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STUDIES IN MACHAERIUM (LEGUMINOSAE) VII. SECTION II. LINEATA. PART I. SPECIES WITH WINGLESS FRUIT.

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Bentham designated the Lineata as a series of Machaerium Pers., later raised to a section by Taubert, to comprise 12 species with alate samaroid fruit and whose leaflets have closely spaced, essentially parallel secondary veins. Four species of Drepanocarpus with similar leaflets but distinguished by fruit lunate or falcate, sometimes curved in a circle, lacking a terminal wing, were assigned to a corresponding series Lineati, later also raised to a section by Taubert, and, finally transferred to Machaerium by Ducke.

MACHAERIUM PERS. SECTION II. LINEATA (BENTH.) TAUBERT.

Machaerium Pers. section Lineata (Benth.) Taubert in Engl. & Prantl, Nat. Pflanzen.-Fam. 3(3): 337. 1894.

Machaerium Pers. series Lineata Benth., Jour. Linn. Soc. 4, suppl.: 53. 1860; in Mart. Fl. Bras. 15(1): 232. 1862.

Drepanocarpus G. F. W. Mey. series Lineati Benth., Jour. Linn. Soc. 4, suppl.: 69. 1860; in Mart., Fl. Bras. 15(1): 255. 1862.

Drepanocarpus G. F. W. Mey. section Lineati (Benth.) Taubert in Engl. & Prantl, Nat. Pflanzen.-Fam. 3(3): 338. 1894.

Trees, shrubs, or lianas; stipules spinescent or, sometimes, caducous; leaves about 5-65-foliolate; leaflets linear-oblong to ovate, elliptic, or subrhombic, secondary veins craspedodromus, veins approximately parallel, mostly extending to the margin, scarcely anastomosing; inflorescences axillary or terminal, simple or compound-racemose; bracts often spinescent; flowers about 7-16 mm long, petals white to yellow, bluish, pink, or purple; fruit alate with a terminal wing or wingless, lunate, falcate, sometimes curved into a circle.

MACHAERIUM SECTION LINEATA in part (wingless species).

Three of the following five species were included in Bentham's 1860 treatment of Drepanocarpus. The other two were described as new in 1972. The numbering of these taxa is in continuation of those in my recent paper on the species of section Machaerium (Phytologia 62: 282-302. 1987).

KEY TO SPECIES OF SECTION LINEATA

1. Fruit lunate or falcate, sometimes curved into a circle, wingless.
   2. Leaflets obtuse or retuse, not aristate at the apes.
      3. Fruit usually curved into a circle, apex acute to subacute.
         4. Stipe of fruit 5-10 mm long; fruit essentially glabrous at maturity, about 6-8 cm long, 1.5-2.3 cm wide, usually curved into a circle (2.5-) 3-4 cm in diameter; calyx 3.5-4 mm long; leaves 5-15-foliolate; leaflets usually short-appressed-pubescent beneath. Nicaragua; Costa Rica; Panamá; Hispaniola; Puerto Rica; Lesser Antilles; Colombia; Venezuela; Trinidad; Guyana; Surinam; French Guiana; Brazil; west coast of Africa from Senegal to Angola. . . . . 9. M. lunatum
         4. Stipe of fruit about 4 mm long or less; fruit tomentose or velutinous to puberulent with lax hairs, sometimes glabrescent with maturity, 3-4 cm long, 1-1.5 cm wide, usually curved into a circle about 2.5-3 cm in diameter; calyx 4-5 mm long; leaves (13-) 21-51-foliolate; leaflets puberulent with lax or subappressed hairs but usually glabrescent at maturity.
            5. Flowers 8-10 mm long, vexillar petal moderately to sparsely pubescent; bracteoles 1-2 mm in diameter; leaflets oblong, 0.5-2.5 cm long, 0.3-1.3 cm wide; fruit tomentulose with brownish to gray hairs, glabrescent with age. Southeastern México; Belize; Guatemala; Honduras; Nicaragua; Costa Rica. . . . 10. M. falciforme
            5. Flowers 10-12 mm long, vexillar petal moderately to densely pubescent; bracteoles 3-4 mm in diameter; leaflets elliptic to oblong, 1-3.7 cm long, 0.4-1.5 cm wide; fruit densely white- to fulvo-tomentose or velutinous when young, somewhat glabrescent with age. Northern Colombia. . . . . 11. M. eliasii
      3. Fruit falcate or lunate, usually bent but not curved into a circle, 4.5-11 cm long, 1.5-3 cm wide, rounded at the apex. Colombia; Venezuela; Guyana; Surinam; Brazil. . 12. M. ferox
   2. Leaflets aristate at the apex with awn 0.5-5 mm long; fruit bent, usually falcate or lunate or, occasionally, curved almost into a circle, usually acute at the apex. Colombia; Venezuela; Peru; Bolivia; Brazil. . . . . 13. M. aristulatum

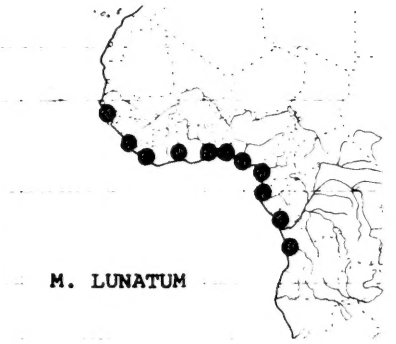

Figure 1. Geographic distribution of species in Machaerium section Lineata.

9. MACHAERIUM LUNATUM (L. f.) Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 310. 1925.

Pterocarpus lunatus L. f. Suppl. 317. 1781. Type: C. G. Dahlberg s. n., Surinam (Lectotype * LINN 887.1.; isotypes LINN 887.2, 887.3, LINN-Smith herb., S).
Pterocarpus aptera Gaert., Fruct. 2: 351, tab. 156, fig. 2. 1791. Type: TUB ? not seen.
Drepanocarpus lunatus (L. f.) G. F. W. Meyer, Prim. Fl. Esseq. 238. 1818.
Nephrosis aculeata Rich. ex DC., Prodr. 2: 420. 1825, nomen in synon.
Orucaria lunata (L. f.) Juss. ex DC., Prodr. 2: 420. 1825, nomen in synon.
Sommerfeldtia obovata Schum., Beskr. Guian. Pl. 331. 1827; Danske Vid. Selsk. Afh. 4: 105. 1829, based on Pterocarpus lunatus L. f.
Drepanocarpus africanus G. Don, Gen. Syst. 2: 378. 1832. "Native of Guinea . . . Herb. Lamb.", A. Afzelius ? not seen.

Shrubs or small trees, sometimes scandent, to about 8 m tall; young stems usually glabrous or nearly so. Stipules indurated, spinescent, to about 7-10 mm long, 2 mm wide at the base, recurved. Leaves about 5-15-foliolate, axis essentially glabrous, about 3-9 cm long. Leaflets subcoriaceous, elliptic to oblong, sometimes obovate-oblong, 1-5 (-7) cm long, 1-2 (-3) cm wide, apex obtuse or retuse, the base rounded to cuneate, upper surface glabrous to slightly puberulent, the lower surface glabrous to moderately pubescent with minute, appressed hairs and, occasionally, a few longer hairs, glabrescent. Inflorescences axillary and terminal, paniculate, axes glabrous to subtomentulose or moderately pubescent with subappressed hairs; lower bracts spinous like the stipules; upper bracts deltoid, acute, striate, subglabrous, about 1-3 mm long, 1 mm wide at the base, caducous; bracteoles broadly ovate, obtuse, sparsely pubescent, glabrescent, about 1 mm long, 1.5 mm wide. Flowers (7-) 8-10 mm long on pedicels 1-2 mm long, calyx glabrous or sparingly pubescent, 3.5-4 mm long, 2 mm in diameter, the lobes obtuse or acute, 0.5 mm long or less; petals pale blue to purple, the vexillum pubescent to subglabrous on the outer face. Fruit lunate, not winged, usually curved so that the ends overlap forming a circle about (2.5-) 3-4 cm in diameter, subsericeous when young, essentially glabrous at maturity, about 6-8 cm long, 1.5-2.3 cm wide, stipe 5-10 mm long.

Distribution: Low lands near the sea, in brackish, sandy or clay soil, coastal marshes, mangrove swamps, sea level to about 25 m elevation. Nicaragua; Costa Rica; Panamá; Hispaniola; Puerto Rica; Lesser Antilles; Colombia; Venezuela; Trinidad; Guyana; Surinam; French Guiana; Brazil; western coast of Africa from Senegal to Angola.

* The sheet designated as lectotype bears leaves, flowers and fruit and is a more complete specimen than those cited as isotypes.

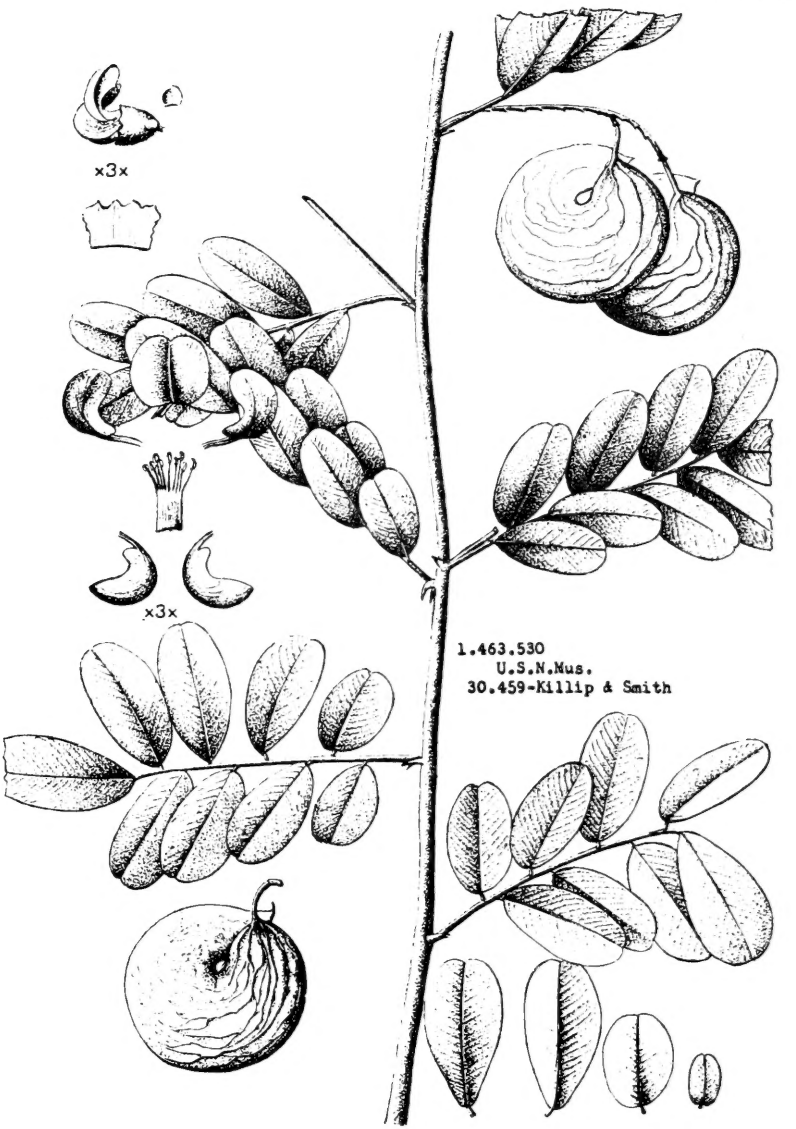

Figure 2. Machaerium lunatum (L. f.) Ducke.
Copy of tab. 14 in Hoehne, Flora Brasílica 25 (128). 1941.

Reprsentative collections:

Nicaragua: Zelaya: Río Kuanwatla, 3 km W of Puerto Isabel, Neill 4575 (MEXU, MO).

Costa Rica: "Marais de Sierpe", Pittier 6809 (BR).

Panamá:Chiriquí: David, Pittier 3373 (BM, NY, US). Canal Zone: Lion Hill Station, S. Hayes 681 (BM, BR, K, P, W). Darien Station, Standley 61616 (US). Fort Randolph, Standley 28693 (US). Gatun Station, Standley 27292 (US). Mamoní R., below La Capitana, Pittier 4585 (NY, US).

Puerto Rico: Low Mameyes, Eggers 923 (BR, LE, M, P, W). Bayamon, Sintenis 927 (BM, BR, G, GH, GOET, K, L, LE, M, NY, P, S, UC, US). Humacao, Sintenis 5205 (BM, F, G, MO, NY, P, POM, US); Liogier et al. 31334 (US). Vieques Isl., Santa Maria, Shafer 2669 (CAS, NY, S, US).

Haiti: Massif du Nord, Bayeux, Ekman H.4804 (GH, IJ, K, NY, S, US).

Dominican Republic: Bertero s. n. in 1821 (G, G-DC, M, MO, S). Santo Domingo, Rose et al. 3756 (NY, US). Sánchez, Peninsula de Samaná, Ekman H.14805 (G, S); Abbott 2418 (US).

Lesser Antilles: St. Croix, West s. n. (LE). St. Thomas, Eggers 329 Guadeloupe: Duchassaing s. n. (GOET); Duss 1013 (P); Questel 580 (P,US); 5148 (US); L. Rodríguez 3199 (P), 4411 (P). Martinique: Plée s. n. (P); Belanger 716 (P); Hahn 219 (BM, BR, G, LE, P, W); Sieber s. n. (NY), 324 (W), 326 (BR, GH, L, LE, M, P, W), 327 (BR); Duss 1092 (NY, US), 3371 (NY); Quentin 937 (PO; Stehlé 6062 (US). St. Lucia: Crudy s. n.(M); Anderson s. n. (K); Sturock 473 (A). St. Vincent: Caley s. n. in 1823 (G); Biolley s. n. (K).

Trinidad: Moruga, Britton & Broadway 2417 (NY, US); Broadway 7589 (NY), s. n. in 1916 (MO). Tobago: Lembeau Bridge, Broadway 4184 (L, M).

Colombia: Chocó: Río Atrato, delta, West 11 (COL); Río Atrato, 2-5 hours below Río Sucio, above Loma Teguerre, Duke 10987 (MO).

Venezuela:Sucre: Río San Juan, 53 km NE of Maturín, Breteler 4676 (COL, G, MG, SP, VEN, WAG). Monagas: Banks of Río San Juan, Tamayo 3507 (NY, SI, US, VEN). Puerto Caripito, Cardona 588 (VEN). Delta Amacuro: Punta Baja, Gines 5132 (US). Pedernales, Orinoco Delta, Curran & Haman 1300 (GH, MO, UC, US); Handover 18 (K). Misión El Guayo, Ferrari 1868 (NY). Caño Joba-Suburu, W of Caño Guayo, Steyermark et al. 115158 (MO). Between Las Margaritas and Curiapo along Río Acure, Fernandez & Trujillo 3539 (MY).

Guyana: Schomburgk 226 (P); A. Anderson s. n. (BM); Jenman 1527 (P). Georgetown, Hitchcock 16678 (GH, US); Archer 2616 (GH, US). Vree-en-Hoop, Hitchcock 16694 (GH, NY, S, US). Pomeroon R., Cruz 3006 (GH, NY, US), 3082 (F, GH, MO, NY, UC, US). Corentyne R., Jenman 372 (P). Buxton, Irwin 299 (US). Demerara R., Persaud 180 (F). Friendship, Robertson & Austin 255 (MO, NY, VEN). Berbice R. S of New Dageraad, Maas et al. 5479 (F).

Surinam: Hostmann 446 (BM, G, K, NY, P, W). Parimaribo, Wullschlägel 115 (BR, GOET, W); Pulle 314 (U), 327 (U). Domberg, Kramer & Hekking 2362 (IJ, U). Saramacca, Tijgerkreek, Stahel /Woodherbarium no./ 110 (A, IAN, K, L, MAD, NY, U, UC, WAG). Liberté, Florschütz & Florschütz 911 (NY, U). Commewijne, Focke 250 (U). Nickerie, Lanjouw & Lindeman 1340 (U). Paulus Kreek, Lindeman & Kramer 231 (U).

French Guiana: Aublet s. n. (BM, W); Poiteau s. n. (G, LE). Beira do Rio Kaw, Black et al. 54-17469 (IAN, P). Cayenne, Aubréville 72 (P, US); Broadway 690 (GH, NY, US); Granville 5152 (US), 7263 (US). Between St. Laurent and Savane de Crique, Jacques, Cowan 38900 (NY, F, US). Gourdonville, Benoist 1676 (P).

Brazil: Amapá: Rio Jarí, 1 km N of Arumanduba, Egler & Irwin 45939 (MG, NY). Rio Arguarí, Egler 658 (MG, RB); Fróes & Black 27620 (IAN). Pará: Belem, Spruce s. n., July-Aug. 1859 (BM, FI, G, GH, GOET, K, LE, NY, P, RB, W), 274 (M); Pires 2695 (COL, IAN, NY); M. Silva 57805 (NY, US); Burchell 9523 (GH, K, LE, P), 9960 (K, L, LE). Ilha do Mosqueiro, Ducke s. n. (IAN); Killip & Smith 30459 (NY, SP, US); Lasseigne 4379 (F). Gurupá, Killip & Smith 30595 (NY, SP, US). Marajó, Oliveira 3429 (IAN, NY), 5058 (IAN); Huber /MG no./ 293 (MG), 1695 (MG). Piauhy: Parnahyba, Ducke /MG no./ 852 (MG), /RB no./ 11768 (RB). Guanabara: Rio de Janeiro, cultivated, Glaziou 9725 (K, P).

Senegal: Perrotet 254 (BM); Chevalier 3430 (G).

"Senegambia": Heudelot s. n. (K); Leprieur s. n. (G, P).

Gambia: Heudelot 339 (P), 639 (G); Roberty 10863 (G); T. K. Hayes 553 (K); Dalziel 8068 (K).

Sierra Leone: G. Don s. n. (BM); Afzelius s. n. (BM); Deighton 991 (BM, K); Morton & Jarr 925 (K, WAG), 2190 (WAG); Thomas 9557 (BR), 9561 (P); Scott Elliott 4335 (BM, K).

Liberia: Baldwin 10505 (K), 10885 (K); Bos 2994 (WAG); de Wit 9130 (WAG); Voorhoeve 98 (WAG).

Ivory Coast: Leewenberg 2716 (K, WAG); de Wit 1254 (WAG); de Wilde 90 (WAG), 782 (WAG); Oldeman 150 (WAG); Chevalier 12244 (P), 17268 (P).

Ghana: Morton A 207 (K, WAG), 2066 (K), 6597 (K).

Nigeria: Dalziel 930 (BM, BR, K, S); Onochie & Ujor /For. Serv. Ibadan/ 32936 (K, WAG); Hamblen 407 (K); Gillett 15375 (K).

Cameroon: Bates 177 (K); Maitland 397 (K).

Gabon: Klawe 205 (BR, K, P); Debeaux 171 (K).

"Congo": Toussaint 37 (BR, P); Flamigni 10779 (BM, BR, US).

Angola: Welwitsch s. n. (BM, K, P); Gossweiler 358 (BM, K, P).

Local names: Amourette (French Guiana); aripillo (Venezuela); atoelia (Surinam); aturía (Brazil); bodorie (Surinam); brandie maka (Surinam); brantimakka (Surinam); bundary bush (Guyana); chinese earring (Guyana); cortiça (Brazil); croc chien (Guadeloupe, Martinique); mangle piquant (Martinique); olvidanovia (Venezuela); siete conchas (Venezuela); turía (Brazil).

Economic uses: According to Irvine (Woody Plants of Ghana, p. 370. 1961) the ripe fruits are eaten in Sierra Leone. In the Gambia a root infusion is used for diarrhoea. On the Ivory Coast "the pulped leafy stems are used as a liniment and plaster for intercostal pains in the joints, backache, and asthenia", "a concoction of crushed leaves is used for heart trouble and for venereal diseases and aphrodisiacs. It is purgative. It is used for leg swelling, and stomach troubles . . . . and for leprosy." It is also said to be fairly poisonous to mice. The plant is used as an ingredient in arrow poison.

10. MACHAERIUM FALCIFORME Rudd, Phytologia 24: 125. 1972.
Type: P. H. Gentle 4744, Belize, Toledo, Rio Grande, on river bank, 8 August 1944 (holotype US; isotypes F, IJ, MEXU, UC).

Trees, shrubs, or lianas, to about 30 m tall; young stems ferrugineo-puberulent, glabrescent with age. Stipules spinescent, to about 10 mm long, 2 mm wide at the base, recurved. Leaves (13-) 21-33-foliolate, axis fulvo-tomentulose, (5-) 7-11 cm long. Leaflets oblong, 0.5-2.5 cm long, 0.3-1.3 cm wide, obtuse at apex and base, surfaces pubescent with subappressed hairs, often glabrous at maturity, sometimes discolorous. Inflorescences axillary or terminal, paniculate, axes ferrugineo- or fulvo-tomentulose; bracts spinescent like the stipules; bracteoles pubescent, broadly ovate, 1-2 mm long and wide. Flowers 8-10 mm long on pedicels 1-2 mm long; calyx sparsely pubescent to glabrous, sometimes setose, about 5 mm long, 3 mm in diameter, the lobes acute or subacute, 1 mm long or less; petals blue, purple, pink, or white, the vexillum moderately to sparsely pubescent on the outer face. Fruit lunate to falciform, brownish- to gray-tomentulose, sometimes sparsely setose, glabrescent with age, 3-4 cm long, 1-1.5 cm wide, often curved forming a circle about 2.5-3 cm in diameter, stipe about 3 mm long or less.

Distribution: In swamps, wet areas, moist forest, southeastern México; Belize; Guatemala; Honduras; Nicaragua; Costa Rica, from sea level to about 700 m elevation.

Representative collections:

México: Veracruz: Ojapa, Orcutt 5139 (MO, US). Fortuño, Rio Coatzacoalcos, Ll. Williams 8496 (F, US), 8808 (F, MICH). Minatitlán, 8 km NE, King 1097 (MEXU, MICH). Region de Los Tuxtlas, Río Coscoapán, Sousa 3178 (MEXU). Sontecomapa, Río Chuniapa, Sousa 4425 (GH, MEXU). San Lorenzo Tenochtitlán, Chavelas ES-2846 (MEXU). Tabasco: Boca del Cerro, Tenosique, Matuda 3545 (F, K, MEXU, MICH, MO, NY, US), 3546 (A, F, MEXU, MICH, NY, US). 3 mi W of Cárdenas, Janzen 1082 (MICH, US). Arroyo Santa Anita, 40 km N of Villahermosa, Barlow 31/3 (MICH). Río Boca Grande, Barlow 31/3b (MEXU). Backmarsh of Río González, 40 km N of Villahermosa, Barlow 36/5 (BM, DS, F, GH, UC). Campeche: Palizada, Matuda 3841 (A, F, MEXU, MICH, NY). Río en la Laguna Pom, rumbo a La Laguna de San Ignacio, Menendez 476 (F).

Belize: Toledo: Near Condemn Branch Hills, Gentle 5363 (LL, US). Malfredi Lagoon, Schipp S-555 (F). Jacinto Creek, Schipp S-577 (A, F, GH, K, MICH, NY, S). Rio Grande, Gentle 4855 (F).

Guatemala: Petén: Between Cedral and Ceibal, Río Santa Monica, Steyermark 46031 (F, LL, NY). Between Cerro Ceibal and Ceibal, Steyermark 46159 (F, LL). Along Río Cancuen above Sayaxché, Steyermark 46179 Izabal: Cadenas, San Felipe Road, Contreras 9232 (F).

Honduras: Hjalmarsson s. n. in 1852 (S), in 1853 (S). Atlántida: Tela, van Severén 66 (US); Standley 54755 (A, F, US). Copán: Copán, Between Sta. Rita and Jaral, Río Copán, Molina 26216 (BM, F, NY, US). Copán, Molina 30608 (F).

Nicaragua: Bluefields: Tidewater, Cukra, Long 157 (F). Zelaya: La Esperanza Río Grande, Molina 2118 (F), 2183 (F, GH).

Costa Rica: San Jose: El General, above Pejibaye, Molina et al. 18247 (F, NY); Jiménez 3798 (F, US).

Local names: Sangregado, zarza de Mucal (México).

11. MACHAERIUM ELIASII Rudd, Phytologia 24: 123. 1972.
Type: Bro. Elias 1242, Colombia, Atlántico, Las Flores, vicinity Barranquila, July 1934 (holotype US; isotypes F).

