treated as a variety than species.

CUPRESSUS GOVENIANA Gord. var. **ABRAMSIANA** (C. B. Wolf) Little, comb. nov. Santa Cruz cypress

Cupressus abramsiana C. B. Wolf, Aliso 1: 215, figs. 4 C, A 15-17, 13 B, 36. 1948.

Santa Cruz cypress is known from the Santa Cruz Mountains of the California Coast Ranges, 2 localities in Santa Cruz County and 1 in adjacent San Mateo County. This taxon was collected as early as 1881. Specimens had been referred to C. sargentii and C. goveniana until Wolf named them as a new species.

Calvin McMillan (The third locality for Cupresses abramsiana Wolf. Madroño 11: 189-194, illus. 1951) concluded that C. abramsiana was "a discrete but highly variable entity," not so close to C. goveniana as was C. pygmaea. As the characteristics were in some respects intermediate between C. sargentii and C. goveniana, a hybrid origin might be hypothesized. He noted that according to the fossil record, Cupressus grew at many places along the coast of California where now absent.

CUPRESSUS GUADALUPENSIS S. Wats. var. **FORBESII** (Jepson) Little, comb. nov. Tecate cypress

Cupressus forbesii Jepson, Madroño 1: 75. 1922.

The typical variety of Cupressus guadalupensis S. Wats. (Amer. Acad. Arts. and Sci. Proc. 14: 300. 1879), Guadalupe cypress, is native only on Guadalupe Island off the Pacific coast of Baja California, Mexico. It is described as highly variable in foliage, cones, and bark (John Thomas Howell, Leafl. West Bot. 3: 145-146. 1942; Sherwin Carlquist 461, UC). According to Wolf's key, the main difference between the 2 taxa is in the number of scales on the male strobii, generally 14-18 in C. guadalupensis and 10-14 in C. forbesii.

Cupressus guadalupensis var. forbesii is known from several groves or localities in Orange and San Diego Counties, California, and the mainland of northwestern Baja California (Wolf 1948, p. 160-166; also collections seen at SD and UC). According to Wolf, Tecate cypress was discovered Dec. 30, 1907 by Charles N. Forbes, who identified it as conspecific with C. guadalupensis (Jepson, Trees Calif. 121. 1909). However, Edgar A. Mearns collected a specimen there in 1894. Jepson (Silva Calif. 158. 1910) also had referred it to C. sargentii Jeps. S. B. Parish (The Tecate cypress. S. Calif. Acad. Sci. Bull. 13: 11-13, illus. 1914) likewise placed Tecate cypress in C. sargentii, though the characters did not agree in all respects.

Type collection: C. N. Forbes s. n. Dec. 30, 1907, Cedar Canyon between El Nido and Dulzura [N. side Otay Mt.], San Diego Co., Calif. (holotype seen at JEPS, isotypes seen at UC

(9 sheets)and US. An earlier collection at the same locality is Edgar A. Mearns 3892, July 5, 1894 (US).

Perhaps the most accessible grove of Tecate cypress, as noted by Wolf, is located on U. S. Highway 80 about 40 miles E. of San Diego in San Diego County toward Imperial Valley. The conspicuous trees rising above the chaparral vegetation are visible near the south side of the highway. The exact locality is adjacent to Guatay Campground on the north side of Guatay Mountain 1 mile west of Guatay P. O. on the Cleveland National Forest, Sec. 21, T. 15 S., R. 4 E., altitude about 4,000 feet. I visited the Guatay Campground grove on Jan. 12, 1970 and saw trees to 30 feet high and 1 foot in trunk diameter with reddish brown bark, smoothish and peeling off (fig. 1).

Pinus radiata D. Don, Monterey pine, has a similar distribution pattern. The typical variety is local on the coast of central California in Santa Cruz, Monterey, and San Luis Obispo Counties. A variety, P. radiata var. binata (S. Wats.) Lemm. (or 2 forms) is confined to Guadalupe Island.

LIST OF NEW WORLD CYPRESSES

The species and varieties of cypresses (genus Cupressus L.) native in the New World as accepted here are listed below (in alphabetical order) with both scientific names and English common names. Citations of place of publication of scientific names not mentioned in this article are given by Wolf (1948) and Little (1953).

1. Cupressus arizonica Greene, Arizona cypress
   - var. arizonica, Arizona cypress (typical) (or Arizona rough cypress)
   - var. glabra (Sudw.) Little, Arizona smooth cypress
   - var. montana (Wiggins) Little, San Pedro Mártir cypress
   - var. nevadensis (Abrams) Little, Piute cypress
   - var. stephensonii (C. B. Wolf) Little, Cuyamaca cypress
2. Cupressus bakeri Jeps., Modoc cypress
3. Cupressus goveniana Gord., Gowen cypress
   - var. goveniana, Gowen cypress (typical)
   - var. abramsiana (C. B. Wolf) Little, Santa Cruz cypress
   - var. pigmaea Lemm., Mendocino cypress
4. Cupressus guadalupensis S. Wats., Guadalupe cypress
   - var. guadalupensis, Guadalupe cypress (typical)
   - var. forbesii (Jeps.) Little, Tecate cypress
5. Cupressus lusitanica Mill., Mexican cypress
6. Cupressus macnabiana A. Murr., MacNab cypress
7. Cupressus macrocarpa Hartw., Monterey cypress
8. Cupressus sargentii Jeps., Sargent cypress

Fig. 1. A mature tree of Tecate cypress (Cupressus guadalupensis var. forbesii) about 30 feet high and 1 foot d.b.h., at the Guatay Campground grove.

Fig. 2. The only grove of Cuyamaca cypress (Cupressus arizonica var. stephensonii), from the southeast. Across the middle distance beyond the creek bed, a line of rounded cypress trees rises above the chaparral.

THE NORTHERNMOST CYPRESS

The northernmost grove of cypress in the New World is a nearly pure stand of 2 acres of Modoc cypress, Cupressus bakeri Jeps., on the Rogue River National Forest 4½ miles west of Prospect and about 30 miles northeast of Medford, Jackson County, Oregon. This isolated station was first reported in 1953 by Oliver V. Matthews, of Salem. An authority on Oregon Trees, he collected herbarium specimens (Matthews s. n., Sept. 30, 1953; UC, US), took photographs of the trees, and gave publicity in newspaper articles. "Flounce Rock Grove" had been known since 1926 but was considered to be a juniper. The trees reached a height of 75 feet and trunk diameter of 22 inches. The exact locality is SE 1/4, SW 1/4. Sec. 33, T. 32 S., R. 2 E., the latitude 42° 45'N., and the altitude, 4,000 feet.

The highway between Medford and Crater Lake National Park passes within 3 miles of this grove. However, the site is not readily accessible because of rough mountainous topography and absence of a trail. This locality represents a range extension of about 60 miles northeast from the Steve Peak area in the Siskiyou Mountains of southeastern Josephine County. Mr. Matthews took me to the Miller Lake grove in the Steve Peak area on June 23, 1961, but a visit to the northernmost site was not made.

The name Cupress bakeri ssp. matthewsii C. B. Wolf (Aliso 1: 83, figs. 3 C, 7 B, 22. 1948), Siskiyou cypress, was given to the northern populations. However, the characters in the key (p. 72-73) seem scarcely sufficient for division of the species into 2 varieties.

This species is the hardiest of the true cypresses, according to Alfred Rehder (Man. Cult. Trees Shrubs Ed. 2, 56. 1940). He placed it as hardy under particularly favorable conditions as far north as Zone 5, in which the average annual minimum temperatures are -10° to -5° F.

Reports of Cupressus from the State of Washington represent introductions. The Forest Service Herbarium has a specimen of Cupressus macrocarpa Hartw. from near Ilwaco, Pacific Co., about 10 miles N. of Columbia River, recorded by the collector Everett Miller as 24 in. D.B.H. and "apparently native." My inquiry some years ago led to information about a plantation there. The coastal strip has a mild, subtropical climate.

CUYAMACA CYPRESS

The rarest of the named cypresses, Cupressus arizonica var. stephensonii (C. B. Wolf) Little (C. stephensonii C. B. Wolf) is known from a single grove in Cuyamaca Mountains, San Diego County, described by Wolf (1948, p. 125-130). The locality is about 40 miles east of San Diego and about 5 miles north of Descanso Ranger

Fig. 3. Large dead fire-blackened Cuyamaca cypress (Cupressus arizonica var. stephensonii) about 40 feet high and nearly 3 feet in trunk diameter, possibly the type tree.

Fig. 4. Thickets of slender young plants of Cuyamaca cypress (Cupressus arizonica var. stephensonii) to 20 feet high from seed germination after the 1950 fire.

Station, also about 6 miles by air line NNW. of the Guatay Campgound stand of Cupressus guadalupensis var. forbesii.

This stand less than 1 mile long is partly within the Cleveland National Forest and Cuyamaca Rancho State Park and thus is doubly protected. On Jan. 12, 1970 I visited this area with officials from both the U. S. Forest Service and the State Park. The site at about 4,000 feet altitude is reached by a walk of about ½ mile west from the end of the nearest truck trail in the park.

As noted by Wolf, the cypress trees are scattered over a chaparral slope near the headwaters of King Creek. The grove is about 1 mile SSW. of Cuyamaca Peak, altitude 6512 feet and the highest point in these mountains, and about ½ mile W. of Japacha Peak, altitude 5825 feet. According to a Forest Service boundary marker yellow metal sign found among the trees, most of the cypresses are within the Cleveland National Forest, mainly in Sec. 30, T. 14 S., R. 4 E., San Bernardino P. M., partly in Sec. 19, and partly extending northeast into Cuyamaca Rancho State Park (unsurveyed). Figure 2 shows this grove from a distance.

The largest Cuyamaca cypresses seen were 30-35 feet high and more than 2 feet in trunk diameter. The bark was smoothish light gray, with mottled patches of pink brown.

Some cypresses were killed by a fire in 1950, as recorded by Posey and Goggans (1967). Among these was a dead fire-blackened tree about 40 feet high and nearly 3 feet in trunk diameter, shown in figure 3, possibly the large type tree photographed by Wolf (1948, p. 128-129, fig. 26 A and B). Thickets of slender young plants to 20 feet high surrounded the dead trees from seed germination after the 1950 fire (fig. 4). The number of trees could reduced by successive fires in reproduction too small to bear cones. Cultivation of trees elsewhere would be a precaution against extinction.

CYPRESS IN NEW MEXICO

Early reports of Cupressus arizonica Greene as native in New Mexico have been questioned by recent collectors. E. O. Wooton and Paul C. Standley (Flora New Mexico 35-36. 1915) recorded this species from the southwestern corner of New Mexico. However, the specimens cited from San Luis Mountains, Edgar A. Mearns 437, 560, 2244 (US), all came from south of the border in Mexico. These specimens were collected by Mearns with the International Boundary Commission, United States and Mexico, 1892. For example, Mearns 437 was collected at the summit of San Luis Mts. 2 mi. S. of the boundary line, according to the label. These mountains extend northward across the international boundary less than 3 miles. Later collectors have found no cypress on the New Mexico side but report magnificent specimens a 3 to 4 miles southward in Mexico near the northeastern corner

Figs. 5, 6. Arizona cypress (Cupressus arizonica) at the Cooks Peak grove in New Mexico. Photographs by Sidney P. Gordon, February 1956.

of Sonora.

The only record of Cupressus arizonica as native in New Mexico is a grove on Cooks Peak in the southwestern part of the State. This isolated peak (altitude 8400 feet) is a familiar landmark about 15 miles north of Deming in Luna County. I am indebted to Sidney P. Gordon, of the U. S. Forest Service, for the following information and for the two photographs of cypress trees (figs 5, 6). This grove of Arizona cypress is located on a long spur ridge which extends east from the northeast corner of Cooks Peak and in the area where the spur leaves the peak. The altitude was estimated to be about 8000 feet and the area of the grove at least 10 acres. This grove was discovered by Mr. Gordon about 1954 during a big game census on Cooks Peak. The two photographs were taken in February 1956.

A report of Cupressus glabra Sudw. from Nevada doubtless represents an introduction. Gordon W. Gullion (Notable Nevada plants. Leafl. West. Bot. 9: 225-233. 1962) recorded 2 small trees from Virgin Mt. 11 mi. S. of Mesquite, Clark Co., Nevada. He noted that they might have been transplanted from another location.

CYPRESS IN TEXAS

Arizona cypress (typical) occurs in Texas only in Chisos Mountains within Big Bend National Park in Brewster County. One small grove was known from near Boot Spring, according to W. B. McDougall and Omer E. Sperry (Plants of Big Bend National Park 23, fig. 14-15. 1951) and Donovan S. Correll (Flora of Texas 1: 338-339. 1966).

Posey and Goggans (1967) reported the discovery of an extensive grove of several thousand trees on East Rim only a few miles from the first. Fortunately these isolated stands in Trans-Pecos Texas are protected within a national park.

MEXICAN CYPRESS

It is convenient to regard Mexican cypress or ciprés as a single variable species under the oldest name, Cupressus lusitanica Mill. and without named varieties. As the entire natural range is south of the border, the infraspecific nomenclature need not be considered here. Some geographic variation is to be expected in this species of relatively broad range, and names are already available. Principal synonymy follows:

CUPRESSUS LUSITANICA Mill. Mexican cypress

Cupressus lusitanica Mill., Gard. Dict. Ed. 8, Cupressus No. 3. 1768.

Cupressus benthami Endl., Syn. Conif. 59. 1847.

Cupressus lindleyi Klotzsch ex Endl., Syn Conif. 59. 1847.

Cupressus knightiana Knight & Perry ex Gordon, Pinetum 61. 1858.

A detailed study of Cupressus lusitanica Mill. in Portugal was made by João do Amaral Franco (A Cupressus lusitanica Miller notas acêrca da sua história e sistemática. Agros 28: 3-27, illus. 1945). He concluded that this species is native of Central America and was introduced into Portugal more than three centuries earlier. Noting the extreme variability, he distinguished 2 subspecies, 6 varieties, and 3 forms.

Wolf (1948, p. 147-158, illus.) also cited additional names and references and reviewed the history of this species. He noted that though named for Portugal, this plant was believed by Philip Miller to have been introduced from Goa, India. Later authors concluded that the native home was Mexico. As the oldest name, Cupressus lusitanica replaces names based on specimens collected in Mexico.

Meanwhile, Maximino Martínez (Los Cupressus de Mexico. Mex. Inst. Biol. An. 18: 71-149, illus. 1947) published his monograph accepting for Mexico 6 species, 4 occurring also north of the border and treated by Wolf under the same names. He excluded Cupressus lusitanica as not Mexican but accepted instead 2 species, C. benthamii Endl. and C. lindleyi Klotzsch. Wolf received the publication by Martínez while his own was in page proof and in a postscript (p. 437-438) graciously accepted the treatment by Martínez. However, under the International Code of Botanical Nomenclature Miller's older name has been identified and adopted.

Paul C. Standley and Julian A. Steyermark (Flora Guatemala 24(1): 27-32, fig. 5. 1958) accepted Cupressus lusitanica Mill. as the oldest name for the complex taxon present in Guatemala and Mexico, noting considerable variation in wild and cultivated plants.

Cupressus lusitanica is known also from one almost inaccessible locality in northwestern Honduras, the summit of Cerro Santa Bárbara. The discovery in April 1951 was reported by Paul H. Allen (The conquest of Cerro Santa Bárbara, Honduras. Ceiba 4: 253-270, illus. 1955). In citing that record, Antonio Molina R. (Coníferas de Honduras. Ceiba 10: 5-21, illus. 1964) noted that the cultivated cypresses of that country were from other sources.

This species has been planted extensively as an ornamental and forest tree southward in mountains in Costa Rica and the Andes. However, as stated by Paul C. Standley (Flora of Costa Rica 65. 1937) and as I have observed, cypress is not native in Costa Rica.

PRESERVATION OF CYPRESS GROVES

Wolf (1948, p. 9-10, 16) noted that cypresses are of very limited area and are endangered by man. He made a plea for preservation and protection of some of these stands and listed the most outstanding grove or station of each kind. His suggestion is timely today, partly because destruction and disturbance of native vegetation have continued, some species have become endangered, and interest in preservation has increased. He stated:

"The total areas now occupied by cypresses in North America are so limited that it would be perfectly feasible to set the major portion of them (at least those stands in the United States) apart as cypress reserves where grazing, excessive cutting or other destructive agencies could be eliminated and adequate measures for protection from fire provided."

Wolf and others have noted that cypresses are adapted to fire, like certain pines. Examples are lodgepole pine (Pinus contorta var. latifolia Engelm.) of the Rocky Mountains and sand pine (P. clausa (Chapm.) Vasey) of Florida. The cones persist tightly closed on the trees several years, opening in the heat of an infrequent forest fire which also kills the trees and ground vegetation. The seeds fall to the gound and germinate on the exposed soil. Thickets of young cypresses form another generation of trees.

A series of properly timed fires could destroy all the mature cypresses and the ensuing seedlings before seed production, according to Wolf. Possibly two or three severe fires could eliminate a grove. However, under natural conditions, wild fires are infrequent where the conifers have the closed-cone adaptation. For example, after a fire, the ground cover probably is not sufficiently dense for several years to support another destructive crown fire. Also it is unlikely that every seed bearing tree would be killed. Being adapted to fire, cypresses are hardy. They might be replaced by other species if fire were entirely eliminated by protection. However, man has increased the frequency of fires. Clearing of land, real estate development, and intensive grazing are other destructive agents of man.

It is encouraging to note that no cypress grove has been destroyed and that several additional stands have been discovered in recent years. In California several new stations unknown to Wolf in 1948 have been recorded in published references. A few additional localities from other States are mentioned here.

Fortunately, representative groves of some kinds of cypresses on public lands have already been given special protection or management. Action is pending or planned on others. For example, groves of Arizona cypress (typical; Cupressus arizonica var. arizonica) are within Big Bend National Park of Texas and Chiricahua National Monument of Arizona. Posey and Goggans (1967) reported the discovery of additional trees in Rincon Mountains within Saguaro National Monument in Arizona, also in the Galiuro and Winchester Mountains, both within Coronado National Forest. Galiuro Mountains are further protected as the Galiuro Wilderness Area.

Arizona smooth cypress (Cupressus arizonica var. glabra) is rare in Sierra Ancha Experimental Forest within Tonto National Forest in Gila County, Arizona, according to Charles P. Pase and R. Roy Johnson (Flora and vegetation of the Sierra Ancha Experimental Forest, Arizona. USDA Forest Serv. Res. Pap. RM-41 19 p., illus. 1968). While stationed there from 1935 to 1937, I was told about this stand in a remote area but did not have occasion to visit it. Also, in recent years foresters have reported another station in the Supersitition Mountains east of Phoenix in Pinal County. This stand is protected within the Superstition Wilderness Area of the Tonto National Forest.

Cypresses are preserved in two new natural areas on public lands (Report of the Committee on Natural Areas. Jour. Forestry 68(1); 57-58, 60-61. Jan. 1970). Casner Canyon Natural Area of the UL SL Forest Service in Coconino County, Arizona, has as its primary type Arizona cypress (Cupressus arizonica var. glabra). Timbered Crater Baker Cypress Natural Area of the Bureau of Land Management in Modoc and Siskiyou Counties, California, has Baker cypress woodland (Cupressus bakeri Jeps.) as its primary type.

The range of Piute cypress (Cupressus arizonica var. nevadensis) in Piute Mountains and vicinity, Kern County, California, is partly within the Sequoia National Forest. The U. S. Forest Service is giving special protection to these groves.

Fires in California vegetation during September 1970 were the most extensive ever recorded. In the mountains east of San Diego, where the chaparral type is characteristic, more than 175,000 acres were burned on the Cleveland National Forest and adjacent areas. Fortunately, the two cypress groves mentioned and illustrated in this article (figs. 1-4) were in unburned parts and escaped damage.

Forest Service, United States Department of Agriculture, Washington, D. C. 20250

A NEW COMBINATION IN OSMANTHUS LOUR. (OLEACEAE) FROM THE CAUCASIAN REGION

Baki Kasapligil
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Osmanthus decorus (Boiss.et Bal.) Kasapligil, comb. nov.
Phillyrea decora Boiss.et Bal. in Vilmorin-Andrieux Suppl. Cat. Fleurs de Pleine Terre (1867); Schneider, Illustr. Handb. d. Laubholzkunde 2: 788 (1912); Rehder, Man. Cultivated Trees & Shrubs 757 (1927) - P. laurifolia Hort., Gard. Chron. Ser. 2, vol. 20: 494 (1883) - P. medwedewii Sredinski, Liesn. Zhurn. S. Petersb. Obshch. Estesty. 7: 173 (1876); Trautvetter, Act. Hort. Petrop. 9: 13 (1884); Dippel, Laubholzkunde 1: 138 (1889); Shishkin et Bobrov (edit.), Flora of the USSR, 18: 375 of English Transl., Jerusalem (1967).- P. vilmoriensis Hort., Gard. Chron. Ser. 2, vol.20: 494 (1883). - P. vilmoriniana Boiss. et Bal. ex Boiss. Fl. Or. 4: 37 (1873); Hooker f. in Bot. Mag. 111: t. 6800 (1885); Kruessmann, Handbuch d. Laubgehoelze 2: 204 (1962); Grossheim, Flora Kavkaza, Akad. Nauk USSR, Baku 7: 200 (1967).

Osmanthus decorus is an evergreen shrub ranging from one to four meters in height. It produces abundant suckers from base, resulting in a broad conical habit. The young twigs are brownish green becoming gray upon aging. The coriaceous, shiny leaves are 4.5 - 16 cm. long and 1.3 - 6 cm. wide, varying from ovate - lanceolate to oblong-obovate in outline. The leaf margins are mostly entire and revolute but the leaves developing in shade are distinctly serrulate. The juvenile leaves of the basal suckers, however, are distinctly serrate. The venation pattern of the leaf blades is brachidodromous, a condition similar to the foliar venation of O. fragrans Lour. and O. heterophyllus (G.Don) P. S. Green. The secondary veins on both sides of the primary vein repeatedly branch and anastomose forming loops which gradually diminish in size towards the leaf margins. On the other hand, the pattern of foliar venation in the genus Phillyrea is camptodromous in which the secondary veins curve slightly and disappear within marginal reticulums.

The length of the petiole in Osmanthus decorus varies from 10 to 28 milimeters. It has an adaxial groove throughout its length. The main vascular bundle in the petioles of O. decorus and O. heterophyllus is accompanied by two accessory bundles while such accessory bundles are absent in the petioles of Phillyrea latifolia L. and P. angustifolia L.

The white to cream colored flowers of O. decorus are borne in cymose fascicles with drooping pedicels just as in O.fragrans, the type species of the genus. In Phillyrea latifolia and P. angustifolia, the greenish yellow flowers develop in cymose racemes

which are erect with well-developed mechanical tissues in their peduncles and pedicels.

The type specimen of Balansa's collection from northeastern Turkey is in Paris. My collection of this plant (No. 3875 a, Aug. 28, 1964) comes from Hatila Valley, near Artvin in northeastern Anatolia. According Shishkin and Bobrov, it grows along the forest margins in western and southern Transcaucasia up to an elevation of 1800 meters.

Osmanthus decorus (Boiss. et Bal.) Kasapligil 'angustifolius' is the only cultivar. It is distinguished by its very narrow leaves which are 1.5 - 7 cm. wide and 8 - 12 cm. long. This cultivar does not otherwise show any differences, either in vegetative or reproductive organs, from its parent species.

I wish to thank Mrs. Ashley Card William (Mills College 1968) who prepared the illustration and Dr. Rimo Bacigalupi of the Jepson Herbarium, University of California, Berkeley for reading the manuscript.

Legends for the plate:

Osmanthus decorus (Boiss. et Bal.) Kasapligil
A- Fruiting branch with opposite leaves and axillary clusters of drupes; B- Enlarged flower with the stamens adnate to a short corolla tube; C- Enlarged stamen showing the twisted anther during the dispersal of pollen grains; D- The surface view of endocarp with converging ridges; E- Face view of the seed with reticulate seed coat; F- Longitudinal section of the seed showing the straight embryo in relation to bony endosperm; G- The spatulate, straight embryo with radicle nearly equal to the cotyledons in length.


D
E
F
G
C
B
A

Eine neue Hypolytrum-Art aus Ceylon

von TETSUO KOYAMA
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Hypolytrum fusco-rubens T. Koyama, spec. nova ex affinitate Hypolytri nemorum (Vahl) Sprengel, a quo fructificationibus obovoideis tantum aliquando rugulosis maturitate sordide fusco-rubentibus distat. Hypolytrum wightianum Böckeler, sensu T. Koyama in Bot. Mag. Tokyo 83: 192. 1970.