Shrubs or lianas, about 4-5 m tall; young stems fulvo-tomentulose, later glabrescent. Stipules spinescent, to about 10 mm long, 4 mm wide at the base, recurved. Leaves (15-) 21-51-foliolate, the axis 4-10 cm long, tomentulose. Leaflets elliptic to oblong, discolorous, 1-3.7 cm long, 0.4-1.5 cm wide, obtuse, sometimes shallowly retuse, base rounded, the upper surface lightly pubescent when young, glabrous at maturity, lower surface pubescent with appressed or subappressed hairs to subglabrous. Inflorescences terminal or axillary, racemose or paniculate, axes cano- to fulvo-tomentulose; bracts striate, spinescent, to about 5 mm long, 1-2 mm wide at the base; bracteoles ovate, striate, sparsely pubescent, 3-4 mm long and wide. Flowers 10-12 mm long on pedicels 1-2 mm long; calyx 4-5 mm long, 3.5 mm in diameter, moderately pubescent with subappressed white hairs, sometimes sparsely setose, the lobes 1 mm long or less; petals blue or purple, vexillum moderately to densely pubescent on the outer face. Fruit lunate, densely white- to fulvo-tomentulose or velutinous when young, somewhat glabrescent with age, about 3.5 cm long, 1.8 cm wide, often curved into a circle 2-3 cm in diameter, stipe about 3-4 mm long.

Distribution: Known only from northern Colombia in low wet areas.

Collections examined:
Colombia: Antlántico: Vicinity of Barranquilla, Bro. Elias 1319 (F, US); Bro. Paul C-4 (US). Magdalena R., Dugand 1005 (F, MAD).

The Curran collection cited above, in flower only, has narrow leaflets and resembles the closely related M. falciforme. Because of its geographic location it is more or less tentatively assigned to M. eliasii.

12. MACHAERIUM FEROX (Mart. ex Benth.) Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 311. 1925, non M. ferox Glaziou 1906, nom. nud.
Drepanocarpus ferox Mart. ex Benth. Comm. Leg. Gen. 32. 1937; Ann. Wiener Mus. 2: 96. 1839. Lectotype: C. F. P. Martius s. n., Brazil, Rio Japura, "in sylvis Tapurensibus provincieae Rio Negro" (M).
Drepanocarpus ferox β macrophyllus Benth. in Mart. Fl. Bras. 15(1): 256. 1862. Type: R. Spruce 3213, Venezuela, Amazonas, Rio Casiquiare, Dec. 1853 (holotype K; isotypes BM, BR, K, NY, P, RB, W).

Lianas, shrubs, or small trees, to about 20 m high; young stems pubescent. Stipules spinescent, 4-5 mm long, 2-4 mm wide at the base, recurved. Leaves about 15-35-foliolate, axis puberulent, about 8-18 cm long. Leaflets coriaceous, elliptic-oblong, about 0.8-6 cm long,

0.5-2.5 cm wide, apex obtuse or retuse, base rounded, upper surface puberulent, becoming glabrous, nitid at maturity, the lower surface pubescent with lax hairs, glabrescent with age. Inflorescences terminal, racemose or paniculate, the axes ferrugineo-velutinous; bracts 3-6 mm long, 1-3 mm wide at the base, usually caducous; bracteoles broadly ovate, 2 mm long, 3 mm wide, pubescent. Flowers 10-13 mm long on pedicels 1-2 mm long; calyx ferrugineo-pubescent, 4-5 (-7) mm long, 2.5 mm in diameter, the lobes 1 mm long or less; petals pink, violet, or purple, the vexillum puberulent on the outer face. Fruit falcate or lunate, usually bent but not curved into a circle, ferrugineo-puberulent or sericeous, glabrescent with age, 4.5-11 cm long, 1.5-3 cm wide, rounded at the apex, stipe about 5 mm long.

Distribution: In moist riparian forest, inundated or non-inundated, at low elevations.

Representative collections:

Colombia: Amazonas: Soratama, between Río Kananari and Río Pacoa, Río Apaporis, García-Barriga 14079 (COL, VEN).

Venezuela: Delta Amacuro: carretera Caño Guará a La Horqueta, Stergios et al. 3271 (PORT). Amazonas: Río Orinoco just below mouth of Río Atabapo, Wurdack & Adderly 42793 (F, G, GH, IAN, K, NY, P, R, S, UC, US, VEN). Río Orinoco above Esmeralda, Ll. Williams 15495 (F, US, VEN), 15496 (F, NY).

Guyana: Schomburgk 267 (K). Demerara R., For. Serv. B. G. 6346, Fanshawe 3016 (K, NY, U); Jenman 4281 (K), 7341 (K, U); Persaud 234 (F); Cruz 1746 (F, GH, MO, NY, UC, US). Mazaruni R., Sandwith 638 (K, NY); Jenman 7526 (NY); Appun 306 (K). Between Demerara R. and Berbice R., Cruz 1611 (F, GH, MO, NY, UC, US). Dadanawa, upper Rupununi R., Cruz 1746 (F, GH, MO, NY, UC, US).

Surinam: Corantijne R., Hulk 94a (U). Nickerie R., Stahel & Gonggrip 1082 (U).

Brazil: Amapá: Mun. de Macapá, 154 km NW of Porto Grande, highway "Perimetral Norte", BR 210, Fazenda Sucupira, Rabelo et al. 3076 (NY). Porto Grande, região do Vila Nova, Rosa 1054 (NY, SFV). Serra do Navidad, Cowan 38564 (IAN, NY, US). Rio Araguari, Pires et al. 51483 (G, GH, IAN, K, MG, NY, U, US). Maranhão: Alzilândia, Rio Pindaré, Jangoux & Bahia 488 (NY), 489 (NY). Pará: Sieber s. n. (BR, syntype of D. ferox). Ega (Tefé), Poeppig 2884 (F, W probable syntypes of D. ferox). "Ad cataractas fl. Aripecuru", Spruce s. n. (K, NY, RB, W). "Cach. do R. Aripecuru", Spruce 546 (K, P). Alto Tapajós, Rio Cururú, 1-10 KM SE from Pratatí, Anderson 10888 (NY, SFV). Beira do Rio Curuaúna, Planalto de Santarem, Fróes 31357 (IAN). Belém, Igarapé do Aurá, Pires 1434 (IAN, NY). Rio Tapajos, Periquito, Ducke /MG no./ 15871 (MG). Rio Tapajos, Cach do Mangabal, Ducke /MG no./ 16752 (MG). Mosqueiro, Ducke 774 (IAN, F, MG, MO, NY, SI, K, UC, US); Killip & Smith 30510 (NY, US). Rio Pixuna, near mouth of Rio Cupari, Black 47-1996 (IAN, US, Breves (Araná), Huber /MG no./ 1842 (BM, MG, US). Rio Caraipí, Daly et al. 1279 (NY, SFV). Amazonas: Rio Javari, 7 hours above Paumar, Prance et al. 23794 (NY, SFV). Maués, Rio Parauri, Rodrigues & Coelo 3911 (US). Rio Negro, "inter Barra et Barcellos", Spruce 2038 (P). "Rio Negro-gapo near S. Isabel", Spruce 2038 (K). Road Humaitá to Porto Velho, Prance et al. 3845 (COL, F, GH, K, MG, NY, R, S, U, UC, US).

Local names: Aturiá (Brazil); bejuco de Murcielago (Venezuela); juquiry preto (Brazil); uña de gavilan (Venezuela).

Note: The fruit illustrated in plate 81, Martius, Fl. Bras. 15 (1). 1862 appears to be of M. aristulatum rather than M. ferox.

13. MACHAERIUM ARISTULATUM (Spruce ex Benth.) Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 311. 1925.

Drepanocarpus aristulatus Spruce ex Benth. Jour. Linn. Soc. 4, suppl.: 69. 1860; in Mart. Fl. Bras. 15(1): 1862. Type: R. Spruce 1756, Brazil, Pará, Lago de Alexo, below Santarem, August 1851 (holotype K; isotypes BM, F, FI, G, GH, GOET, M, NY, P, RB, US, W).

Trees, shrubs, or lianas, to about 10 m high; young stems usually gray-tomentulose, glabrescent with age. Stipules spinescent, to about 15 mm long, 5 mm wide at the base, recurved. Leaves about 11-15-foliolate, axis 5-12 cm long, subglabrous. Leaflets elliptic to ovate or oblong, 2-7.5 cm long, (0.6-) 1-3 cm wide, obtuse to acute, sometimes emarginate at the apex, aristate, the awns (0.5-) 1-5 mm long, base rounded, upper surface usually glabrous, nitid, lower surface pubescent with short sppressed or subappressed hairs, secondary veins almost perpendicular to the midvein. Inflorescences axillary or terminal, paniculate, grayish-tomentulose; bracts spinous like the stipules, to about 5 mm long or deltoid, caducous; bracteoles broadly ovate, 2 mm long, 2.5 mm wide, sericeous or subsericeous. Flowers 10-14 mm long on pedicels 1-2 mm long; calyx sericeous, 5-7 mm long, 4 mm in diameter, lobes acute, 1 mm long or less; petals white to yellowish, pale blue, violet, or purple, vexillum pubescent on the outer face. Fruit usually falcate or lunate, 3.5-7 cm long, 2-3 cm wide, occasionally curved almost into a circle 2.5 cm in diameter, tomentulose, sometimes beset with setae, glabrescent with age, usually acute at the apex, stipe about 5 mm long.

Distribution: In wet savanna, river banks, igapó, várzea, at elevations up to about 200 m, Colombia, Venezuela, Peru, Bolivia, and Brazil.

Representitive collections:

Colombia: Boyacá: Esmeralda, Río Casanare, Cuatrecasas 3936 (F, US). Vichada: Caño de la Ceiba, Cuatrecasas & García-Barriga 4093 (COL, F, US). Vaupes: Río Guaiviare, Cuatrecasas 7583 (COL, F, US); opposite San Fernando de Atabapo, Araque, Molina, & Barkley 17Va217 (COL, US). Amazonas: Lago el Badio, Río Amazon, 2 km N of Leticia, Sastre & Gómez-Pompa 513 (COL, MEXU, P).

Venezuela: Barinas: Reserva Forestal de Caparo, Jiménez Saa 1317 (NY). Guárico: El "Baúl, Llano de Calabozo", Karsten s. n. (W). Caño Galcón, estero de Camaguán, Aristeguieta 7785 (NY). Apure: Curran 649 (NY). Guasdalito via Suripá, Aristeguieta & Agostini 4146 (F, US, VEN). Río Meta, La Ochovera, Cuatrecasas & García-Barriga 4149 (COL, F, US). Caño N of Meta, W of Pto Paéz, Velez 2283 (VEN). San Fernando, Río Arauca 5 km S of El Faro, Davidse & González 13447 (US). Opposite Raudal Marimare, between Río Orinoco and Piedra La Villa, Wurdack & Monachino 41395 (G, GH, IAN, K, MICH, NY, P, S, U, US, VEN, W).

Peru: Loreto: Iquitos, Ducke /MG no./ 7548 (BM, MG, US). Río Itaya, above Iquitos, Killip & Smith 29544 (A, F, NY, US); Gentry et al. 18502 (F); Revilla 618 (F), 659 (F). Lower Itaya, near Iquitos, Davidson & Jones 9890 (F). Río Nanay between Bellavista and Sta. Clotilde, McDaniel et al. 2473 (US). Maynas, Quebrada Yanayacu above Bombonaje, McDaniel & Kimachi 17222 (SFV). Río Nanay, Quebrada de Yarina Cocha, Kimachi 2366 (F). Pebas, Río Ampiyacu, Revilla 825 (F). Carretera a Quisotocha, 10 km NE of Iquitos, Torres 147 (F). Quebrada Yarina Cocha, Río Tapiche, 35 km from Requena, Revilla s. n. (F). Paca-Cocha (Pucallpa), Woytkowski 6309 (GH, US). Reserva Nacional Pacaya (Cocha Yarina), Vasquez et al. 6661 (SFV ex MO). Caballo-Casha, Amazon R., LL. Williams 2277 (F).

Bolivia: El Beni: Trinidad, Misiones Guarayos, Werdermann 2379 (S), 2433 (S); Cardenas 3762 (S). Ballivián, Espiritu, arroyo Tarapalito, Beck 5607 (SFV), arroyo Carnaval, Beck 5731 (SFV). Moxas, San Ignacio "hacia San Borja", Beck 12201 (SFV). Pando: Río Manuripi, 2 km upriver from ferry crossing on road to Chivé, Sperling & King 6526 (SFV ex NY).

Brazil: Roraima (Rio Branco): Beira do Rio Branco, between Fazendas Bom Intento and Capela, Black 51-14040 (IAN, P, R). Rio Apiaú, km 5-15 from mouth, Prance et al. 4175 (COL, F, GH, K, MG, NY, S, U, US). Serra de Carauma, Ule 7725 (G, K, L, MG, UC). Pará: Itaboca, Rio Tonantins, Ducke /MG no./ 16222 (MG). Caquetá, Puerto Cordoba, Ducke /MG no./12246 (MG). Oriximiná, Rio Trombetas, Cid et al. 2397 (NY, US). Monte Alegre, Snethlage /MG no./ 9558 (MG); Traill 158 (K); Ducke /MG no./ 10006 (MG); Fróes 30204 (IAN, NY). Maicurú, Pires et al. 6535 (IAN, NY). Near Parana do Ricardo, Krukoff 5904 (A, BM, BR, F, IAN, K, LE, MICH, MO, NY, S, SP, U, US). Rio Jamundá, Faro, Lago de Terra Santa, Silva 1182 (MG, SP). Taperinha, near Santarem, Zerny s. n. in June 1927 (W). Amazonas: São Paulo de Olivença, Ducke 564 (F, IAN, MG, MO, NY, R, US). Tonantins, Ducke 1512 /MG no./18180 (A, F, IAN, MG, NY, R, US). Lago Prêto, 2 km N of Lábres, Prance et al. 13966 (F, GH, K, MG, NY, US). Rondônia: Rio Ribeirao, basin of Rio Madeira, Prance et al. 6558 (K, MG, NY, R, US).

Local names: Chirapa silla (Peru); garabata casha (Peru); juquirí (Brazil); robasesina (Venezuela); unha de cigana (Brazil); uña de gato, uña de gavilán (Colombia).

REDUCTION OF VIERECKIA AND TWO SPECIES OF CHROMOLAENA TO EUPATORIUM (ASTERACEAE)

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In a forthcoming treatment of the Asteraceae for Mexico (Turner & Nesom, in prep.) we intend to maintain the large genus Eupatorium so as to include Chromolaena DC. The latter genus was accepted by King and Robinson (1970) and subsequently they described the two new species which are reduced to Eupatorium here. In addition, King and Robinson described a monotypic genus Viereckia which I feel is close to the Chromolaena grouping and, as such, is also reduced.

EUPATORIUM TAMAULIPASENSE. (King & H. Rob.) B. Turner, comb. nov.,

Based upon Viereckia tamaulipasensis King & H. Rob., Phytologia 31:118.1975.

This species was originally described as the only member of the genus Viereckia and was thought to have close relationships with Critonia. I would suggest a relationship with the Chromolaena assemblage (sensu King and H. Robinson, 1970), close to C. bigelovii (A. Gray) King & H. Rob.; indeed it is difficult to separate from the latter by any substantial character.

EUPATORIUM BREEDLOVEI (King & H. Rob.) B. Turner, comb. nov.

Based upon Chromolaena breedlovei King & H. Rob., Phytologia 47:233.1980.

EUPATORIUM LUNDELLII (King & H. Rob.) B. Turner, comb. nov.

Based upon Chromolaena lundellii King & H. Rob., Wrightia 6:23.1978.

LITERATURE CITED

King R., and H. Robinson. 1970...The genus Chromolaena. Phytologia 20:196-209.

NEW SPECIES AND COMBINATIONS IN AGERATINA (ASTERACEAE-EUPATORIEAE) FROM MEXICO

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ABSTRACT

Ten new species of Ageratina are described (A. barriei, A. beamanii, A. gentryana, A. hernandezii, A. neohintoniorum, A. potosina, A. queretaroana, A. sandersii, A. sousae and A. warnockii) and five new combinations are proposed, all transfers from Eupatorium.

Preparation of a treatment of the Asteraceae for Mexico (Turner and Nesom, in prep.) necessitates description of the following species and proposed name changes in Ageratina.

AGERATINA BARRIEI B. Turner, sp. nov., Fig. 1.

A. anchistae affinis sed foliis amplioribus petiolis longioribus et capitulis amplioribus paucioribus corollis longioribus.

Perennial herbs to 1 m high. Stems terete, ca 0.4 mm diameter at mid-stem, arising from a coarse fibrous root-system, pubescent with crinkly, multiseptate hairs. Leaves opposite, remote, 8-16 cm long, 3-8 cm wide, the stem leafy throughout (ca 12 pairs); petioles 3-8 cm long, blades neatly cordate, 3(7)-nervate from the base, sparsely pubescent above and beneath with crinkly multiseptate hairs, the margins crenulate. Heads campanulate, 6-7 mm high, ca 30 in terminal, open, corymbose panicles, the ultimate peduncles glabrous, mostly 1-2 cm long. Involucres 5-6 mm high, 2-seriate; bracts subequal, glabrous, ca 1.6 mm wide, the apices mostly obtuse or rounded. Florets numerous (50+); corollas 3-4 mm long, the tube ca as long as the narrow tubular limb, the lobes pubescent. Achenes fusiform, ca 2 mm long, moderately hispid; pappus of ca 30 white, barbellate, bristles 4 mm long.

TYPE: MEXICO. JALISCO: Mcpio. Casimiro Castillo, Puerto los Mazos, 15 km S of Autlan de Navarro on the road to Barro de Navidad (19° 40'N x 104° 25'W), oak forests, open hillsides in volcanic soils; 18 Nov 1984, F. D. Barrie, D. A. Gage & A. Solis 1146 (holotype TEX).

The species is clearly related to the Eupatorium [Ageratina] bellidifolium complex, as defined by Grashoff

and Beaman (1969) and would key to E. achisteum in their treatment. In McVaugh's (1984) Flora Novo-galiciana, Ageratina barriei will key to Eupatorium muelleri but it is clearly much closer in all details to E. achisteum, which is known only from Guatemala, Honduras, and adjacent Nicaragua. The present species differs in its much larger leaves and fewer, larger, heads on longer ultimate peduncles.

It is a pleasure to name this taxon for its only known collector, Fred Barrie, doctoral student at the University of Texas, Austin, and avid worker on the family Valerianaceae.

AGERATINA BEAMANII B. Turner, sp. nov.

A. lemmonii (B. L. Rob.) King & H. Rob. simile sed capitulescentia ampliore laxiore ramis flexilibus et phyllariis brevioribus apice minus acuminato differt.

Erect perennial herbs 50-60 cm high. Stems simple, terete, puberulent at first, but soon glabrate, reddish above. Leaves opposite, sessile or nearly so, 3-5 cm long, 1.5-2.0 cm wide; blades ovate, 3(5)-nervate from the base, glabrous or nearly so, the margins serrulate. Heads white, in 15-numerous, very open, corymbose panicles, the ultimate peduncles minutely puberulent, mostly 10-25 mm long. Involucre 4-5 mm high, 2-seriate, eximbricate, glabrous except for the fringed margins. Receptacle plane, glabrous. Disk florets 40-60; corollas ca 3 mm long, the limb ca 1.5 mm long, abruptly campanulate, the lobes pubescent. Achenes ca 2 mm long, hispidulous, the pappus 1-seriate, of ca 25 deciduous white bristles ca 3 mm long.

TYPE: MEXICO. JALISCO: Open oak-pine woods in the mountains ca 32 road mi W of Ayutla, and ca 70 mi NW of Autlan, ca 6300 ft, 4 Nov 1962, A. Cronquist 9805 (holotype TEX; isotypes MEXU, NY).

Additional specimens examined: MEXICO. DURANGO: Mcpio. de Mezquital, 3 km S of Sta. Ma. de Ocotan, 17 Oct 1984, Gonzalez & Acevedo 1571 (TEX). NAYARIT: Mcpio. de El Nayar, rocky ridge along the Arroyo Santa Rosa, W of Santa Teresa, ca 100 airline km NNE of Tepec, 2095 m, 21-24 Oct 1979, Breedlove 44463 (TEX).

Type material was distributed as Eupatorium lemmonii B. L. Rob. and was so cited in McVaugh's (1984) treatment of Eupatorium for Flora Novo-galiciana. Ageratina beamanii is readily distinguished from that taxon by its much more expanded, broadly paniculate, capitulescence

with more flexuous branches, smaller involucral bracts (4-5 mm high vs 6-7 mm) with more attenuate apices. It belongs to the subgenus Ageratina and relates to the Eupatorium bellidifolium Benth. complex, as treated by Grashoff and Beaman (1969), and will key with difficulty to E. choricephalum in their treatment. The latter, however, has markedly petiolate, usually cordate, blades, otherwise they are quite similar.

It is a pleasure to name this species for my friend and colleague, Dr. John Beaman, of Michigan State University, whose work with the late J. Grashoff has helped clarify relationships among the A. bellidifolia complex.

AGERATINA GENTRYANA B. TURNER, sp. nov.

A. viscosissima (Rolfe) K. & R. simile sed capitulis parvioribus, corollis parvioribus tubo limbo longioribus, acheniis parvioribus setis pappi 10 differt.

Annual herbs to 1 mm high. Stems terete, erect, densely pubescent with glandular-trichomes interspersed with longer, crinkled-crisped, non-glandular trichomes. Leaves opposite (rarely alternate above), broadly ovate to subcordate, those at mid-stem 10-20 cm long, 4-8 cm wide; petioles 4-9 cm long, pubescent like the stems; blades thin, pubescent on both surfaces, (3)5-nervate from at or near the base, the margins crenulate. Heads white, numerous in terminal expanded, corymbose panicles, the ultimate peduncles slender, 3-10 mm long, glandular pubescent. Involucres 3-4(5) mm long, 2-seriate, eximbricate; bracts 24-28 sparsely pubescent. Florets 50-60; corollas goblet-shaped, ca 3 mm long, the tube 1.5-2.0 mm long, the limb 1.0-1.5 mm long; lobes moderately pubescent. Achenes black, ca 1 mm long, short-clavate, the faces minutely papillose-hispid; pappus of ca 10, very fragile, deciduous, barbellate bristles ca 3 mm long.

TYPE: MEXICO. SINALOA: along hwy 40 between La Guayanera and El Cantil, ca 21 mi NE of Concordia and 34 mi NE of Villa Union (ca 105°50'W x 23°24'N). Rocky, oak-covered slopes cut by small canyons with tropical broad-leaved forest of Croton draco, Ipomoea arborea, etc. "Fairly common 2 ft. annual." 2800 ft, 28 Mar 1984, A. C. Sanders et al. 4972 (holotype TEX; isotype UCR).

Additional specimens examined: MEXICO. SINALOA: Sierra Monterey, Quebrado de Platano, "moist shady canyon bottom under Alisos and walnuts", 13 Mar 1940, H. S.

Gentry 5910 (GH); Sierra Surotato, Canyon de Tarahumare, 3000-4000 ft, 17-24 Mar 1945, Gentry 7169 (ARIZ, GH).

The species is superficially similar to A. viscosissima (Rolfe) King & H. Rob. of southern Baja California but contrasts with that species as follows:

viscosissima	gentryana
Perennial	Annual
Involucre 5-6 mm high	Involcre 3-4(5) mm high
Achenes ca 2 mm long	Achenes ca 1 mm long
Corolla narrowly funnelform	Corolla goblet-shaped
tube 1.0-1.5 mm long	tube 1.5-2.0 mm long
limb 2.5-3.5 mm long	limb 1.0-1.5 mm long

The very small, minutely hispidulous, achenes are particularly diagnostic, as are the small corollas with tube longer than the throat, the lobes being moderately pubescent.

While compared with A. viscosissima, the present species perhaps stands somewhere between that taxon and A. parayana (see discussion under the latter), differing from both in its presumably annual habit and small heads. Achenal characters would relate it to A. viscosissima (possessing very similar pappus bristles) while floral features relate it to A. parayana (globet-shaped corollas).

AGERATINA HERNANDEZII B. TURNER, sp. nov.

A. calaminthifolia H. B. K. simile sed foliis amplioribus petiolis longioribus et receptaculis glabris differt.

Shrublet up to 1 mm high. Stems terete, densely short puberulent. Leaves opposite, 7.0-8.5 cm long, 4-5 cm wide; petioles 1.5-2.5 cm long; blades elliptic-ovate, (3)5-nervate from, or near, the base, densely glandular-punctate on both surfaces, glabrous, or nearly so, the margins crenulate. Heads white, numerous in both terminal and axillary, subfasciculate, corymbs, the ultimate peduncles puberulent, 3-10 mm long. Involucres turbinate, biseriate, eximbricate, ca 5 mm high, the bracts 8-10, linear-lanceolate, puberulent. Receptacle plane, glabrous. Florets 10-15 per head; corallas ca 3.5 mm long, glabrous, the tube ca 1.5 mm long, the limb narrowly funnelform. Achenes ca 2.5 mm long, hispid along the angles; pappus 1-serate, of 40-50 white or pinkish, rather persistent, bristles, 3-4 mm long.

TYPE: MEXICO. TAMAULIPAS: Cerro El Diente, Sierra de San Carlos, 17 km al SW de San Carlos (98° 06'W x 23° 16'N), ca 1080m, 28 Nov 1984, Luis Hernandez 1321 (holotype TEX; isotype UAT).