Rhizoma lignescens, oblique adscendens, 2 - 4 mm longum 6 - 8 mm latum; radices robustae, 1.5 - 2 mm crassae, fuscae. Folia multa, radicalia et 2 superiora caulina; laminae late lineares, culmum superantes, 50 - 120 cm longae, 12 - 22 mm latae, tricostatae, plicato-planae, herbaceae, rigidulae, supra virides, subtus valde glaucae, ad apicem acutam gradatim attenuantes; vaginae foliorum radicalium 4 - 10 cm longae, dorso cinnamomeae vel rufo-brunneae, antice membranaceae cinnamomeae mox solutae; vaginae foliorum caulinorum 4.5 - 7 cm longae, glauco-virides, ore oblique truncato, margine brunneo-membranaceo. Culmus solitarius, 60 - 95 cm altus, vere triqueter, 3 - 4 mm latus, medio remote 2-nodosus, laevis, glauco-viridis. Inflorescentia paniculato-corymbosa, late ovoidea usque subhemisphaerica, subdense pluri-spicata, 4.5 - 10 cm alta, 5 - 8 cm lata; axis 2- vel 3-nodosa, internodiis 6 - 25 mm longis acute triquetris cum angulis hispidulo-scabris; radii solitarii usque 3-ni, e prophyllo ochreiformi 5 - 8 mm longi bifidi enati, divergentes, subcompressi, 1 - 2.5 cm longi, angulo scabro; ramuli 0.5 - 1.5 cm longi, apice 1 - 5-spicati. Bracteae 2 vel 3 foliaceae, evaginantes; infima 2.5 - 40 cm longa, patens; 2da 4 - 12 cm longa, divergens; 3a inflorescentiam fere superans. Bracteolae setaceae. Spicae breviter (4 - 8 mm) pedunculatae, late ellipsoideae vel subglobosae, 6 - 12 mm longae, 5 - 6 mm latae, spisse pluriflorae, maturitate fusco-rubentes. Glumae imbricatae, obovato-orbiculares, 1.9 - 2 mm longae, 1.5 - 1.7 mm latae, membranaceae, dilute brunneae et dense castaneo-lineolatae, apice rotundae mucronatae, costa 1-nervia. Squamellae 2, oblongae, 1.25 - 1.5 mm longae, hyalinae, apice acutae, carina dense spinulosa. Fructificationes late obovatae

Abb. 1. Holotypus der neuen Art Hypolytrum fusco-rubens (A) und Hypolytrum nemorum (B).

vel obovato-ovales, 2.5 - 2.8 mm longae, 1.5 - 1.7 mm latae, crasse biconvexae, facie utrinque tantum leviter 3 - 5-rugulosae, fusco-rubentes vel fusco-brunneae et densissime rufo-lineolatae, basi cuneatae, apice subito contractae, rostro conico 0.3 - 0.5 mm longo; stigmata 2.

Holotypus. Ceylon: Sammlung Nr. 327 (PDA), Ort und/oder Sammler unleserlich. Paratypen. Ceylon: "Ceylan", Colonel Walker, s. n., ex Hb. Delessert (NY, P); "Peninsula Indiae Orientalis", Hb. Wight 2908 (GH, K). Verbreitung. Bekannt nur durch die genannten Sammlungen.

Obwohl Hypolytrum nemorum äußerst verschiedenartig sein kann, vor allem in der Größe seiner Früchte, unterscheidet sich Hypolytrum fusco-rubens, wie oben beschrieben, genügend durch seine characteristischen Früchte. In der neuen Art sind die Früchte eiförmig, wobei sie oberhalb der Mitte am breitesten sind, bei Reife rotbraun werden, während die Früchte H. nemorum eiförmig und unterhalb der Mitte am breitesten sind, und bei Reife gelb bis gelbbraun werden. Im allgemeinen sind die Früchte von H. fusco-rubens nicht stark geracket, während sie bei H. nemorum immer auffallend geracket sind. Aufgrund ihrer verkehrteiförmigen Form und der glatten Oberflächen der Früchte, ähnelt H. fusco-rubens in etwa dem H. turgidum. Es unterscheidet sich jedoch grundsätzlich von letzterem durch seine Deckblätter die rund und weniger als 2 mm lang sind im Gegensatz zu elliptisch und 2.3 mm lang, und durch die Vorblätter, die 1.5 gegenüber 2.5 mm lang sind.

Hypolytrum wightianum Böckeler, wozu diese neue Art früer gezählt wurde (Koyama, op. cit. 1970), wurde aufgrund von Untersuchungen dem Isotypus im Botanischen Garten New York mit H. nemorum als identisch gefunden. Daraus folgert:

Hypolytrum wightianum Böckeler, Linnaea 37: 130. 1871-73. = HYPOLYTRUM NEMORUM (Vahl) Sprengel. Authentisches Exemplar untersucht: Herb. Wight. propr. n. 1859 (NY, Isotypus der Art H. wightianum) aus "Peninsula Ind. orientalis."

Summary

Hypolytrum fusco-rubens, a new cyperaceous species from Ceylon, differs from its nearest ally, H. turgidum, in its glumes which are orbicular and less than 2 mm long vs. elliptic and 2.3 mm long, and in the prophylls, 1.5 mm vs. 2.5 mm in length. Although H. nemorum is an extremely variable species, it is quite dissimilar to the new species at least in the ovate, yellowish and prominently rugose fruits in contrast to obovate, purplish and only very weakly ridged ones in the latter.

NOTES ON THE FLOWERING PLANTS OF MUTURAJAWELA

By

K. L. D. Amaratunga*

The Muturajawela swamp lies between Colombo and the Negombo lagoon, stretching northwards from Wattala to a little beyond Ja-Ela. Its eastern boundary is roughly demarcated by the Wattala Ja-Ela trunk road. On the coastal side, the drive from Hendala to Pamunugama could be taken for its western limits, thus leaving between it and the sea a relatively high sand ridge.

The area is low lying and consists mainly of acid peaty deposits. There is a layer of "muck" overlying peat and sandy clay. It has a mean annual rainfall of about 90" and a temperature of about 80° F. There is no pronounced dry season.

On visits made during March, June, September and December 1962/63, the following plants were in flower. In this list, against each name, the name of the family according to J. Hutchinsons system of classification is given.

Nymphaeaceae

1. NYMPHAEA STELLATA Willd., Sp. Pl 2: 1153, 1799; Trimen Handb. Fl. Ceylon 1: 50, 1893.

   Sinhala: Manel.

   In ditches in swamp. Fl. March.

Anonaceae

2. ANONA GLABRA L., Sp. Pl. ed. 1, 537, 1753.

   On earth fillings almost bordering water-filled marsh. This is the Alligator- or Monkey Apple of the West Indies.

Lauraceae

3. CASSYTHA FILIFORMIS L., Sp. Pl. ed. 1, 35, 1753; Trimen, Handb. Fl. Ceylon 3: 455, 1895.

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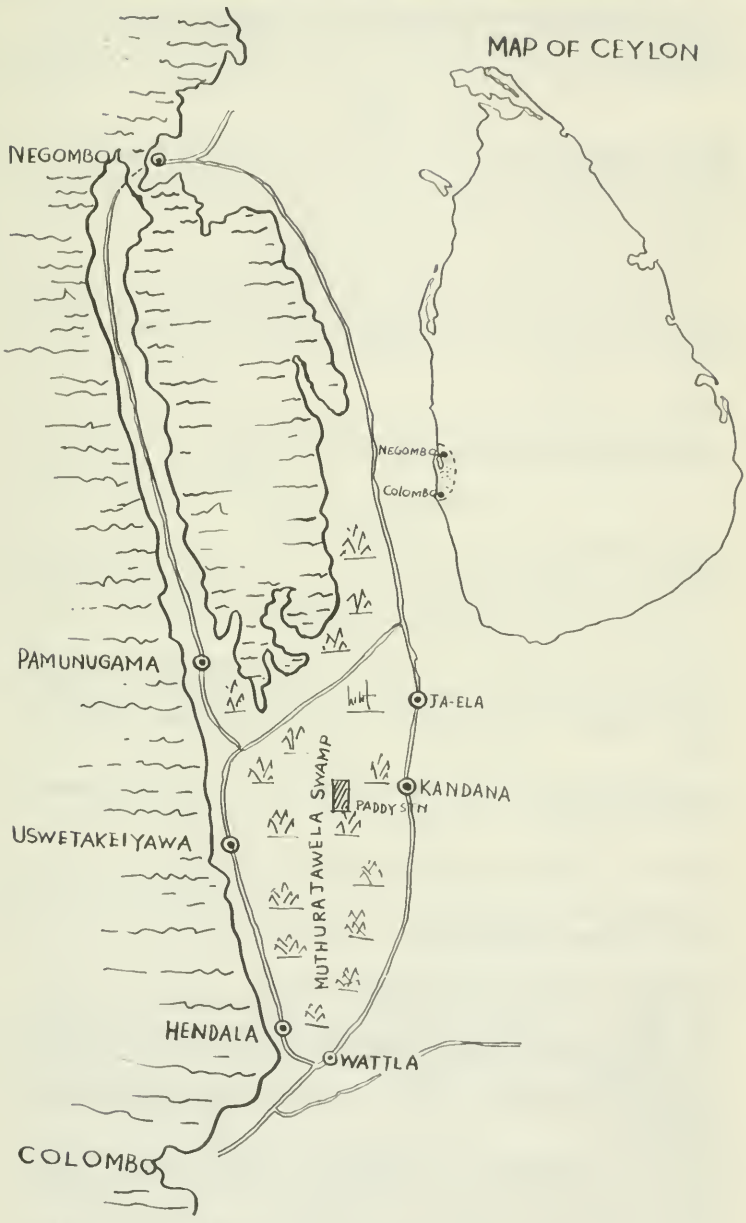

MAP OF MUTHURAJAWELA SWAMP

Leafless parasites with twinning filiform stems provided with suckers on Anona glabra hedges bordering marsh. Fl. September.

Droseraceae

4. DROSERA BURMANNI Vahl, Symb. Bot. 3: 50, 1794; Trimen, Handb. Fl. Ceylon 2: 145, 1894.

Sinhala: Wataessa.

In moist grassy patch in marsh. Fl. December.

5. DROSERA INDICA L., Sp. Pl. ed. 1, 282, 1753; Trimen, Handb. Fl. Ceylon 2: 146, 1894.

Sinhala: Kandul-essa.

On moist grassy patch in marsh. Fl. December.

Fabaceae

6. ABRUS PRECATORIUS L., Syst. Nat. ed. 12, 472, 1767; Trimen, Handb. Fl. Ceylon 2: 57, 1894.

Sinhala: Olinda-wel; Tamil: Kuntomani.

A perennial twinner. Fl. December. The pretty scarlet and black seed (precatory beans) are used as weights by jewellers, however, are poisonous. The roots used as a folk drug.

7. AESCHYNOMENE ASPERA L., Sp. Pl. ed. 1, 713, 1753; Trimen, Handb. Fl. Ceylon 2: 39, 1894.

Sinhala: Maha-diya-siyambala; Tamil: Attuneddi.

On bunds traversing swamp. Fl. March. Slices of stems used in the making of pith hats.

8. DALBERGIA CANDENATENSIS (Dennst.) Prain, in Journ. Asiat. Doc. Bengal 70: 49, 1901; Alston, Suppl. Handb. Fl. Ceylon, 86, 1931. --- Dalbergia monosperma Dalziel, in Kew Journ. Bot. 2: 36, 1850; Trimen, Handb. Fl. Ceylon 2: 89, 1894.

Scrambling over bushes, particularly on Anona glabra. Fl. September.

9. DESMODIUM HETEROPLYLLUM (Willd.) DC., Prodr. 2: 334, 1825; Trimen, Handb. Fl. Ceylon 2: 55, 1894.

Sinhala: Maha-undupiyali.

A perennial straggler on Anona hedge. Fl. December.

10. DESMOSIUM TRIQUETRUM (L.) DC., Prodr. 2: 326, 1825; Trimen, Handb. Fl. Ceylon 2: 49, 1894.

Sinhala: Baloliya.

An erect shrub found along Anona hedge bordering marsh. Fl. June.

Simaroubaceae

11. SAMADERA INDICA Gaertner, Fruct. 2: 352, 1791: Trimen, Handb. Fl. Ceylon 1: 231, 1893.

Sinhala: Samadara.

El. December. The bark, root and fruit used as febrifuge medicines; leaf infusion used as insecticide and destructive to white termites.

Euphorbiaceae

12. AGYNEIA BACCIFORMIS (L.) A. Juss., ex Wight, Tent. Euphorb. 24, 1894; Thwaites, Enum. Pl. Zeyl. 283, 1861; Trimen & Hook. f., Handb. Fl. Ceylon 4: 15, 1898.

Sinhala: Et-pilawakka.

On moist grassy patch in marsh. Annual with large tap root, and oval fleshy leaves. Fl. December.

13. GLOCHIDION ZEYLANICUM (Gaertn.) A. Juss., Tent. Euphorb. 107, 1824; Trimen & Hook. f., Handb. Fl. Ceylon 4: 28, 1898.

Sinhala: Hunukirilla.

Tree on bund traversing marsh. Fl. December.

Balsaminaceae

14. HYDROCERA TRIFLORA (L.) Wight & Arn., Prodr. 140, 1834; Alston, Suppl. Handb. Fl. Ceylon, 36, 1931. --- Hydrocera angustifolia Blume, Bijd. 241, 1825; Trimen, Handb. Fl. Ceylon 1: 212, 1893.

Sinhala: Diya-kudalu; Wal-kudalu.

On marshy ground. Fl. March.

Sterculiaceae

15. MELOCHIA CORCHORIFOLIA L., Sp. Pl. ed. 1, 675, 1753; Trimen, Handb. Fl.Ceylon 1: 170, 1893.

Sinhala: Gal-kura.

A branched herb on waste ground. Fl. June.

Dilleniaceae

16. WORMIA TRIQUETRA Rottboell in Nov. Act. Hafn. 2: 532, 1783; Trimen, Handb. Fl. Ceylon 1: 11, 1893.

Sinhala: Diya-para.

A small tree on damp ground. Fl. December.

Myrtaceae

17. SYZYGIUM CARYOPHYLLATUM (L.) Alston, Suppl. Handb. Fl. Ceylon, 116, 1931. --- Eugenia corymbosa Lamarck, Encycl. Meth. 3: 199, 1789; Trimen, Handb. Fl. Ceylon 2: 174, 1894.

On new earth fillings bordering marsh. Fl. March.

Melastomataceae

18. MALASTOMA MALABATHRICUM L., Sp. Pl. ed. 1, 390, 1753: Trimen, Handb. Fl. Ceylon 2: 199, 1894.

Sinhala: Maha-bowitiya.

On new earth fillings bordering marsh. Fl. March.

Onagraceae

19. LUDWIGIA ADSCENDENS (L.) Hara, in Journ. Jap. Bot. 28: 290, 1953; Raven, in Reinwardtia 6: 387, 1963. --- Jussiaea repens L., Sp. ed. 1, 388, 1753; Trimen, Handb. Fl. Ceylon 2: 233, 1894.

Sinhala: Beru-diyanilla.

In marsh, prostrate and floating on water with white pneumatophores at nodes and from roots. Fl. September.

Symplocaceae

20. SYMPLOCOS LOHA Buch.-Hamilton ex D. Don, Prodr. Fl. Nepal, 144, 1802-3; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.), 2: 209, 1959. --- Symplocos spicata Roxb. (Hort. Beng. 40, 1814. Nomen nudum), Fl. Ind. 3: 541, 1832; Trimen, Handb. Fl. Ceylon 3: 104, 1895.

Sinhala: Bombu; Wal-bombu.

Fl. March. Decoration of the bark is used as an external application, and the leaves afford a dye.

Apocynaceae

21. PARSONSIA LAEVIGARA (Moon) Alston, in Ann. Perad. 11: 203, 1927; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.), 2: 212, 1959. --- Parsonsia spiralis Wallich, (Cat. n. 1631, 1828, nomen nudum) ex A. DC., Prodr. 8: 402, 1844; Trimen, Handb. Fl. Ceylon 3: 134, 1895.

Sinhala: Valanguna.

Twining on Anona glabra. Fl. September.

Centianaceae

22. NYMPHOIDES AURANTIACA (Dalziel) O. Kuntze, Rev. Gen. Pl. 429, 1891; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 211, 1959. --- Limnanthemum aurantiacum Dalziel, in Kew Journ. 2: 136, 1850; Trimen, Handb. Fl. Ceylon 3: 190, 1895.

In marsh. Fl. March.

23. NYMPHOIDES INDICA (L.) O. Kuntze, Rev. Gen. Pl. 429, 1891; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 211, 1959. --- Limnanthemum indicum (L.) Thwaites, Enum. Pl. Zeyl. 205, 1861; Trimen, Handb. Fl. Ceylon 3: 188, 1895.

In marsh. Fl. March.

Asclepiadaceae

24. TYLOPHORA TENUISSIMA (Roxb.) Wight & Arnott, in Wight, Contrib. Bot. Ind. 49, 1834; Alston, Suppl. Handb. Fl. Ceylon, 195, 1931. --- Tylophora tenuis Blume, Bijdr. 1062, 1826; Trimen, Handb. Fl. Ceylon 3: 158, 1895.

Twinning on Anona glabra. Fl. December.

Convolvulaceae

25. ANISEIA MARTINICENSIS (Jacq.) Choisy, Conv. Rar. 144,1838; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 214, 1959. --- Ipomoea uniflora Roem. & Schult., Syst. 4: 247, 1819; Trimen, Handb. Fl. Ceylon 3: 215, 1895.

Sinhala: Poru-pala.

Twinning on plants bordering marsh. Fl. December.

Verbenaceae

26. CLERODENDRON INFORTUNATUM L., Sp. Pl. ed. 1, 637, 1753; Trimen, Handb. Fl. Ceylon 3: 361, 1895.

Sinhala: Gas-pinna.

Fl. December.

Scrophulariaceae

27. BACOPA MONNIERA (L.) Wettstein, in Engl. & Pr., Nat. Pflanzenf. 4: 77, 1891; Alston, Suppl. Handb. Fl. Ceylon 211, 1931. --- Herpestis monniera HBK, Nov. Gen. et Sp. Pl. 2: 366, 1817; Trimen, Handb. Fl. Ceylon 3: 246, 1895.

Sinhala: Lunuwila.

Growing both in the marsh and on the banks of the bunds traversing the swamp. Plant of some medicinal value as a mild purgative.

28. LIMNOPHILA CONFERTA Bentham, in DC., Prodr. 10: 387, 1846; Trimen, Handb. Fl. Ceylon 3: 243. 1895.

Sinhala: Amba-wila.

In marsh. Fl. March. Leaves bear a strong amphoraceous odour and taste, hence called "Kapuru" and chewed with betel.

29. LINDERNIA TENUIFOLIA (Colsm.) Alston, Suppl. Handb. Fl. Ceylon 214, 1931. --- Bonnaya tenuifolia Sprengel, Syst. 1: 42, 1825; Trimen, Handb. Fl. Ceylon 3: 254, 1895.

On damp grassy patch adjoining marsh. Fl. December.

Rubiaceae

30. MORINDA CITRIFOLIA L., Sp. Pl. ed. 1, 176, 1753; Trimen, Handb. Fl, Ceylon 2: 354, 1894.

Sinhala: Ahu.

A small tree growing on Anona hedge. Fl. September. The root bark affords a red dye.

31. MAUCIEA ORIENTALIS L., Sp. Pl. 95, 1753; Alston, Suppl. Handb. Fl. Ceylon 140, 1931. --- Sarcocephalus cordatus Miquel, Fl. Ind. Batav. 2: 133, 1856; Trimen, Handb. Fl. Ceylon 2: 292, 1894.

Sinhala: Kana-bakmi; Tamil: Vammi.

Fl. June.

Acanthaceae

32. HYGROPHILA SALICIFOLIA (Vahl) Nees, in Wall. Pl. As. Rar. 3: 81, 1832; Trimen, Handb. Fl. Ceylon 3: 298, 1895.

On moist banks of bunds almost bordering the water level in the marsh. Fl. March.

Compositae

33. WEDELIA CHINENSIS (Osbeck) Merrill in Philipp. Journ. Sci. (Bot.) 12: 111, 1917; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 237, 1959. --- Wedelia calendulacea Less., Syn. Comp. 222, 1832; Trimen, Handb. Fl. Ceylon 3: 38, 1859.

Sinhala: Ran-wan-kikirindi.

On damp grassy banks of bunds traversing the marsh, growing almost bordering the water level. Fl. March.

Aponogetonaceae

34. APONOGETON CRISPUM Thunberg, Nov. Gen. 73, 1784; Trimen & Hook. f., Handb. Fl. Ceylon 4: 372, 1898.

Sinhala: Kekatiya.

Plants submerged with solitary spike above water level. Fl. March. Tuber eaten in time of famine.

Gramineae

35. ARUNDINELLA LEPTOCHLOA (Nees ex Steud.) Hook. f., Fl. Brit. Ind. 7: 76, 1896; Seneratna, in Peradeniya Manual 8: 100, 1956.

Along Anona hedges bordering marsh. Fl. December.

36. DIMERIA LEHMENNI (Nees) Hackel, in DC., Monogr. Phaner. 6: 82, 1889; Seneratna, in Peradeniya Manual 8: 164, 1956.

On grassy patch bordering the road. Fl. June.

37. ISCHAEMUM ARISTATUM L., Sp. Pl. 1049, 1753; Seneratna, in Peradeniya Manual 8: 176, 1956. --- Ischaemum ciliare Retzius, Obs. Bot. 4: 36, 1791; Trimen & Hook. f., Handb. Fl. Ceylon 5: 216, 1900.

Sinhala: Rat-tana.

A common pasture grass on bunds traversing swamp. Fl.March.

38. ISCHAEMUM MUTICUM L., Sp. Pl. 1049, 1753; Trimen & Hook. f., Handb. Fl. Ceylon 5: 215, 1900; Seneratna, in Peradeniya Manual 8: 176, 1956.

Sinhala: Bada-mal-tana.

On bund traversing swamp. Fl. June. Used as a soil binder as well as a fodder grass.

39. ORYZA PERENNIS Moench., Meth. Pl. 197, 1794; Seneratna, in Peradeniya Manual 8: 36, 1956. --- Oryza sativa L., as misapplied by Trimen & Hooker f., Handb. Fl. Ceylon 5: 182, 1900.

Sinhala: Uruvi; Tamil: Pandi-nel.

In swamp as a weed on marshy paddy fields. Fl. December. Eaten by cattle.

40. SACCIOLEPIS INDICA (L.) Chase, in Proc. Biol. Soc. Washington 21: 8, 1908; Alston, Suppl. Handb. Fl. Ceylon, 319, 1931; Seneratna, in Peradeniya Manual 8: 121, 1956. --- Panicum indicum L., Mant. 2: 184, 1771; Trimen & Hook. f., Handb. Fl. Ceylon 5: 147, 1900.

On grassy bank bordering swamp; gregarious habit. Fl.June.

41. ZOYSIA MATRELLA (L.) Merrill, Philip. Journ. Sci., Bot., 7: 230, 1912; Alston, Suppl. Handb. Fl. Ceylon 329, 1931. --- Zoysia pungens Willd., in Ges. Naturf. Fr. Berlin, N. Schr. 3: 441, 1801; Trimen & Hook. f., Handb. Fl. Ceylon 5: 188, 1900.

On road banks acting as a good sand binder. Fl. September.

Cyperaceae

42. CYPERUS HASPAN L., Sp. Pl. ed. 1, 45, 1753; Trimen & Hook. f., Handb. Fl. Ceylon 5: 26, 1900.

Sinhala: Halpan.

In marsh. Fl. March.

43. CYPERUS PLATYPHYLLUS Roemer & Schultes, Syst. 2: 876, 1817; Trimen & Hook. f., Handb. Fl. Ceylon 5: 38, 1900.

In marsh with its rootstock under water. Fl. March.

44. CYPERUS POLYSTACHYOS Rottboell, Descr. & Icon. 39, 1773; Trimen & Hook. f., Handb. Fl. Ceylon 5: 20, 1900. --- Pycreus polystachyos P. Beauvois, Fl. Owar. 2: 48, t. 86, 1807; Alston, Suppl. Handb. Fl. Ceylon 307, 1931.

In marsh. Fl. March.

45. DIPLACRUM CARICINUM R. Brown, Prodr. Fl. Nov. Hol. 241, 1810; Trimen & Hook. f., Handb. Fl. Ceylon 5: 101, 1900.

A small tufted glabrous annual on moist grassy patches in marsh. Fl. September.

46. ELEOCHARIS DULCIS (Burm. f.) Henschel, Vita Rumph. 186, 1833; T. Koyama, in Contrib. Inst. Bot. Univ. Montreal 70: 35, 19, 1957. --- Eleocharis equisetina Presl, Rel. Haenk. 1: 195, 1830; Trimen & Hook. f., Handb. Fl. Ceylon 5: 69, 1900.

Fl. March.

47. ELEOCHARIS SPIRALIS (Rottb.) Roem. & Schult., Syst. Veg. 2: 155, 1817; Trimen & Hook. f., Handb. Fl. Ceylon 5: 70, 1900.

Shallow water in marsh. Fl. March.

48. FIMBRISTYLIS ACUMINATA Vahl, Enum. Pl. 2: 285, 1806; Trimen & Hook. f., Handb. Fl. Ceylon 5: 48, 1900.

On bunds traversing swamp. Fl. March.

49. FIMBRISTYLIS CINNAMOMETORUM (Vahl) Kunth, Enum. Pl. 2: 229, 1837; Trimen & Hook. f., Handb. Fl. Ceylon 5: 61, 1900. --- Abildaardia cinnamometorum (Vahl) Thwaites, Enum. Pl. Zeyl. 347, 1864; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 135, 1959.

In marsh almost bordering water level. Fl. September.

50. FIMBRISTYLIS DICHOTOMA (L.) Vahl, Enum. Pl. 2: 287, 1806; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 134, 1959. --- Fimbristylis annua (All.) Roem. & Schult., Syst. 2: 95, 1817; Alston, Suppl. Handb. Fl. Ceylon 309, 1931. --- Fimbristylis diphylla (Retz.) Vahl, Enum. Pl. 2: 289, 1806; Trimen & Hook. f., Handb. Fl. Ceylon 5: 53, 1900.

In marsh.

51. FUIRENA UMBELLATA Rottboell, Descr. & Icon. Pl. 70, t. 19, f. 3, 1773; Trimen & Hook. f., Handb. Fl.Ceylon 5:80,1900.

In marsh. Fl. March.

52. LEPIRONIA ARTICULATA (Retzius) Domin, Bibliothec. Bot. 85: 486, 1915; Alston, Suppl. Handb. Fl. Ceylon 311, 1931. --- Lepironia mucronata Rich., in Persoon, Syn. 1: 70, 1805; Trimen & Hook. f., Handb. Fl. Ceylon 5: 88, 1900.

Sinhala: Etapan.

In marsh, normally in brackish swamp. Fl. March. Culm used for making a rough sac called Ampera.

53. RHYNCHOSPORA CORYMBOSA (L.) Britton, in Trans. N.Y. Acad. Sci. 11: 86, 1892; Alston, Suppl. Handb. Fl. Ceylon 311, 1931. --- Rhynchospora aurea Vahl, Enum. Pl. 2: 229, 1806; Trimen & Hook. f., Handb. Fl. Ceylon 5: 82, 1900.

In marsh. Fl. June.

54. RHYNCHOSPORA RUBRA (Lour.) Makino, in Bot. Mag. Tokyo 18: 180, 1903; Alston, Suppl. Handb. Fl. Ceylon 311, 1931. --- Rhynchospora wallichiana Kunth, Enum. Pl. 2: 289, 1837; Trimen & Hook. f., Handb. Fl. Ceylon 5: 83, 1900.

55. SCLERIA POAEFORMIS Retzius, Obs. Bot. 4: 13, 1786; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 137, 1959. --- Scleria oryzoides Presl, Rel. Haenk. 1: 201, 1830; Trimen & Hook. f., Handb. Fl. Ceylon 5: 99, 1900.

Sinhala: Potu-pan; Potu-kola.

In marsh. Fl. March.

56. SCLERIA SUMATRENSIS Retz., Obs. Bot. 5: 19, 1789; Trimen & Hook. f., Handb. Fl. Ceylon 5: 96, 1900.

Fl. September.

57. SCLERIA TESSELLATA Willd., Sp. Pl. 4: 315, 1805; Trimen & Hook. f., Handb. Fl. Ceylon 5: 98, 1900.

In marsh. Fl. March.

Flagellariaceae

58. HANGUANA MALAYANA (Jacq.) Merrill, in Philip, Journ. Sci., Bot., 10: 3, 1915; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 140, 1959. --- Susum anthelminticum Blume, in Schultes f., Syst. 8: 1493, 1830; Trimen & Hook. f., Handb. Fl. Ceylon 4: 317. 1898.

Sinhala: Induru.

In marsh; the long flagelliform shoots floating on water. Fl. March.

Xyridaceae

59. XYRIS INDICA L., Sp. Pl. 42, 1753; Trimen & Hook. f., Handb. Fl. Ceylon 4: 297, 1898.

Sinhala: Ran-mota.

In marsh. Fl. December.

Eriocaulaceae

60. ERIOCAULON SEXANGULARE L., Sp. pl. 87, 1753; Trimen & Hook. f., Handb. Fl. Ceylon 5: 5, 1900.

Sinhala: Kokmota.

In marsh. Fl. in March.

Commelinaceae

61. MURDANNIA GIGANTEA (Vahl) Brueckner, in Engl. & Pr., Nat. Pflanzenf. 2 Aufl., 15: 173, 1930; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 141, 1959. --- Aneilema giganteum R. Br., Prodr. Fl. Nov. Hol. 271, 1810; Trimen & Hook. f., Handb. Fl. Ceylon 4: 308, 1898.

In marsh. Fl. March.

62. MURDANNIA VAGINATA (L.) Brueckner, l. c.; Abeywickrama, in Ceylon Journ. Sci. (Biol. Sci.) 2: 141, 1959. --- Aneilema vaginatum R. Br., Prodr. Fl. Nov. Hol. 271, 1810; Thwaites, Enum. Pl. Zeyl. 322, 1864; Trimen & Hook. f., Handb. Fl. Ceylon 4: 309, 1898.

On moist grassy patch. Fl. June.

Liliaceae

63. ASPARAGUS FALCATUM L., Sp. Pl. 313, 1753; Trimen & Hook. f., Handb. Fl. Ceylon 4: 285, 1898.

Sinhala: Hatawariya.

On new earth fillings bordering marsh. Fl. March. Tuberous roots used as a folk medicine.

Acknowledgement

The writer is grateful to Prof. Dr. T. Koyama, Curator, The New York Botanical Garden, Bronx, New York, U.S.A. for his helpful review of the script and to Dr. J. W. L. Peiris, Deputy Director of Agriculture (Research), Central Agricultural Research Institute, Gannoruwa, Peradeniya, Ceylon for his interest in this work.

PHYTOLOGIA

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CONTENTS

CUATRECASAS, J., *Miscellaneous notes on neotropical flora* 465

MOLDENKE, H. N., *Additional materials toward a monograph of the genus Callicarpa. XI* 482

MOLDENKE, A. L., *Book reviews* 500

Index to authors in Volume Twenty 503

Index to supra-specific scientific names in Volume Twenty 503

Publication dates for Volume Twenty 512

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MISCELLANEOUS NOTES ON NEOTROPICAL FLORA

by Jose Cuatrecasas
Department of Botany, Smithsonian Institution

These notes are taxonomic transfers, new species proposals, and observations relating to some members of the Moraceae, Bombacaceae and Compositae. They have resulted from the preliminary studies for the preparation of revisionary treatments of the genera involved (Cecropia, Matisia, Quararibea, Phragmotheca, Patinoa, Espeletia and Senecio). The work has been partially sponsored by the National Science Foundation.

CECROPIA POLYANDROPHORA Cuatr. sp. nov.

Arbor circa 15 m alta basi radicibus hypogeis, trunco 20 cm diametenti, ramis terminationibus viridi-brunneis internodiis 1-2 cm longis valde asperis pilis acutis patulis basi tuberculatis dense obtectis.

Folia magna coriacea peltata robuste petiolata. Lamina palmata in 8 lobis profunde (4/5) fissa, lobis majoribus oblongo-ovatis ad apicem attenuatis subacutis, maximo ab insertione petioli usque ad apicem 56-64 cm longo 21-25 cm lato lobis minoribus ovato-rotundatis obtusiusculis vel obtusis minimo 22-33 cm longo 8.5-16 cm lato, parte centrali concrescenti radio 9-12 cm inter lobis majores 12-15 cm inter minores, margine leviter sinuata; supra in vivo subatroviridis nitida in sicco pallide brunnescenti fere laevis tantum juvenilissima statu paulo araneosa sparseque pilosa adulta glabra, costis valde notatis nervis secundariis filiformibus prominentibusque tertiis paulo apparentibus; subtus nervis primariis secundariisque plus minusve rubescentibus exceptis cinerea, pilis albis tenuibus flexuosisque indumentum arachnoideo-lanosum subdensum areolis tegentum formantibus, costis valde robustis striatis nervis secundariis prominentibus 25-26 utroque latere (in lobis majoribus) sicut costis pilis brevibus crassiusculis flexuosis brunneis et parcis pilis tenuibus araneosis albis munitis, costis prope centrum magis minute brunneo-tomentosis et cum pilis acutis rectis subpatulis hyalinis 0.5 mm longis plus-minusve copiosis praeditis, nervis tertiis pallidis 2-3 mm distantibus parallelis tenuibus prominulis parce minuteque albido araneosis, venulis minoribus reticulum prominulum plus minusve albo-araneosis formantibus. Petiolus robustus 50-75 cm longus 1-1.5 cm crassus striatus valde juvenilis adpresse arachnoideo-lanatus demum glabratus sparsis vel sparsissimis pilis araneosis; pulvinus basilaris eminens badius pilis brevibus crassiusculis flexuosis patulis densissimis et pilis albidis rigidulis acutis magis dilutis instructum.

Stipulae terminales roseo-violaceae oblongae angustate acuminatae 25-30 cm longae extus dilute villosae pilis minutis flexuosis badiis et pilis ascendentibus acutis albis 0.5-0.8 mm longis subadpressis munitae, intus albido-sericeae pilis albis rectis acutis circa 1 mm longis dense tectae.

Inflorescentiae masculae axillares geminatae pedunculo 3-5 cm longo 6-7 mm crasso (in sicco) tomentuloso pilis brevibus badiis flexuosis et pilis albis acutis patulis vel ascendentibus ad 0.8 mm longis tecto. Spathae 12-14 cm longae subcoriaceae roseo-violaceae ovato-lanceolatae acuminatissimae intus glabrae extus tomentoso-villosae pilis brevibus flexuosis et pilis longioribus albis acutis ascendentibus vel subadpressis. Amenta mascula pedicellata 22-26 valde inaequalia linearia angulata acuta gracilia flexibilia, minora 3 cm longa altera ad 14 cm longa, 3 mm diametentia (in sicco); perianthium 1-1.2 mm longum ad basim attenuatum lateraliter sericeum; stamina duo inaequilonga filamentis laminaribus antheris ellipsoideis 0.3-0.4 mm longis. Receptaculum parcis brevibus setis munitum. Pedicelli teneri glabri nitidique 10-20 mm longi 1.5-2 mm crassi.

Inflorescentiae feminae axillares geminatae pedunculo circa 4 cm longo 5-6 mm crasso in sicco, in statu fructifero ad 7.5 cm longi, tomentuloso. Spathae subcoriaceae roseo-violaceae oblongae subite acuminatae 10-12 cm longae intus glabrae extus minute tomentosae et subadpresse albo-villosae. Amenta feminea breviter pedicellata 2-4 cylindracea statu florifero lutescentia 9-10 cm longa et 6-7 mm diametientia (in sicco), statu fructifero 13-20 cm longa 10-13 mm crassa; perianthium 2 mm longus apice incrassatum polygonale granulosum lateraliter parte media lanuginosum; ovarium oblongum laeve 1 mm longum; stylus flexuosus 0.8 mm; stigma fasciculatum; achaenia 2-2.2 mm longa 1-1.1 mm lata ellipsoideo-oblonga paulo compressa basi rotundata apice attenuata faciebus tuberculato-granulata. Pedicelli feminei glabri 2-5 mm longi 2-3 mm crassi. Peceptaculum glabrum.

Typus: Colombia, Antioquia: Hoya del río Leon o Bacubá entre Villa Arteaga y Chigorodó: río Porroso: La Pradera, 90 m alt, ♂ Arbol 14 m 20 cm diam, base zancuda; hoja tierna rosado cárdena, adulta coriácea, crassiúscula, rigídula, verde más bien oscura con nervios rojos de joven en la haz, cenicienta envés; amentos ♂ x 20-25 amarillo pálidos estípulas y espatas rosado cárdenas; 3-X-61, J. Cuatrecasas & L. Willard 26187; holotypus US; isotypus, COL. Idéntica localidad; ♀ árbol 16 m, 20 cm diam, zancudo; hoja tierna rosada en la haz, adulta 1.2 m long, coriácea, rígida, verde oscura haz, cenicienta envés; pecíolo 75 cm long; estípulas rosado cárdenas hasta 35 cm de largo; espatas rosado cárdenas, amentos ♀ amarillentos x 2-4, maduros hasta 14 mm diámetro; 3-X-61, J. Cuatrecasas & L. Willard 26186, paratypi US, COL (typus ♀).

Cecropia polyandrophora is closely related to C. eximia Cuatr. The main difference is in the male inflorescences which bear more than 20 slender and flexible amenta, their length varying from 3 to 14 cm, in the same bunch; the pedicels are thin, from 1-2 cm long. In contrast, the inflorescences of C. eximia have only 5-7 think (1 cm) and rigid amenta supported by thick pedicels. The female inflorescences have 4-7 amenta in C. eximia and 2 or 3 (rarely 4) in C. polyandrophora. Specimens with only foliage or also with female parts will be difficult to distinguish from C. eximia. Many species of Cecropia apparently

differ only in the characters of one of the sexes; for this reason, the botanists should collect male and female specimens at the same place, in order to obtain a reliable collection for identification. Cecropia eximia was first described on the basis of a female collection (Rev. Acad. Colomb. Cienc. 6: 287, 1945); its knowledge was supplemented later with the help of new male and female specimens collected together from the same population (Rev. Acad. Colomb. Cienc. 9:326-327, 1956). Woodson in his Flora of Panama (Ann. Mo. Bot. Gard. 47: 214, 1960) described the male inflorescences of C. eximia based on specimens from Costa Rica. I am skeptical about the identity of the latter specimens which I have not seen.

QUARARIBEA AND MATISIA

The genus Matisia proposed by Humboldt and Bonpland, has been subsequently accepted by many botanists such as Planchon, Triana, Karsten, Schumann, Poeppig, Endlicher, Huber, Ducke, Sprague, etc. I have myself followed the same line for several years, except for a short time when I adhered to the viewpoint of Vischer (Bull. Soc. Bot. Geneve. 11:199, 1919) in joining Matisia to Quararibea.

The two concepts are clear cut making it easy to differenciate the two genera, both in flower and in fruit. I explained this in 1954 (Rev. Acad. Colomb. Cienc. 9:175, 1954), also listing all the published species for each of the genera at that time. The fact that one species, Quararibea funebris (Llave) Vischer, shows somewhat intermediate characters does not alter the concepts of the two genera. Recent examination of herbarium material of this species indicates ovaries with two biovulate cells, alternating with two lysigenous cavities. Other specimens obtained from the market in Oaxaca, Mexico, by V. V. Patiño, show variations in the structure of the ovary which often has four biovular, carpelar cavities; these cavities being usually irregular in size and also irregular in the development of the ovules. In some cases I found three ovary cells, also alternating, symmetrically, with 3 lysigenous cavities. The stigmas are lobulate according to the number of ovular cells. Probably, these variations in Q. funebris are due to the fact that the trees might be cultivated, the flowers being a popular spice sold in the markets.

Like myself other contemporary botanists, such as Pittier, Gleason, Benoist, Dugand and Little have been accepting the genus Matisia. The pollen grains of a few studied species (Erdtman, Pollen Morph. & Pl. Taxon. 76, 1966), indicate substantial differences which might add new characters to both genera when all the species are worked out.

MATISIA SOEGENGII Cuatr. sp. nov.

Arbor 20 m alta trunco circa 40 cm diametro, florigero. Ramusculi terminales dense brunnescenti tomentosi pilis stellatis multiradiatis radiis inaequilongis 0.2-1 mm longis fasciculatis instructi. Stipulae terminales lanceolatae crassiusculae dense tomentosae deciduae, circa 15 mm longae 4-5 mm latae.

Folia ampla firme membranacea viridia palmatinervia longe petiolata. Petiolus stellato-tomentulosus gracillis sed rigidus sursum triangulatus deorsum teretiusculus basi incrassatus, 25-37 cm longus. Lamina 42-46 x 32-40 cm ambitu late ovato-rotundata leviter inciso-trilobata, basi profunde cordata leviter asymmetrica sinu angusto 7-10 cm profundo, auriculis late rotundatis paulo inaequalibus, apice triangulata acuta saepe cuspidata margine lobis uno utroque latere triangulatis circa 2 cm longis latisque reliqua integra; nervis primariis 9 supra prominulis subtus valde prominentibus mediali robustiore nervis secundariis 4-5 utroque latere arcuato-ascendentibus subtus prominentibus, tertiis transversalibus parallelis supra filiformibus subtus prominentibus, nervulis minoribus perpendicularibus reticulum laxum formantibus; superficie supra nervis majoribus breviter pilosis basim versus tomentellis cetera subglabra, subtus dilute stellato-hirtula pilis gracilibus ad 1 mm longis sed nervis principalibus dense hirtulis seu tomentosis.

Flores fasciculati ex tuberculis trunci orientes. Pedicelli teretes crassi 1.5-2.5 cm longi 3-4 mm diametro dense minuteque viridi-brunneo-tomentosi ebracteati. Calyx tubulosus 30 cm longus 10-12 mm diametiens 2 mm crassus intus dense adpresseque strigoso-sericeus extus minute denseque viridi-brunnescente tomentosus, apice trilobatus lobis 3-4 mm longis obtusis. Petala 5 prefloratione contorta, crassa fragilia lutescentia spatulata apice rotundata integra vel emarginata basim versus cum costa incrassata in ungem angustata, intus tantum sursum adpresse sericeo-villosa ungue glabro extus minute stellato-pilosa, 40-45 mm longa, subapicem 15-18 mm lata. Staminorum columna valde robusta sursum teres circa 3 mm crassa basim versus 5-sulcata 4 mm diametiens densiuscule stellato-pubescens, apice in 5 lacinias antheriferas producta; laciniis linearibus subteretibus robustis 20-22 mm longis, secundum abaxiali facie 12-14 loculos pollinigeros 1.5-2.5 mm longos ferentibus, inter eos cum pilis crassiusculis vermicularibus subflexuosis acutis 2 mm longis ornatis. Stylus exsertus robustus 5-angulatus dense stellato-tomentellus. Stigma rotundato-capitatum absolete 5-lobatum. Ovarium in calyce inclusum sursum stellato-tomentosum 5 sulcatum, 5 loculatum loculis biovulatis. Fructus immaturus extus dense minuteque brunneo-stellato-tomentosus, oblongo-obovoideus utrinque attenuatus subapiculatus, circa 8.5 x 4.5 cm, exocarpio crasso fibroso denique indurato, endocarpio maturitate in 5 nuculas lignosas 3.5-1.7 cm monospermas amygdaliformes scisso. Semen 28 x 13 x 9 mm testa membranacea. Cotyledones cordato-orbiculares contortuplicatae bullato-corrugatae. Calyx fructifer cupularis coriaceus integer 3.5 cm diam 1.5-2 cm altus. Pedunculus fructifer robustus 3 cm longus 4-5 mm crassus. Fig.1.

Typus: Ecuador, Esmeraldas, Rio Mira between Guadual and Piguambí, "tree 20 m tall, diameter ± 40 cm, small buttresses, cauliflorous, calyx pale yellowish, corolla yellow, stamens and style creamy, fruit immature velvety brown, white inside, fairly common here, younger trees have much larger leaves than shown in the specimen; flowers in flash"; collected 6 Sept. 1961 by Wertit Soegeng s.n. Holotypus US.

This interesting species belongs to the section Eumatisia Tr. & Pl. being closely related to M. stenopetala St. & Cuatr, which resembles very much on account of foliage and indumentum. It differs from this one and the other species of the section by its larger flowers with long, coriaceous, tubular calyx, robust staminal column and style, the structure of the antheriferous laciniae and shape and size of the fruit. The thin, membranaceous leaves of this species is neither found in any other species of this group.

The following mentioned specimens collected at Santo Domingo de los Colorados about 300 m. high, probably belong to this species. They have somewhat thicker leaves with more abundant indumentum and they lack the two indentations described for the type. No flowers or fruits seen of these collections.

Ecuador, Pichincha: Santo Domingo de Los Colorados, 1000 feet, seasonal forest, 20 feet tall riverside tree, D.B.H. 8", wood soft, leaves crowded at branch tips, corolla cream, fruit in spirit, 24 Oct. 1961 collect. Cazalet & Pennington 5141 (US, sterile). Ibidem, soft wooded tree to 20 feet, D.B.H. 8", ramiflorous, fruit 5-10 c. enclosed in persistent and swollen K, 1 Nov. 1961, collect. Cazalet & Pennington 5229 (US, leaf and section of a young fruit). Ibidem, tree 27 feet, D.B.H. 6 inches, 40 cm long cordate leaves, 4 Apr. 1943 collect. E. Little 6161 (US, sterile).

MATISIA ARTEAGENSIS Cuatr. sp. nov.

Arbor 8 m alta caule simplici 10-12 cm diametro, florigero. Stipulae subcoriaceae lanceolato-subulatae dense minuteque stellato-tomentosae 2.5-3.5 cm longae basi circa 8 mm latae.

Folia magna tenuiter coriacea rigidaque longe petiolata subpalmatinervia. Petiolus robustus argute striatus ad apicem longe pulvinatus basi incrassatus breviterque pulvinatus tomentulosus cum minutis pilis stellatis densiusculis tectus, maturitate circa 46 cm longus. Lamina ovato-oblonga vel elliptica symmetrica ad 80 cm longa 50 cm lata basi profundissime cordata lobis rotundatis conniventibus 12-13 cm longis apice paulo attenuatta subobtusa vel obtusa subite breviterque acuminata margine integra, basi 9-11-nervata; supra viridis subglabra tantum nervis parum pilosis, nervis principalibus paulo notatis ceteris obsoletis; subtus pallido-viridis pubescens pilis stellatis patulis copiose munita, costa prominentissima ceteris nervis primariis prominentibus, nervis secundariis circa 6 paribus in parte media distantibus bene prominentibus, nervis tertiis perpendicularibus, parallelis 1-1.5 cm distantibus, nervis minoribus prominulis laxum reticulum formantibus.

Flores fasciculati ex tuberculis trunci prodeuntes, in specimine dessunt. Pedunculi subfructiferi 1.5-3 cm longi robusti sparse stellato-pilosi. Calyx fructiferus (prematuratione) cupularis vel subpatelliformis 15-16 mm diametro, intus sericeus extus atroviridis sparse stellato-pilosus. Fructus incipiens ovato-oblongis obtuse apiculatus (obpyriformibus) ochraceus dense stellato-tomentosus.

Typus: Colombia, Antioquia: Hoya del río León o Bacubá, Villa Arteaga, Las Caucheras, rain forests around Villa Agraria, about 95 m alt, "palo de 8 m, 10-12 cm diám, simple, pecíolo 50 cm, limbo coriáceo rígido, 80 x 50 cm, verde oscuro brillante haz, claro mate envés" "sapote", 2 Oct. 1961, coll. J. Cuatrecasas & L. Willard 26175. Holotypus, US: isotypus COL.

Matisia arteagensis is closely related to M. stenopetala and M. soegengii. From both it differs in the more oblong outline of the leaves. Furthermore M. stenopetala has tomentose leaves and calyces. M. soegengii has much larger flowers with a long, tubular carnose, tomentose calyx.

MATISIA CALIMANA Cuatr. sp. nov.

Arbor medialis ramis terminalibus pallide viridibus juvenilibus pubescentibus deinde glabris. Stipulae breves tomentellae mox deciduae.