This species was apparently first collected by H. H. Bartlett (10485 MICH, vicinity of San Jose, Sierra de San Carlos; photograph US) in 1930 and was distributed as Eupatorium hebes B. L. Rob. var. rasum B. L. Rob. More recently King and H. Robinson annotated the specimen as Ageratina hebes (B. L. Rob.) King & H. Rob. The latter, in my opinion, is synonymous with the widespread, variable, A. tomentella (Schrad.) King & H. Rob., which is confined to Southern Mexico and adjacent Guatemala. The present taxon is readily distinguished from the latter by its glabrous leaves and nonvenulose glandular punctations and probably stands closest to A. calaminthifolia (H.B.K.) King and H. Rob., a species of northern Mexico which can be distinguished from A. hernandezii by its smaller leaves and pubescent receptacles.

The present species is named for Mr. Luis Hernandez, prolific collector of the Tamaulipan region working out of the University of Tamaulipas (UAT-CONCACYT), Ciudad Victoria.

AGERATINA NEOHINTONIORUM B. Turner, sp. nov. Fig. 2

A. salicifoliae affinis sed foliis tenuioribus petiolo abrupte rotundatis, trichomatibus caulium glandiferis, et capitulis paucioribus differt.

Erect herb to 50 cm high. Stems slender, reddish, sparsely branched, glandular-pubescent to glabrate. Leaves opposite throughout, the nodes remote; petioles 0.5-1.0 mm long, or seemingly absent; blades lanceolate to lance-elliptic, 3-4 cm long, 1.0-1.5 cm wide, 3-nervate from near the base, the margins remotely denticulate. Heads campanulate, borne 5-10 in terminal or axillary corymbs, the ultimate peduncles 2-4 cm long, pubescent with glandular trichomes. Involucres 6 mm high, 2-seriate, eximbricate; bracts elliptic-lanceolate, 2(3)-nervate, ca 2 mm wide, the outer series glandular pubescent. Receptacle plane, ca 3 mm across. Florets ca 50 per head; corollas white, ca 5 mm long, the tube ca 2 mm long, the throat abruptly flaring, the lobes pubescent. Achenes spindle-shaped, ca 2 mm long, hispidulous; pappus of ca 30 white, deciduous, bristles, 4-5 mm long.

TYPE: MEXICO. MEXICO STATE: Mcpio. Temascaltepec,

"Cumbre-Cimientos" pine forest, 26 Jan 1936, G. B. Hinton et al. 8848 (holotype LL; isotypes MICH, UC).

The species belongs to the subgenus Ageratina and combines involucral and floral features of the A. bellidifolia complex with vegetative features much like A. salicifolia King & H. Rob. It can be distinguished from the latter by its thinner, more broadly-based, leaves, fewer-headed capitulescence which is pubescent with stout glandular-trichomes.

In providing the specific name I hope to make amends for my superfluous A. hintoniorum B. Turner which is synonymous with A. vernicosa Brandegee (cf. Turner, 1987).

AGERATINA OREITHALES (Greenm.) B. Turner, comb. nov. Based upon Eupatorium oreithales Greenm., Proc. Amer. Acad. Arts 32:308. 1897.

This taxon is closely related to A. prunellifolia (H.B.K.) King and H. Rob., but in my opinion distinct. It differs from the latter in several characters, including leaf shape and eglandular peduncles. Both taxa are maintained by Espinosa (1985) for the Flora Fanerogamica del Valle de Mexico and Williams (1976) maintains A. oreithales (as Eupatorium nubivagum L. Wms.) in the Flora of Guatemala. I accept A. oreithales to be a wide-ranging taxon occurring primarily along the Sierra Madre Oriental from Southern Nuevo Leon to Guatemala, with extensions along the trans-volcanic belts to the Pacific ranges in Michoacan and Guererro. I have observed the two taxa occurring together, and at one site (slopes of Cofre de Perote, 3200 m, in Veracruz; Guererro TEX) a putative hybrid was collected which had a chromosome count of n=51 univalents. The A. oreithales-A. prunellifolia complex is clearly in need of detailed field and experimental study but present evidence suggests the presence of two taxa.

AGERATINA PARAYANA (Espinosa) B. Turner, comb. nov.

Based upon Eupatorium parayana Espinosa, Phytologia 56:331.1984.

Perennial herbs to 2.5 m high, superficially resembling E. viscosissima of Baja California but readily distinguished by its narrower heads with fewer florets, corollas with longer tubes and abruptly-flaring throats, pappus bristles 20-40 (as opposed to ca 10), glandular-pubescent leaves, etc.

Espinosa compared A. parayana with type material of A. viscosissima (through the aid of Annetta Carter) and noted the several differences that distinguish between them. However, description of the lobes as glabrous are ill-founded since my examination of type material and yet other material of A. viscosissima from Baja California show the lobes to be pubescent, albeit on the sparse side. Thus the latter clearly belongs to the subgenus Ageratina as it possesses most of the characters of that taxon, including pubescent lobes.

McVaugh (1984) applied the name A. viscosissima to material from the Mexican mainland (Sin, Mich and Gro), noting, however, many of the distinctions between these and material from Baja California. As I interpret the group, his Sinaloan plants probably belong to what I call here A. gentryana; the material from Michoacan and Guerrero probably belong to what I would call A. parayana. Espinosa, presumably, would largely restrict his A. parayana to the state of Mexico, but I would extend his concept to cover most of the broad-leaved, densely glandular, populations of Ageratina along the Pacific slopes south of Jalisco, including individuals with distinctly heart-shaped leaves. So defined, A. parayana is a variable species with perhaps infraspecific categories, but these await the study of more experienced field workers.

AGERATINA POTOSINA B. Turner, sp. nov.

A. oriethales (Greenm.) B. Turner sed caulibus suffruticosis ubique foliosis nodulis numerosioribus et capitulis amplioribus differt.

Suffruticose perennial herbs or shrublets 20-60 cm high. Stems puberulent to hirsutulous, about equally leafy throughout from 10-40 nodes. Leaves opposite, 3-8 cm long, 1-4 cm wide, strongly petiolate on the lower stems (mostly 1-3 cm long) but becoming sessile on upper stems; blades ovate (3)5-nervate from the base, sparsely puberulous along the veins or glabrate, the margins dentate to serratulate-crenulate. Heads campanulate, white, 3-10 in terminal subfasciculate cymes, the ultimate peduncles hirsutulous (rarely with a few glandular trich omes), 0.5-2.0 cm long. Involucre biseriate, eximbricate, mostly 7-9 mm long; bracts linear lanceolate, 1.5-2.5 mm wide, hirsutulous, the apices acute. Receptacle plane, glabrous. Florets 40-60; corollas ca 5 mm long, the tube ca 2 mm long, the lobes quite pubescent. Achenes ca 3 mm long, hispidulous; pappus of 30-50 readilly deciduous bristles 3.5-4.5 mm long.

TYPE: MEXICO. NUEVO LEON: Mcpio. Galeana, microwave station on Cerro Potosi, 2 Aug 1975, S. Lewis 144 (holotype TEX; isotype MEXU).

REPRESENTATIVE ADDITIONAL SPECIMENS EXAMINED (from among 14 or more collections): MEXICO. COAHUILA: Mcpio. Arteaga, Sierra del Coahuilon, 2950 m, 25 Aug 1985, Hinton et al. 18910 (TEX); Sierra La Viga, north side, 2700-3000 m, 24 Oct 1984, McDonald & Gomez 1183 (TEX); Sierra La Marta, 24 Oct 1981, Poole et al. 2462 (TEX). NUEVO LEON: Cerro Potosi:, pine forests above Las Canoas, 21 Jul 1935, Mueller 2278 (GH); Cerro Potosi, 2 mi down road from summit, 23 Aug 1984, Lavin 4797 (TEX); Cerro Potosi, 3500-3700 m, 26 Jul 1985, McDonald 1810 (TEX); Cerro Potosi, ca 3600 m, 26 Oct 1984, McDonald & Gomez 1266 (TEX); E slope Cerro Potosi, 20 Oct 1979, M. Warnock 2022 (TEX).

This taxon is apparently common in the subalpine habitats near the top of Cerro Potosi and in similar habitats on Sierras Coahuilon, La Marta and La Viga to the north in the nearby state of Coahuila. For a number of years I called the plants concerned, A. oreithales (Greenm), B. Turner, a predominantly herbaceous species with relatively few stem leaves largely distributed from southern Nuevo Leon (Sierra Peña Nevada) to Guatemala, in similar habitats. Both the latter and A. potosina are closely related to A. prunellifolia (H.B.K.) King & H. Rob. which has longer, glandular-pubescent, peduncles and smaller heads. The complex centering about this latter taxon is in much need of field work and experimental study.

AGERATINA QUERETAROANA B. Turner, sp. nov.

A. triniona (McVaugh) King & H. Rob. simile sed capitulescentia dense glandifera trichomatibus brevibus et phyllariis auguste acutis eximbricatis glandulipubescentibus differt.

Perennial herb or shrublet to 1.5 m high. Stems tan or purplish, densely pubescent with short, glandular, trichomes. Leaves opposite, 8-10 cm long, 5-7 cm wide; petioles 2-4 cm long, densely hirsutulous; blades cordate 3(5)-nerved from the base, glandular-punctate and covered with a dense velvety puberulence, less so with age, the margins evenly crenulo-dentate. Heads white, numerous in terminal corymbose-panicles the ultimate peduncles glandular-pubescent, 4-12 mm long. Involcres 2-seriate, eximbricate, 5-7 mm long; bracts greenish to purple, linear-lanceolate, ca 0.8 mm wide, narrowly acute,

glandular-pubescent. Receptacle glabrous. Florets 16-22; corollas 6-7 mm long, glabrous, the tube ca 2 mm long, gradually tapering into the narrowly funnelform throat. Achenes ca 3 mm long, hispidulous; pappus 1-seriate, of ca 25, white or reddish, bristles 4-5 mm long.

TYPE: MEXICO. QUERETARO: 1.5 mi W of Pinal de Amoles, pine forest at ca 7300 ft., north slopes, 11 Nov 1976, B. L. Turner 76-18 (LL, MEXU).

Additional collection examined: MEXICO. HIDALGO: ca 15 mi NE Villa Carranza, Barranca de Marmoles, pine forest, 2300 m, 12 Oct 1981, M. J. Warnock 2464 (TEX).

Ageratina queretaroana belongs to the subgenus Neogreenella and is closely related to the more western A. triniona from which it can be readily distinguished by its glandular-pubescent capitulescence, strictly eximbricate, glandular-pubescent, narrowly acute, involucral bracts and longer corollas.

AGERATINA RAMIREZIORUM (Espinosa) B. Turner, comb. nov.

Based upon Eupatorium ramireziorum Espinosa, Phytologia 56:335.1984.

This taxon is closely related to A. photina (B.L. Rob) King & H. Rob. but their leaves appear quite distinct, the latter having more lanceolate blades which are 3-nerved from the base.

AGERATINA ROBINSONIANA (Greene) B. Turner, comb. nov.

Based upon Eupatorium robinsonianum Greene, Erythea 1:150.1893.

Robinson (1926) treated this taxon as a variety of Eupatorium espinosarum A. Gray. McVaugh (1984) followed this treatment with some reservation, noting that its foliage is "scarcely if at all gummy", etc. Paradoxically, he also recognized E. subintegrum (Greene) B. L. Rob, which I would include under the fabric of E. espinosarum. At least E. robinsonianum is more distant from E. espinosarum than is E. subintegrum, the latter intergrading with the former over a broad region of northcentral Mexico. Thus, in our forthcoming treatment of Mexican Asteraceae (Turner & Nesom, in prep.) we will recognize both Ageratina robinsoniana and A. espinosarum, the latter with but two varieties: var espinosarum (=E. espinosarum var. ambiguum A. Gray) and var. subintegrifolia (B.L. Rob.) B. Turner, comb. nov., Based

upon Eupatorium espinosarum var. subintegrifolium B. L. Rob., Proc. Amer. Acad. Arts 26:165.1891.

AGERATINA SANDERSII B. Turner, sp. nov. Fig. 3.

A. neohintoniorum B. Turner simile sed foliis glabris amplioribus et capitulis parv. oribus numerosioribus acheniis glabris differt.

Erect perennial glabrous herbs to 80 cm high. Stems terete, glabrous. Leaves opposite throughout, 6-12 cm long, 1-3 cm wide; petioles 1-4 mm long, narrowly winged; blades lanceolate-elliptic, 3-nervate from the base, glabrous, finely reticulate, the margins remotely serrulate. Heads 15-30 in congested, terminal or axillary, corymbs, the ultimate peduncles glabrous, 3-5 mm long. Involucre ca 3 mm high, biseriate, eximbricate; bracts 2-nervate, ciliate, acute. Florets 20-30 per head; corollas white, ca 2.5 mm long, the tube ca 1.5 mm long, the throat ca 1 mm long, abruptly funnelform, the lobes pubescent. Achenes spindle-shaped, ca 1 mm long, glabrous; pappus of 10-15, readily deciduous, barbellate bristles ca 2 mm long.

TYPE: MEXICO. SONORA: 18.3 mi E of Rio Yaqui bridge near Tonichi, on the road to Carrizal and Santa Rosa (ca 109° 21'W x 18°30'N), ca 3200 ft, 27 Mar 1983, A.C. Sanders 3711 (holotype TEX; isotypes ARIZ, UC, UCR).

According to label data, the species is uncommon, "growing along a small stream" in a tropical deciduous forest with "Acacia cymbispina, Ceiba acuminata, Lysiloma watsoni, Quercus tuberculata . . .", etc.

Ageratina sandersii belongs to the subgenus Ageratina, possessing the heads and floral features of A. malacolepis (B. L. Rob.) King & H. Rob., but the foliage is suprisingly similar to A. neohintoniorum (described above), but the leaves are larger and it is essentially glabrous throughout.

It is a pleasure to name the species for its only known collector, Dr. A. C. Sanders, Curator, University of California at Riverside.

AGERATINA SOUSAE B. Turner, sp. nov.

A. bellidifolia (H.B.K.) King & H. Rob. simile sed caulibus ubique foliiferis, laminis foliorum pro parte maxima deltoideis vel flabellatis glabris et capitulis paucioribus in pedunculis brevioribus differt.

Erect perennial herb 50-60 cm high. Stems leafy throughout, slender, striate, glandular-pubescent (with age glabrate) arising from a small, fibrous-rooted, woody crown. Leaves 4-6 cm long, 2.0-3.5 cm wide; petioles 6-20 mm long; blades deltoid, flabellate or broadly ovate, glabrous, except beneath along the major veins, 3(5)-nervate from the base, the margins crenulo-dentate. Heads white, numerous in open corymbose panicles, the ultimate peduncles glandular-pubescent, 5-15 mm long. Involucres 5-7 mm long, 2-seriate, eximbricate; bracts 2-3 nervate, glandular-pubescent. Receptacle plane, glabrous. Disk florets 40-60; corollas ca 5 mm long, the tube ca 3 mm long, the lobes pubescent. Achenes ca 2.5 mm long, densely hispid along the angles; pappus 1-seriate of 20-25 white deciduous bristles.
TYPE: MEXICO. OAXACA: 27 mi NE Tlaxiaco, ca 6700 ft, "Brushy places in thin soil on sloping limestone rocks in pine-juniper country at the north base of the Sierra Madre del Sur.", 27 Oct 1965, A. Cronquist & M. Sousa 10421 (holotype TEX; isotypes MEXU, NY, etc.)

Additional specimens examined: MEXICO. OAXACA: along highway 175, ca 2 mi S of Loma Grande, ca 8000 ft, 28 Dec 1969, Clarke et al. 12940 4-6a (TEX, UC); 32 mi NW of Oaxaca, 7200 ft, 27 Oct 1965, Cronquist & Sousa 10424 (TEX).

The Cronquist collections were distributed as Eupatorium [Ageratina] prunellifolium H.B.K., vel. aff., but they clearly belong to the Ageratina bellidifolia complex as treated by Grashoff and Beaman (1969). Because of its glandular-pubescence, A. sousae will key to A. bellidifolia in their treatment, a very different taxon with predominantly basal, mostly elliptical, leaves and fewer heads on much longer ultimate peduncles.

It is a pleasure to name the species for Mario Sousa, outstanding legume systematist working out of MEXU.

AGERATINA TRIANGULATA (Alam. ex DC). B. Turner, comb. nov.

Based upon Eupatorium triangulatum Alam. ex DC., Prod. 5:172. 1836.

A. triangulata is closely related to, but clearly different from, A. rubricaulis (HBK.) King & H. Rob. The microfiche photograph (G-DC!) captures many of its distinctive vegetative features. It is readily distinguished from A. rubricaulis, the latter differing in having short internodes, short petioles, leaves

gradually reduced upwards, more ovate-deltoid, coarsely dentate, blades, etc, not to mention features of the capitulum.

Indeed, McVaugh (1984), having examined the type personally, correctly notes that "the type of Eupatorium triangulatum is a specimen with small corollas (4 mm long), short pappus (2-4 mm long), and only ca 12 flowers in a head (not 20-25 as usually found in this species [E. rubricaule])". Nevertheless, he placed this in synonymy under E. rubricaule HBK.

In addition to the microfiche type, I have examined the following collections, all of which share the combination of features which mark A. triangulata. MEXICO STATE: Temascaltepec, Sierritz, 3 Dec 1935, Hinton 8772 (GH,UC). GUERRERO: Distr. Mina, Teotepec, 2650 m, oak and pine forest, 1.5 m high, Hinton et al 14801 (LL ,TEX). VERACRUZ: ca 4 mi W of Prof. R. Ramirez, ca 2450 m, 9 Dec 1984, Spooner 2875 (TEX).

AGERATINA WARNOCKII B. Turner, sp. nov.

A. viscosissimae affinis sed foliis parvioribus crassioribus petiolis brevioribus laminis plerumque deltoideis et capitulis numerosioribus in pedunculis brevioribus differt.

Suffrutescent herb or shrublet to 1 m high. Stems densely pubescent with glandular trichomes. Leaves opposite throughout, 4-7 cm long, 2-3 cm wide; petioles 1.5-3.0 cm long, glandular-pubescent; blades deltoid to deltoid-cordate, thick, dark green to purplish, glandular-pubescent above and beneath, 3-nervate from the base, the margins irregularly dentate with 5-8 teeth to a side. Heads 8-30 in terminal, somewhat open corymbs, the ultimate peduncles, 0.5-2.5 cm long. Involucres campanulate, 5-6 mm high, biseriate, eximbricate; bracts linear, 2-costate, glandular, the apices acute. Florets ca 40 to a head; corollas white, ca 5 mm long, the tube ca 2 mm long, the limb abruptly funnelform, the lobes pubescent. Achenes spindle-shaped, ca 1.6 mm long, sparsely hispidulous; pappus of ca 20 white, barbellate, readily deciduous, bristles 3.5-4.5 mm long.
TYPE: MEXICO. DURANGO: just W. of Puente Buenos Aires along route 40 west out of Durango at km 154, west side of road in pine woods, 12 May 1980, Michael J. Warnock 2066 (TEX; isotype MEXU).

Additional specimens Examined: DURANGO: 78 mi W of Durango, 9000 ft, 18 Mar 1966, Hess & Hall 632 (MICH); ca 34 road miles W of El Salto, head of barranca, pine

forests, 2400-2500 m, 24 Mar 1951, McVaugh 11530 (MICH); ca 6 mi W of Durango, mesa ca 3 mi due N of Presa Guadalupe Victoria, "rocky volcanic flats with Quercus Acacia and Opuntia, 26 Mar 1984, 6900 ft, Sanders et al. 4860 (TEX); eastern end of El Espinazo de Diablo, 16 mi E of Revolcaderos, 7800 ft, 26 Mar 1984, Sanders et al. 4887 (TEX).

The species belongs to the subgenus Ageratina and is presumably most closely related to the widespread A. viscosissima (sensu McVaugh, 1984), but differs from that taxon in possessing smaller, thicker, deltoid leaves and a fewer-flowered, more open capitulescence. I first became aware of the taxon by the holotype but, thinking this might be an aberrant A. viscosissima, I set it aside until additional collections might come to the fore. As noted above, these have, and all share the combinations of characters alluded to, which mark A. warnockii as quite distinct.

It is a pleasure to name this taxon for Dr. M. J. Warnock of Sam Houston State University, Huntsville, Texas, prolific collector and expert on the genus Delphinium.

ACKNOWLEDGEMENTS

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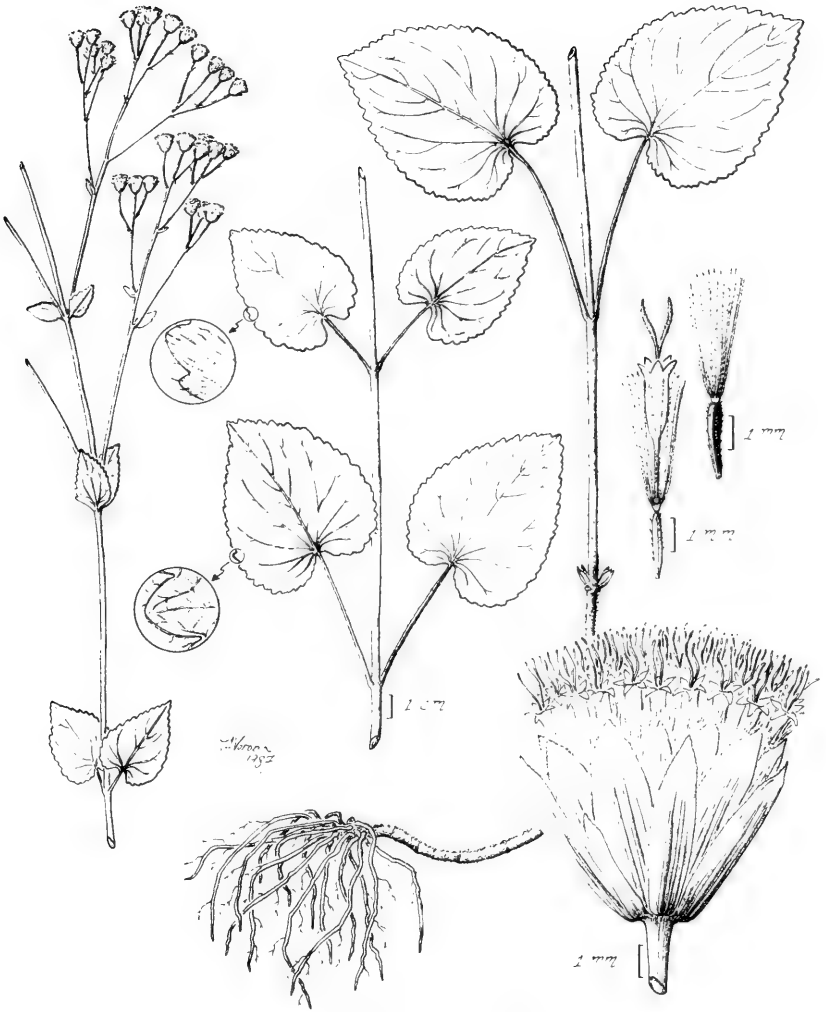

Fig. 1. Ageratina Barriei, from holotype

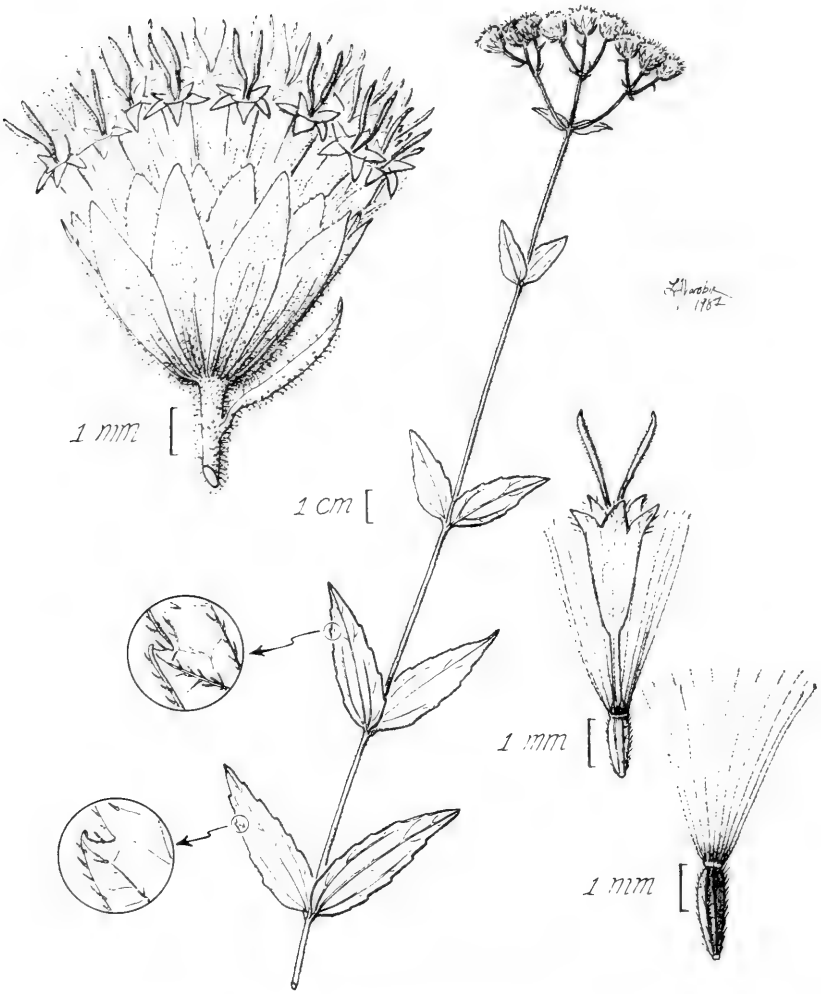

Fig. 2. Ageratina neohintoniorum, from holotype.