Folia firme membranacea griseo viridia simplicia. Petiolus 1.8-3 cm longus stellato-tomentosus apice basique pulvinato-dilatatus. Lamina obovato-elliptica vel subelliptica basin versus angustata cuneataque apice plus minusve attenuata subobtusa et subite acuteque acuminata margine integra 21-32 cm longa 11.5-16 cm lata, basi trinervis; supra nervis principalibus discoloribus filiformibus stellato-pubescentibus cetera sparse pilosula, subtus dilute pilosula pilis stellatis radiis teneris patulis, nervis principalibus pallidis conspicuissimis: costa, duobus nervis basilaribus acute ascendentibus et 4-5 nervis secundariis utroque latere arcuato-ascendentibus prominentibus, nervis tertiis transversis parallelis et nervis minoribus perpendicularibus reticulum laxum prominulum conspicuumque formantibus.

Pedunculi fructiferi oppositifolii robusti stellato-tomentosi 3-4 cm longi. Calyx fructifer cupullato-patelliformis rigide coriaceus circa 4 cm diametro extus minute tuberculatus et densissime velutino-tomentosus, intus crasse tomentoso-velutinus pilis pubescentibus stellatis brevibus densissimis et pilis longis albis sericeis instructus. Fructus globosus leviter depressus apice umbilicatus basi attenuatus aequatore prominenti, minute granulatus densissime indumento rufescenti stellato-tomentoso velutinoque tectus, 4-4.5 cm longus latusque, 5-septatus, epicarpio coriaceo duro 3-4 mm crasso, mesocarpio fibroso-carnoso tenui, endocarpio in 5 nuculis lignosis amygdaliformibus basi acutis intus nitidis extus leviter rugulosis 22 x 12 mm, pariete 0.8 mm crasso maturitate solutis. Semina ellipsoidea circa 2 x 1 cm, testa brunnescenti tenuiterque membranacea.

Typus: Colombia, Valle: Pacific Cost, Rio Calima region: Quebrada de La Brea, 30-50 m alt, 25 Sept 1961, coll. J. Cuatre-

casas & L. Willard 26086. Holotypus, US: isotypus, COL.

Matisia calimana is characterized by its membranaceous, sparsely stellate-pubescent leaves combined with the rather rounded, reddish, velvety-tomentose fruits. These hard drupaceous fruits are accompanied by the persistent, coriaceous, disk-shaped calyx.

MATISIA DOLICHOPODA (A. Robyns) Cuatr. comb. nov.

Quararibea dolichopoda A. Robyns, Ann. Mo. Bot. Gard. 54: 185, 1967.

MATISIA LONGITUBULOSA (A. Robyns) Cuatr. comb. nov.

Quararibea longitubulosa A. Robyns, Ann. Mo. Bot. Gard. 55: 56, 1968.

MATISIA SANBLASENSIS (A. Robyns) Cuatr. comb. nov.

Quararibea sanblasensis A. Robyns, Ann. Mo. Bot. Gard. 55: 57, 1968.

This species, described from Panama has also been found in the Chocoan region of Colombia, It seems to be represented by the following collection: Colombia, Antioquia: Hoya del río León o Bacubá, Villa Arteaga, Las Caucheras, rain forests at Villa Agraria, 95 m alt, "tree 15 m, leaves chartaceous, flexible," 2 Oct. 1961 collect. J. Cuatrecasas & L. Willard 26171 (US, COL).

MATISIA WURDACKII (A. Robyns) Cuatr. comb. nov.

Quararibea wurdackii A. Robyns, Ann. Mo. Bot. Gard. 55:58, 1968.

PATINOA PARAENSIS (Huber) Cuatr. comb. nov.

Matisia paraensis Huber, Bol. Mus. Paraense 3:430, 1902.

One of the main reasons for my trip to Belem do Para in 1962, was to try to collect fruiting material of Matisia paraensis Huber which I suspected to belong to Patinoa. I was fortunate to find fruiting trees with the invaluable help of the Instituto Agronomico do Norte, and especially of Mrs. Dagmar Albuquerque, Curator of the herbarium. The fruits which were collected were 16-17 cm long and 11-12 cm broad, and agree perfectly with those which are typical of the genus Patinoa (Cuatrecasas, Rev. Intern. Appl. Agr. Trop. 33:306, 1953). Unfortunately, the plants were not in flower at that time, but, some months later, Mr. Paulo B. Cavalcante sent me flowering specimens (nº 16847) from another tree, which was marked with the number 212. I was able to use these materials for my study and for the illustrations, which will be included in a forthcoming synopsis of the genus Patinoa.

Brasil, Pará: Furo Mucujubino, "cupuassú-rana", 30-VII-1901, Guedes 2207 (MG, holotypus). Belém, Murutucú, matta de varzea do Guamá, arbore pequena, flor verde, "cupuassú-rana", 14-XII-41, Ducke 842 (MG, NY, US). Vicinity of Belem, "cupuaçu-rana", Pires 51846 (US). Antonio Lemos, varzea do Rio Tajapurú, arbore de folhas grandes e reluzientes (verde escuro), flor

branca, "cumpussurana", 21-VII-48, Black 48-3030 (NY). Belém, horto Museu Goeldi, arvore 212, flores 20-4-1963, Cavalcante MG-16847 (US). Horto Botanico Pará (Furos de Breves, Pará), "cupu-assú-rana", XII-1917, Ducke 16847 (MG, US). Belém, grounds of the Instituto Agronomico do Norte. Igarapé de Murutucú, 20 m alt, tree 10 m, leaves rather dark, yellowish green above, pale green beneath, fruits 16-17 x 11-12 cm, 7-XI-1962, Cuatrecasas 26647 (US). Horto Bot. Rio de Janeiro, culta (from prov. Breves, Pará), arbor parva, floribus viridibus, "cupu-rana". 20-XII-1928, Ducke 21047 (US). Amazonas, Esperança, boca do Javarí, mata de terra firme, lugar humido, 7-XII-1945, Ducke 1780 (A, IAN, NY, US). Fig. 2.

PHRAGMOTHECA FUCHSII Cuatr. sp.nov.

Arbor. Rami terminales juveniles ochraceo-virides dense adpresseque lepidoti denique glabrati. Stipulae tomentosae lanceolatae circa 1 cm longae deciduae.

Folia alterna crassiuscule membranacea simplicia bene petiolata. Petiolus 5-8 cm longus subteres dense lepidotus ad apicem et basim dilatatus. Lamina 22-30 cm longa 9-13.5 cm lata obovato-elliptica oblongata basi obtusa vel rotundata apice paulo attenuata vel obtusa cuspidata margine integra basi quinquenervia costa supra stricte impressa subtus valde prominenti, nervis secundariis 6-7 utroque latere valde ascendentibus supra filiformibus subtus prominentibus, nervis tertiis notatis subtus prominentibus, nervulis minoribus reticulum laxum subtus prominulum formantibus; superficie supra leviter asperula viridula subtus ochraceo-viridi fere nitidula utrinque copiose lepidota.

Pedunculus fructifer oppositifolius robustus 3.5 cm longus lenticellatus et dense lepidotus. Calyx fructifer patelliformis 5 cm diametro in specimine dense ochraceo-lepidotus intus densissime adpresseque villoso-subsericeus.

Drupa circa 8 cm alta 10 cm diametro depresse globosa apiculata basi umbilicata ochracea dense lepidota et stellato-tomentosa epicarpio coriaceo rigidoque sed tenui (0.8 mm crasso), mesocarpio fibroso-carnoso circa 5 mm crasso, endocarpio 5 nuculis lignosis monospermis subellipsoideis compressis sulcatis valde duris 7 x 4.8 x 3 cm instructo. Parietis ligno duro latere 7-10 mm dorso 14 mm crasso. Semen amygdaliforme circa 30 x 17 x 8 mm episperme membranaceo rubescenti cotyledonibus crassis albis plano-convexis plumula basali. Fig. 3.

Typus: Colombia, dep. Chocó: area of Baudó, near the Bocana of Río Baudó on left bank of the river near the headwaters of Estero del Medio, coll. Ferb. 1967, H.P. Fuchs & L. Zanella 21944. Holotypus, US.

This is the second record for a collection of Phragmotheca and the first in fruiting condition, the fruit of this genus being unknown to the present. The identification of the genus is based in the typical stellate-scaled trichomes spread throughout the branchlets, leaves, pedicels, calyces and epicarps.

Phragmotheca fuchsii differs from P. siderosa Cuatr. (Rev. Acad. Colomb. Cienc. 7:49, 1946) in having thinner membranaceous

and more oblong leaves which are green above and slightly ochraceous below, with sparsed scales distributed on both surfaces. P. siderosa has rather ovate or elliptic-ovate, coriaceous leaves covered by a ferruginous indumentum of densely distributed scales. The scales in P. siderosa are more deeply divided having longer rays. Only further collecting will provide the necessary elements to enable an actual comparison of flowers and fruits from both species.

ESPELETIA CURIALENSIS Cuatr. sp. nov.

Caulirosula, caudice simplice usque ad 10 m. alto vaginis foliorum vetustorum spisse obtecto, tantum ad apicem folia crebra rosulata producto.

Folia lata coriacea flexibilia quando vetusta rigidula, griseo-viridia vel cinereo-viridia sessilia, lanceolata apice acuta basim versum attenuata in vaginam longam ad caudem adpressa producta. Lamina 44-52 cm longa 7-9 cm lata basim 1.4-2 cm angusta margine aspectu integra sed minusculis dentibus callosis recurvis remotis inconspicuisque munita; supra costa dense albo-sericea lanuginoso-villosa conspicua reliqua molliter tenuiterque lanuginosa, nervis secundariis plus minusve conspicuis; subtus costa valde prominenti densiuscule albo-lanata et subsericeo-villosa, nervis secundariis bene conspicuis elevatis, angulo 50°-60° divergentibus, 1-1.5 cm inter se distantibus, lanuginoso-sericeis, nervulis in reticulo plano vel parce prominulo obsoleto cum indumento lanugineo molli fere velato vagina subtus longe dense adpresseque albo-vel cinereo-barbata. Folia juvenilia mollia dense crasseque villoso-sericea alba vel cinerea in sicco albo-grisea.

Inflorescentiae axillares numerosae circa 80-90 cm longae, cymoso-paniculatae corymbiformes, capitulis latiusculis radiatis copiosis. Axis robustus 70-80 cm longus supra basim usque ad 2 cm diametienti albo-vellereus, dimidia parte inferiore 4-5 paribus foliis oppositis subcoriaceis sublanceolatis vel oblongo-lanceolatis basim versus plus minusve angustatis ad basim amplectente vaginatis, vaginis membranaceis oppositis connatis ad 2-3 cm longis, lamina 20-30 cm longa 2.5-4 cm lata, nervatione indumentoque foliorum rosulae similibus; dimidia parte superiori ramosi, 5-6 paribus ramorum oppositorum, bracteis subtendentibus foliosis sessilibus inferioribus oblongis vel lanceolato-oblongis basi amplectentibus breviterque connatis, usque ad 23 x 3 cm, sursum gradatim minoribus, superne lance-ovatis vel ovatis acutisque 4-2 cm longis 3-1.5 cm latis, semper quam ramo brevioribus et lanato-villosis. Rami elongati sursum 3-2-fissi vel simplices, inferiores valde longiores (usque ad 40 cm) magis robusti alteris gradatim minores omnes verticem paniculae altitudine attingentes vel subattingentes, ramulis oppositis gracilibus lanato-albicantibus, sursum 3-1-plo ramosis, extremo saepe capitulis tribus pedunculatis vel singulo instructis. Pedunculi maturitate 2-8 cm longi viridi-ochracei et albido-lanati.

Capitula expansa 35-40 cm diametientia disco centrali 20-24 mm diametro, 174-209 flores ferentia. Involucrum semiglobosum

basi rotundatum ad marginem circa 30 mm amplum, phyllariis sterilibus 3-seriatis 11-12, exterioribus plerumque tribus herbaceis crassiusculis violaceo-viridibus lanato-villosis, ovatis acutis 15-17 mm longis 10-12 mm latis, subexterioribus tribus ovatis vel oblongo-ovatis 14-18 x 9-11 mm, alteris tenuioribus 17-13 x 10-9 mm, omnibus nervis parallelis numerosis filiformibus intus consipcuis; phyllariis interioribus fertilibus cum sterilibus similimis planis extus lanatis, 12-14 x 6-7 mm. Receptaculum convexum 10-12 mm diametro glabrum. Paleae exteriores feminei oblongis vel obovato-oblongis acutis subamplectentibus hyalinis, dorso crassiore, margine tenui, apice extus hirsuto, 10.5-10 x 3.5-4 mm. Paleae disci obovatae valde amplectentes hyalinae multinervatae apice obtusissimae barbataeque, circa 8 mm longae 4 mm latae.

Flores radii feminei ligulati exserti 3-seriati 42-53 in capitulo. Corolla lutea interdum vetusta rubescenti 11-15 mm longa; tubo crassiusculo 2.5-3 mm longo pilis pluricellularibus crassiusculis patulis brevibus copiosis et parcis glandulis minutis pediculatis munito; lamina 3.5-4 mm lata crassiuscula obovato-oblonga obtusa 2-3-dentata 5-7-nervato duobus nervis magis notatis, inferne subtus parce pilosula. Stylus 6-8 mm longus ramis lanceolato-subulatis 2-2.8 mm longis. Ovaria in serie exteriori obovata facie abaxiali plano-convexa, adaxiali costa prominenti circa 4 x 2.5 mm, altera oblongiora 4.2-4.4 x 2 mm, dorso subangulato, omnia basi acuta et ad nervos calloso-marginata.

Flores disci masculi 126-156 in capitulo. Corolla lutea 8.5-9.8 mm longa glabra vel sparsissimis pilis minutis glandulosis; tubulo 3-3.5 mm longo angusto (0.6 mm diam); limbo sursum paulo ampliato (campanulato-tubuloso) 5.5-6.3 mm longo 1.8-2 mm lato, commisurale nervato, dentibus triangularibus subaequilateris 1.2-1.5 mm longis marginibus minute papillosis. Antherae 3-3.2 mm longae basi subacutae, appendice apicali ovato-elliptica subacuta 0.5 mm longa. Stylus 9-13 mm longus basin versus angustatus apice conico breviter emmarginatus minute papillosus subapicem piloso-papillosis, postanthesim valde exsertus. Ovarium minimum sterile. Nectarium tubulosm crassiusculum breviter obtuseque 5 dentatum.

Typus: Colombia, Boyacá, páramo entre Chita y Sácama, vertiente oriental (tributaria del rio Casanare), Quebrada del Curial, lugar llamado La Porquera, 3350 m alt; "tronco simple 6 m, 12 inflorescencias 80 cm long, con abundantes capítulos hojas coriáceas bastante rígidas cuando viejas, involucro verdoso-violáceo o verdoso purpúreo, lígulas amarillas al envejecer vinosas, corolas del disco amarillas", 15 Sept. 1969 collect. José Cuatrecasas & Laureano Rodríguez, 27740. Holotypus, US; isotypus, COL.

Espeletia curialensis is closely related to E. uribei Cuatr. from the paramos near Bogota. It may be distinguished by the less rigid or softer leaves which are less narrowed at the base and lack the prominent venation typical of E. uribei. Furthermore in E. curialensis the inflorescences surpass the length of the leaves, being stouter and having more leaves and flowers; the

heads, as well as the rays are larger, the tube of the ray corollas is much longer and the disc corollas are subglabrous.

ESPELETIA FIGUEIRASII Cuatr. sp. nov.

Caulis brevis vel brevissimus circa 5 cm diametro ad 10 cm longus ad basim pauce ramosus vel gemmiferus, superne rosulato-foliatus, inter folia densissime longissimeque fulvo-barbatus.

Folia basilaria linearia dense rosulata. Lamina 25-30 cm longa 1-1.6 cm lata, coriacea flexibilis stricte lanceolato-linearis margine anguste revoluta apice acutissimo mucronulato (mucro 1.5 mm longo), basim versus angustata et in vaginam ampliatam producta; supra viridis costa minute pilosa deorsum dense argenteo-arachnoidea reliqua glabra; subtus albo-cinerea densissime minuteque lanuginosa et longissime villoso-sericea. Vagina 4.5-5.5 cm longa basi usque ad 2 cm lata faciebus glabris sed marginibus longissime densissimeque fulvo-barbatis.

Inflorescentia centralis axe robusto ad 1.5-2 m alto prope basim 4 cm diametro, fistuloso striato purpurascenti cum velo sericeo pilis albis longissimis adpressis plus minusve vestito 2/3 superioribus ramoso ramis ramulisque ascendentibus paniculam thyrsoideam ad 50 cm amplam extremo subcorymbosam formantibus. Rami patuli ascendentes purpuracei albido-pilosi seu floccoso-arachnoidei. Pedunculi 1-10 cm longi angusti erecti recti vel pauce curvati dense hirsutuli, pilis flexuosis 1-3 cm longis semiascendentibus plus minusve intricatis tectis. Folia caulinaria inferiora ad 30 cm longa 1.6 cm lata linearia acuta radicalia similia; superne gradatim breviora. Bracteae subtendentes 3-1 cm longae 2-1 mm latae subulatae flexuosae supra glabrae subtus villosae et resinoso-granulatae.

Capitula semiglobosa vel subglobosa 12-18 mm diametro 9-12 mm alta atropurpurea. Involucrum 9-12 phyllariis sterilibus biseriatis crassiusculis rigidulis ovato-oblongis vel lanceolato-oblongis acutato-acuminatis 7-12 mm longis 2-3 mm latis, 3-5 nervatis purpureo-viridibus vel atropurpureis extus pubescentibus pilis longiusculis ascendentibus rigidulis basim strictis acutiusculis sursum obtusiusculis; phyllariis interioribus fertilibus 6.5-7.5 x 2.3 mm ovato-oblongis acuminatis planis crassiusculis basim versus incrassatis cum costa eminenti 2-4 nervis lateralibus conspicuis, extus pilosis pilis ascendentibus 1-3 mm longis obtusiusculis (longioribus acutis), sursum sparsis pilis pistilatis. Receptaculum plano-convexum glabrum 7-9 mm diam. Paleae radii 2-3 seriatae femineae 5-6 x 2.3-1.8 mm, incrassatae rigidulae oblongae vel obovato-oblongae subite acutatae amplectentes naviculares extus praecipue sursum densiuscule hirtulo-atropilosae, interiores angustae sursum pilis pistilatis (0.3-0.4 mm). Paleae disci amplectentes obovato-oblongae 5-6.5 x 2 mm apice subite acutato-acuminatae marginibus hyalinae dorso sursum hirtulae pilis crassiusculis pistilatis brunnescentibus 0.3-0.4 mm longis, acumine nudo.

Flores marginales feminei 68-92 in capitulo 3-4 seriati. Corolla tubulo brevi 0.8-1.5 mm longo crassiusculo apice integro, rarissime cum appendiculo adaxiali lineari stricto (ad 1 mm

longo) ornato, densissime patulo-pilosi pilis crassiusculis pistilatis 0.2-0.3 mm longis, reducta. Stylus 2.2-2.5 mm longus ramis exsertis luteolis oblongis margine revoluto 1-1.2 mm longis. Ovarium oblongum basim angustatum triquetrum plus-minusve arquatum faciebus laevibus.

Flores disci pseudohermaphroditi 68-92 in capitulo. Corola 5-6 mm longa carnosula enervata vel nervis commisuralibus tantum visibilibus, tubulo stricto 2.5-3 mm longo sparse piloso pilis hyalinis obtusis vel pistilatis 0.2-0.3 mm longis, limbo bene ampliato deorsum sparsis pilis, dentibus oblongo-triangularibus 1.5 mm longis marginibus crassioribus minutissime papillosis dorso sursum dense atro-pistilato-pilosis sed apice nudo; antherae 2 mm longae basi acute auriculatae appendice apicale ovata acuta circa 0.4-0.5 mm longa. Stylus crassus 5 mm, apice conico-capitato breviter fisso minute papilloso subapicem moderate pilosus. Nectarium tubulosus basim crassior apice 5-dentatus 1.2 mm longus.

Achaenia nigra 3.2-3.6 mm longa oblonga basim versus angustata acuta triangulata basi acuta paulo curvata vel corniculata, faciebus laevibus.

Typus: Venezuela, Mérida: Sierra Nevada de Santo Domingo: Páramo de Los Granates, Loma de Paja - Las Escaleras, 3240 m alt, tronco corto con ramificación basilar a ras de suelo, hoja verde haz, blanquecina envés, eje de la inflorescencia 1.8-2 m, purpurácea con pelos blancos; capítulos 1-2 cm diam, purpuráceos, muy oscuros, estilos amarillos, nom. vulg. "frailejón maguei", collect. 11 Oct. 1969, J. Cuatrecasas, L. Ruiz-Terán & M. López Figueiras 28068. Holotypus, US; isotipus MERF.

The relationships of this species will be discussed in the forthcoming monograph. However, it may be mentioned here that Espeletia figueirasii resembles in habit E. viridis Aristeg., from which it may readily be distinguished by the discoid nature of the heads and the whitish villose-lanate indumentum of the underside of the leaves.

ESPELETIA MARCANA Cuatr. sp. nov.

Acaulirosula albicans. Folia coriacea crassa rigidula breviter petiolata. Lamina 26-31 cm longa 6-8 cm lata, late lanceolata utrinque attenuata apice acuta margine integra basi in brevem petiolum (circa 1 cm longum) angustata; supra albo-viridis aspectu laevis dense tomentoso-lanata pilis patulis crispis congestis obtecta, costa latiuscula densissime albo-lanuginoso-sericea notata, ceteris nervis obsoletis; subtus dense tomentoso-lanata plus costa nervisque albo villoso-lanatis, costa crassa eminentique, nervis secundariis numerosis prominentibus 45-50 utroque latere angulo 60°-70° divergentibus, nervulis minoribus venulisque minutum reticulum prominentem cum indumento velatum formantibus. Petiolus brevis cum latitudine costa reductus circa 1 cm longus dense lanato-villosus. Vagina coriacea nervato-striata adaxiali facie glabra abaxiali longe dense adpresseque stramineo-villosa.

Inflorescentiae recemosae axillares numerosae folia valde excedentes, 90-100 cm longae habitu albido-lanatae. Axis robustus 1.5 cm diametro dense albo-lanatus et vellereus inferne 3-4 foliis alternis sessilibus linearibus lanatis, inferiore supra basim 14-16 cm longa 1.3-2 cm lata vagina 2.5-3.5 cm longa, duobus tertiis superioribus racemosus. Pedunculi robustiusculi crasse albo-lanati ascendenti-erecti sursum gradatim minoribus 12- 2.5 cm longis monocephalis; bracteis subtendentibus linearibus dense lanatis sursum decrescentibus 8- 2 cm longis 1- 0.4 cm latis.

Capitula radiata hemisphaerica 18-22 mm diametientia circa 10 mm alta. Involucrum patellatum 18-22 mm diametro, phyllariis exterioribus 8-9 oblongo-lanceolatis acuminatis dense albo lanatis 9-11 x 3 mm, discum excedentibus, phyllariis alteris sterilibus 16-18 plus minusve biseriatis tenuioribus 9-7 x 3 mm, phyllariis interioribus fertilibus teneris ovatis vel subobovatis apice subite attenuatis acuminatisque sursum lanuginoso-villosis 5.5-6 x 2.2-2.8 mm. Receptaculum plano-convexum 10-10.5 mm diametro. Paleae radii hyalinae 4.5-5 x 1.5-2 mm oblongae basim versus paulo angustatae apice triangulares acuminatae ad apicem extus barbellatae. Paleae disci hayalinae 5 x 2 mm, late oblongae apice triangulares acuminataeque sursum barbulatae.

Flores radii feminei 110-120 in capitulo triseriati. Corolla lutea 3-3.5 mm longa, tubo 1 mm longo dense piloso pilis flexuosis intricatis ad 0.8 mm longis, lamina 2-2.5 mm longa 1.6-2 mm lata subovata obtusa 3-2-dentata dentibus usque ad 1 mm longis obtusis, 3-2-nervata nervis medialis loborum, supra glabra subtus sursum sparsis pilis acutis, ad apicem tubi labio adaxiali dentiformi ovato obtuso 0.3-0.5 mm longo (cum indumento tubi velato) instructa.

Flores disci pseudohermaphroditi 260-290 in capitulo. Corolla lutea circa 5 mm longa, tubulo 2 mm longo crassiusculo praecipue sursum sparse piloso pilis usque ad 1 mm longis, limbo tubuloso deorsum sparse pilosum, dentibus triangularibus acutis 0.5 mm longis marginato-papillosis dorso pilosis pilis acutis 0.2-0.5 mm longis. Antherae 1.8 mm basi breviter sagittatae appendicibus apicalis oblongo-ovatis 0.3 mm longis. Stylus 5.5 mm longus apice dilatato-conico minute papilloso subapicem longiuscule papillosus. Nectarium tubulosum crassum 0.6 mm altum obtuse quinqueangulatum.