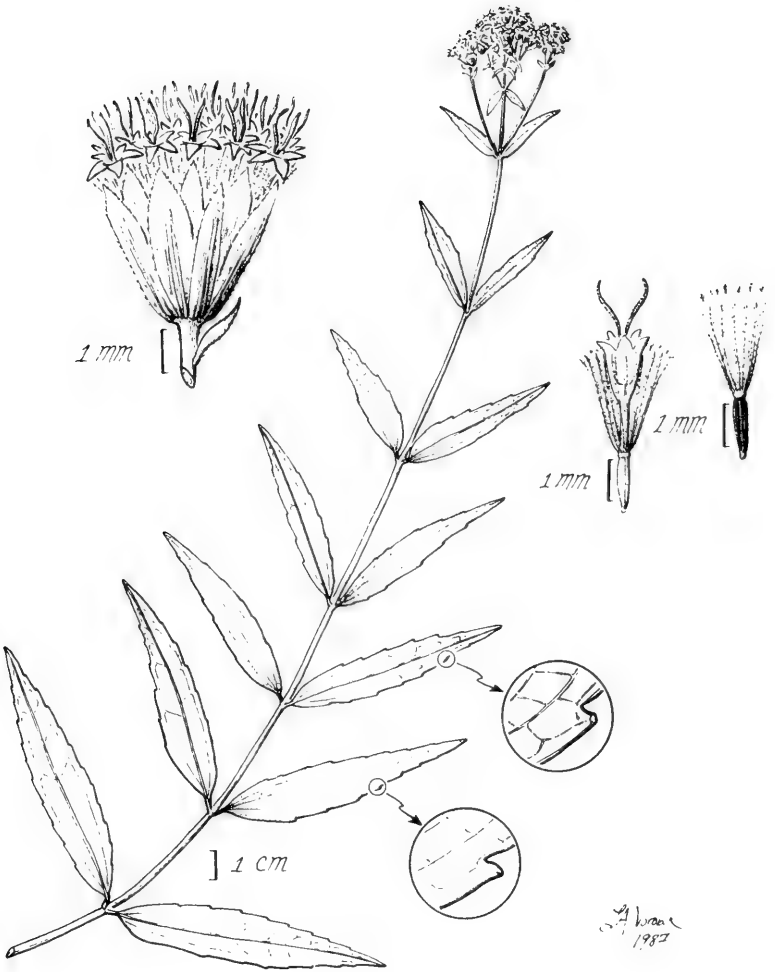

Fig. 3. Ageratina Sandersii, from holotype.

ON THREE MISUNDERSTOOD NEOTROPICAL SPECIES OF *TECTARIA* (POLYPODIACEAE: ASPLENIOIDEAE)

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ABSTRACT. A critical examination of type specimens has established that a widespread fern of southern Central America and Colombia, commonly identified as *Tectaria rheosora* (Baker) C. Chr., actually represents *T. rivalis* (Mett. ex Kuhn) C. Chr. A second widespread species, variously identified as *Tectaria rheosora* or *T. subebenea* (Christ) C. Chr., is properly *T. rheosora*; however, that name is here formally placed into synonymy under *Tectaria athyrioides* (Baker) C. Chr. *Tectaria subebenea* is believed to be a rare species, apparently endemic to Costa Rica. Distinguishing features and representative specimen citations are provided for each species.

INTRODUCTION

A floristic treatment of the pteridophytes of the La Selva Biological Station, Costa Rica, was recently completed (Grayum & Churchill, 1988) with the resolution of a taxonomic problem involving two of the nine species of *Tectaria* occurring on the property. These two species, similar in general aspect, were initially distinguished in the field at La Selva (an Atlantic lowland site), on the basis of morphological and ecological differences. Subsequently, an examination of herbarium material from throughout southern Central America and northern South America confirmed the consistency of these differences, led to the discovery of additional distinguishing features and demonstrated the widespread occurrence of both species in the general region. The existence of a serious taxonomic problem was revealed by a perusal of the specimen annotations: respected authorities frequently failed to distinguish these two species altogether, or did so inconsistently, and exhibited a general lack of consensus as to which names to use and how to apply them. Thus, the problem had both biological and nomenclatural components; the first of these aspects, as mentioned above, was resolved in the field, the second by means of a herbarium study of type specimens. Since the conclusions of this investigation are of general pertinence to Central American pteridology, they are here reported.

THE BIOLOGICAL COMPONENT: CHARACTERIZATION OF THE FERNS

The two problematical La Selva Tectaria species share the following attributes: both are moderately large ferns with stout, short-creeping to suberect rhizomes, dark petioles and frond axes, coarsely pinnate-pinnatifid to subtripinnate laminae, copiously areolate venation, free included veinlets in most areolae and indusiate sori. Both species come out to the vicinity of Tectaria rheosora (Baker) C. Chr./T. subebenea (Christ) C. Chr. in most regional keys (e. g., OTS, 1967). They may be distinguished from one another as follows:

Species A: Areolae along costae, costules and distal part of rachis with free included veinlets; lamina bipinnate to subtripinnate, usually with 4-6 pairs of free pinnae below the pinnatifid apex; petiole about equaling the lamina, dark reddish-brown to medium brown, conspicuously scaly in basal 10-20 cm; indusia regularly lunate, ciliate along the margin; primary riparian forest at La Selva, elsewhere on comparatively well-drained sites (slopes and ridges) in primary forest.

Species A ranges from the Atlantic slope of Nicaragua (or perhaps even further north) to the Pacific lowlands (Chocó) of Colombia (specimen citations for the species highlighted in this paper are provided in Appendix 1). In Costa Rica, it occurs in both the Atlantic and Pacific lowlands, mostly below 1000 m but occasionally to as high as 2250 m.

This species is regularly identified as Tectaria rheosora by most authorities. It is abundant in the canyon of the Río Reventazón at Turrialba, Prov. Cartago, Costa Rica, and a plant from that population is illustrated under the name T. rheosora in Tryon & Tryon (1982, Fig. 69.1).

Species B: Areolae along costae, costules and distal part of rachis long, prominent, lacking free included veinlets; lamina pinnate-pinnatifid to subbipinnate (the basal pinnae simple, or with at most a single pair of free pinnules), with 2-3 pairs of free pinnae below the pinnatifid apex; petiole longer than the lamina, deep blackish-brown toward base, the scales few and restricted to the very base; indusia varying from linear to sublunate on the same frond, the margins eciliate; primary swamp forest and along sluggish portions of forest creeks.

Species B is known only from Nicaragua (Matagalpa) to Panama (Veraguas), from sea level to about 1100 m. Collections have been seen only from the Atlantic slope.

This species is identified either as Tectaria rheosora or, about equally as often, T. subebenea; a few authors have annotated specimens as "Tectaria sp. nov."

NOMENCLATURAL CONCLUSIONS

A recent visit to the herbarium of the Royal Botanic Gardens, Kew, England (K), afforded the opportunity to examine all of the type specimens relevant to the problem under discussion (as well as several others that proved to be irrelevant). Coming hard on the heels of extensive field and herbarium experience with this group of ferns, the interpretation of these types was straightforward and, in fact, instantaneous, leading to the following three principal conclusions:

1. Species A, surprisingly enough, is neither Tectaria rheosora nor T. subebenea but, rather, Tectaria rivalis (Mett. ex Kuhn) C. Chr. Both isosyntypes of Aspidium rivale Mett. ex Kuhn, the basionym, were studied at K: Seemann s. n. (January, 1848), from the Bay of Utria, Chocó, Colombia; and Fendler 406, from Chagres, Panama. The Seemann specimen is an isolectotype, Seemann s. n. (US) having been selected as the hololectotype by Lellinger (1977). The latter author states that the Fendler collection is actually Tectaria rheosora, based on an examination of a photograph of the holosyntype at B. Although I have not seen Fendler 406 (B), the isosyntype at K is clearly not T. rheosora; it differs only negligibly (i. e., in pubescence of the frond axes) from the Seemann specimen and, like Mettenius, I regard the two collections as conspecific.

2. Species B corresponds to Tectaria rheosora (Baker) C. Chr.; the holotype (Harrison 54, Costa Rica) of the basionym, Polypodium rheosorum Baker, is a single, unusually small leaf, however there is no question that it represents this entity. But there is a complication here: the type of Nephrodium athyrioides Baker, the basionym of Tectaria athyrioides (Baker) C. Chr., also represents Species B. Priority cannot be invoked to select the correct name, since both basionyms were published in the same article by Baker (1884); moreover, both new combinations in Tectaria were made at the same time (Christensen, 1934).

History has treated these two names very differently, however, in terms of their usage in botanical literature and in herbaria. Nephrodium athyrioides literally passed into oblivion as soon as it was published. Except for the occasion of its formal transferral to Tectaria, I have been unable to find any mention of the name in the literature, nor have I seen any herbarium specimens so identified. But although the name is not used, neither does it appear to have been listed in synonymy under another name.

Tectaria rheosora, on the other hand, has become a well known name--but for all the wrong reasons. It has been consistently misapplied to the wrong species, especially T. rivalis, while many collections legitimately entitled to the name have been identified as T. subebenea.

The above patterns appear to have become entrenched at a very

early date. For example, Bommer & Christ (1896) made absolutely no mention of Nephrodium athyrioides (although the type is from Costa Rica), while under Polypodium rheosorum they cited at least one specimen of Tectaria rivalis. Later authors have merely followed suit.

In spite of its familiarity, the name Tectaria rheosora (Baker) C. Chr. is here formally placed into synonymy under T. athyrioides (Baker) C. Chr. for the purposes of the La Selva flora. As far as I am able to determine, this action establishes a precedent in this regard. The decision is justified as follows: first, the type of Nephrodium athyrioides is a better and more representative specimen than that of Polypodium rheosorum (in fact, it consists of two sheets; since these are differently numbered, one is here arbitrarily designated as the lectotype). Indeed, the type specimen of P. rheosorum was actually misinterpreted by the author of the name, as noted on the sheet by Prof. R. E. Holttum (14.12.1981): "I see no distinction between this and Tectaria athyrioides (Bak.). Indusia are present, not seen by Baker." It was Baker's failure to discern indusia on this specimen that caused him to assign it to Polypodium, rather than Nephrodium; the indusia are clearly evident on the type of N. athyrioides.

A second reason for preferring Tectaria athyrioides over T. rheosora is that Baker later illegally reused the name Polypodium rheosorum for an unrelated, Chinese species (Baker, 1891). This is perhaps rather minor, but adds to the general aura of confusion that has attended the epithet since its publication. It can safely be said that the name Tectaria rheosora has never been correctly and consistently applied to the species represented by the holotype, by any authority. Now that this species is well understood and has been clearly characterized apparently for the first time, it seems well to start it on its way with an untarnished (if little known) name. A complete synonymy follows:

Tectaria athyrioides (Baker) C. Chr., Index filicum, suppl. III:177. 1934. Nephrodium athyrioides Baker, J. Bot. 22:363. 1884. Aspidium costaricanum C. Chr. (not A. athyrioides Mart. & Gal. 1842), Index filicum, fasc. II:70. 1905. TYPE: COSTA RICA, Harrison 30 (lectotype: K).

Tectaria rheosora (Baker) C. Chr., Index filicum, suppl. III:184. 1934. Polypodium rheosorum Baker, J. Bot. 22:363. 1884 (not 1891). Aspidium rheosorum (Baker) C. Chr., Index filicum, fasc. II:90. 1905. TYPE: COSTA RICA, Harrison 54 (holotype: K).

3. Tectaria subebenea (Christ) C. Chr. appears to be a distinctly different species from the two previously discussed, and is not represented at La Selva. It agrees in general with T. rivalis and T. athyrioides in having large, pinnately divided fronds with areolate venation; the indusia are round and eciliate, and there are some (but few) free included veinlets in the costal areolae.

T. subebenea differs in its larger fronds, even darker (nearly black) frond axes and, most strikingly, in its broadly ovate, hyaline petiolar scales. Although I do not know this species in the field, I feel confident that it is a separate entity (the point is moot with respect to the problems discussed in the preceding sections, Aspidium subebeneum Christ being the most recent of any of the basicnyms involved). Judging from the available specimens, Tectaria subebenea is endemic to Costa Rica, where it occurs from about 200-1400 m.

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APPENDIX 1

REPRESENTATIVE SPECIMENS EXAMINED

Tectaria athyrioides (Baker) C. Chr.

COSTA RICA. No other location, Harrison 30 (lectotype, K), 31 (syntype, K), 54 (holotype of Polypodium rheosorum Baker, K). ALAJUELA: Burger & Stolze 4940, 5051 (CR). HEREDIA: Biolley 7497 (CR), Burger & Burger 8046B (CR), Chacón 537 (CR), Grayum 8289 (CR, MO), Grayum & Chavarría 8293 (CR, MO), Hammel 10372 (CR, DUKE), McDowell 765, 1068 (CR, DUKE), Pittier 7497 (BR), Scamman 7470 (CR), Smith et al. 1781 (CR, UC). SAN JOSE: Biolley s. n., 7/1888 (M), Kupper 350 (M), Pittier 666, 1181 (BR).

NICARAGUA. MATAGALPA: Araquistain & Moreno 2652 (CR), Neill 1806 (CR). ZELAYA: Neill 1851 (CR).

Tectaria rivalis (Mett. ex Kuhn) C. Chr.

COLOMBIA. CHOCO: Seemann s. n., 1/1848 (isolectotype; K).

COSTA RICA. ALAJUELA: Croat 36519 (CR, MO), Lellinger & White 1640 (CR). CARTAGO: Grayum & Hammel 5740 (CR, MO), Skutch 4618 (CR). HEREDIA: Grayum 2707, 3045 (CR, DUKE), 8288 (CR, MO). LIMON: Antonio 607 (CR), Croat 43207 (CR, MO), Grayum et al. 7688 (CR, MO), Moran 3094, 3122 (CR), Pittier 3099, 6804 (CR), Tonduz 9484 (CR). PUNTARENAS: Burger & Gentry 8924 (CR), Burger & Liesner 7258 (CR), Utley & Utley 1091, 1188 (CR).

NICARAGUA. RIO SAN JUAN: Neill 3410 (CR). ZELAYA: Stevens 6313 (CR, MO), Vincelli 135, 219 (CR).

PANAMA. CANAL ZONE: Fendler 406 (isosyntype; K). PANAMA: Hamilton et al. 3241 (CR, MO). VERAGUAS: Antonio 2371 (CR, MO).

Tectaria subebenea (Christ) C. Chr.

COSTA RICA. No other location, Endres s. n. (K). ALAJUELA: Croat 43620 (CR, MO). LIMON: Tonduz 9447 (type; CR, K). PUNTARENAS: Anonymous (McAlpin?) 74-1173 (CR-57978). SAN JOSE: Valerio 33480 (CR).

SOLANUM AYMARAESENSE (SECT. PETOTA), NOVA SPECIE PERUVIANA

*by C. Ochoa**

Herbaceum, tuberiferum, ramificatissimum, usque ad 70-80 cm altum. Caules et internodia modice longi. Caulis decumbentis, angustissime alatus, tenuis, basi, 6-8 mm diam., viridis, sparse pilosus, pilis brevibus, vix perspiciendis, internodia(5-)7-9 cm longa. Stolones 1 m vel plus longi, tubercula, 4.5-5.5 cm longa, oblonga, in extremis obtusa, alba, lenticellis parvis, sparsis obsita, gemmae parvae plus vel minus profundae. Folia, 13.0-18.0 cm longa, 7.5-10.5 cm lata, foliola interjecta sessilia, foliola pilis minutis obsita, subtus satis dense obsita tam quam rhachis et petioluli, pilis glanguliferis nullis. Foliola late ovalia, 4.5-5.3 cm longa, 2.5-3.0 cm lata, apice obtusa, basi inaequilatera, rotundata, petioluli, 1.5-2.5 mm longi. Folia pseudo-estipulacea late falcata 5 x 3 mm. Inflorescentia cymosa val cymoso-paniculata, 5-7(-12)-flora. Pedunculus 9 cm longus, dense puberulentus, tam quam pedicelli et calyx, gracilis, basi, 1.5 mm diam. Pedicellus, 10-15 mm longus, nunc medio, nunc paulo infra medium articulatus, pedicellus superior, 6-7 mm longus. Calyx symetricus, 8-9 mm longus, lobi anguste lanceolati, apice longe acuminati acumina subspathulata, 2.5-3.0(-3.5) mm longa. Corolla rotato-pentagonalis, plerumque parva, 2.5-2.8 cm diam., pallide violacea, sed dense violacea inter stella et acumen. Columna antherarum truncato-conica, asymetrica, antherae 6 mm longae, basi cordatae, filamenta, 0.5-1.0 mm longa, albo-hialina, glabra. Stylus, 10.5-11.5 mm longus, 2.5 mm exertus, basi usque ad 2/3 dense papillosus, stigma parvum, ovale, apice obtusum, Baccae globosae, 10-15 mm diam., plerumque viridae cum 1-2 striis longitunalibus obscure violaceis ornatae. Ad seriem Tuberosa pertinet. Numerus cromosomatum: 2n = 2x = 24.

Typus: PERU, departamenti Apurimac, provinci Aymaraes, vicinitas San Francisco, 2500 m supra mare. **C. Ochoa 4150**, *Martius 1973 (holotypus, OCH; isotypus, US).*

Affinitas: Habitu et indumento, pedunculis longis, forma corollae affinitatem cum S. longiusculus habet, sed notabiliter diversa est forma late ovata foliolorum, disectione minore, articulatio pedicelli et amplitudine tuberculorum.

Habitat: In vallibus interandinis, inter proclivia saxosa et inter species **Eupatorium**, **Bidens**, **Monnina**, **Calceolaria** *et* **Solana** *non tuberifera.*

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* *International Potato Center, P.O. Box 5969, Lima-Peru*

Solanum aymaraesense *Ochoa. Holotypus OCH-4150, ca. x 1/2*

DIAGNOSES OF CYRTANDRA SPECIES (GESNERIACEAE) SECTION CYLINDROCALYCES

HAWAIIAN PLANT STUDIES 158

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In the genus Cyrtandra in the Hawaiian Islands, the section Cylindrocalyces is one of the larger sections and it is present on all of the larger islands. The present report adds 20 new species and 3 varieties to the total. Unless otherwide indicated the types are in the Bishop Museum, Honolulu.

Cyrtandra Bishopii sp. nov. Novellae pilosae sunt, foliis oppositis inaequalibus, petiolis 3-4.5 cm longis pilosulis, laminis 6-15 × 2.4-6 cm ellipticis acuminatis basi cuneata supra primo pilosulis infra glaucis, cymis 5 cm longis 1-3-floriferis pilosulis, pedicellis 11-14 mm longis, calycibus 20-21 mm longis fusiformibus pilosulis 4 lobis 11 mm longis lanceolatis, corollis 20 mm longis puberulis, loba infera 6 × 11 mm transverse elliptica. Typus: Oahu I., Koolau Range, Kahawainui Gulch, E. Bishop 016910.

C. brevipedicelaris sp. nov. Caules glabri sunt, foliis opppositis, petiolis 7-11 mm longis pilosulis, laminis 11.5-14 × 2-3.2 cm subcoriaceis oblanceolatis subacutis basi decurrenti, cymis 4.5 cm longis 3-5-floriferis, pedicellis 5-15 mm longis glabris, calycibus 23 mm longisfusiformibus rostro 4 mm longo, labia infera cum 2 lobis 9 mm longis lanceolatis, corollis 28 mm longis glabris loba infera 9 × 1 mm suborbiculari mucronata. Typus: Kauai I., Limahuli, S. Perlman & C. Wichman 200.

C. calvicorolla sp. nov. Ramulae glabrae sunt, foliis oppositis inaequalibus eis novellis sericie pilosis, petiolis 3-10 cm longis, laminis 18-19 × 6-15 cm oblanceolatis vel ellipticis subacutis basi cuneata et decurrenti supra midnervo pilosulo infra nervis pilosulis, cymis 1.5-3 cm longis 3-5-floriferis pilosulis, pedicellis 7-10 mm longis, calycibus 23-25 mm longis fusiformibus pilosulis rostro 4-5 mm longo labia supera bilobata lobis 11.5 mm longis infra lanceolatis supra subulatis, corollis 25 mm longis glabris. Typus: Kauai I., Anahola, H. St. John etR. S. Cowan 23,113.

C. cylindrica sp. nov. Ramulae glabratae sunt, foliis oppositis inaequalibus, petiolis 1.2-4.7 cm longis pilosis, laminis 4-15 × 1.7-8.8 cm ellipticis subacuminatis basi cuneata decurrenti supra hirsutis infra pilosis

nervis hirsutulis, cymis 1.5-2.3 cm longis 1-floriferis pilosis, pedicellis 1-2 mm longis, calycibus 18-20 mm longis pilosis, 5 lobis 5-8 mm longis lanceolatis, corollis 20-22 mm longis pilosulis. Typus: Kauai I., C. Christensen 287.

C. ellipsoidea sp. nov. Novellae pilosulae sunt, foliis oppositis inaequalibus, petiolis 4-7 cm longis alatis pilosulis, laminis 20-23.5 × 6-10.2 cm ellipticis subacuminatis basi cuneata supra midnervo pilosulo infra nervis pilosulis, cymis 1.5-3 cm longis 3-floriferis pilosulis, pedicellis 1-2 mm longis, calycibus 18-23 mm longis pilosulis rostro 3-4 mm longo 5 lobis 6-8 mm longis subulatis ex basi ovata, corollis 25-27 mm longis glabris loba infera 12-14 × 9-10 mm ovata. Typus. Kauai I., Hanakapiai, S. Perlman 474.

C. glabricalycis sp. nov. Frutex 1 m altus est, foliis oppositis, petiolis 1-3 mm longis pilosulis, laminis 6-22 × 1.7-3.7 cm subcoriaceis subacutis basi cuneata subtus nervis pilosulis, cymis 5-6 cm longis 1-floriferis pilosulis, pedicellis 20-25 mm longis, calycibus 27 mm longis glabris lobis 2-4 mm longis lanceolatis, corollis 23 mm longis. Typus: Kauai I., P. van Royen 11,709.

C. indivisa sp. nov. Frutex 1 m altus est, foliis oppositis, petiolis 5.5 cm longis pilosulis, laminis 25-32 × 9-10 cm ellipticis acutis basi cuneata decurrenti supra midnervo pilosulo infra pilosulis, cymis 4-5 cm longis 3-floriferis pilosulis, pedicellis 5-6 mm longis, calycibus 30-38 mm longis pilosulis rostro 4-5 mm longo 19 mm lobatis labia supera bifida lobis 3 mm longis subulatis, corollis 32 mm longis. Typus: Kauai I., Lumahai Valley, C. Christensen 224.

C. infrafissa sp. nov. Novellae pilosae sunt, foliis oppositis inaequalibus, petiolis 6-7 cm longis pilosis, laminis 18-24 × 6.7-8.5 cm ellipticis acuminatis basi cuneata supra nervis pilosulis infra pilosulis, cymis pilosulis, pedulculo et pedicello 1-2 mm longis, calycibus 24 mm longis pilosis rostro 5 mm longo 2 lobis lanceolatis, corollis 31 mm longis glabris loba infera 10 × 7 mm ovata. Typus: Kauai I., Lumahai Valley, C. Christensen 252.

C. integra sp. nov. Frutex 1-2 mm altus ramosus est, foliis oppositis inaequalibus, petiolis 8-12 mm longis pilosulis, laminis 14-20 × 3-4.5 cm subcoriaceis ellipticis subintegris acuminatis basi cuneata infra nervis pilosulis, cymis 1-2-floriferis pilosulis, pedicellis 12-15 mm longis, calycibus 38 mm longis rostro 7-8 mm longo 3 lobis 19 mm longis lanceolatis , corollis 31 mm longis glabris loba infera 11 × 10 mm. Typus: Kauai I., Wainiha-Manoa, C. Christensen 287,

C. macrocarpa (Skottsb.) comb. nov.
C. Gayana Heller, var. macrocarpa Skottsb., Acta Horti Gothob. 15: 441, 1944.

Expanded diagnosis: Young shoots pilosulous leaves opposite, petioles 8-11 mm long, glsbrate; blades 8.5-13.5 × 2.1-3.2 cm narrowly elliptic, subobtuse, the blade cuneate, below the veins pilosulous; cymes 5 cm long, 3-flowered, pilosulous; pedicels 13-16 mm long; calyx 20-22 mm long, ellipsoid, almost beakless, upper lobes 4-5 mm long, deltoid; corolla 25-27 mm long, glabrous. Lectotype: Kauai I., Alakai, Kilohana, O. Selling 2,869 (BISH).

C. obtusa sp. nov. Novellae pilosulae sunt, foliis oppositis inaequalibus, petiolis 4-7 cm longis pilosulis, laminis 8.5-10 × 4-6.7 cm elliptici-obovatis basi cuneata supra midnervo pilosulo infra nervis pilosulis, cymis 2.5-3 cm longis 1-floriferis pilosulis; pedicellis 10-15 mm longis, calycibus 18 mm longis pilosulis rostro 2 mm longo lobis 8 mm longis lanceolatis, corollis 26 mm longis glabris. Typus: Kauai I., Haupu Range, C. N. Forbes 749.K.

C. oenobarba H. Mann, var. proceripetiolata var. nov. Planta herbacea acaulescens est, a specie differt in petiolis 14-27 cm longis, laminis 13-15 × 10-13 cm suborbicularibus profunde cordatis, cymis 18 cm longis 7-floriferis, pedunculis 10.5 cm longis, bracteis 12 mm longis chartaceis, pedicellis 10-15 mm longis . Typus: Kauai I., Power Line Trail, C. N. Forbes 146.K.

C. orbicularis sp. nov. Ramulae glabrae sunt, foliis oppositis, petiolis 2.5-4 cm longis pilosulis, laminis 9.5-16.5 × 3.5-6.2 cm subcoriaceis ellipticis sibacuminatis basi cuneata subdecurrenti infra nervis pilosulis, cymis 3-7-floriferis, calycibus 11 mm longis puberulis lobis inferis 4.5 mm longis ovatis acutis, corollis 20 mm longis glabris loba infera 4 × 5.5 mm oblate suborbiculari. Typus: Kauai I., S. Perlman 15.

C. paludosa Gaud., var. honopueensis var. nov. A var. irrostrata differt in petiolis adpresse pilosulis, laminis supra adpresse pilosulis infra nervis adpresse pilosulis, cymis calycibusque divergente pilosulis, tubo corollae capitate glandulose pilosulis, Typus: Hawaii I., Kohala Mts., Honopue Gulch, L. E. Bishop 007029,

C. paludosa Gaud., var. kohalaensis var. nov. A var. honopueensis differt in ramulis petiolisque dense divergente pilosulis, laminis supra ascendente pilosulis infra in nervis dense divergente pilosulis, cymis calucibusque divergente pilosulis. Typus: Hawaii I., Kohala Ditch Trail Road, A. Greenwell (Degener no.) 19,260.

C. Perlmanii sp. nov. Novellae pilosulae sunt, foliis oppositis, petiolis 23-25 mm longis pilosulis, laminis 19-24 × 4-5 cm oblanceolatis subacuminatis basi cuneata subtus nervis pilosulis, cymis 5-7-floriferis pilosulis, pedunculo 4-5 mm longo, pedicellis 8-10 mm longis, calycibus 22 mm longis rostro 5-6 mm longo 3 lobis lanceolatis, corollis 20 mm longis glabris. Typus: Kauai I., Limahuli Valley, S. Perlman 3.

C. puberis sp. nov. Novellae pilosulae sunt, foliis oppositis inaequalibus, petiolis 3-6 cm longis, laminis 15.5-20.7 × 7.3-8.7 cm ellipticis subacuminatis basi cuneata decurrenti supra nervis pilosulis infra pilosulis nervis pilosis, pedicellis 10 mm longis glabris, calycibus 10 mm longis glabris labiis 3 mm longis lobis deltoideis, corollis 20 mm longis glabris. Typus: Kauai I., Limahuli Valley, S. Perlman 1.

C. pubinervis sp. nov. Novellae pilosulae sunt, foliis oppositis, petiolis 1.7-3.5 cm longis glabratis, laminis 8-13.7 × 3.5-7 cm ellipticis subacutis basi rotundata supra et infra nervis pilosulis, cymis 3.5-4 cm longis 3-5-floriferis puberulis, pedicellis 8-10 mm longis, calycibus 15-16 mm longis pilosulis rostro 2-2.5 mm longo lobis 7-9 mm longis lanceolatis, corollis 22 mm longis glabris. Typus: Kauai I., Hanapepe Falls, A. A. Heller 2,440.

C. semisubulata sp. nov. Frutex est, foliis oppositis, petiolis 6-7 cm longis alatis pilosulis, laminis 27-30.5 × 11.5-13.5 cm ellipticis acuminatis basi cuneata supra nervis pilosulis infra pilosulis, cymis 3.5-4.5 cm longis 3-5-floriferis pilosulis, pedicellis 6-15 mm longis, calycibus 24-30 mm longis pilosulis labia supera 8-10 mm longa trifida lobis 3-4 mm longis subulatis, corollis 30 mm longis glabris. Typus: Kauai I., C. Christensen 331.

C. sericea sp. nov. Novellae pilosulae sunt, foliis oppositis, petiolis 2.5-4 cm longis pilosulis, laminis 7-12 × 2.3-4 cm subcoriaceis ellipticis acuminatis basi cuneata decurrenti supra midnervo pilosulo infra nervis pilosulis, cymis 2.5-4 cm longis 7-15-floriferis, pedunculo 7-12 mm longo, calycibus 12-13 mm longis glabris, lobis inferis 5-6 mm longis lanceolatis, corollis 17 mm longis glabris. Typus: Kauai I., S. Perlman 193.

C. vanRoyenii sp. nov. Ramulae glabrae sunt, foliis oppositis, petiolis 3-8 mm longis glabratis, laminis 10-16 × 3-4.6 cm coriaceis fusiformibus subacutis basi rotundata infra nervis puberulis, cymis 4-7 cm longis 1-2-floriferis pilosulis, pedicellis 2.5-4 cm longis, calycibus 28 mm longis puberulis ½ partitis labia supera 6 mm longa trilobata, corollis 34 mm longis glabris. Typus: Kauai I., Alakai, Mohihi-Waialae, P. van Royen et al. 11,749.

C. wahiawaensis sp. nov. Novellae glabrae sunt, foliis oppositis inaequalibus, petiolis 9-13 mm longis, laminis 4-14 × 1.2-4 cm subcoriaceis glabris oblanceolatis subacuminatis basi cuneata decurrenti, cymis 1-floriferis glabris, pedicellis 15-25 mm longis, calycibus 19 mm longis rostro 3 mm longo lobis 6-7 mm longis ovatis, corollis 20-22 mm longis glabris. Typus: Kauai I., Wahiawa, S. Perlman 481.

C. waioliensis sp. nov. Novellae pilosulae sunt, foliis oppositis inaequalibus, petiolis 5-11.5 cm longis puberulis, laminis 24-25 × 8.8-10.5 cm ellipticis acutis basi cuneata decurrentiinfra nervis pilosulis, cymis 3-4 cm longis 3-floriferis pilosulis, pedicellis 6-9 mm longis, calycibus 26 mm longis pilosulis rostro 3-5 mm longis 11 mm partitis, corollis glabris. Typus: Kauai I., Waioli Ridge, C. N. Forbes 92.K.

DIAGNOSES OF LYSIMACHIA SPECIES (PRIMULACEAE)

HAWAIIAN PLANT STUDIES 159

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As previouslu known Lysimachia in the Hawaiian Islands contained 1 indigenous herbaceous littoral species, and 12 upland fruticose endemic species.To these there are here added 61 new endemic species. Unless otherwise indicated the types are in the Bishop Museum, Honolulu.

Lysimachia angusta sp. nov. Novellae glabrae sunt, foliis alternatis sessilibus, laminis 25-53 × 1.2-2.2 mm linearibus, pedicellis in flore 13-17 mm longis puberulis, lobis calycis 5-6.5 mm longis lineari-lanceolatis glabris, corollis 10 mm longis, capsulis 4.5 mm longis 6-valvatis rostro 3 mm longo. Typus: Maui I., Kiphulu, B. Harrison 539.

L. arta sp. nov. Novellae glandulose puberulae sunt, foliis alternatis, petiolis 0-2 mm longis, laminis 18-35 × 3-7 mm coriaceis linearibus glabris, pedicellis in flore 11-13 mm longis capitate glandulose puberulis, lobis calycis 4.5-5 mm longis in dorso glabris lanceolatis, corollis 12 mm longis, capsulis 5 mm longis rostro 4-4.5 mm longo. Typus: Maui I., Kipahulu, B. Harrison 272.

L. attenuata sp. nov. Novellae puberulae sunt, foliis alternatis, petiolis 3-5 mm longis primo puberulis, laminis 45-90 × 4-9 mm lineari-lanceolatis primo puberulis, pedicellis 5.5-9 cm longis puberulis, lobis calycis 6-6.5 mm longis lanceolatis atomiferis, stylo 7 mm longo. Typus: Molokai I., Kahuaawi Gulch, O. Degener 17,676 (A).

L. caliginis sp. nov. Novellae pilosulae sunt, foliis 3-5-subverticillatis, petiolis 0-3 mm longis pilosulis, laminis 15-47 × 6-7 mm subcoriaceis ellipticis acutis primo pilosulis, pedicellis 12-18 mm longis pilosulis, lobis calycis 5-6 mm longis lanceolatis pilosulis, corollis 9-10 mm longis purpureis, capsulis 4-5 mm longis subglobosis rostro 4 mm longo. Typus: Maui I., Ukulele, C. N. Forbes 864.M.

L. ciliolata sp. nov. Novellae pilosae sunt, foliis alternatis, petiolis 2-4 mm longis pilosulis, laminis 30-55 × 8-20 mm subcoriaceis ellipticis subacuminatis infra primo pilosulis, pedicellis 10-20 mm longis pilosulis, lobis calycis 6.5-7 mm longis lanceolatis pilosulis, corollis 11 mm longis, capsulis 6 mm longis ovoid-eisrostro 5 mm longo. Typus: Maui I., Olowalu, C. N. Forbes 2,369.M.

L. elliptica sp. nov. Novellae pilosulae sunt, foliis ternatis, petiolis 3-5 mm longis pilosulis, laminis 25-48 × 10-18 mm subcoriaceis ellipticis vel oblanceolatis acuminatis infra pilosulis, pedicellis in fructu 15-17 mm longis, lobis calycis 7.5-9 mm longis lanceolatis ciliatis, capsulis 6-7 mm longis subglobosis. Typus: Maui I., Lahainluna Valley, C. N. Forbes 325A.M.

L. Fauriei sp. nov. Novellae glandulose puberulae sunt, foliis alternatis vel ternatis sessilibus, laminis 35-65 × 3-4.7 mm subcoriaceis glabris ligulatis subacutis, pedicellis 20-37 mm longis, lobis calycis 5-5.7 mm longis lanceolatis ad basim puberulis, corollis 9-12 mm longis, capsulis 6 mm longis conicis rostro 5-6.5 mm longo. Typus: Molokai I., Kamolo, Faurie 705A (A).

L. Fayi sp. nov. Novellae glutinosae sunt, foliis alternatis subsessilibus, laminis 70-95 × 20-29 mm glabris oblanceolatis acuminatis, pedicellis 30 mm longis viscidis, lobis calycis 8-9 mm longis lanceolatis, corollis 13-13.5 mm longis rosaceis, stylo 5 mm longo. Typus: Kauai I., Mt. Kahili, J. Fay 502.

L. Funkiae sp. nov. Novellae capitate glanduose puberulae sunt, foliis alternatis sessilibus, laminis 14-35 × 0.5-0.8 mm linearibus minute puberulis, pedicellis 25-30 mm longis capitate glandulose puberulis, lobis calycis 4-5.3 mm longis lanceolatis, corollis 7 mm longis magentis, stylo 5 mm longo. Typus: Oahu I., Waiahole Ditch Trail, E. Funk et al. 211.

L. furcata sp. nov. Novellae puberulae sunt, foliis alternatis sessilibus, laminis 25-45 · 9-12 mm coriaceis ellipticis acutis midnervo pilosulo, pedicellis 15-18 mm longis capitate glandulose puberulis, lobis calycis 6.5-7 mm longis lanceolatis subpuberulis, corollis 10 mm longis, stylo 9 mm longo. Typus: Maui I., Wai Anapanapa, B. Harrison 488.

L. glauca sp. nov. Planta glabra fundens est, foliis alternatis sessilibus, laminis 27-47 × 3-4 mm angustissime ellipticis acutis, pedicellis 25-28 mm longis, lobis calycis 6 mm longis ovatis subacutis glabris, corollis 10-11 mm longis. Typus: Molokai I., Puu Kolekole, T. Pratt 73.

Descriptio: Capsulis 6 mm longis, stylo 6 mm longo.

L. hanapepeensis sp. nov.

Lysimachiopsis hillebrandii sensu Heller as to Kauai plant, Minn. Bot. Stud. 1: 875, pl. LVIII, 1897, not Lysimachia Hillebrandi J. D. Hook. in A. Gray, Proc. Am. Acad. Arts 5: 328-329, 1862.

Frutex ramosus decumbens est, ramulis novellis puberulis, foliis alternatis, petiolis 2-4 mm longis glabratis, laminis 30-78 × 10-40 mm ellitpcis subacutis basi cuneata glabratis, pedicellis 9-22 mm longis pilosulis, lobis

calycis 8.5-9 mm longis lanceolatis ad basim puberulis, corollis 17 mm longis purpureis, stylo 12 mm longo, capsulis 7 mm longis subglobosis. Typus: Kauai I., Hanapepe-Wahiawa, A. A. Heller 2,614A.

L. Harrisonae sp. nov. Frutex ramosis est, ramulis glabris, foliis alternatis in spiris, petiolis 1 mm longis glabris, laminis 20-40 × 1-1.5 mm linearibus obtusisglabris, pedicellis 8-11 mm longis puberulis, lobis calycis 3.2-4 mm longis ovatis varie lanceolatis subacutis secus midnervo capitate glandulose puberulis, corollis 7-8.5 mm longis purpureis, capsulis 5 mm longis ovoideis, stylo 3 mm longo. Typus: Maui I., Haleakala, Waihoi Valley, B. Harrison 1,049.

L. haupuensis sp. nov. Frutex ramosus est, novellis puberulis, foliis alternatis, petiolis 2-3 mm longis puberulis glabratis, laminis 28-46 × 8-13 mm subcoriaceis ellipticis subacutis basi cuneata infra primo puberulis, pedicellis 23-47 mm longis puberulis, lobis calycis 5-6 mm longis lanceolatis puberulis, corollis 10-11 mm longis, stylo 5 mm longo. Typus: Kauai I., Haupu, L. H. MacDaniels 883.

L. Helleri (R. Knuth) comb. nov.

L. Hillebrandi J. D. Hook. in A. Gray, var. Helleri R. Knuth, Engler, Pflanzenreich 237: 310, 1905.

Lysimachiopsis Hillebrandii (J. D. Hook. in A. Gray) Heller, sensu Heller in part, Minn. Bot. Stud. 1: 875pl. LVIII, 1897, non Lysimachia Hillebrandi J. D. Hook. in A. Gray (1862).

Lectotype: Kauai I., Hanapepe-Wahiawa, A. A. Heller 2,614 (BM).

L. kahiliensis sp. nov. Frutex ramosus est, novellis glabris, foliis alternatis sessilibus, laminis 25-50 × 8-16 mm ellipticis subacuminatis basi cuneata glabris, pedicellis 11-15 mm longis glabris, lobis calycis 9 mm longis lanceolatis, capsulis 6-7 mm longis subglobosis. Typus: Kauai I., Kahili Ridge, Wahiawa, C. N. Forbes 271.K.

L. kalaupapaensis sp. nov. Frutex ramosus est, novellis hirsutulis, foliis alternatis sessilibus glabris, laminis 25-53 × 4-10 mm subcoriaceis ellipticis acutis, pedicellis 30-45 mm longis in apice hirsutulis, lobis calycis 5-5.5 mm longis lancei-ovatis puberulis, corollis 12-13 mm longis purpureis, capsulis 6 mm longis subglobosis rostro 6-7 mm longo. Typus: Molokai I., Kalaupapa pali, J. F. Rock 14,030.

L. kukuiensis sp. nov. Frutex ramosus est, novellis pilosulis, foliis plerumque ternatis cum petiolis 1-2 mm longis pilosulis, laminis 18-29 × 5-8 mm coriaceis ellipticis subacutis infra midnervo pilosulo, pedicellis 10-12 mm longis pilosulis, lobis calycis

6-7 mm longis lanceolatis glabris, corollis 11 mm longis rosaceis, capsulis 6 mm longis subglobosis, stylo 6 mm longo. Typus: Maui I., Puu Kukui, G. R. Ewart III 140.

L. lamiatilis sp. nov. Frutex est, novellis pilosulis, foliis alternatis, petiolis 2-3 mm longis pilosulis, laminis 23-50 × 10-28 mm subcoriaceis ellipticis varie obovatis infra cuneata infra piosulis, pedicellis 17-20 mm longis pilosulis, lobis calycis 7 mm longis lanceolatis, corollis 10 mm longis, stylo 12 mm longo. Typus: Kauai I., Wahiawa marsh, J. M. Lydgate.

L. lata sp. nov. Frutex ramosus est, novellis pilosulis, foliis ternatis sessilibus, laminis 15-35 × 10-24 mm coriaceis ellipticis acutis basi rotundata vel cuneata, pedicellis 7-11 mm longis pilosulis lobis calycis 5-5.5 mm longis ellipticis subacutis glabris, corollis 11 mm longis, capsulis 5-6 mm longis subglobsis rostro 6 mm longo. Typus: Maui I., Lahainaluna, C. N. Forbes 325B.M.

L. longa sp. nov.

Lysimachiopsis daphnoides (A. Gray) Heller, sensu Heller, Minn. Bott. Stud. 1: 875, pl. LVII, 1897, non Lysimachia daphnoides (A. Gray) Hillebr., (1888).

Frutex 35-65 cm altus est, ramis plerumque simplicis, novellis hirsutulis, foliis alternatis sessilibus, laminis 25-52 × 9-18 mm subcoriaceis oblancei-ellipticis subacutis infra midnervo et marginibus hirsutulis, pedicellis 33-110 mm longis hirsutulis, lobis calycis 7.5-8 mm longis lancei-ovatis ciliatis, capsulis 8-9 mm longis subglobosis rostro 10-11 mm longo. Typus: Kauai I., Wahiawa bog, A. A. Heller 2,736.

L. MacDanielsii sp. nov. Frutex ramosus est, novellis pilosis, foliis alternatis, petiois 3-4 mm longis pilosis, laminis 20-43 × 8-17 mm lancei-ellipticis subcoriaceis infra pilosis, pedicellis 10-40 mm longis pilosis, lobis calycis 5-6.5 mm longis lanceolatis subglabris, corollis 11-13 mm longis, capsulis 7-8 mm longis subglobosis rostro 7 mm longo. Typus: Oahu I., Konahuanui, L. H. Macdaniels 89.

L. Mannii sp. nov. Frutex est, novellis pilosulis, foliis alternatis, petiolis 5-10 mm longis glabratis, laminis 35-50 × 16-23 mm coriaceis ellipticis subacuminatis basi cuneata infra pilosulis, pedicellis 20-28 mm longis pilosis, lobis calycis 7.5-8 mm longis lanceolatis pilosulis, corollis 14-16 mm longis, stylo 8.5 mm longis. Typus: Oahu I., Waiahole, C. N. Forbes 1,747.O.

L. mucronata sp. nov. Frutex ramosus est, novellis puberulis, foliis alternatis glabris, petiolis 2-6 mm longis, laminis 30-60 × 6-11 mm fusiformibus, pedicellis 30-45 mm longis glabris, lobis calycis 4-4.5 mm longis ovatis mucronatis, corollis 10 mm longis. Typus:

Molokai I., Waiehu, Wailau, C. N. Forbes 528.Mo.

L. maxima (R. Knuth) comb. nov.

L. Hillebrandi J. D. Hook. in A. Gray, var. maxima R. Knuth, in Engler, Pflanzenreich IV, 237: 310, 1905.

L. Hillebrandi J. D. Hook. in A. Gray, var. γ Hillebr., Fl. Haw. Is. 283-284 k888.

Petiolae 3 mm longae pilosulae sunt, laminis 6.7 × 2.5 cm elliptici-oblanceolatis subacuminatis basi cuneata infra pilosulis, pedicellis ultra 18 mm longis puberulis, lobis calycis 8-8.5 mm longis lanceolatis varie ovato-lanceolatis

Lectotypus: Molokai I., Pelekunu, W. Hillebrand (BISH).

L. molokaiensis sp. nov. Frutex est, novellis puberulis, foliis plerumque alternatis, petiolis 3-5 mm longis puberulis, laminis 5-6.7 × 0.8-1.1 cm anguste ellipticis subacutis basi cuneata decurrenti infra primo puberulis, pedicellis 12-15 mm longis puberulis, lobis calycis 6 mm longis lanceolatis, corollis 15 mm longis, stylo 7 mm longo. Typus: Molokai I., W. Hillebrand (K).

L. mucronata sp. nov. Frutex est, novellis puberulis, foliis alternatis, petiolis 2-5 cm longis glabris laminis 3.5-9 × 0.5-1.2 cm ellipticis obtusis basi cuneata decurrenti, pedicellis 33-40 mm longis in apice puberulis, lobis calycis 5 mm longis ovatis mucronatis puberulis, corollis 7 mm longis, capsulis 7 mm longis ovoideis rostro 7 mm longo. Typus: Molokai I., Wailau, Faurie 706 (G).

L. Munroi sp. nov. Frutex ramosus est, novellis puberulis, foliis alternatis, petiolis 1-3 mm longis glabratis, laminis 3-8 × 0.4-1 cm subcoriaceis ellipticis acutis, pedicellis 19-30 mm longis puberulis, lobis calycis 6-7.2 mm longis lancei-ovatis puberulis, corollis 11-12 mm longis, capsulis 7-8 mm longis conicis rostro 7-8 mm longo. Typus: Molokai I., Waihanau Valley, G. C. Munro 127.

L. occidentalis sp, nov. Frutex ramosus est,novellis pilosis, foliis alternatis, petiolis 2-4 mm longis pilosulis, laminis 17-32 × 6-9 mm subcoriaceis elliptic-isobtusis basi cuneata infra pilosulis, pedicellis 15-20 mm longis pilosulis, lobis calycis 5-6 mm longis lanceolatis obtusis capitate glandulose puberulis, corollis 11-12 mm longis, capsulis 7 mm longis rostro 6 mm longo. Typus: Maui I., Hanaulaiki, R. W. Hobdy.

L. olokeleensis sp. nov. Frutex est, novellis glandulose atomiferis et viscidis, foliis alternatis, petiolis 6-18 mm longisglandulose atomiferis et viscidis, laminis 5-11 × 1-2.8 cm lanceolatis acuminatis basi cuneata infra viscidis, pedicellis 10-40 mm longis glandulose atomiferis, lobis calycis 6 mm longis late

ovatis acuinatis glandulose atomiferis, corollis 10-11 mm longis, capuslis 9 mm longis subglobosis rostro 6 mm longo. Typus: Kauai I., Olokele, J. M. Lydgate 9.

L. ovoidea sp. nov. Frutex decumbens est, novellis puberulis, foliis alternatis, petiolis 4-11 mm longis puberulis, laminis 2.3-6 × 1.7-3.2 cm subcoriaceis ellipticis subacuminatis basi rotundata vel cuneata, pedicellis 20-30 mm longis pilosulis, lobis calycis 3-4 mm longis lanceolatis pilosulis, corollis 8 mm longis purpureis, capsulis 9 mm longis ovoideis rostro 5 mm longo. Typus: Kauai I., Wainiha Valley, J. Fay 581.

L. pedicellata sp. nov. Frutex ramosus est, novellis pilosulis, foliis alternatis, petiolis 2-4 mm longis pilosulis, laminis 1.8-5.3 × 0.6-2.2 cm coriaceis ellipticis acutis basi cuneata decurrenti supra pilosulis infra pilosulis, pedicellis 35-60 mm longis pilosis, lobis calycis 6-6.5 mm longis lanceolatis pilosis, corollis 10 mm longis, stylo 5 mm longo, capsulis 7 mm longis subglobosis. Typus: Lanai I., Maunalei, G. C. Munro 431.

L. pentophylla sp. nov. Frutex ramosus decumbens est, novellis puberulis, foliis 4-5-verticillatis, petiolis 2-5 mm longis puberulis, laminis 3.4-7.2 × 0.8-2.8 cm ellipticis acuminatis basi cuneata supra et infra pilosulis, pedicellis 25 mm longis pilosulis, lobis calycis 7-8 mm longis lanceolatis pilosulis, corollis 9 mm longis, capsulis 6-7 mm longis subglobosis rostro 5 mm longo. Typus: Maui I., Haleakala, Koolau Gap, H. St. John & A. L. Mitchell 21,266.