Typus: Venezuela, Táchira: Páramo del Colorado, continuación del Páramo del Zumbador 3100-3200 m alt., 1 Oct. 1969 collect. J. Cuatrecasas, M. López-Figueiras & Luís Marcano 27993. Holotypus, US; isotypus MERF.

Espeletia marcana is related to E. thyrsiformis A. C. Smith from which it differs mainly by the larger, broad-lanceolate leaves (with the shape of those of E. grandifolia), by the racemose inflorescence, by the larger heads and flowers and the smaller rays which possess longer tube.

SENECIO RUITERANII Cuatr. sp nov.

Frutex erectus usque 1 m altus vel plus minusve sarmentosus,

divaricato-ramosus, caule 1 cm diametro cortice badia suberosa fissurato-striata rugosaque. Rami terminales plerumque erecti striati viridi-ochracei dense tomentosi, pilis malpighiaceis furcis tectis.

Folia alterna petiolata coriacea prope terminationem ramulorum copiosa. Petiolus 4-7 mm longus supra sulcatus basi dilatatus, dense tomentoso-lanuginosus. Lamina 1.5-5 cm longa 0.6-2.2 cm lata. obovato-elliptica vel obovata vel elliptica saepe elongata basi cuneata apice subotusa vel subite acutata vel rotundata saepe sursum 5-3-dentata dentibus triangularibus acutis brevibus interdum integerrima, margine revoluta; supra viridis vel griseo-viridis, juvemili statu adpresse pilosa denique glabrata minutissimeque tuberculata, costa parum conspicua alteris nervis obsoletis; subtus dense crasseque-vel cinereo-tomentosa pilis brachiatis et furcis flexuosis intricatis adpressis obtecta, costa et duobus vel tribus nervis utroque latere satis curvato-ascendentibus prominentibus, alteris nervulis nullis.

Inflorescentia terminalis corymbosa brevis plerumque folia non attingens, axe brevi angulato ochraceo-tomentoso 5-10-ramis monocephalis teneris ochraceo-tomentosis angulatis 0.5-3 cm longis, bracteolis 2-4 mm longis parcis linearibus strictis acutis instructis ad apicem interdum tantum 1-3 ad modum calyculi. Capitula radiata. Involucrum cylindraceum circa 7-7.5 mm longum lanuginoso-ochraceum phyllariis 8-9 crassiusculis rigidulis externis linearibus acutis circa 7 x 1.5 mm, interioribus oblongis acutis 7 x 2.5-2.8 mm marginibus hyalinis. Flores feminei radiati 5-8 in capitulo; corolla lutea ligulata crassiuscula glabra 7.5-8.5 mm longa tubo 2.8-3 mm longo lamina lineari minute tridentata enervia 1.5 mm lata; stylus 5 mm longus ramis strictis 1.5 mm longis; ovarium glabrum 10-nervatum 2-2.4 mm longum; pappus albus sericeus 5 mm longus. Flores disci hermaphroditi 13-21 in capitulo; corolla lutea 7-7.5 mm longa glabra tubo amplo circa 2.8 mm longo limbo sursum sine ampliato laevi lobis triangulari-oblongis acutis 1.5-1.6 mm longis. Antherae 3.2 mm basi minute auriculatae. Stylus 6 mm, ramis 1.4 mm truncatis. Ovarium oblongum 2-2.5 mm longum 10-nervatum. Pappus albus 6 mm longus.

Typus: Venezuela, Lara: Páramo del Jabón, 3100-3400 m alt. Frútex 1 m con ramas torcidas o bejucoso, hojas coriáceas, verdes o verde-grisáceas haz, cenicientas u ocráceas envés, involucro ocráceo claro, lígulas amarillas, 2 Nov. 1969, J. Cuatrecasas, L. Ruiz Terán & López Figueiras 28204. Holotypus, US; isotypus. MERF.

Senecio ruiteranii is a very distinct species, whose relationships are to be found with Senecio greenmannianus Hieron. a tree or large bush typical of the timberline of Venezuelan paramos.

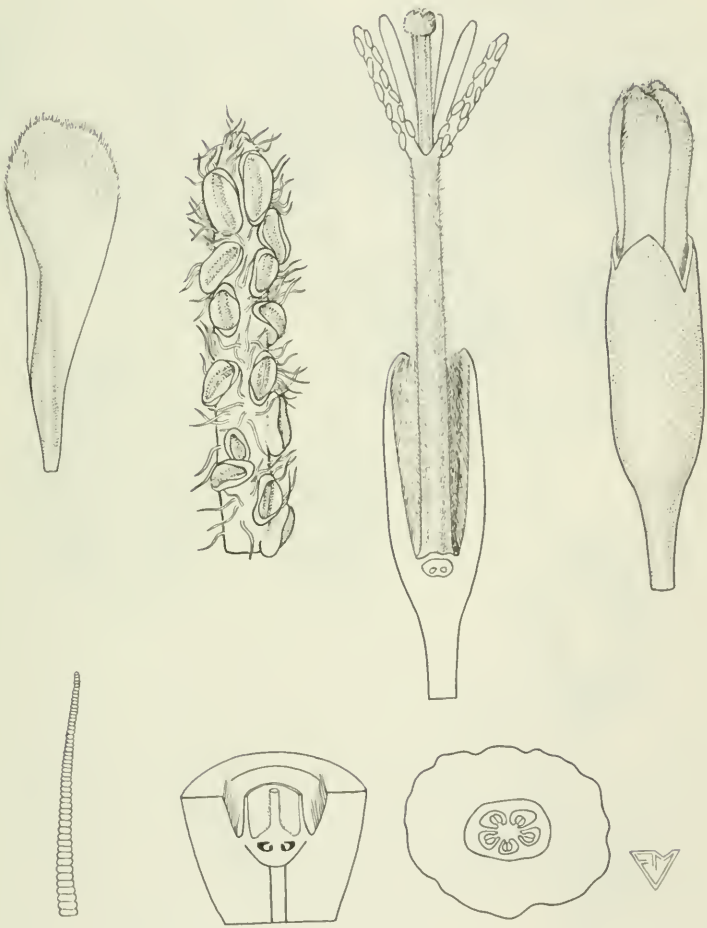

Fig. 1. Matisia soegengii Cuatr.: Petal, x 1; staminal lacinia, x 3; mature flowers, the petals removed, x 1; flower, x 1; hair of the anthers, x 20; vertical section of the ovary, x 2; transection of the ovary, x 3. From Soegeng s.n.

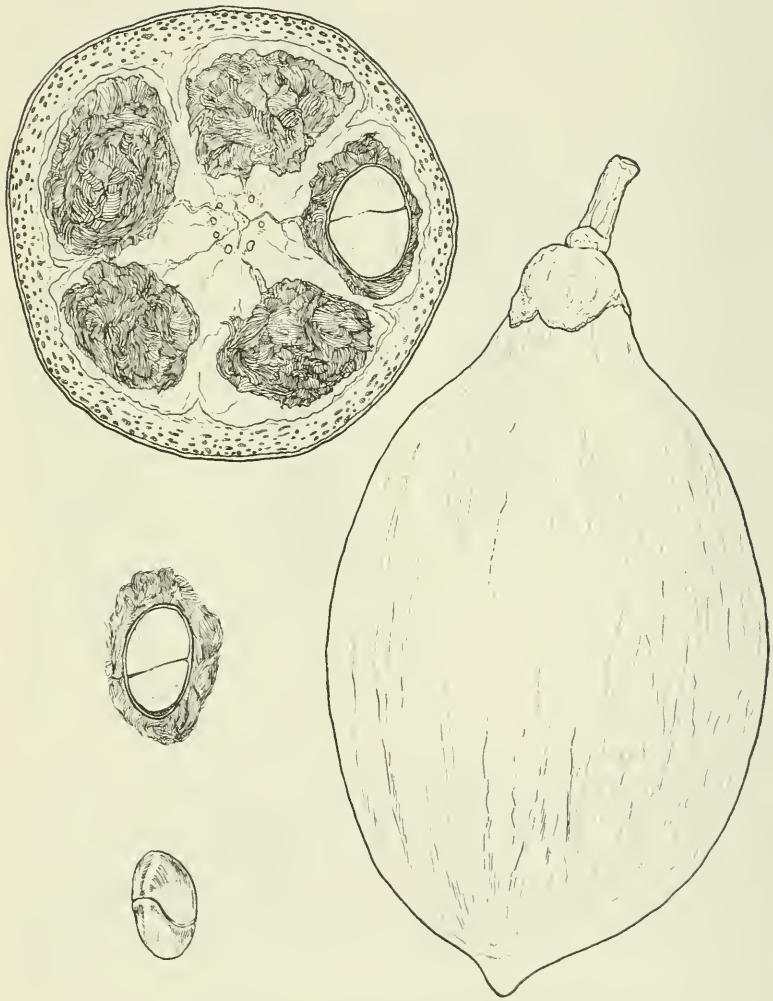

Fig. 2. Patinoa paraensis (Huber) Cuatr.: Transection of fruit, mature fruit, seed and cotyledons x ½. From Cuatrecasas 26647.

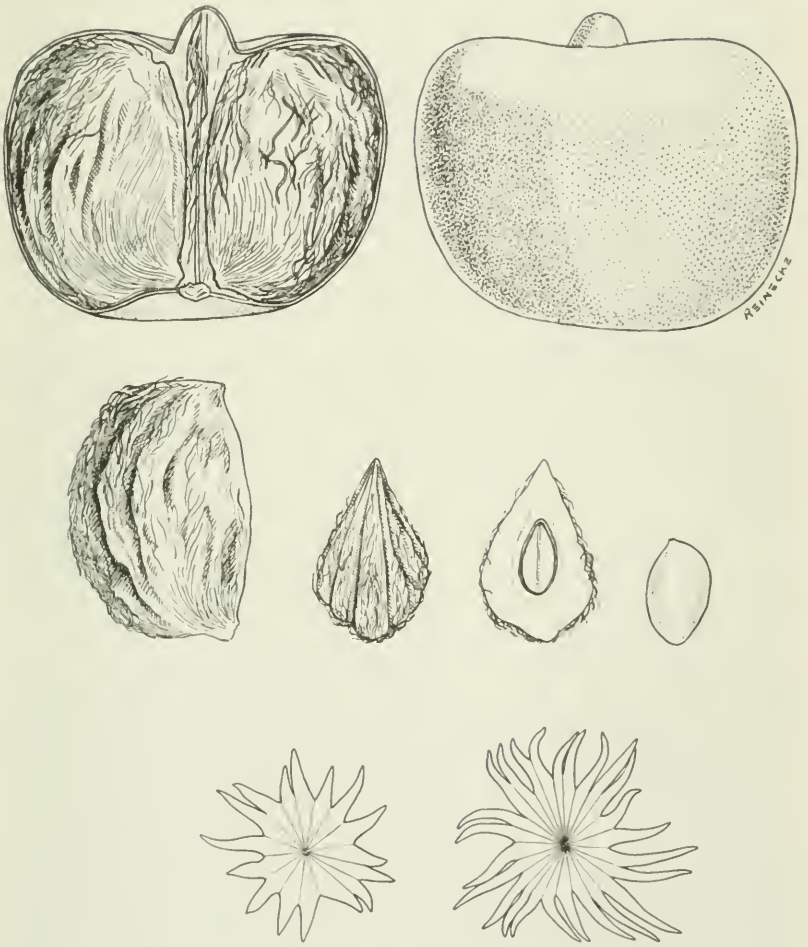

Fig. 3. Phragmotheca fuchsii Cuatr.: Fruit in section; fruit entire; nucule, lateral view, apical view, transection, seed, all x $\frac{1}{2}$; lower left, leaf scale of P. fuchsii from Fuchs & Zanella 21944; lower right, leaf scale of P. siderosa from Cuatr. 16558, x 100.

ADDITIONAL MATERIALS TOWARD A MONOGRAPH OF THE GENUS CALLICARPA. XI

Harold N. Moldenke

CALLICARPA L.

Additional & emended synonymy: Tomex L., Nov. Pl. Gen. Diss. Dassow 5. 1747; Sp. Pl., ed. 1, pr. 1, 1: 118. 1753; Gen. Pl., ed. 5, 54. 1753 [not Tomex Forsk., 1775, nor Thunb., 1783]. Illa Adans., Fam. Pl. 2: 446 & 565. 1763. Callicarpus Beckm., Lex. Bot. 44. 1801. Jonsonia Garden in L., Corresp. 1: 364. 1821. Spondylococcum Wittst. apud Pfeiffer, Nom. Bot. 2 (2): 1244. 1874. Calocarpus L. apud Post & Kuntze, Lexicon 91. 1904. Calocarpus P. & K. apud Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 179, in syn. 1966. ?Rodschiedia Dennst. apud Airy Shaw in Willis, Dict. Flow. Pl., ed. 7, 975, in syn. 1966 [not Rodschiedia Gaertn., Mey., & Scherb., 1800].

Additional & emended bibliography: Rheede, Hort. Ind. Malab. 5: 111, pl. 56. 1685; L., Gen. Pl., ed. 5, pr. 1, 50, 54, [504], & [509] (1754) and pr. 2, 50. 1760; Adans., Fam. Pl. 2: 226, 446, 530, & 565. 1763; Planer, Gatt. Pfl. 1: 87 (1775) and 2: 1054. 1775; Scop., Introd. Hist. Nat. 197 & 236. 1777; Reichard in L., Gen. Pl., ed. 8, 56. 1778; Jacq., Select. Stirp. Amer. Hist. Picta, ed. 2, 13, pl. 259, fig. 6. 1780; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 246. 1789; Schreb. in L., Gen. Pl., ed. 8 [9], 1: 73 (1789) and 2: 846. 1791; Haenke in L., Gen. Pl., ed. 8 [10], 1: 105 (1791) and 2: 792. 1791; W. Bartram, Travels, ed. 1, 436 (1791) and ed. 2, 434. 1794; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 2, 2: 246. 1796; Beckm., Lex. Bot. 44. 1801; Dennst., Schlüs. Hort. Malab. 31. 1818; L., Corresp. 1: 364. 1821; E. Twining, Ill. Nat. Ord. Pl. 2: 104, fig. 6. 1855; A. Gray, Man. Bot., ed. 2, pr. 1, 299 & 709 (1856), pr. 2, 299 & [611] (1858), and pr. 3, 299 & [709]. 1859; A. Wood, Class-book, [ed. 42], pr. 1, 537, 538, [825], & 831. 1861; A. Gray, Man. Bot., ed. 3, 299 & [611] (1862) and ed. 4, pr. 1, 299 & [707]. 1863; A. Wood, Class-book, [ed. 42], pr. 2, 537, 538, [825], & 831. 1863; A. Gray, Man. Bot., ed. 4, pr. 2, 299 & [611]. 1864; A. Wood, Class-book, [ed. 42], pr. 3, 537, 538, [825], & 831. 1865; Miq., Prol. Fl. Jap. 30—31. 1866; A. Wood, Class-book, [ed. 42], pr. 4, 537, 538, [825], & 831. 1867; A. Gray, Man. Bot., ed. 5, pr. 1, 339, 341, & 683 (1867) and ed. 5, pr. 2, 339, 341, & 685. 1868; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 1, 241, 243, & 376. 1868; A. Wood, Class-book, [ed. 42], pr. 5, 537, 538, [825], & 831 (1868) and pr. 6, 537, 538, [825], & 831. 1869; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 2, 241, 243, 342, & 376. 1869; A. Gray, Man. Bot., ed. 4, pr. 3, 299 & [611]. 1870; A. Wood, Class-book, [ed. 42], pr. 7, 537, 538, [825], & 831. 1870; A. Wood, Am. Bot. & Flor., ed. 1, pr. 1, 235—237, 376, & 388 (1870), pr. 2, 235—237, 376, & 428

(1871), and pr. 3, 235--237, 376, & 428. 1872; A. Wood, Class-book, [ed. 42], pr. 8, 537, 538, [825], & 831. 1872; A. Wood, Am. Bot. & Flor., ed. 1, pr. 4, 235--237, 376, & 428. 1873; Pfeiffer, Nom. Bot. 1 (1): 502, 535, & 536 (1873) and 1 (2): 818, 1232, 1244, 1425, 1442, 1742, & 1788. 1874; A. Wood, Am. Bot. & Flor., ed. 1, pr. 5, 235--237, 376, & 428 (1874) and pr. 6, 235--237, 376, & 428. 1875; A. Wood, Class-book, [ed. 42], pr. 9, 537, 538, [825], & 831. 1876; S. Kurz, Journ. Asiat. Soc. Beng. 45: 105--164. 1876; S. Kurz, Forest Fl. Brit. Burma 2: 273--275 & 589. 1877; A. Gray, Man. Bot., ed. 5, pr. 8, 339, 341, & 685. 1878; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 3, 241, 243, & 376. 1880; A. Gray, Man. Bot., ed. 5, pr. 8 [9], 339, 341, & 685. 1880; Gamble, Man. Ind. Timb., ed. 1, 282--283 & 525. 1881; A. Wood, Class-book, [ed. 42], pr. 10, 537, 538, [825], & [836]. 1881; Vidal y Soler, Phan. Cuming. Philip. 133—134 & 187—188. 1885; Vesque, Ann. Sci. Nat. Paris, sér. 7, 1: 335, 336, & 340—343. 1885; Maxim., Bull. Acad. St. Pétersb. 31: 80. 1887; Maxim., Mél. Biol. 12: 513. 1887; O. R. Willis in A. Wood, New Am. Bot. & Flor., ed. 2, 235--237, 376, & 428. 1889; S. Wats. & Coult. in A. Gray, Man. Bot., ed. 6, pr. 1, 401, 403, & 751. 1889; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26: [Ind. Fl. Sin. 2:] 252—257. 1890; Shirasawa, Bull. Coll. Agr. Tokyo Imp. Univ. 2: [Jap. Laubh. Winterzust.] 269, pl. 10, fig. 8—10, & pl. 14, fig. 8. 1895; L. H. Bailey in A. Gray, Field For. & Gard. Bot., ed. 2, 339, 342, & 509. 1895; B. F. Bush, Garden & Forest 10: 515. 1897; Koord., Meded. Lands Plant-tuin. Buitenz. 19: 558 & 561. 1898; J. Matsum., Bot. Mag. Tokyo 13: 114--115. 1899; Kuriowa, Bot. Mag. Tokyo 14: 126. 1900; Durand & Jacks., Ind. Kew. Suppl. 1, pr. 1, 473 & 480. 1901; Gamble, Man. Ind. Timb., ed. 2, 525. 1902; Prain, Bengal Pl., pr. 1, 823 & 827. 1903; D. H. Scott in Solereder, Syst. Anat. Dicot., transl. Boodle & Fritsch, 1: 630, 631, & 633. 1908; Nakai, Fl. Kor. 2: 134--135. 1909; J. Matsum., Ind. Pl. Jap. 2 (2): 528—530. 1912; Diels, Notes Roy. Bot. Gard. Edinb. 7: 332 & 344. 1913; Kawag., Bull. Kag. 1: 124 & 175. 1915; Simada, Trans. Nat. Hist. Soc. Formos. 31: 12. 1917; Gibbs, Contrib. Phytogeogr. & Fl. Arfak Mts. 218. 1917; E. H. Wils., Journ. Arnold Arb. 1: 186. 1920; Troup, Silvicult. Indian Trees 2: 697 & 778--779. 1921; Nakai, Trees & Shrubs Indig. Jap., ed. 1, 336—338. 1922; Sakaguchi, Gen. Ind. Fl. Okin. 18. 1924; S. Sasaki, List Pl. Formos. 349—350 & 424. 1928; Masam., Prel. Rep. Veg. Yak. 115. 1929; Mak. & Nemoto, Fl. Jap., ed. 2, 994 & 995. 1931; Silva Tarouca & Schneid., Unsere Freiland-Laubgehölz., ed. 3, 111. 1931; Roys, Ethno-bot. Maya [Tulane Univ. Mid. Am. Res. Ser. Publ. 2:] 306 & 319. 1931; Terasaki, Nippon Shokubutsu Zufu [Jap. Bot. Illustr. Album] 1592--1594. 1933; McLean, Torreya 33: 21. 1933; Masam., Fl. & Geo. Yakus. 387. 1934; H. F. MacMillan, Trop. Plant. & Gard., ed. 4, 104 & 511. 1935; Masam., Trans. Nat. Hist. Soc. Formos. 25: 251 & 254. 1935; Takenouchi, Journ. Nat. Hist. Fukuoka 2: 15. 1936; Kanehira, Formos. Trees, ed. 2, 642--648 & 716, fig. 599--604. 1936; Nemoto, Fl. Jap. Suppl. 622. 1936; H. P. Parks, Tex. Agr. Exp. Sta. Bull. 551: 110—111. 1937; Nakai in Shirasawa,

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It should be noted that Airy Shaw (1966) still regards Aganon Raf. as a synonym of Callicarpa -- actually it does not even belong in the Verbenaceae. Also, although he accredits the name Calocarpus to Post & Kuntze, these authors plainly credit it to Linnaeus. On page 975 of his work he suggests that the genus Rodschiedia Dennst. (1818) [not Rodschiedia Gaertn., Mey., & Scherb., 1800] may actually belong in the synonymy of Callicarpa. This genus and the only species proposed in it, R. serrata Dennst., published in the same place as the genus, were based on the Tsjerou Poëam of Rheede in his Hort. Ind. Malab. 5: 111, pl. 56 (1685) and which is described there as follows: "Tsjerou Poëam Malabarensibus, Patarola Brachmanis, Nilha Lusitanis, Quelbessen Belgis, Arbuscula humilis est, caudice tenui, albicante, cortice cincta nigricante, intus viridi, multisque geniculatis ramulis donato. Radix flavescens, rufo cortice tecta, odoris ac saporis sylvestris, & ingrati. Folia oblongo-rotunda, acuminata, in ambitu leviter crenata, lenia, supernè atro-viridia & splendentia, infernè subviridia ac lanuginosa; Nervis aliquot è media costa albicante, & in adversa parte ex tuberante in latera excurrentibus: odor & sapor sylvestris, ac ingratus. Flores inodori, viridi-albicantes, racematim ad foliorum alas in surculis proveniunt, calicique viridi tripartito inhaerent, tripetali; è tribus viz. oblongo-rotundis, acuminatis, expansisque foliolis constantes, medium occupante globulo viridi; è quo exsurgit atilus tenuis, oblongus, viridi-flavescentes, capitulo rotundo. Floribus pari modo succedunt Bacca oblongo-rotundae, tricoccae, virides, calycibus exceptae, tria intus continentes. Semina viridi-albicantia, amara, membranaceis pelliculis sejuncta, ita ut singula in singulis latitent loculamentis. Provenit variis Regni Malabarici locis, praesertim circa Repolyn, semper vivet, floret, fruget-que. Caeterum ex arboris floribus, fructibus, & cortice in oleo coctis linimentum paratur, quod capiti inunctum cephalalgiam sanare fertur. Folia recentia contusa, & parti erysipelate laboranti imposita id tollere dicunt." Jackson, in the Index Kewensis, suggests that this plant is a species of Croton in the Euphorbiaceae, and it is thus regarded by subsequent monographers of that family. The description and illustration certainly seem to exclude the Verbenaceae as even a possibility and point much more

strongly to the Euphorbiaceae. If Airy Shaw is correct in his disposition of the genus, then the original description and illustration must both be very faulty indeed! The Rodschiedia of Gaertner, Meyer, & Scherbius, by the way, is a synonym of Capsella Medic. in the Brassicaceae.

According to de Wit (1967) the members of this genus as a whole are reputed to possess aphrodisiac properties. Planer (1775) coins the German common name of "Burchardien" for members of the genus, while Rzedowski (1966) calls the Mexican members "elte" and "frute de chachalaca". A recent list of hosts for fungi records the fungi Aschersonia philippinensis, Atractilina callicarpae, Irenina callicarpae, and Kuehneola callicarpae as attacking members of the genus Callicarpa.

Chang (1951), in a very rare publication, proposes an entirely new division of the genus: Sect. 1. Eucallicarpa Chang — "Cymae pedunculatae, pedunculis 0.6--8 cm longis; flores parvi, absque staminibus circ. 2--3 mm longi; filamenta corolla saltem duplo longiora, antheris ovalibus 0.5--0.8 mm longis, longitudinaliter dehiscentibus; fructus vix ultra 2 mm diametro". Subsect. 1. Tubulosae Briq, emend. Chang, stat. nov. — "Calyx tubulatus vel cupulatus profunde dentatus, dentibus circ. 1--2 mm longis vel longioribus". Subsect. 2. Cyathimorphae (Briq.) Chang, stat. nov. -- "Calyx cupulato-truncatus vel brevissime denticulatus, dentibus triangularibus vix ultra 0.3 mm longis". Sect. 2. Verticirima Chang, sect. nov. — "Folia breviter petiolata; cymae brevissime pedunculatae; flores majores circ. 3--6 mm longi, filamentis corollam subaequantibus, antheris oblongis 1.5--2 mm longis poro apicali dehiscentibus; fructus 2--4 mm diametro".

Vidal y Soler (1885) cite Cuming 526, 1095, 1460, & 1778 as unidentified species of this genus. The Koelz 24567, distributed as Callicarpa sp., is actually Caryopteris grata Benth., Sayers N.G.F. 21559 is Geunsia cumingiana (Schau.) Rolfe, while Degener & Degener 28976 is not verbenaceous.

CALLICARPA ACULEOLATA Schau.

Additional bibliography: Hocking, Excerpt. Bot. A.12: 424. 1967; Moldenke, Phytologia 16: 358. 1968; Moldenke, Biol. Abstr. 49: 1325, 2769, & 7688. 1968.

Liogier describes this plant as a shrub, 1 m. tall, with white flowers in June, common on dry hillsides among rocks on limestone hills, at 150 m. altitude.

Additional citations: HISPANIOLA: Dominican Republic: Liogier 11815 (N, N, N, N, N, Rf).

CALLICARPA ACUMINATA H.B.K.

Additional synonymy: Callicarpa acummunata H.B.K. ex Moldenke, Résumé Suppl. 16: 17, in syn. 1968.

Additional bibliography: Roys, Tulane Univ. Mid. Am. Res. Ser. Publ. 2: [Ethno-bot. Maya] 306 & 319. 1931; H.-T. Chang,

Act. Phytotax. Sin. 1: 272 & 308. 1951; Moldenke, Phytologia 16: 358 & 452. 1968; Hocking, Excerpt. Bot. A.13: 569 & 571. 1968; Moldenke, Résumé Suppl. 16: 3 & 17 (1968) and 17: 2. 1968; Moldenke, Biol. Abstr. 49: 1325, 2769, & 5713. 1968.

Recent collectors describe this plant as a bush, shrub, or small tree, 4--30 feet tall, or even as a "vine", the stems 2--3 inches in diameter, the buds cream-colored or greenish-brown, the flowers small, white or whitish to creamy, and the fruit small, juicy, borne in clusters, at first green or yellow, then red or fuchsia, finally purplish-red or purple to black, flowering also in January and February and fruiting also in March, October, and December (in addition to the months previously reported), growing even at sealevel, inhabiting gravel bars, thickets, forests, rain forests, marshy rainforests, "often by native plantations", stabilized sand-dunes, salt-spray areas, old clearings, low forests, Quercus-Liquidambar woods, slopes with Heliocarpus, Croton, and Erythrina, cultivated land, low land near sealevel, and even the seacoast itself. It has been found in secondary forest vegetation, along rivers and along small rivers in barrios. Roys says that it is "abundant in forest and brush lands", while Molina reports it as "frequent in pinewoods and wet matorral" and "a common shrub 3 m. tall in wet thickets". Johnston reports it as an "abundant shrub in thickets" on San José island, while Duke describes it as a "common shrub even in roadways" on that island. The latter collector also comments that "this is fairly common in the lowlands [of Darién] but I have not seen it in the interior before".

The corollas are described as "white" by most collectors, as, for instance, on J. A. Duke 8515 & 12515, I. M. Johnston 6, Lewis, Escobar, MacBryde, Oliver, & Ridgway 2017, and H. von Wedel 2641 & 2980, as "whitish" on Bristan 1015 and H. von Wedel 1627, and as "greenish-yellow" on J. A. Duke 14612. Duke reports that this species is a very common shrub on Soskatupu island, where it produces fruits that are "at first whitish-lavender and erect, later black and pendulous like an elderberry" [Sambucus].

Additional vernacular names reported are "zacpucim", "zac-pucim", and "zac-puc-yim".

Material has been misidentified and distributed in herbaria as Solanum verbascifolium var. adulterinum (Ham.) Don. The R. Mc Vaugh 10489, cited below, may possibly better be regarded as C. pringlei Briq. The Burger & Liesner 6878, distributed as C. acuminata, actually is Aegiphila falcata Donn. Sm.

Additional citations: MEXICO: Chiapas: Breedlove 6488 (Ip); Ton 1396 (Mi, N). Quintana Roo: Roe, Roe, & Mori 1229 (Ac), 1339 (Ip), 1353 (Ip). San Luis Potosí: Kenoyer C.365 (Au--120853); R. Mc Vaugh 10489 (N); J. Rzedowski 10689a (Ip), 11067 (Ip). Tamaulipas: Barkley, Webster, & Paxson 864 (Au--169010); Martin & Harrell 6b (Ip); H. Puig 2875 (Ip); J. Rzedowski 10345 (Ip). Veracruz: Holguín s.n. [26/VI/1965] (Ip); Paxson, Webster, & Barkley 17M631 (Au-

169009). Yucatán: Arrington s.n. [27.IX.1964] (Au--243814); Steere 1004 (N). GUATEMALA: El Petén: Contreras 2705 (N), 5856 (W--2510401), 6128 (W--2558714). HONDURAS: Comayagua: A. Molina R. 8069 (N), 13016 (N), 13023 (N, W--2568205). Lempira: A. Molina R. 12959 (N, W--2567826). Olancho: A. Molina R. 13238 (N). Santa Bárbara: A. Molina R. 22052 (N). NICARAGUA: Bluefields: Proctor, Jones, & Facey 27272 (N). Zelaya: Bunting & Licht 1294 (N, W--2542895). COSTA RICA: Alajuela: A. Jiménez M. 755 (N), 3297 (N). PANAMA: Bocas del Toro: Lewis, Escobar, MacBryde, Oliver, & Ridgway 2017 (E--1887599, W--2545862); Wedel 167 (E--1218024), 218 (E--1217992), 1627 (E--1227544), 2641 (E--1240174), 2666 (E--1240124), 2980 (E--1244987). Coclé: J. A. Duke 13236 (E--1908619, E--1925851). Darién: Bristan 1015 (E--1908107, N); J. A. Duke 10152 (E--1887209), 14120 (E--1908122), 14240 (E--1925909), 14612 (E--1909161). Panamá: J. A. Duke 14512 (E--1908631). San Blas: Lewis, Dwyer, Elias, & Solís 115 (E--1881957, W--2589475). SAN BLAS ISLANDS: Colon: Wedel 71 (E--1218092). Columbus: Wedel 31 (E--1191581). Nakka: J. D. Dwyer 6877 (E--1824726, Ft--3197). Old Bank: Wedel 1895 (E--1232483). Soskatupu: J. A. Duke 8515 (E--1836331, Oh); T. S. Elias 1663 (E--1925954). PEARL ISLANDS: Saboga: Tyson 5580 (E--1980033). San José: J. A. Duke 12515 (E--1908633); I. M. Johnston 6 (E--1590823). COLOMBIA: Tolima: King, Guevara, & Forero G. 6018 (N). ECUADOR: Esmeraldas: Sparre 15330 (S). PERU: San Martín: Belshaw 3148 (N).

CALLICARPA ACUTIDENS Schau.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 272. 1951; Moldenke, Phytologia 14: 219. 1967.

CALLICARPA ACUTIFOLIA Chang, Act. Phytotax. Sin. 1: 284--285. 1951.

Additional & emended bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 272, 279, 284--285, 310, & 311. 1951; Moldenke, Phytologia 13: 467. 1966.

Because of the rarity (in libraries) of the journal in which this taxon was described, the original description is repeated herewith: "Frutex. Ramuli hornotini angulares sparse stellato-puberuli, annotini teretes brunneoli glabrescentes. Folia oblonga vel lanceolata 11--16 cm longa, 2--4 cm lata, apice acuminata, basi acuta, margine in parte 3/4 superiore minutissime crenato-denticulata, supra viridia glabra minutissime fulvo-glandulosa ad costam nervosque laterales utrinsecus 9--13 subtus elevatos prope marginem arcuato-anastomosantes simpliciter albido-puberula, subtus fulvo-viridia sparse stellato-puberula et luteo-glandulosa; petioli 1--1.5 cm longi, supra simpliciter pubescentes subtus glabri. Cymae supra-axillares 7--9 cm longae, 6--7 cm latae, septies dichotomae, pedunculis 3.5--5 cm longis minutissime

stellato-puberulis; bracteae lineari-lanceolatae parcissime puberuli circ. 5 mm longae; calyx 1 mm longus truncatus glaber, lobis inconspicuis; corolla glabra, tubo 2 mm longo, lobis 0.6 mm longis; stamina exserta, filamentis 4 mm longis, antheris 0.6 mm longis, longitudinaliter dehiscentibus; ovarium glabrum punctatum, stylo 5 mm longo. Fructus 1.5 mm diametro in sicco nigrescens farinoso-punctatus."

The species is based on C. Wang 37254 from Kwangtung, China, deposited in the herbarium of the Botanical Institute, Sunyatsen University, Canton, China. The author cites also H.-T. Chang 4727 and W. Y. Chun 7619 from the same province and claims that the species is related to C. longifolia Lam. and C. longissima Merr.

CALLICARPA AMERICANA L.

Additional synonymy: Callicarpa americana var. americana Burlage, Ind. Pl. Tex. 182. 1968.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 1, 2: 246. 1789; W. Bartram, Travels, ed. 1, 436 (1791) and ed. 2, 434. 1794; J. F. Gmel. in L., Syst. Nat., ed. 13, pr. 2, 2: 246. 1796; A. Gray, Man. Bot., ed. 2, pr. 1, 299 (1856), pr. 2, 299 (1858), and pr. 3, 299. 1859; A. Wood, Class-book, [ed. 42], pr. 1, 538. 1861; A. Gray, Man. Bot., ed. 3, 299 (1862) and ed. 4, pr. 1, 299. 1863; A. Wood, Class-book, [ed. 42], pr. 2, 538. 1863; A. Gray, Man. Bot., ed. 4, pr. 2, 299. 1864; A. Wood, Class-book, [ed. 42], pr. 3, 538 (1865) and pr. 4, 538. 1867; A. Gray, Man. Bot., ed. 5, pr. 1, 341 (1867) and pr. 2, 341. 1868; A. Wood, Class-book, [ed. 42], pr. 5, 538. 1868; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 1, 243 (1868) and pr. 2, 243. 1869; A. Wood, Class-book, [ed. 42], pr. 6, 538 (1869) and pr. 7, 538. 1870; A. Gray, Man. Bot., ed. 4, pr. 3, 299. 1870; A. Wood, Am. Bot. & Flor., ed. 1, pr. 1, 237 (1870), pr. 2, 237 (1871), and pr. 3, 237. 1872; A. Wood, Class-book, [ed. 42], pr. 8, 539. 1872; A. Wood, Am. Bot. & Flor., ed. 1, pr. 4, 237 (1873), pr. 5, 237 (1874), and pr. 6, 237. 1875; A. Wood, Class-book, [ed. 42], pr. 9, 539. 1876; A. Gray, Man. Bot., ed. 5, pr. 8, 341 (1878) and pr. 9 ["8"], 341. 1880; A. Gray, Field For. & Gard. Bot., ed. 1, pr. 3, 243. 1880; A. Wood, Class-book, [ed. 42], pr. 10, 539. 1881; Vesque, Ann. Sci. Nat. Paris, sér. 7, 1: 336, 340, 341, & 343. 1885; O. R. Willis in A. Wood, Am. Bot. & Flor., ed. 2, 237. 1889; S. Wats. & Coult. in A. Gray, Man. Bot., ed. 6, pr. 1, 403 (1889) and pr. 2, 403. 1890; L. H. Bailey in A. Gray, Field For. & Gard. Bot., ed. 2, 342. 1895; B. F. Bush, Garden & Forest 10: 515. 1897; Robinson & Fern. in A. Gray, Man. Bot., ed. 7, 690 & 891, fig. 883. 1908; D. H. Scott in Solereder, Syst. Anat. Dicot., transl. Boodle & Fritsch, 1: 631 & 633. 1908; Hottes, Book of Shrubs, ed. 1, 147 & 148. 1928; Parks, Tex. Agr. Exp. Sta. Bull. 551: 110—111. 1937; Hottes, Book of Shrubs, ed. 5, 168. 1950; H.-T. Chang, Act. Phytotax. Sin. 1: 270 & 272. 1951; Hottes, Book of Shrubs, [ed. 6, pr. 1], 168. 1952; Core, Pl. Tax. 402. 1955; Petrides, Field Guide Trees & Shrubs 62. 1958; Hottes, Book of Shrubs, [ed. 6, pr. 2], 168 (1958) and [pr. 3], 168. 1959; Martin & Brad-

ley, Seed Ident. Man. 115 & 195, pl. 132, fig. 261 & 792. 1961; W. H. Lewis, Southw. Nat. 6: 47—48. 1961; Hocking, Excerpt. Bot. A.4: 332 (1962) and A.6: 92. 1963; E. L. D. Seymour, Wise Gard. Encycl., ed. 6, 211. 1963; Radford, Ahles, & Bell, Guide Vasc. Fl. Carol. 282 & 283. 1964; Halls & Alcaniz, U. S. Forest Serv. Res. Note SO.28: 1—2. 1965; S. A. Manning, Syst. Guide Flow. Pl. 18 & 142. 1965; Thornberry, Agric. Handb. 165: 478. 1966; Justice & Bell, Wild Fls. N. C. 161 & 208. 1966; W. C. Grimm, Recog. Nat. Shrubs 254 & 255. 1966; Halls & Alcaniz, Bioresearch Index 1967: 246. 1967; Ornduff, Reg. Veg. 50: 86 & 124. 1967; E. Lawrence, South. Gard., ed. 2, 186. 1967; Bostick, Castanea 32: 150. 1967; Johnson & Little, U. S. Forest Serv. Res. Paper SO.26: 13. 1967; de Wit, Pl. World High. Pl. 2: 185. 1967; Hocking, Excerpt. Bot. A.11: 205 & 505. 1967; Burlage, Ind. Pl. Tex. 182, 193, 209, 210, 219, 224, & 231. 1968; Carter & Jones, Castanea 33: 203. 1968; Uphof, Dict. Econ. Pl., ed. 2, 96 & 352. 1968; Moldenke, Biol. Abstr. 49: 2769 & 7688. 1968; Moldenke, Résumé Suppl. 16: 2 & 17 (1968) and 17: [1]. 1968; Moldenke, Phytologia 16: 358—359, 366, 367, 384, 385, 388, 447, & 454. 1968; A. L. Moldenke, Phytologia 18: 114. 1969; J. V. Watkins, Fla. Landsc. Pl. [advertisement]. 1970; Amerson, Outdoor World 3 (5): 24. 1970.

Additional & emended illustrations: Martin & Bradley, Seed Ident. Man. 195, pl. 132, fig. 261 & 792. 1961; W. C. Grimm, Recog. Nat. Shrubs 254. 1966; Justice & Bell, Wild Fls. N. C. 161 [in color]. 1966; Amerson, Outdoor World 3 (5): 24 [in color]. 1970; J. V. Watkins, Fla. Landsc. Pl. [advertisement] [in color]. 1970.

G. T. Robbins describes this plant as having "stems 3—4 feet long, trailing over other vegetation in shady woods". The corollas are described as "pink" on Gillis 7114, "light-pink" on G. T. Robbins 2660, "pale lavender-pinkish" on Cronquist 5323, and "white" on C. H. Muller 8028. Cronquist describes the fruit (called "berries" by him, but they are drupes) as "brilliant wine-purple". Collectors have found the plant growing on sand dunes, in open pinewoods, at the edges of granite outcrops and at the edges of woods bordering granite outcrops. Tatnall refers to it as "frequent in pinewoods in the southern half of Northampton County, Virginia", while Voss found it "in [the] Austro-riparian Biotic Province, in sandy loam soil in pine-oak forest association, frequent to common in [this] area [San Jacinto County, Texas] and also to [the] east". Manning (1925) tells us that it grows in moist woods or thickets, is pollinated by insects, especially bees, and is cultivated in Europe. Lawrence (1967) points out again that the fruits of this species are more attractive than those of the commonly cultivated C. dichotoma (Lour.) K. Koch and C. japonica Thunb. It will grow well in gardens in wet or dry places, in open sunlight or in partial shade, and in any soil in our southern states. Radford, Ahles, & Bell (1964) record it from sandy or rocky woodlands, usually moist, throughout South Carolina and the central parts of North Carolina, infrequent in the piedmont of North Carolina, and rare in the mountains, flowering there

in June and July, fruiting from August to October.

Burlage says that "The berries [drupes!] are acidulous and astringent yet edible. The juice is slightly aromatic and has been used in dropsical conditions. It is also used as a fish poison." Uphof adds that the leaves are employed in the treatment of edema. Sturtevant records that the Seminole Amerinds use the root as a medicine and call the plant "kalá:cí:lá:pi". Bostick records it from Saint Clair County, Alabama. L. H. Lewis says that the chromosome number is n = 18, 2n = 36 and that the plant is apparently a tetraploid with the basic number of 9.

Thornberry (1966) lists the following fungi as attacking this plant: Atractilina callicarpae Dearn. & Barth. [leaves, Florida], Botryosphaeria callicarpae Cke. (?B. ribis Gross. & Dug.) [stems, Georgia & South Carolina], Cercospora callicarpae Cke. [leaves, South Carolina to Texas], Coniothyrium callicarpae Cke. [stems, South Carolina], Meliola cookeana Speg. [a black mildew, Florida, Louisiana, & Texas], Nectria cinnabarina Tode [stems, Alabama], and Physalospora obtusa (Schw.) Cke. [stems, South Carolina].

Additional citations: VIRGINIA: Princess Anne Co.: Sudworth s. n. [26 July 1890] (Mi). NORTH CAROLINA: Brunswick Co.: Flanders 1 (N). Carteret Co.: D. H. Nicholson 1769 (W--2440937). Harnett Co.: Radford & Stewart 630 (N). SOUTH CAROLINA: Aiken Co.: Radford 543 (N). Colleton Co.: Ahles & Bell 17859 (Se--199298). Fairfield Co.: C. R. Bell 9419 (N). GEORGIA: DeKalb Co.: Nunan s.n. [South. App. Bot. Club 19: 1830] (W--2433752). Rockdale Co.: Cronquist 4850 (Mi), 5323 (Mi). Thomas Co.: G. H. Morton 2673 (N). Wayne Co.: W. H. Duncan 7655 (N). FLORIDA: Broward Co.: Sturtevant 96 (W--2524664). Dade Co.: Gillis 7114 (Ft--2667); Stimson & Shafer 577 (W--2526663). Franklin Co.: Collector undetermined 55811 (Se--223416). Holmes Co.: G. H. Morton 2804 (N). Levy Co.: Janish & Janish 339 (Se--187170). Seminole Co.: P. O. Schallert 64 (Se--197241). ALABAMA: Jefferson Co.: E. L. Reed 1538 (Lk). MISSISSIPPI: Hancock Co.: Jones & Jones 12668 (N). TENNESSEE: County undetermined: A. Ruth s.n. [Kum, Sept. 1893] (Se--95714). MISSOURI: Taney Co.: J. A. Steyermark 69453 (N). OKLAHOMA: McCurtain Co.: Nelson, Nelson, & Goodman 5419 (Se--119728); G. T. Robbins 2648 (Se--153534), 2660 (N). TEXAS: Brazos Co.: H. B. Parks s.n. [Sept. 7, 1946] (Se--122696). DeWitt Co.: C. H. Muller 8028 (Mi). Jasper Co.: Cory 49833 (Mi). San Jacinto Co.: W. J. Voss 95 (Lk). CUBA: Pinar del Río; León 5106 (W--2289130). CULTIVATED: California: Jerabek s.n. [April 1945] (Sd--36093).

CALLICARPA AMERICANA var. LACTEA F. J. Muller

Additional & emended bibliography: Hocking, Excerpt. Bot. A. 11: 505. 1967; Moldenke, Phytologia 16: 359. 1968; Burlage, Ind. Pl. Tex. 182. 1968.

Rhieret describes this as a rare plant, with "ivory-white" fruits in October, growing in woods with the typical form.

Additional citations: LOUISIANA: Jefferson Island: Rhieret 16579 (W--2433196).

CALLICARPA AMPLA Schau.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 272. 1951; Moldenke, Phytologia 13: 497--498. 1966.

CALLICARPA ANGUSTA Schau.

Additional bibliography: Vidal y Soler, Phan. Cuming. Philip. 134. 1885; Moldenke, Phytologia 16: 359. 1968.

Additional citations: WESTERN PACIFIC ISLANDS: PHILIPPINE ISLANDS: Culión: H. H. Bartlett 15516 (Mi).

CALLICARPA ANGUSTIFOLIA King & Gamble

Additional bibliography: Moldenke, Phytologia 14: 220. 1967.

Additional citations: MALAYA: Perak: Scortechini 1596 (Se--198153--cotype).

CALLICARPA ARBOREA Roxb.

Additional synonymy: Callicarpa tomentosa Lam & Bakh. apud H.-T. Chang, Act. Phytotax. Sin. 1: 281, in syn. 1951. Calycarpha arborea Roxb., in herb.

Additional & emended bibliography: S. Kurz, Forest Fl. Brit. Burma 2: 274 & 589. 1877; Gamble, Man. Ind. Timb., ed. 1, 282. 1881; Diels in Engl., Bot. Jahrb. 29: 547. 1900; Gamble, Man. Ind. Timb., ed. 2, 525. 1902; Prain, Bengal Pl., pr. 1, 827. 1903; Troup, Silvicult. Indian Trees 2: 778--779. 1921; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 14 & 21--22. 1932; P. Dop in Lecomte, Fl. Gén. Indo-Chine 4: 792. 1935; Metcalfe & Chalk, Anat. Dicot. 1036, fig. 248 D. 1950; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 278, 281, & 311. 1951; Puri, Indian Forest Ecol. 1: 37, 165, 214, 223, 237, 260, & 290. 1960; Rolla, Bull. Bot. Surv. India 5: 188. 1963; Bhatnagar, Trop. Ecol. 7: 12. 1966; Panigrahi, Bull. Bot. Surv. India 8: 3 & 11. 1966; Subramanyam & Henry, Bull. Bot. Surv. India 8: 208 & 212. 1966; Hara, Fl. East. Himal. 16, 18, & 268. 1966; Hocking, Excerpt. Bot. A.11: 505 (1967) and A.12: 423. 1967; D. K. Das, Pakist. Journ. Forest. 18: 308 & 311. 1968; Moldenke, Résumé Suppl. 16: 9. 1968; Moldenke, Phytologia 16: 359-360, 364, 381, & 383. 1968; Moldenke, Biol. Abstr. 49: 2769 & 4199. 1968; Uphof, Dict. Econ. Pl., ed. 2, 96. 1968; K. C. Sahni, Indian Forest. 95: 333 & 346. 1969; Sawyer & Chermsirivathana, Nat. Hist. Bull. Siam Soc. 23: 126. 1969; M. A. Rau, Bot. Surv. India 10, Suppl. 2: 61. 1969.

King tells us that this species is a tree about 6 m. tall, with lavender flowers, growing in redbrown gravelly sandy-clay soil, in open sunlight in semidense dipterocarp forests with some trees to 20 m. tall, in Thailand; King 5458 is represented by a wood voucher. Sawyer & Chermsirivathana (1969) report it as "infrequent in phytocenose". Sahni (1969) calls it a "small tree, bark light or

sand-colored, very common from 608 to 612 m. altitude, growing gregariously", and cites Sahni 5065. Das (1968) reports the vernacular name "dhalahuza" and found the species growing along streams in association with Dendrocalamus hamiltonii, Imperata cylindrica, and Macaranga denticulata. Bhatnagar (1966) refers to it as a pioneer tree in open areas in Assam, growing along with Eupatorium odoratum, Macaranga denticulata, Mallotus albus, etc. Kingdon-Ward calls the species a small tree with violet flowers, growing "in forests and in second growth where it is common, and in thickets generally", at altitudes of 4000 to 6000 feet, in Manipur. Beusekom & Phengkhlai call it a "treelet a few m. tall, scattered, leaves pale-green beneath, flowers violet-pink, slightly scented, stigma white, anthers purplish", growing in poor sandy soil in open shrubby forests at 1000 m. altitude in Thailand. Troup (1921) describes the species as "A small or moderate sized tree with the branchlets, under sides of leaves, and inflorescences densely tomentose with soft stellate hairs. Wood moderately hard, even-grained, resembling that of Gmelina (Gamble). The tree is a familiar one in the eastern sub-Himalayan tract, where it springs up readily on burnt savannah lands when they first come under fire-protection; being a strong light-demander it soon becomes ousted by other trees. In Burma it comes up frequently in deserted taungya lands. The corymbose cymes of small lilac or purple flowers appear from April to June, and the fruit, a small drupe, ripens from August to November or sometimes later. Growth, according to Gamble, 5 rings per inch of radius, giving a mean annual girth increment of 1.26 in."