L. pilosula sp. nov. Frutex est, novellis pilosulis, foliis alternatis, petiolis 3-8 mm longis pilosis, laminis 3-6 × 0.3-0.8 cm ellipticis obtusisbasi cuneata decurrenti glabris, pedicellis 17-20 mm longis pilosulis, lobis calycis 5-5.5 mm longis lanceolatis pilosulis, corollis 10 mm longis, capsulis 6-7 mm longis subglobosis rostro 5 mm longo. Typus: Maui I., Hanaula, C. N. Forbes 114a.M.

L. Rockii sp. nov. Frutex ramosus est, novellis pilosulis, foliis alternatis sessilibus, laminis 2-6.5 × 0.4-1.8 cm subcoriaceis lanceolatisbasi cuneata pilosulis, pedicellis 22-43 mm longis pilosis, lobis calycis 7-9.5 mm longis lanceolatis pilosulis, corollis 13-14 mm longis, capsulis 7 mm longis subglobosisrostro 7-10 mm longo. Typus: Molokai I., Mapulehu, J. F. Rock 6,146.

L. rubrimaculata sp. nov. Frutex ramosus est, foliis alternatis, petiolis 2-4 mm longis pilosulis, laminis 1.8-3 × 0.6-1.4 cm coriaceis ellipticis acutis infra midnervo pilosulo, pedicellis 10-17 mm longis pilosulis, lobis calycis 6.5-7 mm longis lanceolatis obtusis puberulis, corollis 11 mm longis, capsulis 6 mm longis subglobosis rostro 7 mm longo. Typus: Oahu I., Moanalua, C. N. Forbes.

L. rufa sp. nov. Frutex ramosus est, novellis pilosulis, foliis alternatis sessilibus, laminis 3-5.5 × 0.8-1.3 cm coriaceis oblanceolatis infra nervis pilosulis, pedicellis 12-23 mm longis pilosulis, lobis calycis 6-6.5 mm longis ovatis pilosulis, corollis 11-12 mm longis, stylo 8-9 mm longo. Typus: Molokai I., Puu Kaeo,Waikolu, O. Degener 17,679 (A).

L. Russii sp. nov. Frutex est, novellis pilosulis, foliis alternatis, petiolis 6-10 mm longis pilosulis, laminis 2.2-4.6 × 1.1-2 cm coriaceis ellipticis subacutis basi cuneata decurrenti pilosulis, pedicellis 20-40 mm longis pilosulis, lobis calycis 9-10 mm longisligulatis acutis, corollis 17-18 mm longis, capsulis 7 mm longis ovoideis rostro 7-8 mm longo. Typus: Oahu I., Koolau Range, Wahiawa, G. W. Russ.

L. scansoria sp. nov. Frutex est, novellis pilosulis, foliis alternatis, petiolis 4-7 mm longis puberulis, laminis 2.5-4.3 × 1-1.6 cm coriaceis ellipticis varie oblanceolatis acutis basi cuneata decurrenti infra pilosulis, pedicellis 12-13 mm longis pilosulis, lobis calycis 4-5 mm longis lanceolatis pilosulis, corollis 8-9 mm longis, stylo 4 mm longo, capsulis 7 mm longis subglobosis. Typus: Lanai I., G. C. Munro.

L. stene sp. nov. Frutex ramosus est, novellis pilosulis, foliis alternatis sessilibus, laminis 1.5-2.5 × 0.1-0.2 cm subligulatis sed ad apices deminuentibus infra pilosulis, pedicellis 8-10 mm longis pilosulis, lobis calycis 4 mm longis lanceolatis puberulis, corollis 6 mm longis, capsulis 4.5-5 mm longis subglobosis rostro 5.5-6 mm longo. Typus: Maui I., Waiehu, J. Remy 458 (GH).

L. stenophylla sp. nov. Frutex est, novellis pilosulis, foliis alternatis, petiolis 2-4 mm longis, laminis 2.1-4.2 × 0.4-0.9 cm ellipticis acutis basi cuneata decurrenti, pedicellis 11-18 mm longis, lobis calycis 5-6 mm longis lanceolatis, corollis 10 mm longis, stylo 6 mm longo, capsulis 7 mm longis ellipsoideis. Typus: Oahu I., Kalihi, C. N. Forbes 1,255.O (falso 1,522.O).

L. subherbacea (Hillebr.) comb. nov.

L. Hillebrandi J. D. Hook. in A. Gray, var. subherbacea Hillebr., Fl. Haw. Is. 283, 1888.

Clastotype: Molokai I., [W. Hillebrand]. (BISH).

L. ternifolia sp. nov. Frutex est, novellis pilosulis, foliis ternatis sessilibus, laminis 3-8 × 1.4-4.9 cm coriaceis ellipticis varie obovatis subacuminatis basi subcordata supra pilosulis infra pilosis, pedicellis 23-33 mm longis pilosulis, lobis calycis 8-9 mm longis lanceolatis varie ellipticis obtusis pilosulis, corollis 10 mm longis, stylo 5 mm longo. Typus: Molokai I., Pelekunu Trail, C. N. Forbes 242.Mo.

L. venosa (Wawra) comb. nov.
L. Hillebrandi J. D. Hook. in A. Gray, var. venosa Wawra, Flora 57: 523, 1874.
Typus: Kauai I., Waialeale, H. Wawra 2,165 (W).

L. waiaholeensis sp. nov. Frutex ramosus est, novellis puberulis, foliis alternatis sessilibus glabris, laminis 1.7-3.5 × 0.07-0.12 cm linearibus, pedicellis 32-33 mm longisglandulose puberulis, lobis calycis 3.5-4.2 mm lancei-ovatis glabris, capsulis 4 mm longis suborbicularibus. Typus: Oahu I., Waikane-Waiahole Trail, (Degener no.) 17,666 (NY).

L. waianaeensis sp. nov. Frutex ramosus est, novellis pilosulis, foliis alternatis, petiolis 3-7 mm longis, laminis 2.5-5.5 × 1-2.4 cm coriaceis ellipticis acutis basi cuneata glabris, pedicellis 12-22 mm longis pilosulis, lobis calycis 4-4.5 mm longis lanceolatis pilosulis, corollis 9 mm longis purpureis, capsulis 7 mm longis subglobosis rostro 5-11 mm longo. Typus: Oahu I., Puu Kanehoa, H. St. John 14,012.

L. waiehuensis sp. nov. Frutex est, novellis pilosulis, foliis alternatis, petiolis 7-14 mm longis pilosulis, laminis 3-6.2 × 1.5-3.2 cm subcoriaceis ellipticis acuminatis basi cuneata decurrenti infra midnervo pilosulo, pedicellis 30-35 mm longis pilosulis, lobis calycis 5-6 mm longis ovatis subacutis puberulis, corolla 10-11 mm longa, stylo 6 mm longo, capsulis 8 mm longis ovoideis. Typus: Molokai I., Waiehu, Wailau, C. N. Forbes 559.M.

L. waikoluensis sp. nov. Frutex ramosus est, novellis puberulis, foliis alternatis vel in parte ternatis, petiolis 1-2 mm longis, laminis 2.3-4.4 × 0.4-1.2 cm ellipticis ambitu acutis, pedicellis 15-20 mm longis, lobis calycis 6.5-7 mm longis lanceolatis, capsulis 7 mm longis globosis rostro 7-8 mm longo. Typus: Molokai I., Waikolu, Hanalilolilo, H. St. John et al. 12,348.

L. Websteri sp. nov. Frutex est, novellis pilosis, foliis alternatis, petiolis 3-9 mm longis pilosulis, laminis 4.3-7.4 × 1.5-2.8 cm coriaceis oblanceolatis varie ellipticis ambitu acutis supra midnervo pilosulo infra pilosis, pedicellis 28-40 mm longis pilosulis, lobis calycis 8-9 mm longis lanceolatis pilosulis, corollis 6 mm longis, capsulis 8 mm longis ovoideis rostro9 mm longo. Typus: Oahu I., Waianae Range, South Palawai Gulch, G. L. Webster 1,458.

DIAGNOSES OF NEW SPECIES OF SICYOCARYA (CUCURBITACEAE)

HAWAIIAN PLANT STUDIES 160

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Sicyocarya has contained two Hawaiian species described by Asa Gray who placed them in the genus Sicyos. The present paper adds 26 new species, endemic to the Hawaiian Islands.

Sicyocarya atrimaculata sp. nov. Caules nigri-maculati sunt, petiolis 2.2-2.8 cm longis, laminis 4.7-8.3 × 5-6 cm 2-3-partitis infra hirsutulis, floribus masculis cum lobis perianthii 1.5-2 mm longis ovatis subacutis, antheris 5, nucibus 8.5-12 4-4.5 2.3 mm lanceoloideis nigri-maculatis. Typus: Maui I., Haleakala Range pipeline, G. C. Munro 801.

S. beccifer sp. nov. Caules nigri-maculati sunt, petiolis 4-6 cm longis puberulis, laminis 7.5-15 × 8-14 cm vadose 5-lobatis infra puberulis, floribus femineis 6, nucibus 12 × 8-9 mm corpore subgloboso rostro 2-3 mm longo. Typus: Hawaii I., Laupahoehoe, F. R. Warshauer 1,535.

S. cruralis sp. nov. Calues glabri sunt, petiolis 14-30 mm longis puberulis, laminis 3.5-4.5 × 3-3.7 cm vadose 3-5-lobatis puberulis, floribus masculis cum lobis perianthii 0.7-0.9 × 0.7-1.2 mm deltoideis, antheris 3, floribus femineis cum 4 lobis corollae 1.7 mm longis ellipticis subacutis, nucibus 7.5-8 × 2.4-2.7 × 1.5-1.7 mm lanceoloideis in basi cum 3-4 pedibus, Typus: Hawaii I., J. Remy 539 (P).

S. hawaiiensis sp. nov. Novellae hirsutulae resinosae sunt, caulibus nigri-maculatis, petiolis 5-7.5 cm longis maculatis glabratis, laminis 10-11 × 9-11 cm vadose 3-lobatis infra hirsutulis, floribus femineis in gemma 1 mm diametro globoso, nucibus 7 × 6.5 mm subglobosis 5-angulosis hirsutulisrostro 1 mm longo. Typus: Hawaii I., J. Remy 539 (P).

S. kaalaensis sp. nov. Caules nigri-maculati glabri sunt, petiolis 1.5-4.7 cm longis, laminis 6-12 cm diametro vadose 3-5-lobatisinfra puberulis, floribus masculs cum lobis perianthii 2 mm longis ovatis, subacuminatis, antheris 5, floribus femineis cum 4 lobis perianthii inaequalibus 2-2.7 mm longis ellipticis acutis, nucibus 15-17 × 8-10 mm ovoideis acutis puberulis. Typus: Oahu I., Mt. Kaala, H. St. John 23,365.

S. kaenaensis sp. nov. Novellae glabrae sunt, petiolis 14-25 mm longis, laminis 3.5-5 × 4-5.5 cm 1/3-lobatis primo puberulis, floribus masculis cum lobis

perianthii 2 mm longis ovatis, anterhis 5, floribus femineis cum lobis perianthii 2 mm longis ovatis, nucibus 7.5-8 X 3 mm lanceoloideis nigri-maculatis ad basim lobatis. Typus: Oahu I., Kaena Point, G. D. Carr 898.

S. kalalauensis sp. nov. Nodae glandulose puberulae sunt, petiolis 3.5-5.5 cm longis capitate glandulose puberulis, laminis 12-17 X 10.5-15.5 cm ovatis profunde 5-lobatis, floribus masculis cum lobis perianthii 3.5-4 mm longis ovatis, antheris 3, floribus femineis 4-5, nucibus 19-22 X 9-10 mm lancei-ovoideis 5-amgulosis capitate glandulose puberulis rostro 5 mm longo. Typus: Kauai I., Kalalau Valey, C. N. Forbes & C. Dole 59.K.

S. kauaiensis sp. nov. Caules nigri-maculatae sunt, nodis puberulis, petiolis 2.2-2.8 cm longis puberulis, laminis 7-8.3 X 6.3-8.5 cm 5-lobatis infra nervis puberulis, floribus femineis 2-3, nucibus 17-18 X 3-6 mm lanceoloideis trigonis puberulis. Typus: Kauai I., Kokee, O. Degener 18,041.

S. kilaueaensis sp. nov. Caules glabri sunt, petiolis 3.5-9 cm longis puberulis, laminis 9-23 X 9.5-21 cm vadose 3-lobatis infra praecox hirsutulis, floribus masculis cum lobis perianthii 2.3-2.5 mm longis ovatis, antheris 5, nucibus 18-20 X 8-9 X 5-6 mm ellipsoideis glabris rostro 2-3 mm longo. Typus: Hawaii I., 23 Mile, J. F. Rock 16,006.

S. kipahuluensis sp. nov. Caules glabri sunt, petiolis 7.5-15 cm longis glabris, laminis 16-20.5 X 15-19 cm cordatis elobatis infra nervis puberulis, floribus masculis cum lobis perianthii 2.3 mm longis ovatis subacutis, antheris 3, nucibus 25 X 12 X 4-5 mm ellipsoideis 5-angulosisglabris. Typus: Maui I., Kipahulu, C. N. Forbes 1,709.M.

S. kokocrateris sp. nov. Caules glabri sunt, petiolis 1-5.7 cm longis, laminis 7-13.5 X 5.5-12.5 cm cordatis vadose 5-lobatis, floribus masculis cum lobis perianthii 1.3 mm longis ovatis, antheris 3, floribus femineis cum 4 lobis corollae 0.5 mm longis ovatis, nucibus 11-13 X 3.5-4.5 mm lanceoloideis in dimidio basali cum lobis rotundatis pluribus. Typus: Oahu I., Koko Crater, H. St. John 26,936.

S. konaensis sp. nov. Novellae puberulae sunt, petiolis 2.5-5.5 cm longis puberulis, laminis 8.5-16 X 8-14 cm ½-lobatis in 5 lobis, gemmis masculis 2.5 mm diametro globosis puberulis lobis 1.1 mm longis ovatis, nucibus 32-36 X 12-14 X 11-12 mm oblanceoloideis glabris. Typus: Hawaii I., McCandless forests, J. F. Rock 26.018.

S. lanceoloidea sp. nov. Caules viridi-maculati sunt, nodis puberulis, petiolis 3.5-8 cm longis puberulis,

laminis 9-17 X 9-16.5 cm cordatis ½-lobatis in 5 lobis, floribus masculis cum lobis perianthii 3.5-3.7 mm longis ovatis subacutis, antheris 5, floribus femineis cum lobis corollae 4 mm longis lanceolatis, nucibus 23-25 X 7-8 X 5-6 mm lanceoloideis puberulis, rostro 8 mm longo. Typus: Kauai I., Kokee, C. N. Forbes 776.K.

S. Lebishopii sp. nov. Novellae hirsutae et glandulose puberulae sunt, petiolis 7-18 mm longis hirsutis et glandulose puberulis, laminis 7-12 X 8-11.5 cm 1/4-lobatis in 5 lobis infra puberulis, floribus masculis cum lobis perianthii 2.2-2.5 mm longis ovatis, antheris 5, floribus femineis cum 5 lobis corollae 1.3-1.6 mm longis ovatis capitate glandulose puberulis, nucibus 9-10 X 6-7 X 3-4 mm lanceoloideis puberulis et cum lobis acutis pluribus. Typus: Kauai I., Waimea Canyon, L. E. Bishop 1,316.

S. mauiensis sp. nov.

Sicyos cucumerinus A. Gray, var. β triangulata Cogn., Monogra. Phanerog. 3: 898, 1881.

Novellae subglabrae sunt, caulibus nigri-maculatis, petiolis 12-38 mm longis, laminis 4.5-11 X 2-8 cm deltoideis elobatis infra puberulis, floribus masculis cum 4-6 lobis 1.7-2 mm longis lancei-ovatis, antheris 2, floribus femineis cum lobis corollae 0.8 mm longis ovatis acutis, nucibus 5-7.5 X 4-5 mm ovoideis angulosis. Typus: Maui I., Haleakala, Kaupo Gap, H. St. John & A. L. Mitchell 21,198.

S. molokaiensis sp. nov. Novellae pilosae sunt, caulibus nigri-maculatis, petiolis 22-34 mm longis subglabratis, laminis 5.5-11 X 4-9.5 cm hastatis, floribus masculis cum lobis perianthii 1.3 mm longis ovatis, antheris 5, floribus femineis 2-4 sessilibus, nucibus 3 X 1.6 mm ovoideis. Typus: Molokai I., Kahuaawi Gulch, O. Degener 18,398 (NY).

S. Obatae sp. nov. Novellae glabrae sunt, caulibus nigri-maculatis, petiolis 2-3.5 cm longis, laminis 6-10.5 X 6-10.3 cm subcordatis vadose 5-lobatisinfra puberulis, floribus masculis cum lobis 3.5-4 mm longis ovatis, antheris 3, floribus femineis cum lobis corollae 3-3.5 mm longis ellipticis, nucibus 20-22 X 8 X 6-7 mm lanceoloideis 5-angulosis glabris rostro 3-4 mm longo. Typus: Oahu I., Makaho-Waianae Kai, W. C. Gagne, J. Obata & D. Palmer 682.

S. paucifrugalis sp. nov. Novellae puberulae sunt, petiolis 2.2-3.2 cm longis puberulis, laminis 5-9 X 6-9.3 cm suborbicularigus 5-partitis infra hirsutulis, floribus femineis cum 4 lobis 0.7-0.8 mm longis ellipticis, nucibus 7 X 3.5 mm lanceoloideis tertio basali 5-anguloso rostro 5.5 mm longo, Typus: Molokai I., Waiakuilani Gulch, L. E. Bishop & T. Pratt 1,766.

S. protrusa sp. nov. Caules glabri sunt, petiolis 1.8-3.8 cm longis, laminis 2.5-3.7 X 2.3-4 cm suborbicularibus1/3 lobatis in 5 lobis infra hirsutulis, floribus masculis cum lobis perianthii 2-2.5 mm longis ovatis, antheris 5, floribus femineis cum lobis corollae 0.8-1 mm longis ovatis, nucibus 7-8.5 X 3-4 X 2-2.5 mm lanceoloideis corpore cum maculis nigris spiciferis rostro 2-4 mm longo. Typus: Lanai I., Maunalei, H. St. John 18,818.

S. puberula sp. nov. Novellae hirsutulae sunt, caulibus nigri-maculatis, petiolis 4-10.5 cm longis puberulis, laminis 11-18 cm diametro suborbicularibus 1/6-1/4-lobatis in 5 lobis infra puberulis, floribus masculis cum lobis perianthii 2.3-2.5 mm longis ovatis, antheris 5, floribus femineis cum lobis corollae 2.5 mm longis ellipticis capitate glandulose puberulis, nucibus 15-20 X 8-12 X 7-12 mm corpore ellipsoieo puberulo rostro 3-6 mm longo. Typus: Hawaii I., Mauna Kea C. H. Lamoureux 4,382.

S. Rockii sp. nov. Caules pilosulae sunt, petiolis 2.5-3 cm longis puberulis, laminis 9-11.5 X 9-11.2 cm suborbicularibus 5-sublobatis infra puberulis, floribus masculis cum lobis perianthii 2.4 mm longis ellipticis, antheris 4, floribus femineis cum lobis corollae 1.5-2 mm longis ellipticis, nucibus 16-18 X 6-7 mm ellipsoideis puberulis stipitatis rostro 2-3 mm longo. Typus: Hawaii I., Puu Waa Waa D. Herbst et al. 5,433.

S. rostrata sp. nov. Caules pilosis sunt, petiolis 6-9 cm longis capitate glandulose hirsutulis, laminis 6.5-7.5 X 7-8.5 cm cordate vadose 5-lobatis infra puberulis, floribus masculis cum lobis perianthii 1.5 mm longis ovatis, antheris 5, nucibus 9 X 3.5 X 3 mm ovoideis rostro 2.5 mm longo. Typus: Kauai I., Barking Samds, D. Herbst & S. Ishikawa 5,691a.

S. saltuaria sp. nov. Caules glabri sunt, petiolis 18-42 mm longis puberulis, laminis 6-12 X 7-9.5 cm cordatis elobatis infra hirsutulis, nucibus 27-30 X 12-14 X 9 mm oblanceoloideis 5-angulosis. Typus: Hawaii I., Honaunau, L. W. Bryan.

S. umbellata sp. nov. Caules glabri sunt, petiolis 2-4.5 cm longis glabris, laminis 8-12 X 5-9 cm ovatis acutis, floribus masculis cum lobis perianthii 1.5-2 mm longis deltoideis, antheris 4, nucibus 23-24 X 9-10 X 3-5 mm oblancei-fusiformibus angulosis. Typus: Maui I., Kipahulu, P. K Higashino 9,412.

DIAGNOSIS OF PLEOMELE STENOPHYLLA (LILIACEAE)

HAWAIIAN PLANT STUDIES 161

Harold St. John
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The type specimen is in the Bishop Museum, Honolulu.

Pleomele stenophylla sp. nov. Arbor est, foliis 36-62 × 0.8-1.1 cm, bracteis inferis 10 cm longis lancei-linearibus, pedicellis 4-6 mm longis, fructibus 3-4-loculatis.

Holotypus: Kauai I., Waimea, Halemanu Cliff Lookout, Waiahulu Stream, dry open canyon slope, 2,900 ft alt., Dec. 28, 1952, H. St. John 24,899.

Specimens Examined: Kauai I., Makaweli, Olokele Ditch Trail, open lower forest, 1 mile below ditch house, 1,427 ft alt., Dec.26, 1947, H. St. John et al. 23,084.

Comparison: The most similar species is P. Forbesii Degener, of Oahu, a species with the leaves 28-45 × 0.5-1 cm; lower floral bracts 3 m long, lanceolate; pedicels 10 mm long; and the fruit 1-3-celled.

A NEW SPECIES OF XYRIS (SECT. XYRIS) FROM THE GULF COASTAL PLAIN

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In the process of an intensive field survey on the distribution and ecology of *Xyris* species in the West Gulf Coastal Plain, we discovered a puzzling entity which did not seem to fit any known species. After making detailed field observations at numerous sites, and searching for additional material at LL, LSU, NLU, SMU, and TEX, we were convinced that it represented a distinct, previously undescribed species.

Xyris **louisianica** Bridges & Orzell, sp. nov. (Figure 1)

Xyris strictae Chapman simile, sed habitu solitario subcespitoso, basibus plantarum pallidioribus, apice scapi spica angustior, spicis anguste ovatis acutis, seminibus anguste ellipticis 0.5–0.7 mm longis, non fuscatis differt.

Perennial herb, solitary or in small clumps, the plant base equitant, with persistent fibrous remains of old leaves. Leaves narrowly linear, 15–30 (–45) cm long, 2–5 (–7) mm broad, gradually tapering to a slender, incurved tip, dull green above (rarely maroon-brown), and reddish-maroon to reddish-brown toward the base; margins tuberculate or papillate, surfaces smooth. Sheaths of the scape shorter than the leaves, 10–13 cm long, with a short cusp-like blade. Scapes linear, 30–70 (–90) cm long, roundish with several ridges towards the base, somewhat flattened above, with the two marginal ridges papillate or tuberculate, scape apex 1–3 mm wide, definitely narrower than the spike. Spikes narrowly ovoid to narrowly ellipsoid, 1.0–2.0 (–2.5) cm long, 6–8 mm wide, slightly acute, of many tightly imbricate scales. Fertile bracts suborbicular, ca. 5 mm long, the outer surface dark brown with a dark green rectangular dorsal patch, the margins entire, becoming erose at the apex with age. Lateral sepals slightly curvate, 5–6 mm long, reddish brown, the keel ciliate, narrower than the wings. Blades of petals triangular-cuneate, 3.0–3.5 mm long, yellow, opening in the late morning, and closing in the late afternoon or evening. Seeds narrowly ellipsoid, 0.5–0.7 mm long, one end caudate, both ends with darkened tips, opaque, longitudinally striate, slightly farinose, not darkened at maturity.