Hara (1966) gives the distribution of C. arborea as "Himalaya (Kumaon to Assam), Burma, Malaya, Indo-China, and S. China". Recent collectors give its height as 6 to 13 meters, record the vernacular name "bormalla", and have found it growing at altitudes of 608—2000 m. Puri (1960) claims that it reached Chota Nagpur through the Bengal plains, that an associate species in grassy areas is Pinus insularis, that it is fire-resistant, that it grows simultaneously with Acanthocephalus indicus in the Khair-sissu forests and along all the large rivers of northern India on new sandy or gravelly alluvium, but is short-lived, later being replaced by mixed forests, that it is very common on the Barren Islands in edaphic forests, that it grows in the second story of edaphic moist east Himalayan deciduous forests in Bengal and Assam, under Bombax malabaricum, Gmelina arborea, etc., in the North Indian Lower Alluvial Savannahs, and that in temperate grasslands vegetation it and Careya arborea form a loose association with the grass Sehima wallichii on the Shillong plateau otherwise almost devoid of trees. Uphof (1968) informs us that "In Hindu medicine a decoction of the bark is applied to cutaneous ailments; it is bitter, aromatic, tonic, and carminative".

Rolla (1963) reports the species as common in Sikkim; Panigrahi (1966) tells us that it is scarce in the forests of Bihar; while Subramanyam & Henry (1966) found it in the evergreen forests

on the higher slopes in Madhya Pradesh, India. Panigrahi cites Panigrahi 11898 from Bihar, while Subramanyam & Henry cite 12138 from Madhya Pradesh. Balakrishnan (1964) describes the drupes as "purplish-black". Panigrahi and his associates (1964) speak of a Xylia xylocarpa - Callicarpa arborea - Polyalthia cerasoides association in the semi-evergreen forests of Orissa, where, they aver, Callicarpa arborea is abundant.

Chang (1951) cites A. Henry 12093 as C. arborea and also nos. 5231, 55169, 60404, 60846, 61029, 61166, & 65995 of collectors or herbaria named by him, unfortunately, only in Chinese characters. The Callicarpa vastifolia Diels, cited by him as a synonym of C. arborea, is actually in the synonymy of Viburnum rhytidophyllum Hemsl. in the Caprifoliaceae. The Degener & Degener 28448, distributed as C. arborea and so previously cited by me, is actually C. macrophylla Vahl.

Additional citations: INDIA: Manipur: Kingdon-Ward 17465 (N). THAILAND: Beusekom & Phengkhlai 1252 (Ac); R. M. King 5458 (W—2435994).

CALLICARPA ARBOREA var. PSILOCALYX (H. J. Lam) Moldenke

Additional bibliography: Vidal & Soler, Phan. Cuming. Philip. 134. 1885; Moldenke, Phytologia 15: 16. 1967.

CALLICARPA AUSTRALIS Koidz.

Additional bibliography: Masam., Sci. Rep. Kanazawa Univ. 4: 46. 1955; Moldenke, Phytologia 16: 360 & 373. 1968.

Masamune (1955) joins Nakai, Hara, and Ohwi (as previously noted in this series of papers) in reducing this taxon to synonymy under C. japonica var. luxurians Rehd.

CALLICARPA BARBATA Ridl.

Additional bibliography: Moldenke, Phytologia 16: 360. 1968; B. L. Burtt, Notes Roy. Bot. Gard. Edinb. 29: 141—155. 1969; Brentzel, Biol. Abstr. 51: 1571. 1970.

Van Steenis (1967) states that this species is related to C. fulvohirsuta Merr., C. havilandii (King & Gamble) H. J. Lam, C. involucrata Merr., C. saccata Steen., and C. superposita Merr.

CALLICARPA BICOLOR A. L. Juss.

Additional bibliography: Hocking, Excerpt. Bot. A.12: 425. 1967; Moldenke, Phytologia 16: 360—361. 1968; Moldenke, Biol. Abstr. 49: 2290. 1968.

Material of this species has been misidentified and distributed in herbaria as C. candicans (Burm. f.) Hochr. The Elmer 18086, previously reported by me in this series of notes as C. erioclona Schau., is, in part at least, C. bicolor. Kjellberg reports the fruit of C. bicolor as violet-black in color when fresh. The species has been collected in anthesis in September.

Additional citations: WESTERN PACIFIC ISLANDS: PHILIPPINE IS-

LANDS: Luzon: H. H. Bartlett 14711 (Mi); Elmer 18086, in part (Ca—270774). INDONESIA: GREATER SUNDA ISLANDS: Buton: Kjellberg 96 (S, S).

CALLICARPA BICOLOR var. BERMEJOSI Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.12: 425. 1967; Moldenke, Phytologia 16: 361. 1968; Moldenke, Biol. Abstr. 49: 2290. 1968.

CALLICARPA BICOLOR var. SUBINTEGRIFOLIA Moldenke

Additional bibliography: Hocking, Excerpt. Bot. A.12: 425. 1967; Moldenke, Phytologia 16: 361. 1968; Moldenke, Biol. Abstr. 49: 2290. 1968.

CALLICARPA BODINIERI Léveillé

Additional synonymy: Callicarpa sequint Lévl. apud H.-T. Chang, Act. Phytotax. Sin. 1: 288, sphalm. 1951. Callicarpa bodnieri (Hesse) Rehd. ex Glasau, Sommergr. Ziergeh. 64, sphalm. 1967.

Additional bibliography: Lévl., Fl. Kouy-Tchéou 439--440. 1915; Dop, Trav. Lab. For. Toulouse 1 (21): 12. 1932; Worsdell, Ind. Lond. Suppl. 1: 160. 1941; T. H. Everett, Cat. Hardy Trees & Shrubs 16. 1942; H.-T. Chang, Act. Phytotax. Sin. 1: 270, 271, 279, 288, 292, 305, 310, & 311. 1951; Zaugg & Coaz, Dec. Trees & Shrubs [transl. Edlin] pl. 11. 1960; Hocking, Excerpt. Bot. A.12: 423. 1967; Glasau, Sommergr. Ziergeh. 64. 1967; de Wit, Pl. World High. Pl. 2: 185 & 186, fig. 161. 1967; Moldenke, Phytologia 16: 361--362 & 367. 1968; Moldenke, Résumé Suppl. 16: 17 (1968) and 17: 7. 1968; Uphof, Dict. Econ. Pl., ed. 2, 96. 1968.

Additional illustrations: de Wit, Pl. World High. Pl. 2: 186, fig. 161. 1967.

Recent collectors describe this plant as a medium-sized shrub, 2--7 feet tall, with fragrant flowers and glossy-purple fruit. It has been collected in flower in January and in fruit in March (in addition to the months previously reported). The corollas are described as "pink" on Tsang 27835 and as "mauve" on Sykes 7/65. Tsang reports the plant as "fairly common" in clay soil in thickets and in meadows. Uphof (1968) informs us that it it used in Chinese medicine as an emenagogue and in the treatment of blenorrhoea.

Material has been misidentified and distributed in herbaria as C. bodinieri var. giraldii (Hesse) Rehd. and as C. japonica var. rhombifolia H. J. Lam. Sykes 7/65 bears a notation "cultivated as var. giraldii but seemingly too hairy for it", presumably by the collector.

Chang (1951) regards C. tonkinensis Dop as conspecific with and a synonym of C. bodinieri. He cites A. Henry 3107 and E. H. Wilson 1528, as well as nos. 22, 159, 847, 1112, 1301, 1338, 1350, 2258, 4471, 4570, 5596, 10081, 10342, 13530, 22634, 27740, 27835,

27963, 45459, 50269, 50734, 51236, 52017, 81789, 83645, & 130327 of collectors or herbaria whose names, unfortunately, are given only in Chinese characters.

Additional citations: CHINA: Kwangsi: W. T. Tsang 27835 (Ca--1286196), 27963 (Ca—1286201). Yünnan: J. F. Rock 9195 (Ca—327974). CULTIVATED: New Zealand: W. R. Sykes 7/65 [Herb. Bot. Div. D.S.I.R. 156005] (Rf, Z), 636/65 (Nz—157632a).

CALLICARPA BODINIERI var. GIRALDII (Hesse) Rehd.

Additional synonymy: Callicarpa bodinieri var. giraldii Rehd. ex H.-T. Chang, Act. Phytotax. Sin. 1: 271. 1951. Callicarpa bodinieri giraldii Blackburn, Trees & Shrubs East. N. Am. 103. 1952. Callicarpa geraldii Hesse ex Hirata, Host Range & Geogr. Distrib. Powd. Mild. 276. 1966. Callicarpa bodnieri var. giraldii (Hesse) Rehd. ex Glasau, Sommergr. Ziergeh. 64, sphalm. 1967.

Additional bibliography: Worsdell, Ind. Lond. Suppl. 1: 160. 1941; Hottes, Book of Shrubs, ed. 5, 168. 1950; H.-T. Chang, Act. Phytotax. Sin. 1: 271, 280, 289—290, 292, 305, 310, & 311. 1951; Hottes, Book of Shrubs, [ed. 6, pr. 1], 168 (1952), [pr. 2], 168 (1958), and [pr. 3], 168. 1959; Zaugg & Coaz, Dec. Trees & Shrubs [transl. Edlin] pl. 11. 1960; E. L. D. Seymour, Wise Gard. Encycl., ed. 6, 211. 1963; Hirata, Host Range & Geogr. Distrib. Powd. Mild. 276. 1966; Glasau, Sommergr. Ziergeh. 64. 1967; Moldenke, Phytologia 16: 361—362, 367, 371, & 377. 1968; Moldenke, Résumé Suppl. 16: 17. 1968.

Additional illustrations: Zaugg & Coaz, Dec. Trees & Shrubs [transl. Edlin] pl. 11 [in color]. 1960.

Zaugg & Coaz (1960) tell us that this plant is only hardy in sheltered districts, requires a warm sheltered spot and deep rich well-worked soil, and produces mauve waxy fruits all winter.

Chang (1951) cites Lévl., Cat. Pl. Yunn. (1917) and "p. 297". He cites M. Chan 1060, G. Forrest 7556, Handel-Mazzetti 6317, 8691, & 9045, L. Y. Lin 4129, C. Y. Luh 1093, E. E. Maire 133, T. P. Wang 900 & 2154, and E. H. Wilson s.n., as well as nos. 23, 116, 223, 598, 682, 914, 923, 1652, 1887, 1963, 2761, 2990, 3204, 4082, 4648, 5265, 5453, 5719, 6394, 7653, 7918, 8402, 10115, 12095, 12180, 12836, 13273, 15711, 18036, 20717, 40920, 43372, 52221, 58931, & 59184 of collector or herbaria whose names are given only in Chinese characters.

The E. D. Merrill 11112, distributed as this variety, is actually C. japonica var. angustata Rehd.

Additional citations: CHINA: Kiangsu: Herb. Univ. Nanking 1095 (Ca—230385).

CALLICARPA BODINIERI var. LYI (Lévl.) Rehd.

Additional bibliography: Hand.-Mazz., Anzeig. Akad. Wiss. Math.-nat. Wien 58: 230. 1921; H.-T. Chang, Act. Phytotax. Sin. 1: 279, 289, & 311. 1951; Moldenke, Phytologia 15: 18--19. 1967.

Chang (1951) agrees with Rehder in placing C. grisea Hand.-Mazz.

in the synonymy of this variety. He cites Courtois 23509 as well as nos. 179, 1012, 1235, 1531, 3385, 3388, & 3415 of collectors and/or herbaria whose names are given only in Chinese characters.

CALLICARPA BODINIERI var. ROSTHORNII (Diels) Rehd.

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 279, 289, & 311. 1951; Moldenke, Phytologia 15: 19 & 39. 1967.

Chang (1951) cites only a no. 10129 of a collector or herbarium whose name he gives only in Chinese characters.

CALLICARPA BRACTEATA Dop

Additional bibliography: Hocking, Excerpt. Bot. A.12: 423. 1967; Moldenke, Phytologia 14: 221. 1967; Moldenke, Biol. Abstr. 49: 4199. 1968.

CALLICARPA BREVIPES (Benth.) Hance

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 271, 272, 299, 300, 302, 303, 306, 307, 311, & 312. 1951; Tingle, Check List Hong Kong Pl. 37. 1967; Moldenke, Phytologia 16: 362, 371, & 453. 1968.

Chang (1951) cites the Forbes & Hemsley (1890) reference as page "252" and the Hance (1873) reference as volume "8". He also cites the following numbered specimens: 151, 199, 6803, 8626, 9901, 20166, 21643, 21713, 22495, 22579, 25123, 27262, 28853, 31032, 33985, 36848, 38085, 41191, 62467, 64235, 72825, 74230, & 81075, but the collector and/or herbarium names are given only in Chinese characters, as are also the localities of collection. He reduces C. brevipes f. serrulata P'ei to synonymy here.

CALLICARPA BREVIPES var. DENTOSA Chang, Act. Phytotax. Sin. 1: 300--301. 1951.

Synonymy: Callicarpa dentosa Chun ex H.-T. Chang, Act. Phytotax. Sin. 1: 300 & 301, in syn. 1951. Callicarpa dentonsa Chang ex Moldenke, Résumé Suppl. 18: 8, in syn. 1969. Callicarpa brevipes var. dentonsa Chang ex Moldenke, Résumé Suppl. 18: 7, sphalm. 1969.

Bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 299--301 & 312. 1951; Moldenke, Résumé Suppl. 18: 7 & 8. 1969.

Because the original is found in so few libraries, it is worth repeating Chang's original description here: "Frutex 1--2 m altus. Ramuli sparse stellato-pubescentes. Folia oblongo-elliptica 16 x 6 cm, interdum oblonga 25 x 7.5 cm, apice acuta basi late cuneata, subtus costis nervisque exceptis glabra, petiolis 6--15 mm longis. Cymae brevissime pedunculatae, pedunculis circ. 4 mm longis, pedicellis in flore 1.5 mm longis, in fructu 3 mm longis. Flores albi; calyx glaber truncatus; corolla 3.5 mm longa; filamenta corolla subaequilonga, antheris 1.5 mm longis poro apicali dehiscentibus; ovarium glabrum. Fructus 3 mm diametro."

The variety is based on C. Wang 30615b from Canton, Kwangtung, China, and is deposited in the herbarium of the Botanical Insti-

tute, Sunyatsen University, Canton. He cites also M. Chun 3557, H. Y. Liang 60877, P. H. Liang 84462, and L. Teng 8396 from the same province and compares the variety with the typical form of C. brevipes (Benth.) Hance and with C. tingwuensis Chang, to which species it is apparently related.

CALLICARPA BREVIPES var. OBOVATA Chang, Act. Phytotax. Sin. 1: 301--302. 1951.

Bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 299, 301--302, & 312. 1951.

The original description of this taxon as given by Chang (1951) reads as follows: "Frutex 3 m altus. Ramuli juveniles stellato-pubescentes. Folia chartacea subsessilia obovata 7--12 cm longa, 3.5--5.5 cm lata, apice abrupte acuminata vel acuta, basi subcordata, utrinque glabra, subtus glandulosa ad costam stellato-pubescentia, margine prope apicem denticulata; nervi laterales utrinsecus 7--9. Cymae brevissime pedunculatae; calyx 2.5--3 mm longus, parce stellato-pubescens, lobis subtruncatis; tubus corollae calice paulo longior, lobis circ. 1 mm longis; stamina paulo exserta, filamentis corolla subaequilongis, antheris 1.5 mm longis, poro apicali dehiscentibus. Fructus circ. 4 mm diametro".

The variety is based on S. K. Lau 28117 from Hainan Island and is deposited in the herbarium of the Botanical Institute, Sunyatsen University, Canton, China.

CALLICARPA BREVIPES f. SERRULATA P'ei

Additional bibliography: H.-T. Chang, Act. Phytotax. Sin. 1: 300. 1951; Moldenke, Phytologia 14: 102--104. 1966.

Chang (1951) reduces this taxon to synonymy under typical C. brevipes (Benth.) Hance.

CALLICARPA BREVIPETIOLATA Merr.

Additional bibliography: Moldenke, Phytologia 16: 362. 1968.

The corollas are described as "purple" on Kingdon-Ward 17640. The plant has been collected in anthesis in November (in addition to the months previously reported) and in fruit in June and November. Another vernacular name recorded for it [from Sumatra] is "doehoet hapoer-hapoer".

Additional citations: INDIA: Manipur: Kingdon-Ward 17640 (N). INDONESIA: GREATER SUNDA ISLANDS: Sumatra: Boeea 6049 (N); Hamel 424 (Mi).

CALLICARPA CANDICANS (Burm. f.) Hochr.

Additional & emended bibliography: Gamble, Man. Ind. Timb., ed. 1, 283. 1881; Vidal y Soler, Phan. Cuming. Philip. 134. 1885; Dop in Lecomte, Fl. Gén. Indo-Chine 4: 793. 1935; H.-T. Chang, Act. Phytotax. Sin. 1: 276, 279, 285, & 311. 1951; Hocking, Excerpt. Bot. A.12: 423 & 424. 1967; Moldenke, Biol. Abstr. 49: 4199. 1968; Uphof, Dict. Econ. Pl., ed. 2, 96. 1968; Moldenke, Résumé Suppl. 16: 11 & 17. 1968; Moldenke, Phytologia 16: 362--364, 367, 381, 384, 385, 387, 388, 447, 449, & 454. 1968.

BOOK REVIEWS

Alma L. Moldenke

"THE FLOWERING WORLD OF 'CHINESE' WILSON" by Daniel J. Foley, xv & 334 pp., illus., Macmillan Company, New York, New York 10022. 1969. $8.95.

"This is a book for plant-lovers who garden with a purpose -- to grow those ornamentals which are superior for their flowers, their fruits, and their foliage, as well as the unique forms which they assume." Actually the appeal is much greater so as to include all plant-lovers, those interested in the Orient and those interested in biographies.

Foley, himself an excellent leader in horticulture, considers Ernest Henry Wilson "the most intrepid plant hunter of the early twentieth century" who made several forays deep into the Far East mostly for the Arnold Arboretum and returned with over a thousand exotics that have become established in the gardens of the New World and Europe.

In reference to the many severe hardships Wilson had to endure, his answer was "But such count for nothing, since I have lived in nature's boundless halls and drank deeply of her pleasures. To wander through a tropical or temperate forest with tree trunks more stately than Gothic columns, beneath a canopy of foliage more lovely in its varied forms than the roof of any building fashioned by man, the welcome cool, the music of the babbling brook, the smell of mother earth, and the mixed odors of a myriad of flowers -- where does hardship figure when the reward is such?"

This very interesting and valuable book starts with a welldone biographical sketch of "Chinese" Wilson, continues with excerpts from his books delineating the fascinating adventures involved in these botanical collecting trips, and finishes with a brief description of several of "Wilson's Plant Treasures", including species of Kolkwitzia, Davidia, Buddleia, Cotoneaster, Forsythia, Stewartia, Rosa and Lilium.

There are several attractive black/white photographs of these and other plants.

The book reads charmingly and easily. The text is marred only by spelling errors, such as lush on p. 186, villosa on p. 188, edelweiss on p. 236, and Buxus on p. 298.

"POPULATION, RESOURCES, ENVIRONMENT: ISSUES IN HUMAN ECOLOGY" by Paul R. & Anne H. Ehrlich, 383 pp., illus., W. H. Freeman & Company, San Francisco, California 94104. 1970. $8.95.

Like the senior author's now widely read "Population Bomb", this so very important book tells in a more scientifically detailed and updated manner the horror story man inexorably is facing

and will face unless he makes concerted effective efforts to husband the few remaining natural resources, to live in as much harmony as possible with his environment, and to control human proliferation. "No geological event in a billion years -- not the emergence of mighty mountain ranges, nor the submergency of entire subcontinents, nor the occurrence of periodic glacial ages -- has posed a threat to terrestrial life comparable to that of human overpopulation."

There is almost no end to intelligent concrete suggestions for implementing desired goals — and the naive hope based on "green revolution" is not one of them!

This valuable source book is planned to serve students, teachers and general readers. Among them it is hoped that there will be our political and economic leaders who need to be equipped with this information. The authors affirm that their primary purpose is "to inform and convince [the readers] about the elements and dimensions of the environment crisis, rather than merely to frighten or discourage them." There are annotated bibliographies at the end of chapters as well as a general bibliography and index.

"BIOLOGY AND THE FUTURE OF MAN" edited by Philip Handler, ix & 936 pp., illus., Oxford University Press, London, Toronto & New York, 10016. 1970. $12.50.

Sponsored by the National Academy of Sciences, edited by its president, and written by panels of scientists on their own fields, this very valuable and comprehensive book provides content summaries, prime scientific problems, trends for the future, and all-told a full overview of our current understanding of the life sciences. It is written not as an encyclopedic text nor in highly specialized terms, but rather for well-read scientists and the educated public.

"The greater service the report can render is to share with its readers your sense of values as well as your love and enthusiasm for the pursuit of understanding of life in all its ramifications". So the scientists were "charged"; most of them have succeeded.

The first half of the book deals "with living phenomena at increasingly higher levels of organization -- molecules, subcellular organelles, cells, tissues and organs, organisms, species, and ecosystems." A whole chapter is devoted to the digital computer because the committee members believe that "is on the verge of effecting as remarkable a transformation of the life sciences as it has in the physical sciences." The second half of the book develops "a series of illustrations of the manner in which understanding of living phenomena have been put to work in the service of man. The final chapter, written mostly by Handler, gives the book its title, states the nature of man and the great hazards, as well as the great opportunities, which he faces.

The greatest defect in this otherwise excellent contribution to our biological understanding is a sin of omission -- no index!

There are also minor sins of commission in misspellings of Puccinia on p. 597 and 605, segmental on p. 343, mitochondrion on p. 247 and sincere on p. viii.

This carefully prepared work might be put to special use as required reading for graduating seniors in a college major program in any of the phases of biology or for graduate students in any of the phases of biology as they prepare for advanced degrees.

"PRINCIPLES AND METHODS OF PLANT BIOSYSTEMATICS" by Otto T. Solbrig, xiii & 226 pp., illus., Collier-Macmillan Ltd., London, & Macmillan Company, New York, N. Y. 10022. 1970. $9.95.

This valuable and needed book introduces this relatively new and encompassing field of biosystematics as defined in the enlightened glossary as "the application of genetics, cytology, statistics and chemistry to the solution of systematic questions in order to provide explanations about the diversity of organisms within the frame of the theory of evolution."

The book is divided into two parts. Part I, after an historical introduction, considers evolution especially at the population level, patterns of phenetic variations, varieties of breeding systems, speciation, hybridization, and species classification problems. Part II describes such techniques for the studies of species and their populations as have been successfully developed in genetics, cytology, chemistry and statistics. Throughout this work the outstanding contributions of field observation, of experiments and of thought have been summarized effectively and their authors recognized. This then is an excellent text to add to any of our outstanding books on plant classification for such a college course under whatever name. It also provides stimulating, informative material for the biologically-trained, the biologically-inclined, and the intelligent general reader.

"Man has so far paid too little attention to his environment and the way he has been modifying it. Polluted air, polluted water, and sterile soil over ever increasing surfaces of the earth are clear signs that such a situation cannot continue. To proceed intelligently, we must first know what forces have shaped the environment we call natural. Here is where the knowledge of the biosystematist is needed."

Index to Authors in Volume Twenty

Adams, C. D., 309
Agostini, G., 1, 401
Amaratunga, K. L. D., 452
Beckner, J., 217
Cuatrecasas, J., 465
Eiten, L. T., 273
Goodland, R. J. A., 57
Handro, O., 390
Kasapligil, B., 446
King, R. M., 193, 196, 210, 213, 332
Koyama, T., 218, 449
Little, E. L., Jr., 429
Miller, H. A., 315
Moldenke, A. L., 53, 214, 270, 325, 391, 500
Moldenke, H. N., 4, 78, 81, 242, 244, 277, 338, 339, 404, 482
Parker, K. F., 192
Robinson, H., 184, 193, 196, 210, 213, 329, 332, 334
Rudd, V. E., 324, 426
Smith, L. B., 121, 390
Wurdack, J. J., 369

Index to supra-specific scientific names in Volume Twenty

Abildaardia, 461
Abrus, 454
Acanthaceae, 71, 459
Acanthocephalus, 494
Acanthococos, 63, 76
Achyrocline, 72
Acinodendron, 379
Aciotis, 372
Acisanthera, 76
Acrocomia, 63, 76
Actinostemon, 309
Adelobotrys, 372, 373
Aechmea, 178, 183
Aegiphila, 78
Aerobia, 121
Aeschynomene, 75, 454
Aganon, 486
Ageratina, 197, 332
Ageratum, 72
Agonandra, 66, 76
Agyneia, 455
Alibertia, 58, 62, 77
Alismales, 328
Alismataceae, 1, 3
Allagoptera, 63, 76
Allardtia, 158-173
Alternanthera, 71
Amaranthaceae, 71
Amasonia, 78
Amblyarrhena, 386
Anacardiaceae, 71
Anacardium, 71
Ananas, 67, 72
Andira, 61, 75
Andropogon, 59, 63, 74
Aneilema, 463
Anemopaegma, 71
Aniseia, 457
Anneslia, 310
Annona, 59, 71
Annonaceae, 57-60, 71
Anona, 452, 454, 455, 457-459
Anonaceae, 452
Anoplophytum, 121, 158, 159, 161, 164, 165, 167-171, 173
Antonia, 67, 75
Apocynaceae, 59, 71, 457
Aponogeton, 459
Aponogetonaceae, 459
Aquifoliaceae, 65, 71
Araliaceae, 65, 71
Araucaria, 325
Arbutus, 80
Ardisia, 403
Aristida, 63, 74
Aristolochia, 65, 71
Aristolochiaceae, 65, 71
Arrabidaea, 72
Arundinella, 459

Aschersonia, 487
Asclepiadaceae, 67, 71, 457
Asparagus, 463
Aspidosperma, 59, 71
Aspilia, 72
Aster, 72, 197
Asteriscium, 184-186, 188, 191
Astronium, 71
Ateramnus, 309
Atractilina, 487, 492
Attalaea, 63
Attalea, 76
Austroeupatorium, 334
Axinaea, 373, 374
Axonopus, 59, 63, 64, 74
Ayapana, 210-213, 333
Ayenia, 309, 310
Azorella, 325
Baccharis, 59, 61, 72, 212
Bacopa, 458
Baepalanthus, 287
Balanophoraceae, 65, 71
Balsaminaceae, 455
Banisteria, 75
Banisteriopsis, 75
Barbula, 184-191
Barjonia, 67, 71
Bauhinia, 58, 59, 61, 74, 426
Bauhiniae, 426
Befaria, 82
Bernardia, 73
Bidens, 72
Bignoniaceae, 57, 59, 60, 67, 71
Bisboeckelera, 275
Blastocaulon, 244, 245, 340, 423
Blastocaulum, 244
Blepharidophyllum, 321
Blephariglottis, 217
Bombacaceae, 72
Bombax, 72, 494
Bonnaya, 458
Boraginaceae, 72
Borreria, 59, 62, 77
Botryosphaeria, 492
Bowdichia, 61, 75
Brassicaceae, 487
Bredemeyera, 77
Brocchinia, 260
Bromelia, 72
Bromeliaceae, 72, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183
Brosimum, 76
Browallia, 392
Brunfelsia, 392
Buchnera, 65, 77
Buddleia, 500
Bulbostylis, 59, 73
Bumelia, 82
Bursera, 72
Burseraceae, 72
Butia, 63, 76
Byrsonima, 59, 60, 75, 76
Byttneria, 77
Cabralea, 76
Cactaceae, 72, 327
Cadieae, 426
Caesalpiniaceae, 310
Caesalpiniae, 426
Caesalpinioideae, 59, 74
Calea, 72
Calliandra, 310
Calliathron, 398
Callicarpa, 482, 483, 485-499
Callicarpus, 482
Callisthene, 60, 70
Calocarpus, 482, 486
Calolisianthus, 73
Calophysa, 389
Calycarpha, 493
Calyptrella, 374
Camarea, 76
Campomanesia, 76
Camptochaete, 329
Campuloclinium, 210
Capaponia, 65, 73
Caprifoliaceae, 495
Capsella, 487
Capsicum, 391
Cardiopetalum, 71
Carex, 218-241

Careya, 494
Carptotepala, 245, 246, 297, 340, 341
Caryocar, 66, 72
Caryocaraceae, 57, 66, 72
Caryophyllaceae, 65, 72
Caryopteris, 487
Casearia, 73
Cassia, 58, 59, 61, 74, 75, 310, 311
Cassytha, 74, 452
Catocoryne, 387
Cecropia, 76, 465-467
Celastraceae, 72
Centianaceae, 457
Centrosema, 58, 61, 75
Ceratiomyxomycetidae, 326
Cercospora, 492
Chamaecrista, 310, 311
Chamaecyparis, 216, 430-432
Chamaegyne, 273, 274
Chaptalia, 72
Chastanaea, 373, 374
Chloris, 64, 74
Chlorophycophytina, 395
Chlorophyta, 395
Chochlospermaceae, 57
Chromolaena, 193, 196-209
Chrysobalanaceae, 72
Chrysophyllum, 77
Cipura, 74
Cissampelos, 76
Cistus, 216
Cladocaulon, 287
Clechoma, 74
Clerodendron, 338, 458
Clerodendrum, 338, 400
Clidemia, 375, 377, 385, 387-389
Clitoria, 61, 75
Cochlospermaceae, 66, 72
Cochlospermum, 66, 72
Coccoloba, 65, 77
Cocoideae, 62
Comanthera, 246
Combretaceae, 72
Combretum, 72
Commelina, 65, 72
Commelinaceae, 65, 72, 463
Commelinales, 328
Comolia, 370
Comomyrsine, 401, 402
Compositae, 57-61, 67, 72, 192, 193, 195, 196, 209, 210, 212-214, 332-334, 337, 338, 410, 459
Coniothyrium, 492
Connaraceae, 73
Connarus, 73
Conomorpha, 401-403
Convolvulaceae, 73, 392, 457
Copeifera, 61, 75
Copernicia, 62
Corallinaceae, 398
Corallinoideae, 398
Cordia, 72
Cotoneaster, 500
Couepia, 72
Crataegus, 216
Cremanium, 379, 385
Critonia, 197
Crotalaria, 61, 75
Croton, 73, 486, 488
Crumenaria, 77
Cryptopyxis, 329
Ctenium, 74
Cucurbitaceae, 65, 73
Cupania, 77
Cuphea, 75
Cupressaceae, 429
Cupressus, 216, 429-443, 445
Curatella, 73
Cyathimorphae, 487
Cybianthus, 401, 402
Cybistax, 72
Cylindrocephala, 193, 196, 197
Cyperaceae, 31, 57-59, 73, 273, 275, 276, 460
Cyperus, 73, 460, 461
Cypripedium, 249
Dalbergia, 61, 75, 454
Dalbergieae, 426
Dalechampia, 73

Dasyphyllum, 72
Davidia, 500
Davilla, 73
Declieuxia, 77
Dejanira, 73, 74
Dendrocalamus, 494
Desmatodon, 188
Desmodium, 61, 75, 454, 455
Diaphoranthema, 158-160, 162, 164, 166-169, 172, 173
Dichromena, 73
Dictyota, 391
Didymodon, 188, 189
Didymopanax, 65, 71
Diectomia, 74
Dilleniaceae, 73, 456
Dilodendron, 77
Dimeria, 459
Dimerostemma, 72
Dimorphandra, 61, 74
Diodia, 77
Diospyros, 66, 73
Diplacrum, 275, 461
Diplothemium, 63
Dipterocarpus, 410
Dipteryx, 75
Diptychandra, 67, 74
Ditassa, 71
Drosera, 454
Droseraceae, 454
Drosophila, 326
Duguetia, 71
Dupata, 287
Dupatya, 41, 87, 92, 93, 96, 97, 104, 105, 110, 113-115, 117, 119, 120, 245, 249, 252, 253, 255-257, 259, 263, 287, 294, 302, 303, 307, 308, 350, 352, 356, 357, 359, 360, 364, 415, 420, 422, 424, 425
Dyckia, 58, 67, 72, 178, 179, 183
Ebenaceae, 66, 73
Echinodorus, 2
Echinolaena, 63, 64, 74
Echinosteliales, 326
Egleria, 276
Eleocharis, 273-276, 357, 461
Elephantopus, 72
Eleutherandra, 262
Elionurus, 74
Embryophytina, 395
Emmotum, 65, 74
Encholirium, 178, 180, 183
Encyclia, 217
Enterolobium, 75
Epidendrum, 217
Eragrostis, 63, 74
Eremanthus, 62, 67, 72
Eriaucolon, 5, 8
Ericaceae, 393
Eriocaulaceae, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 81-83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105-109, 111, 113, 115, 117, 119, 242, 244, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 361, 363, 365, 367, 404, 405, 407, 409, 411, 413, 415, 417, 419, 421, 423, 425 463
Eriocaulon, 5-32, 35-37, 39, 41, 42, 47-50, 52, 82, 83, 86, 92-96, 99, 104-108, 113, 114, 119, 120, 246-248, 250, 253-257, 259, 263-265, 267, 268, 277, 278, 280, 281, 283, 284, 287, 294, 295, 297, 302, 303, 307, 341-351, 356, 357, 364, 404-418, 420, 422-425, 463
Eriocavlon, 341, 348
Eriope, 74
Eriosema, 58, 59, 61, 75
Eriotheca, 72
Erocauloneae, 4
Eryngium, 65, 66, 78
Erythrina, 75, 488
Erythrophyllopsis, 191
Erythroxylaceae, 73

Erythroxylum, 59, 73
Espeletia, 465, 473-477
Etaballia, 426-428
Eucallicarpa, 487
Eugenia, 76, 456
Eulepis, 265, 266, 268
Eumatisia, 469
Eumycotina, 326
Eupaepalanthus, 415
Eupatoriadelphus, 334, 337
Eupatoriastrum, 208
Eupatorieae, 193, 210, 213, 332-334, 337
Eupatoriopsis, 193
Eupatorium, 62, 72, 193-209, 211-213, 332-337, 494
Euphorbia, 73
Euphorbiaceae, 59, 67, 73, 309, 312, 455, 486, 487
Evolvulus, 73
Excoecaria, 309
Fabaceae, 426, 454
Fagara, 77, 311
Ficus, 76
Fimbristylis, 73, 461
Flacourtiaceae, 73
Flagellariaceae, 462
Forsythia, 500
Fuirena, 461
Fulfordistria, 316, 317, 320-322
Galactia, 61, 75
Gareinia, 312
Geissanthus, 401-403
Genipa, 62, 77
Gentianaceae, 73
Gesneriaceae, 390
Geunsia, 487
Glochidion, 455
Gmelina, 494
Gomphrena, 71
Gottschea, 315-321
Graffenrieda, 378
Gramineae, 57-60, 63, 74, 459
Guarea, 76
Guettarda, 62, 77
Guetteria, 71
Guttiferae, 66, 74, 312
Guzmania, 145, 146
Gymnanthes, 309
Gymnopogon, 63, 74
Gyrotheca, 37
Habenaria, 217
Haberlea, 193
Hackelochloa, 74
Hamamelis, 426
Hancornia, 67, 71
Hanguana, 462
Harpalyce, 75
Harrisonia, 294
Hebeclinium, 213
Hecastophyllum, 426, 427
Heliamphora, 249, 260
Helianthus, 216
Helicteres, 77
Heliocarpus, 488
Helonema, 274-276
Hemidiodia, 77
Hepaticae, 315, 322
Hereria, 75
Herpestis, 458
Heterocentron, 377
Heterolaena, 197
Heteropteris, 76
Hibiscus, 40
Himatanthus, 71
Hirtella, 72
Hoehnephytum, 67, 73
Hortia, 77
Husnotiella, 189
Hydrocera, 455
Hygrophila, 459
Hymenaea, 61, 75
Hymenopyramis, 78
Hymenoxys, 192
Hyparrhenia, 64, 74
Hypericum, 40
Hypocyrta, 390
Hypolytrum, 449-451
Hyptis, 59, 74
Icacinaceae, 65, 74
Ichnanthus, 74
Icthyothere, 73
Ilex, 65, 71
Illa, 482

Impatiens, 277
Imperata, 494
Indeterminata, 59
Indigofera, 61, 75
Inga, 75
Inocarpus, 426
Ipomoea, 73, 457
Irenina, 487
Iresine, 71
Iridaceae, 74
Iris, 216
Ischaemum, 459, 460
Isocarpha, 210
Isostigma, 73
Jacaranda, 59, 60, 67, 72
Jacquemontia, 73
Jonsonia, 482
Julocroton, 73
Jungermannia, 315, 317, 318, 320, 321
Jussiaea, 456
Justicia, 71
Kanime, 73
Kielmeyera, 66, 67, 74
Kolkwitzia, 500
Krunodiplophyllum, 321
Kuehneola, 487
Labiatae, 59, 74
Lachnanthes, 37
Lachnocaulon, 8, 32, 35-37, 39-42, 45-52, 81-83, 252, 296, 417
Lafoensia, 75
Lagenocarpus, 105
Langsdorffia, 65, 71
Lantana, 78, 242, 338
Lasiacis, 74
Lasiocroton, 312, 313
Lasiolepis, 287, 294
Lauraceae, 74, 452
Leandra, 76, 374-378, 385, 387
Leguminosae, 57-61, 67, 74, 324, 396, 426
Leiothrix, 83, 86-105, 107-120, 248-265, 294, 296, 355
Leiothryx, 83, 89
Leiotrhix, 83, 262
Leithrix, 83
Leothrix, 83
Lepidesmia, 210, 212
Lepironia, 462
Leptocoryphium, 63, 74
Leucocephala, 20
Licania, 72
Liceales, 326
Liliaceae, 75, 463
Liliales, 328
Lilium, 500
Limnanthemum, 284, 457
Limnophila, 458
Limnoxeranthemum, 287
Lindernia, 458
Lippia, 78, 79
Liquidambar, 488
Lithraea, 71
Loganiaceae, 75
Loranthaceae, 65, 75
Ludwigia, 76, 456
Luehea, 65, 77
Lycium, 392
Lycopodium, 316
Lythraceae, 75
Macairea, 369, 370
Macaranga, 494
Machaerium, 61, 75, 324
Macrosiphonia, 71
Magonia, 67, 77
Maieta, 389
Mallotus, 494
Malpighiaceae, 57, 59, 60, 75
Malvaceae, 66, 76
Mammea, 312
Mandevilla, 71
Manihot, 67, 73
Maprounea, 73
Maranta, 65, 76
Marantaceae, 65, 76
Matayba, 77
Matisia, 465, 467-471, 479
Mauciea, 458
Mauritia, 62
Maytenus, 72
Melastoma, 385, 456
Melastomataceae, 57, 59, 60, 63,

67, 76, 456
Meliaceae, 76
Melinis, 64, 74
Meliola, 492
Melochia, 456
Memora, 72
Menispermaceae, 76
Meriania, 373
Mesanthemum, 8, 265, 267-269, 277-287
Mesosetum, 74
Messanthemum, 265, 266
Miconia, 63, 76, 374-376, 378-387, 389
Microconia, 334
Mikania, 73
Mimosa, 58, 61, 75
Mimosaceae, 310
Mimosoideae, 59, 75, 426
Mitracarpus, 77
Moraceae, 76
Morinda, 458
Moutouchi, 426
Murdannia, 463
Mycetozoa, 326
Myrcia, 76
Mycota, 326
Myristicaceae, 65, 76
Myroxylon, 426
Myrsinaceae, 76, 401, 403
Myrsine, 76
Myrtaceae, 58, 76, 456
Myxocotina, 326
Myxogastromycotidae, 326
Myxomycetes, 326
Nautonia, 67, 71
Nectandra, 74
Nectria, 492
Neea, 76
Neocuatrecasia, 332, 333
Nepeta, 54
Nicotiana, 216
Nidularium, 72
Nierembergia, 392
Niphogeton, 325
Nissolia, 324
Notarisia, 316, 318, 319
Nothofagus, 325
Notopterygium, 315
Nyctaginaceae, 76
Nymphaea, 284, 452
Nymphaeaceae, 452
Nymphoides, 457
Ochnaceae, 76
Ocotea, 74
Odontadenia, 71
Oleaceae, 446
Olyra, 74
Onagraceae, 76, 456
Ooclinium, 193, 195
Opiliaceae, 57, 66, 76
Oplismenus, 74
Orbignya, 62
Orchidaceae, 67, 76
Orchidales, 328
Ormosia, 75
Orobanche, 390
Oryza, 460
Osmanthus, 446, 447
Osmia, 197, 199
Osmiella, 196, 197, 208
Ossaea, 375
Ouratea, 58, 76
Oxalidaceae, 76
Oxalis, 76
Paepalanthus, 7, 11, 25, 27, 36, 39, 50, 82, 86-88, 90, 92, 93, 95-97, 103-111, 113-120, 243, 245, 246, 248-259, 263, 265, 268, 287, 294-308, 340, 346, 349, 350, 352-368, 414-425
Paepalantuhs, 243, 287
Paepalantus, 287
Paepallanthus, 287
Paepalnnthus, 287, 368
Paepalunthus, 287
Paeplanthus, 287
Palicourea, 77
Palmae, 57-59, 76
Panicum, 59, 63, 74, 460
Papilionaceae, 426
Papilionatae, 426
Papilionoideae, 59, 75
Papulanthus, 287

Paraschistochila, 315-317
Parinari, 72
Parsonsia, 457
Paspalum, 59, 63, 74
Patinoa, 465, 471, 480
Peixotoa, 76
Peltodon, 74
Pennisetum, 74
Periandra, 75
Persea, 82
Petunia, 392
Pfaffia, 71
Phaseolus, 61, 75
Phillyrea, 446
Phoradendron, 65, 75
Phragmotheca, 465, 472, 473, 481
Phycomycetes, 54
Phyllanthus, 73
Phyllocactus, 72
Physalospora, 492
Physarales, 326
Physcomitrium, 329, 330
Phytarrhiza, 158, 159, 161, 164, 165, 167-173
Pinaceae, 429
Pinguicula, 350
Pinus, 39, 80, 242, 410, 434, 436, 444, 494
Piptadenia, 75
Piptocarpha, 62, 73
Pisonia, 76
Pityrophyllum, 121
Plasmodiophora, 54
Plathymenia, 61, 75
Platypodium, 75
Platystachys, 121
Plenckia, 72
Poepalanthus, 287
Polyalthia, 495
Polyanthina, 210, 213
Polycarpaea, 65, 66, 72
Polygala, 40, 77
Polygalaceae, 77
Polygonaceae, 65, 77
Polymyxa, 54
Polytrichum , 35, 48
Porophyllum, 73
Portea, 180
Pouteria, 77
Praxeliopsis, 193
Praxelis, 193-196
Proteaceae, 57, 66, 67, 77
Protium, 72
Pseudalcantarea, 159, 164, 168, 173
Pseudo-Catopsis, 121, 158, 160, 161, 163-165, 167-170, 172
Pseudocymopterus, 216
Psidium, 59, 76
Psychotria, 62, 77
Pterandra, 76
Pterocarpus, 426
Pterocaulon, 73
Pterodon, 61, 75
Ptychomnion, 329-331
Puccinia, 502
Pycreus, 461
Qualea, 60, 70, 78
Quararibea, 465, 467, 471
Quercus, 36, 80, 82, 242, 488
Quinqueloculina, 215
Randia, 77
Rapanea, 76
Relbunium, 77
Rhamnaceae, 77
Rhamnidium, 77
Rheedia, 312
Rhipsalis, 72
Rhodocalyx, 71
Rhynchelytrum, 64, 74
Rhynchosia, 61, 75
Rhynchospora, 59, 73, 462
Richardia, 77
Riedeliella, 67, 75, 426
Riencourtia, 73
Rodschiedia, 482, 486, 487
Rondonanthus, 297
Rosa, 500
Roupala, 66, 67, 77
Rourea, 73
Rubiaceae, 57, 59, 60, 62, 77, 458

Rudgia, 62, 77
Ruellia, 71
Rutaceae, 77, 294, 311
Sabicea, 77
Sacciolepis, 460
Sacnocaulon, 32, 37
Sagittaria, 1, 2
Salacia, 72
Salpiglossis, 392
Salvertia, 60, 78
Samadera, 455
Sambucus, 488
Sandemania, 370
Sapindaceae, 77
Sapotaceae, 77
Sarcocephalus, 458
Sarmentaria, 373
Sauvagesia, 76
Scapaniaceae, 321
Schefflera, 65, 71
Schistocheila, 318, 319
Schistochila, 315-322
Schistochilaceae, 315, 317, 319, 321, 323
Schistochilaster, 317-320
Schistophylla, 318
Schizanthus, 392
Schoenocaulon, 5
Scleria, 73, 462
Sclerolobium, 61, 75
Scrophulariaceae, 65, 77, 458
Sebastiana, 73
Sehima, 494
Senecio, 62, 465, 477, 478
Serjania, 77
Setaria, 64, 74
Sida, 66, 76
Simaba, 77
Simaroubaceae, 455
Simaruba, 77
Simarubaceae, 77
Sipania, 77
Sisyrinchium, 74
Smilax, 75
Solanaceae, 65, 77, 391
Solanum, 65, 77, 391, 488
Sorocea, 76
Sorosporium, 282
Spermatophyta, 214
Sphagnum, 39, 40
Spilanthes, 73
Spiraea, 338
Spondylococcum, 482
Spongospora, 54
Sporobolus, 74
Stachytarpheta, 78, 79, 243
Stegolepis, 249, 260, 263
Stemonitales, 326
Stenorhynchus, 76
Stephanophyllum, 83, 86, 104, 105, 117, 253, 254, 263, 264, 294
Sterculiaceae, 77, 309, 455
Stevia, 197, 209
Stewartia, 500
Stomatanthes, 334-337
Stratiotes, 285
Streptocarpus, 277
Strychnos, 75
Stryphnodendron, 61, 75
Stylogyne, 401-403
Stylosanthes, 58, 61, 75
Styracaceae, 77
Styrax, 77
Susum, 462
Sweetia, 61, 75
Syagrus, 63, 77
Symplocaceae, 65, 77, 456
Symplocos, 65, 77, 456
Syngonanthus, 36, 41, 42, 52, 80, 89, 94, 95, 98, 101, 107, 108, 243, 250, 258, 268, 296, 306, 417, 418, 424
Syringa, 191
Syzygium, 456
Tabebuia, 59, 60, 72
Tapirira, 71
Tecoma, 60
Tenuissimae, 274
Terminalia, 72
Tetramicra, 217
Tetrapteris, 76
Teucrium, 40
Thalia, 40

Thrasya, 63, 74
Tibouchina, 76, 371, 377
Tiliaceae, 65, 77
Tillandsia, 212-173, 182, 183
Tillandsioideae, 121
Tocoyena, 62, 77
Tomex, 482
Tonina, 86, 105
Torresea, 67, 75
Tortula, 187, 188
Tournefortia, 72
Trachypogon, 64, 68, 74
Tradescantia, 216
Tricentrum, 370
Trichiales, 326
Trichilia, 76
Trichocalyx, 256
Trichocline, 73
Trichostomopsis, 184-191
Trichostomum, 187, 188
Triginia, 376
Trimezia, 74
Tristachya, 64, 74
Trixis, 73
Tsjerou, 486
Tubulosae, 487
Turnera, 313
Turneraceae, 313
Tylophora, 457
Typha, 40
Umbelliferae, 65, 78, 184
Utricularia, 249, 275
Vanilla, 76
Vanillosmopsis, 62, 73
Variabiles, 362
Vateirea, 61, 75
Verbena, 80, 394
Verbenaceae, 78, 216, 242, 394, 458, 486
Vernonia, 59, 61, 62, 73
Verticirima, 487
Viburnum, 495
Viguiera, 73
Virola, 65, 76
Vitex, 78, 400
Vochysia, 59, 60, 78
Vochysiaceae, 57-60, 70, 78
Vriesea, 129, 130, 132, 134, 135, 137-144, 148-152, 159, 163, 170, 174-178, 181, 183
Waltheria, 77
Websteria, 276
Wedelia, 73, 459
Weigeltia, 401, 402
Weymouthia, 329
Wormia, 456
Xeractis, 300
Xylia, 495
Xylopia, 71
Xylosma, 73
Xyridaceae, 463
Xyris, 26, 282, 350, 463
Zanthoxylum, 311
Zea, 55
Zeyhera, 72
Zoopsis, 322
Zornia, 61, 75
Zoysia, 460

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