TYPE: UNITED STATES. LOUISIANA. CALCASIEU PARISH: SH, NEQ, SEQ, Sect. 30, T9S, R11W; Vinton 7.5' Quad; Swales and depressions of cutover wetland longleaf pine savannah on N side

of paved road, ca. 1.3 mi NW of Edgerly; Elev. 23', 24 Sep 1987, *Orzell & Bridges 5800* (HOLOTYPE: TEX; ISOTYPES: FSU, GH, LSU, MISSA, MO, NCU, NLU, NY, SMU, TEX, TAMU, VDB). Additional specimens examined (with abbreviated locality information; full label data is available from the authors;): **LOUISIANA. ALLEN PAR.:** Sec. 22, T3S, R5W, 9 Jun 1972, *Thomas 29985* (NLU); Sec. 21, T6S, R6W, 9 Jun 1972, *Thomas 30092* (NLU), 15 Aug 1987, *Orzell & Bridges 5753* (NLU, SMU, TEX); Sec. 26, T6S, R6W, 24 Oct 1981, *Thomas & Allen 79560* (NLU); Sec. 22, T6S, R6W, 15 Aug 1987, *Orzell & Bridges 5756* (MO, NLU, SMU, TEX); Sec. 14, T6S, R6W, 22 Sep 1987, *Orzell & Bridges* 5788 (SMU, TEX). **BEAUREGARD PAR.:** 14 mi W of DeRidder, 17 Jul 1964, *Kral 20736* (SMU); Along RR & LA 27 between Juanita & Singer, 22 Aug 1971, *Thomas 24648* (NLU); Sec. 22, T5S, R10W, 5 Jun 1986, *Thomas et al. 96670* (NLU); Sec. 12, T4S, R9W, 15 Aug 1987, *Orzell & Bridges 5749* (MO, NCU, NLU, SMU, TEX); Sec. 12, T5S, R9W, 15 Aug 1987, *Orzell & Bridges 5752* (LSU, SMU, TEX). **CALCASIEU PAR.:** Off Westwood Rd, 2.5 mi NW of West Lake, 29 Jun 1969, *Mistretta s.n.* (NLU, 2 sheets); Sec. 31, T8S, R8W, 17 Aug 1987, *Orzell & Bridges 5761* (FSU, LAF, SMU, TEX); Sec. 26, T8S, R9W, 17 Aug 1987, *Orzell & Bridges 5763* (NLU, NY, SMU, TEX); Sec. 24, T9S, R13W, 17 Aug 1987, *Orzell & Bridges 5765* (F, GH, NY, SMU, TEX); Sec. 15, T11S, R9W, 24 Sep 1987, *Orzell & Bridges 5799* (LAF, NLU, GA, SMU, TEX, US). **RAPIDES PAR.:** Sec. 22 & 27, T5N, R5W, 8 Jun 1978, *Schutz & Schutz 1466* (NLU). **ST. TAMMANY PAR.:** Sec. 30, T6S, R10E, 11 Jun 1972, *Thomas 30277* (NLU); Sec. 33, T7S, R13E, 20 Jun 1976, *Thomas et al. 49544* (NLU); Sec. 5, T7S, R14E, 27 Sep 1975, *Thomas & Allen 47265* (NLU); Along Hwy 36, 2.2 mi W of Hwy 41, 13 Jul 1983, *Kessler 7335* (NLU); 10 Oct 1970, *Allen 52* (LSU); 7 Sep 1985, *Lievens 1014* (LSU); 8 Aug 1948, *Bougere 23* (LSU); Primate Research Center, Covington, 17 Jul 1964, *Rylander 566* (SMU). **TANGIPAHOA PAR.:** 14 Jun 1968, *Brown 20985* (LSU); 15 Oct 1919, *Arsene 11140* (LSU); 1921, *Arsene 12548* (LSU). **VERNON PAR.:** 11 Sep 1981, *Givens 2226* (LSU); Sec. 14, T1S, R8W, 14 Aug 1987, *Orzell & Bridges 5725* (SMU, TEX); Sec. 12, T1S, R8W, 14 Aug 1987, *Orzell & Bridges 5737* (NLU, NCU, SMU, TEX). **WASHINGTON PAR.:** 5.5 mi SW of Bogalusa, 12 Jun 1966, *Thieret s.n.* (SMU); Sec. 4, T1S, R14E, 25 Jun 1971, *Thomas et al. 23753* (NLU); Sec. 4, T1S, R11E, 17 Aug 1983, *Thomas 85388 & Taylor 4889* (NLU). **WINN PAR.:** Sec. 2, T11N, R3W, 19 Sep 1972, *Thomas & Cicala 31933* (NLU). **MISSISSIPPI. JACKSON CO.:** Pascagoula, 14 Oct 1975, *Montz 3554* (LSU); *Demaree 32296* (SMU). **PEARL RIVER CO.:** *Sargent & Jones 13695* (SMU). **STONE CO.:** *Kral 17401* (SMU). **TEXAS. HARDIN CO.:** Near Sour Lake, 19 Jul 1945, *Lundell & Lundell 14126* (LL); 7.4 mi NW of Silsbee, then 2/3 mi S, 9 Jul 1949, *Cory 56639* (SMU); 2 mi S of Kountze, 21 Jul 1964, *Kral 20902* (LL, SMU, TEX); 8 mi S of Kountze, 21 Jul 1964, *Kral 20916* (SMU); 5 mi N of Silsbee, 22 Aug 1972, *Amerson 1275* (SMU); 10 mi W of Kountze, 18 Sep 1959, *Turner 4614* (TEX); 1.8 mi W of Honey Island, 25 Sep 1987, *Orzell & Bridges 5807* (APCR, NLU, SMU,

TAMU, TEX); 4.9 mi W of Honey Island, 25 Sep 1987, *Orzell & Bridges 5808* (SMU, TEX). **JASPER CO.:** Along FS Rd 343, 1 mi S of FS Rd 306, 12 Aug 1987, *Orzell & Bridges 5676* (SMU, TEX); N side FS Rd 314, 1 mi W of FS Rd 303, 12 Aug 1987, *Orzell & Bridges 5685* (APUR, NLU, NCU, SMU, TEX). **LIBERTY CO.:** 21 mi SE of Cleveland, 3 Jul 1950, *Webster & Wilbur 3185* (SMU). **NEWTON CO.:** 2.5 mi E of Bleakwood, 15 Oct 1987, *Orzell & Bridges 5921* (SMU, TEX). **TYLER CO.:** Hickory Creek Savanna, Big Thicket National Preserve, 25 Sep 1987, *Orzell & Bridges 5802* (ASTC, FSU, LSU, MO, NCU, NLU, TAES, TAMU, SMU, TEX).

Almost all of the additional material cited for *Xyris louisianica* had previously been identified as *Xyris ambigua* Beyr. ex Kunth, which is common throughout much of the South Atlantic and Gulf Coastal Plains. *X. louisianica* superficially resembles *X. ambigua* in its equitant base, relatively long leaves, and ciliate lateral sepals, a combination of characters shared by only *X. ambigua* and *X. stricta* Chapm. among the *Xyris* species of the Southeastern United States. The recognition of these taxa and their limits has been relatively slow. Chapman (1860), in describing *X. stricta*, clearly contrasted it with *X. ambigua*, yet this name was placed in synonomy under the latter by Mohr (1901), Malme (1937), and with some doubt by Kral (1960). Afterward, Kral (1966) recognized the distinctiveness of *X. stricta*, and provided an analysis of its differences from *X. ambigua* and *X. iridifolia*. In the same treatment, Kral noted that two forms of *Xyris ambigua* occur in Mississippi, Louisiana, and eastern Texas. One form has a larger stature and appears the same as eastern *X. ambigua*, while the other is of smaller stature, has more maroon pigmentation of leaf bases and has smaller flowers. He further noted that both forms may cohabit a single site with differences between them quite striking. Some of the distinctive characters of the latter entity, the species here described, were included within Kral's (1966) description of *X. ambigua*. In the field where we have observed *X. ambigua* and *X. louisianica* at the same site they are quite distinct, with no intermediate forms present in hundreds of plants examined at over fifteen sites, particularly regarding the characters of the plant base, leaf shape, petal size and shape, and seed size, shape, and surface. At first, we attempted to fit *X. louisianica* within the range of variation of *X. stricta*, since it resembles this species more than it does *X. ambigua*. However, we were convinced by the habitat and geographical separation and several consistently different characters that these plants were best considered as a new species. Since it had previously been thought of as a form of *X. ambigua*, its differences from this species should be summarized. The plant bases of *X. louisianica* are darker, more reddish-maroon or brown, than the bases of *X. ambigua*, and lack the pronounced dark longitudinal striations of the latter species. The leaves are narrow and ascending, in contrast to the broader, more flabellately spreading leaves of *X. ambigua*. Spike shape is very variable in

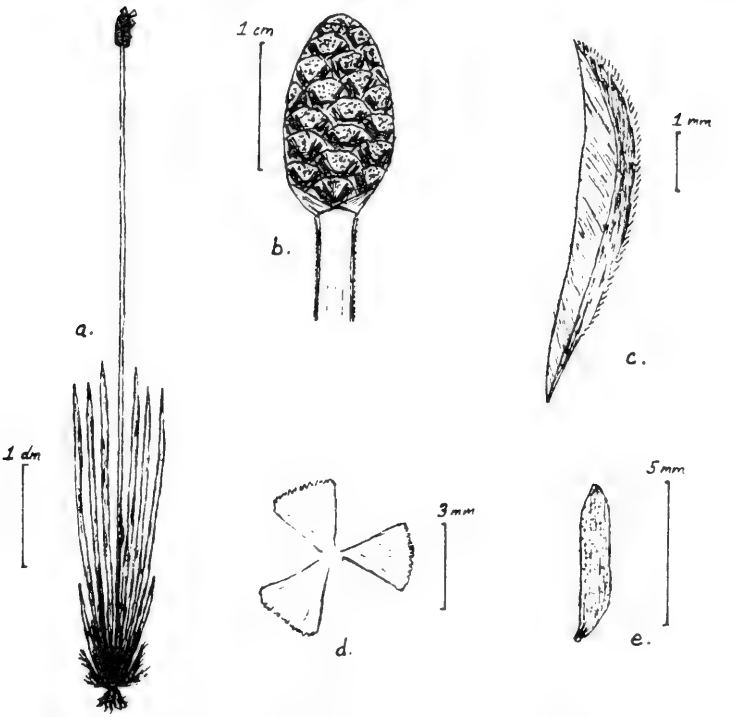

Figure 1. *Xyris louisianica* Bridges & Orzell. a. Habit sketch. b. Spike. c. Lateral sepal. d. Petal blades. e. Seed.

both species, mostly as a function of age of the individual spike and its growing conditions, however, the largest, best developed spikes of *X. louisianica* are not as broad or as sharply acute as those of *X. ambigua*. The scales of the spike also tend to be much darker than those of *X. ambigua*. Several crucial field characters are provided by the fresh flowers, and are not easily observed on dried specimens. The petal blade size and shape and time of day of flowering are clearly different between the two species. The petal blades of *X. louisianica* are very much like those of *X. stricta*, and both have a similar midday to afternoon flowering time, in contrast to the larger, obovate petal blades and early morning flowering time of *X. ambigua*. The seeds of *X. louisianica* resemble those of *X. stricta*, both being narrowly ellipsoid, opaque, and farinose, with those of *X. stricta* slightly longer and distinctly darker in color at maturity. This is in contrast to the more broadly ovoid, translucent, lustrous, smaller seeds of *X. ambigua*. Apparently, Kral had little field experience with this entity, and had not seen its mature seeds, which are not usually well-formed before September. Seed morphology has

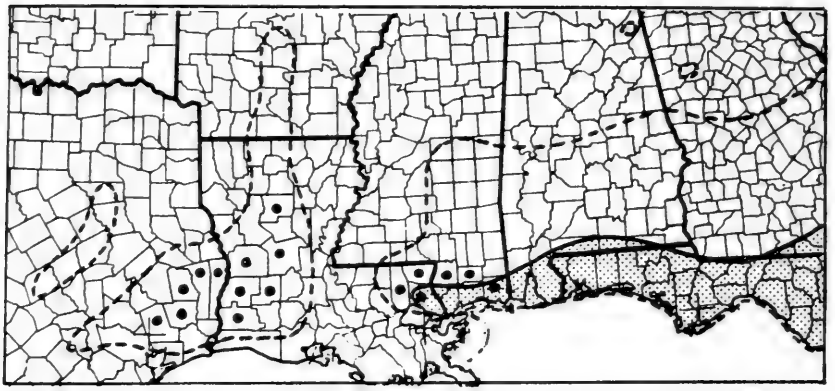

Figure 2. County distribution of *Xyris louisianica* (dots), and western portion of general range of *X. ambigua* (dashed lines) and *X. stricta* (shaded area).

been considered very important in the delimitation of *Xyris* species. Many of the herbarium specimens cited here lack seeds due to their early season collection dates, perhaps contributing to the slow recognition of the distinctiveness of *X. louisianica*.

Xyris louisianica appears to be most frequent in the West Gulf Coastal Plain of southwestern Louisiana and adjacent southeastern Texas (Figure 2). It is most abundant in acid, clay-based wetland longleaf pine (*Pinus palustris* Mill.) savannas on Quaternary terrace surfaces, primarily the Montgomery Formation. The microhabitats for *X. louisianica* include naturally seasonally wet depressions, shallow swales, ditches, and roadsides adjacent to these savannas. It is much less frequent on Miocene age surfaces to the north, and is absent from the coastal prairies to the south. *Xyris louisianica* is also found on the lower terraces of the East Gulf Coastal Plain of extreme southern Mississippi and the adjacent "Florida Parishes" of southeastern Louisiana. *Xyris louisianica* is geographically isolated from *X. stricta* except at the eastern periphery of its range in southern Mississippi and St. Tammany Parish, Louisiana. However, even in this area it appears that the two are not found in the same habitats.

Xyris louisianica occupies drier sites than reported for *X. stricta*, and overlaps the wide moisture-tolerance range of *X. ambigua*. Where *X. louisianica* and *X. ambigua* are sympatric, *X. louisianica* tends to be found in lower, seasonally inundated, depressions or swales, in association with such species as *Cacalia lanceolata* Nutt., *Eupatorium leucolepis* (DC.) T. & G., *Rhynchospora elliottii* A. Dietr., *Pluchea rosea* Godfrey, and *Scleria reticularis* Michx., whereas *X. ambigua* is more commonly on slightly better drained microsites. At some sites, *X. louisianica* can be found with *X. laxifolia* Mart. var. *iridifolia* (Chapm.) Kral,

but is usually slightly higher than this species. Other species of *Xyris* which have been observed by the authors at *X. louisianica* sites include *X. baldwiniana* Schultes, *X. caroliniana* Walt., *X. drummondii* Malme, *X. difformis* Chapm. var. *curtissii* (Malme) Kral, *X. jupicai* L. C. Rich., *X. platylepis* Chapm., and *X. scabrifolia* Harper (Orzell & Bridges, in prep.), although in most cases these are not found mixed within the *X. louisianica* populations.

The following key [modeled after the key between *X. ambigua* and *X. stricta* in Kral (1966)] will serve to distinguish *X. louisianica* from these two species:

1. Seed farinose, narrowly elliptical or narrowly ovoid; spike dark brown, the scales tightly imbricate; plant bases maroon, purplish, dark-brown, or reddish-brown; leaves narrowly linear, gradually tapering from the equitant base to tip; petal blades triangular-cuneate, 0.3-0.5 cm long, open at midday 2

   2. Seed dark when mature, 0.7-0.8 mm long, plant bases dark maroon to dark brown, densely cespitose on wet, mucky substrata; apex of scape conspicuously flattened, almost as broad as the spike; spike oblong-cylindrical, obtuse ..... *Xyris stricta* Chapman

   2. Seed light-colored, 0.5-0.7 mm long, plant bases maroon to maroon-brown, solitary or in small clumps on drier, clayey substrata; apex of scape somewhat flattened, but not nearly as broad as spike; spike narrowly ovoid to ellipsoid, slightly pointed ..... *Xyris louisianica* Bridges & Orzell

1. Seed lustrous, translucent, broadly ovoid; spike pale brown or tan, the scales loosely imbricate; plant bases pinkish, purplish, or stramineous, with dark longitudinal striations on inner leaf bases; leaves shorter, broader, more flabellately spreading, abruptly tapered to tip; petal blades obovate, 0.6-0.7 mm long or more, opening in early morning, usually closed by midday .....*Xyris ambigua* Beyr.

Acknowledgement: Thanks to Guy Nesom of TEX for providing the Latin diagnosis.

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MEDICINAL PLANTS OF PALAU

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ABSTRACT

Palauans used at least 190 plant species for medicinal purposes. Herein we list the plant species used, and describe preparatory and medicinal aspects of use.

INTRODUCTION

The people of the Palau Islands have long made use of the flora for medicinal purposes. Due to contact with outside cultures, much of the knowledge of Palauan folk medicines is becoming lost, and many younger Palauns are ignorant of the enthnobotanical usage of local plants.

In a study of the medicinal plants of Palau made from August 1968 to August 1970 we recorded the medicines practiced mainly by the older men (Rubak) and women (Mechas). Since many of the Palauan medicines are relatively unknown we believe that they should be documented before the older practitioners died and their secrets lost due to the impact of Western acculturation.

Palau is a remote group of about 200 islands, part of the Caroline Island complex in the Western Pacific. The largest island, Babeldaob, about 26 miles in length, is a typical volcanic island of tuffaceous breccias with angular to subangular fragments of andesite, shale and basalt tuff (Osborne 1966). Portions of Koror and the southern islands are raised reef structures of coralline limestone, while the southernmost islands of Angaur and Pelilieu are platform islands composed of limestone. The entire Palau group is bordered by fringing reefs which protect them from oceanic wave action. Temperature averages 81 F with low daily and seasonal variation while humidity varies from 77% in March to a high of about 84% in November and December. Cloud cover percent is high and rainfall varies from 120-160 inches per year (Civil Affairs

Handbook, 1944).

Previous literature on the medicinal plants of Palau is limited; Okabe (1940, 1943) listed 100 plant species used and their method of preparation and Salsedo (1970) described the uses of certain medicinal plants by Palauans.

METHODS AND MATERIALS

From August 1968 to August 1970 Carl Salsedo lived with a Palauan family and became fluent in Palauan, which provided the necessary language proficiency for communication with the Palauan informants. Every village and hamlet in the Palaus was surveyed during this time. Each village was visited for at least one or more weeks, during which time interviews were conducted, first to determine the local medical practitioners or those villagers knowledgeable about folk medicines, who were subsequently interviewed and their information recorded. The islands of Koror, Babeldaob, Pelilieu, Angaur and Kayangel were surveyed in order.

Validity of Palauan plant names and information regarding their use was determined on the basis of at least six different informants and the total number of Palauans interviewed was about 500. Botanical specimens of all medicinal plants were collected; duplicates were deposited in the Palau Herbarium at the Entomology Laboratory and specimens were sent to the Smithsonian Institution for identification. Less complete collections were deposited at the University of Guam and University of Connecticut.

Alkaloid screening was conducted at the Entomology Laboratory at Koror using the Culvenor and Fitzgerald (1963) test. Between 2-4 gms of fresh plant materials was ground in a 7.6 cm porcelain mortar with a small amount of clean sand and sufficient chloroform to yield a thick slurry. 10 ml of ammoniacal chloroform (N/20 with respect to ammonia) was added and the mixture stirred for about 1 min before filtering into a 13 x 1.2 cm test tube. The extract obtained was added to 0.5 ml. of 2N sulfuric acid, the test tube was shaken, and the phases were allowed to separate. The aqueous layer was removed with a dropper whose tip was fitted with a cotton wool plug for filtering and breaking emulsions. After removing the cotton wool and any chloroform in the dropper, two of three drops of the aqueous solution were placed in each of two 1 by 1/4 inch test tubes for testing with Mayers reagent and silicotungstic acid.

The density of the precipitate formed was assessed on a - to +4 basis by comparison with a strychnine standard (1.0 mg./ml. in 25% HCl). 0.1 ml. of strychnine solution was rated as +2; 0.5 ml. was +3; 0.7 ml. was +4.

The reagents were prepared as follows: Mayers, dry mercuric chloride (6.8 grams) and potassium (25 grams) were dissolved separately in water and diluted to make one liter of solution; Silicotungstic acid: 5 grams of silicotungstic acid was dissolved in 100 ml. of 6N sulfuric acid.

RESULTS AND DISCUSSION

A survey of all of the islands and villages of the Palau district revealed a total of 190 species of plants used medicinally for over 200 categories of cures, including 90 species of trees, 10 shrub species, 77 herb species and 23 vines (Table 1). A sampling of the more common remedies include cures to stop the bleeding of cuts, abortatives, earache, punctured eardrums, headaches, stomachaches, diarrhea, fish stings, venereal disease, asthma, woman's afterbirth medicines and boils.

Plant parts used in medicine preparation included; young and old leaves, inner and outer bark, roots, ripe and unripe fruits, sap, flowers, stems and stipules. Coconut oil was often used as a base in mixtures with various plant parts such as cures for aches, bruises and massage where the coconut oil is applied to the body and the leaves then are applied.

Medicines were applied externally or taken internally depending on the type of ailment. To apply medicines externally the plant parts were pounded together then applied to the affected area, e.g. a fish sting. For internal medicines the plant parts were pounded together and eaten or squeezed in water using a coconut fiber of cloth and drunk.

Tertiary alkaloids were in 23 of the 190 species with 11 species exceptionally rich in tertiary alkaloids: betel nut (Areca catechu L.), papaya (Carica papaya L.), cordia (Cordia subcordata Lam.), crinum (Crinum asiaticum L.), spider lily (Hymenocallis littoralis (Jacq.) Salisb.), hanging club moss (Lycopodium phleqmaria L.), tobacco (Nicotiana tabacum L.), ochrosia (Ochrosia oppositifolia (Lam.) K. Schum.), pandanus (Pandanus aimiriikensis Martelli), beach naupaka (Scaevola taccada (Gaern.) Roxb.), and Uncaria palauensis.

The young leaves in the majority of plants tested contained tertiary alkaloids whereas the majority of older leaves did not. Palauan medicinal

plant practitioners are acutely aware that the growing part of a plant contains an active ingredient. This is supported by the majority of cures specifying the use of the young leaves, followed by the older leaves, inner and outer bark, roots, unripe and ripe fruits, sap, stems, stipules and flowers.

Since all of the plants recorded in this study have been used as medicinals, it is proposed that they merit further chemical investigation to ascertain their active ingredients. Such plants may be cultivated in Palau with the concomitant benefit to the drug industry and economy of the Palau Islands.

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TABLE EXPLANATION

Individual species of plants are arranged alphabetically to family. The results of Silicotungstic acid and Mayers Reagent tests are shown in that order, expressed as - indicting no positive result for other test to +4 indicating highest abundance of the alkaloid against a strychnine standard. The following are plant parts abbreviations: Yl young leaves, L leaves, B bark, Ib inner bark, Bs basal stalk, F fruit, Fu unripe fruit, Fr ripe fruit, S sap, St stem, Stip stipule, Fl flowers.

Table 1. Summary of plant species, local names, uses and alkaloid assays of the medicinal plants.

Scientific Name	Palauan Name	Use	Part Used	Month Coll.	Locality Coll.	Assay Test
ACANTHACEAE to COMPOSITAE						
Acanthus ebracteatus Vahl.	Kollil	punctured eardrum	Yl	11/69	Ngmerid, Koror, mangroves	- -
Alternanthera sessilis (L.)	Kelel a malk	bodyache, boils	L	11/68	Ngerbechd, Koror, roadway	- -
Hymenocallis littoralis (Jacq.) Salisb.	Bisech a chad	stop bleeding after abortion	Bs	1/69	Entomol. Lab., Koror	+4 +4
Mangifera indica L.	Idel	cuts	Yl	6/69	Ngermid, Koror, forest	- -
Rhus taitensis (Guill.)	Eues	ringworm	Yl	6/69	Airai, Bab. forest edge	- -
Spondias pinnata (L.) Kuns	Titimel	stop bleeding after abortion	L	6/69	Entomol. Lab., Koror	- -
Cerbera manghas L.	Emeridech	cuts	Yl	1/69	Ngermid, Koror, forest	- -
Ochrosia oppositifolia (Lam)	Uauch	festering sores	Yl	8/70	Ngchelobel, limestone isl.	+4+4
Plumeria rubra	Elilai	shark bites	Yl	5/70	Entomol. Lab., Koror	- -
Alocasia macrorrhisa (L.) L. Schott.	Bisech er Belauu	ringworm	St	11/68	Meiungs, Koror, forest	- -
Colocasia esculenta (L.) Schott	Kukau sp. psechel	fish stings	St	7/70	Ngerbechd, Koror, taro patch	- -
Crytosperma chamissonis Schott. Merr.	Brak sp. yars	tuberculosis	R	7/70	Ngerbechd, Koror, taro patch	- -
Epipremum carolinensis	Toilalech	stops bleeding	Yl	7/69	Rendrok, Koror, forest	- -
Raphidophora pinnata	Toilalech	stomache	St	6/70	Kayangel, coconut forest	- -

Scientific Name	Palauan	Use	Part	Month	Locality	Test
Xanthosoma brownii Deg.	Beiodech	headache, aphro.	R	7/69	Ngerbechd, Koror, forest	- -
Boerlagiodendron pulcherrimum (Vid.)	Kesiamel	clean woman's womb after childbirth	Yl	6/69	Airai, Bab., forest	- -
Polyscias nodosa (Bl.)	Pngeii	cuts	Yl	7/69	Meiungs, Koror, forest	- -
Schefflera odorate (Bl.)	Bungaruau	woman afterbirth	Yl	11/68	Rock Isle, Iwayama Bay	- -
	Ngursmedob	veneral disease	R	11/68	Rock Isle, Iwayama Bay	- -
Sarcolobus palauensis Hatus	Uralanguis	abortative	Yl	7/69	Ngmerid, Koror, taro patch	- -
Barringtonia asiatica (L.)	Ptdull	abortative	Yl	7/69	Ngerengchol, isle, strand	- -
Barringtonia racemosa (L.)	Koranges	eardrum, cuts	L	6/69	Ngermid, Koror, forest	- -
Dolichandrone spathacea (L.) K. Schum	Riu	yaws	Yl			
	Kairs	flavoring	F			
Bixa orellana L.	Burk	eyespots, catar.	Yl	7/70	Ngerkesewoal, Koror, garden	- -
Annas comosus (L.) Merr.	Ongorrangebard	hookworms	Fu	6/69	Idid, Koror, garden	- -
Canna indica L.	-	hemorrhoids	Bs	12/68	Entomol. Lab, Koror, garden	- -
Crataeva speciosa Volk.	Edepsungel	massage, sprains	L	2/69	Ngermid, Koror, garden	- -
	beluu		Ib	2/69	Ngermid, Koror, garden	+1+2
Carica papaya L.	Bobai	abortative, cuts	Yl,S	1/69	Ngermid, Koror, garden	+4+4
		backache, headache	L,R	1/69	Ngermid, Koror, garden	+4+4
			Fl	1/69	Ngermid, Koror, garden	+4+4
Casuarina equisetifolia L.	Ngas	abortative, teeth	Ib	1/69	Ngermid, Koror, roadside	- -
		asthma	R	1/69	Ngermid, Koror, roadside	- -
Terminalia cattapa L.	Miich	cuts, festering	Yl	11/68	Ngermid, Koror, forest edge	- -
		heartburn	Fr	8/70	Ngermid, Koror, forest edge	- -

Scientific Name	Palauan	Use	Part	Month	Locality	Test
Terminalia samoensis Rech.	Esmiich	yaws	L	1/68	Aulong, isle, strand	- -
Rheo spathacea (Sw.) Stearn	Kobesos	internal aches	Yl	1/69	Entomol. Lab., Koror, gard.	- -
Ageratum conyzoides L.	Ngmak	boils	Yl	2/69	Ngermid, Koror, roadside	+ +
Adenostemma lavenia L. Kuntze	Beraber	afterbirth med. burns	Yl	6/69	Ngermid, Koror, cliff base	- -
Eclipta alba L. Mann.	Deberbelel a tengadik	as above, nausea dizziness	L	3/70	Ngerbechd, Koror, taro patch	- -
Wedelia biflora (L.) DC.	Ngesil	cuts	L	6/69	Airai, Bab. strand	- -
Veronia cinerea (L.) Less.	Ethneong	afterbirth med.	L	11/68	Ngerbechd, Koror, garden	- -
CONNARACEAE to FLACOURTIACEAE						
Connarus gaudichaudii	Chemecherash	amoebic dysentary	Ib	3/70	Airai, Bab. forest	- -
Ipomoea batatas (L.) Lam.	Emutii	hernia	Yl	8/70	Ngerbechd, Koror, garden	- -
Ipomoea congestica	Oliemad	boils	L	7/69	Ngerbechd, Koror field	- -
Ipomoea gracilis R. Br.	Torech	asthma	L	6/69	Ngerbechd, Koror, roadside	- -
Ipomoea pes-caprae L.	Kebeas choll	venereal disease	L	1/69	Pelilieu, strand	- -
Merremia peltata (L.) Merr.	Kebeas	asthma, mouth sore	L	7/69	Ngermid, Koror, roadside	- -
Desmodium umbellatum	Babeluu	fish stings, tonic	L	4/70	Malakal, Koror, isle.	+ +
Cucurbita maxima Duch.	Kalbasang	abortative	Yl	2/69	Ngermid, Koror, garden	- -
	Odopterengul	pinkeye	R	6/70	Kayangel, strand	- -
Cyathea sp.	Eluu	massage	Yl	12/68	Ngermid, Koror, wet forest	- -
Fuirena umbellata Rothb.	Desumramesei	fish stings	L	4/70	Ngerbechd, Koror, taro	- -
Scleria levis Retz.	Bakallild	stomach	Yl	7/69	Ngesoal, Koror, savanna	- -
Dioscorea bulbifera L.	Belloi	hernia	R	3/70	Arakabesan, Koror, forest	- -
Dioscorea esculenta (L.) Bu	Esiach	treat mentally ill	L	4/70	Airai, Bab. forest	- -
Codiaeum variegatum (L.) Bl	Knetquet	cuts	Yl R	6/70	Ngermid, Koror, forest edge	- -

Scientific Name	Palauan	Use	Part	Month	Locality	Test
Codiaeum variegatum (L.) Bl.	Kesuk	cuts, sores	L,St	12/68	Entomol. Lab., Koror, garden	- -
		yaws	S	12/68	Entomol. Lab., Koror, garden	- -
Euphorbia chamissonis Kl.	Kerkar	cuts	S	6/70	Kayangel, strand	- -
Exoecaria agallocha L.	Yas	internal injuries	Ib	2/69	Ngesoal, Koror, mangroves	- -
Glochidion sp.	Ngolem	burns, cuts	Yl	1/69	Meiungs, Koror, forest edge	- -
Macaranga carolinensis Volk.	Bdel	diarrhea	Yl	11/69	Ngermid, Koror, forest edge	- -
Mallotus cf tiliaefolius	Lelbelb	cuts	Yl	4/70	Ngermid, Koror, forest edge	- +
Manihot esculenta Crantz.	Diokang	cuts	Yl	8/70	Ngerbechd, Koror, garden	- -
		bruises, br. bones	R	8/70	Ngerbechd, Koror, garden	- -
Phyllanthus amarus Sch.	Ukalla ruchel	tonic, colds	L	11/69	Entomol. Lab., Koror, lawn	- -
Phyllanthus palauensis Hos.	Ukellela che	colds	L	1/69	Airai, Bab., savanna	- -
Flacourtia rukam Z & M	Emechong	woman diet cont.	B	4/70	Ngermid, Koror, forest	- -
Pangium edule Reinw.	Raimel	hernia	L	2/69	Arakabesan, Koror, forest	- -
Hanguana malayana (Jack) M.	Chewais	fungus	Yl	12/68	Ngesoal, Koror, swamp	- -
Scaevola taccada Roxb.	Korrai	colds, tubercul.	Yl	11/68	Rendrok, Koror, strand	+4 +4
	Korrai	irreg. menstra.	F	2/69	Rendrok, Koror, strand	- -
GRAMINEAE to LAURACEAE						
Bambusa vulgaris Schrat Wen	Bambuu	toe fungus	B	8/70	Entomol. Lab, Koror, open	- -
Centhotheca lappacea Desv.	Moibibuchel	cuts	L	6/70	Airai, Bab., swamp	- -
Cymbopogon citratus Staff.	Keskus	female rite	L	2/69	Arakebesan, Koror, savanna	- -
Digitaria sanguinalis Scrop.	Chudel era	cuts	L	11/68	Ngermid, Koror, savanna	- -
Digitaria violascens Link	Sau .	ngasech	L	7/70	Ngermid, Koror, garden	- -
Eragrostis domingensis	Ouemoket	cuts	L	4/70	Airai, Bab., savanna	- -
Saccharum offininarum L.	Deb	stop vomiting	Yl	8/70	Ngerbechd, Koror, garden	- -
Saccharum spontaneum L.	Bungarius	cuts	L	4/70	Ngermid, Koror, roadside	- -
Schizostachyum lima Merr.	Lild	pinkeye	B	8/70	Ngermid, Koror, forest edge	- -

Scientific Name	Papauan	Use	Part	Month	Locality	Test
Callophyllum innophyllum	Btaches	asthma	Yl	11/68	Ngerdis, Koror, strand	- -
Hernandia sonora L.	Btaches	hernia	F	1/69	Ngerdis, Koror, strand	- -
Salacia naumanii Engl.	Detimel	stomach ache	L	8/70	Ngerbechd, Koror, mangrove	- -
Lophopyxis pentaptera Engl.	Koteb	afterbirth med.	Ib	6/69	Airai, Bab., mangrove	- -
	Koteb	amoebic dysentary	L	6/69	Airai, Bab., mangrove	- -
Ocimum sanctum L.	Chermadachar	toothache	Yl	7/69	Ngerbechd, Koror, garden	- -
Cassytha filiformis L.	Techellachull	aches, VD	Yl	7/69	Arakabesan, Koror, savanna	- -
LEGUMINOSAE to MALVACEAE						
Caesalpina crista L.	Tochedulik	aphrodisiac	Yl	4/70	Ngermid, Koror, forest	- -
Canavalia rosea (Sw,) DC.	Keldellel	headache	Yl	7/70	Arakabesan, Koror, strand	+2+2
Cassia alata L.	Kerul a besoekl	ringworm	L	7/69	Arakabesan, Koror, savanna	- -
Cassia occidentalis L.	Korriu	neckache	L	7/69	Arakabesan, Koror, savanna	- -
Derris elliptica (Wall.) Ben	Dub sp. teche.	hernia, sores	Yl	7/69	Ngesoal, Koror, forest	- -
Desmodium triflorum (L.) DC	Olumud	dizziness	L	6/69	Airai, Bab., savanna	- -
Entata phaeoloides Merr.	Kesebekuu	afterbirth med.	B	8/70	Ngermid, Koror, forest	- -
		skin diseasees	L	8/70	Ngermid, Koror, forest	- -
Inocarpus edulis Forst.	Keam	tuberculosis	Yl Ib	6/69	Ngermid, Koror, forest	- -
Leucaena leucocephala de Wit	Telentund	abortative	Yl	1/69	Ngerbechd, Koror, roadside	- -
Mimosa invisa Mart	Toched	toothache	Yl	8/70	Airai, Bab., savanna	- -
Ormosia calavensis Azoala	Edepsungelked	cuts	B	6/69	Ngesoal, Koror, savanna	- -
Pongamia pinnata Merr.	Kisaks	broken bones	L	7/69	Arakabesan, Koror, strand	- -
Pterocarpus indicus (L.) Wild	Las	diarrhea, tuber.	IbL	7/69	Rendrok, Koror, mangroves	- -
Serianthes kanehirae Fosb.	Ukall	woman diet	Ib	7/69	Airai, Bab., forest	- -
Allium cepa L.	Sebulias	earache	L	7/70	Entomol. Lab., Koror garden	- -
Cordyline fruticosa	Sis-ditmechi	punctured eardr.	YlR	1/69	Ngermid, Koror, garden	- -

Scientific Name	Palauan	Use	Part	Month	Locality	Test
Crinum asiaticum L.	Abarath (angaur)	bruises	Bs	5/70	Angaur strand	+4 +4
Dracena multiflora Roxb.	Oredakl	stomachache	Yl	5/69	Airai, Bab., savanna	- -
Fagraea ksid Gilg. & Bene	Ksid	hernia	R, Fr	4/70	Airai, Bab., dry savanna	- -
Pemphis acidula Forst.	Ngis	toothache	Ib	6/70	Rendrok, Koror, strand	- -
Hibiscus tiliaceus L.	Ermall	diarrhea	Yl	7/69	Meiungs, Koror, mangrove	- -
MELASTOMATACEA to OKALIDACEAE						
Medinilla blumeana Mans.	Teketekoel	hernia	Yl	3/70	Aimeliik, Bab., forest	- -
Melastoma malabathricum	Matakui	afterbirth	Yl	6/69	Arakabasan, Koror, savanna	- -
Artocarpus communis Forst.	Medu	hernia	Yl	11/68	Entomol. Lab., Koror	- -
Ficus hispida L. F.	Wosech	appetite,cuts	L,F	11/68	Entomol. Lab., Koror	- -
Ficus micricarpa	Lulk	fishsting	L	7/69	Aulong, isle., strand	- -
Ficus tinctoria Forst.	Oseked	swollen areas	L	3/70	Rendrok, Koror, strand	- -
Musa sp	Tuu	burns, boils	Bs	1/69	Entomol. Lab., Koror, gard.	- -
Musa sp	Tuu sp Erasech	dysentary	Bs	4/70	Airai, Bab., garden	- -
Musa sp	Tuu sp Mechad	earache	S	4/70	Airai, Bab., garden	- -
Musa sp	Tuu sp Rumutel	itchy mouth	S	4/70	Ngermid, Koror	- -
Horsfieldia amklaal Kan.	Emeklachel	stimulant	Yl	7/70	Rendrok, Koror, strand	- -
Horsfieldia palauensis K.	Erasachel	fainting st.	L	7/70	Ngesoal, Koror, forest edge	- -
Decaspermum fruticosum F.	Kertaku	mental ill.	Yl	1/69	Ngermid, Koror, savanna ed.	- -
Eugenia cumini (L.) Bru.	Mesekerrak	hernia	Yl	8/70	Ngchelobel, isle, inter.	- -
Eugenia javanica Lam.	Robotel	cuts, afterbr.	Yl	11/68	Ngerbechd., Koror, roadsd.	- -
Eugenia reinwardtiana K.	Kesiil	chest pains	Yl	6/69	Aulong, isle, strand	- -
Psidium guajava L.	Kuabang	stomachache	Fu	11/68	Entomol. Lab., Koror, gard.	- -

Scientific Name	Palauan	Use	Part	Month	Locality	Test
Nepenthes mirabilis Merr.	Meliik	bodyache, sores	Yl	1/69	Airai, Bab., savanna	- -
Ludwigia octovalvis Raven	Erur	dizziness	Yl	1/68	Ngermid, Koror, taro patch	- -
Averhoa bilimbi K.	Imekurs	cuts, venereal	Yl	12/68	Arakabasan, Koror, forest	+ -
Averrhoa carambola L.	Kemin	cuts	Yl	12/68	Agricul. Sta, Koror, gard.	+ -
PALMAE to RHAMNACEAE						
Areca catechu L.	Bunch	cuts	Yl	8/70	Arakabasan, Koror, forest	+4 +4
		broken bones	Inflor	8/70	Arakabasan, Koror, forest	+4 +4
		venereal dis.	Yg. aer	1/69	Ngermid, Koror, garden	+4 +4
		fish stings	Fr	1/69	Ngermid, Koror, garden	+4 +4
Cocos nucifera L.	Lius	cuts	Yl, L	8/70	Ngchelobel, isle, coconut	- -
	Duboch	diarrhea	Embryo	8/70	Ngchelobel, isle, coconut	- -
		punct. eardrum	Fr Base			- -
		tuberculosis	Fr			- -
		fish sting	Fu,St			- -
		afterbirth, hernia, V.D.	meat			- -
Pandanus aimiriikensis Mart.	Chertochet	dissiness,V.D.	Yl	3/70	Ngergiil, Airai, river bank	+4 +4
Pandanus odoratissimus Kan.	Ongor	vomiting	Yl	6/70	Airai, Bab, savanna	- -
Ceratoptis thalictroides	Tielauek	abortative	L	7/69	Airai, Bab., taro patch	- -
Gleichenia linearis var fer.	Itouch	hemostat	L	1/69	Ngermid, Koror, garden	- -
Piper betel L.	Kebui	abortative	Yl	8/70	Ngermid, Koror, garden	- -
Piper fragile Benth.	Kesebibui	massage	Yl	6/69	Airai, Bab., forest	- -
Piper sp.	Kebui l'yaur	internal mass.	Yl	3/70	Ngerenchol, isle, forest	+2 +2

Scientific Name	Palauan	Use	Part	Month	Locality	Test
Polygonu minus var procerum	Sekes (A)	ngasech	L	6/70	Angaur, taro patch	- -
Antrophyum reticulatum	Arr	toothache	L	6/70	Arakabasan, Koror, cliff	- -
Asplenium nidus L.	Buklbeluu	indigestion	Yl	1/69	Inwayama Bay, tree trunk	- -
Dryopteris dentata Forst. C.	Kilkuld	swollen gums	Yl	11/68	Ngesoal, Koror, forest ed	- -
Nephrolepsis acutifolia Pres.	Amarsuuch	vitamins	L	4/70	Airai, Bab., mangroves	- -
Polypodium scolopendria B.	Ebechab	bodyache	L	6/69	Ngermid, Koror, forest	- -
Pteris ensiformis var victoriae		infections	L	6/70	Ngerbechd, Koror	- -
Pteris tripartita Sw.	Tangalikurs	cuts	L	3/70	Ngerbechd, Koror, garden	- -
Pyrrosia lanceolata Farw.	Albeluu	cuts	L	1/69	Ngermid, Koror, forest	- -
Vittaria incurvata Cav.	Arr ra beluu	cuts, afterbirth	L	7/69	Airai, Bab, forest, trunk	- -
Alphitonia carolinensis Hos.	Elebiob	abortative	Yl	3/70	Airai, Bab., dry savanna	- -
RHIZOPHORACEAE to SAPOTACEAE						
Bruguiera gymnorhiza Lam.	Denges	eardrum	Yl,I	6/69	Rendrok, Koror, mangroves	- -
Rhizophora mucronata	Tebechel	broken bones	Yl,L	3/70	Airai, Bab.	- -
Parinarium glaberrium Hassk.	Eritem	diarrhea	L	12/68	Ngermid, Koror, forest	- -
Guettarda speciosa L.	Blau	swollen areas	L	8/70	Rendrok, Koror, mangrove	- -
Hedyotis albidopunctata Fosb.	Kelel a malk	child delivery	L	6/69	Kayangel, above strand	- -
Ixora casei Hance	Kerdau	itching sores	Yl	7/69	Airai, Bab., wet forest	- -
Morinda citrifolia L.	Ngel	massage	L	11/68	Ngesoal, Koror, savanna ed	- -
	Dingel	afterbirth	Fu	11/68	Ngesoal, Koror, savanna	+2 +2
Mussaenda sericea Bl.	Erecheroi	cuts	Yl,F	11/68	Ngerbechd, Koror, roadway	- -

Scientific Name	Palauan	Use	Part	Month	Locality	Test
Randia cochinchinensis Merr.	Kerumes	broken bones	Yl	8/70	Iwayama Bay, isle, crevice	- -
Randia racemosa F. Villa	Kerumes	broken bones	Yl	7/69	Meiungs, Koror	- -
Uncaria palauensis	Drikel	mental illness	L	7/69	Kngsoal, Koror, forest edg	+3+3
Citrus aurantiifolia Swingle	Merandel sp malchianged	headache fishsting	Yl F	7/69	Airai, Bab. garden	- -
Citrus limon (L.) Burm. f.	Merandel sp. debechel	headache fishsting	Yl F	7/69	Airai, Bab.	- -
Citrus sp.	Bekersiu	int. bleeding	F	8/70	Ngerbechd, Koror, garden	- -
Allophylus timorensis Bl.	Ebludes	headache	L	8/70	Ngerbechd, Koror, forest edg.	- -
Manilkara udoido Kanehira	Uduid	afterbirth	Yl	7/69	Airai, Bab., forest	- -
SCROPHURLARIACEAE to ZOSTERACEAE						
Adenosma javanica (Bl.) Koor.	Etermall	hernia	L	7/69	Airai, Bab., savanna	- -
Angelonia augustifolia	-	abortative	Yl	7/69	Airai, Bab., roadside	+ +2
Limnophila aromatica Merr.	Yaml	ngasech	L	7/69	Ngerbechd, Koror, taro patch	- -
Limnophila fragrans Seem.	Ukelakal	afterbirth	L	7/69	Airai, Bab.	- -
Capsicum annum L.	Meringel	abortative	F	11/68	Meiungs, Koror, garden	- -
Nicotiana tabacum L	Dekool	abortative	Yl,St	3/70	Ngermid, Koror, Airai, Bab.	+4+4
Physalis angulata L.	Bubeubedul	venereal dis.	Yl	7/69	Malakal, Koror, sandy area	- -
Abroma augusta L. f.	Lab	aphrodisiac	L	3/70	Ngerengchol, isle, forest	- -
		punct. eardrum	R	6/70	Kayangel, coconut forest	- -
Symplocos palauensis Koidz	Ebtui	hernia	Yl	7/69	Airai, Bab., dry savanna	- -
Tacca leontopetaloides O.Ktze	Esbocheb	burns	R	3/70	Arakabasa, Koror, savanna	- -
Phaleria nisidai Kanehira	Delalakar	aches, abortat.	L	12/68	Ngerbechd, Koror, roadside	- -

Scientific Name	Palauan	Use	Part	Month	Locality	Test
Triumfetta procumbens Forst.	Kerkar (K)	cuts	Yl	6/70	Kayangel, strand	- -
Centella asiatica L. Urban	Dingal ra beab	cuts	L	7/69	Arakabasa, Koror, garden	- -
Elatostemma stoloniforme Ka.	Duchus (K)	infection	St	6/70	Kayangel, wet area	- -
Laportea ruderalis Forst. C.	Onkegad	boils, aphro.	L	6/70	Kayangel, under coconuts	- -
Pipturus argenteus	Eremallueang	boils	Ib	6/70	Kayangel, ab strand flora	- -
Callicarpa candicans Hoch.	Dub sp. rsachel	sores	Yl	7/69	Airai, Bab., savanna edge	- -
Clerodendrum incrme (L.)	Emrert	ringworm	L	3/70	Airai, Bab., mangrove edge	- -
Clerodendrum paniculatum	Butecherar ra Ngebard	stomache	L	7/69	Ngerbechd, Koror, garden	- -
Clerodendrum speciosissimum	Butecherar	headsores	L	3/70	Ngerengchol, isle, forest	- -
Cordia subcordata Lam.	Kalau	cuts, abortat.	L	1/69	Ngermid, Koror, forest	+4+4
Premna obtusifolia R. Br.	Chosm	cuts, sores	L	11/68	Arakabasanm Koror, forest	- -
		stonefish	Ib	11/68		
Vitex negunda var bicolor	Klsechedui	coughing	L	7/68	Airai, Bab., forest edge	- -
Cayratia trifolia (L.) Quis	Berdakl	dietary suppl.	L	7/69	Ngermid, Koror, forest	- -
Leea brunoniana Clark	Sengall	stomach,	L	7/69	Ngermid, Koror, forest	- -
Alpinia pubiflora Schum	Delebedeches	fishsting	Yl	3/70	Meiungs, Koror, forest	- -
Costus seriaceus Bl.	Isebsab	stomache	Yl	7/69	Airai, Bab., forest edge	- -
		hernia	R			
		end childbr.	Fl, Fr			
Curcuma domestica Valet	Kesol	skin allergy	R	12/68	Ngermid, Koror, garden	- -
Zostera sp.	Arr	fishsting	L,R	1/69	Rendrok, Koror, ocean	- -

Notes on Begoniaceae -- VI

Lyman B. Smith and Dieter C. Wasshausen

United States National Museum, Washington, D. C., U. S. A.

In preparing the treatment of Begoniaceae for the FLORA DE VENEZUELA, we have found that a new varietal name is necessary.

11b. BEGONIA BREVIPETALA (A. DC.) Warb. var. LUTEYNORUM L. B. Smith & D. C. Wasshausen, var. nov. A var. brevipetala inflorrescentia 4-dichotoma, bracteis anguste obovatis aliquantum persistentibus differt.

Type: Venezuela: Trujillo: Bocono-Guaramascal road, kms. 16-22 SSE de Bocono, alt. 2775-3175 m., James L. Luteyn, Maria Lebron-Luteyn, L. Ruiz-Teran & J. A. Dugarte 5208 (Holotype, US; isotype, NY).

Begonia brevipetala var. luteynorum

NOMENCLATURE OF THE WEEPING HIMALAYAN CYPRESS (**CUPRESSUS, CUPRESSACEAE**).

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The genus **Cupressus** has long been known to occur in the Himalayan region. However, only one species known as **C. torulosa** Don has been correctly described from the western Himalayas. A second species known as having markedly pendulous branchlets and cultivated fairly extensively in the eastern Himalayas has never been properly described according to the ICBN. The **Cupressus** species known from the eastern Himalayas is markedly distinct in itspendulous branchlets and has only been recently discovered wild in Bhutan. A formal diagnosis and description is now needed to differentiate and to validly describe this over-looked species.

The earliest herbarium collections of the Weeping Himalayan Cypress present in European herbaria were made by Griffith in Bhutan. Griffith collected specimens from a cultivated tree near Dewangiri in January 1838 and noted it as having drooping branches. Later, Griffith (1848) named the plant **Cupressus pendula** Griff. as a new name. Unfortunately the name published by Griffith is antedated by the older homonym **C. pendula** Thunb. (1783), belonging to an altogether different genus and species.

Ten years after Griffith's collections, J.D. Hooker and T. Thompson collected specimens of a weeping **Cupressus** species cultivated in Sikkim. Hooker (1854) referred the specimens as **Cupressus funebris** Endl. and stated the species was imported to Sikkim and Bhutan from Tibet. In this reference Hooker also noted the cultivated cypresses of the eastern Himalayas as having weeping limbs.

Knight and Perry (1850) described other Asiatic **Cupressus** species based on cultivated plants in Europe. The names **C. corneyana** and **C. majestica** were based on trees with drooping branches cultivated in Europe. The origin of the former was given as Japan or the north of China, the latter species origin was unknown. It is true the original description of these two names is quite vague, but neither name was applied to material from the Himalayas. Later, Carriere (1855) further described **C. corneyana** and **C. majestica** and states the origin of these taxa is unknown. Unfortunately, no type specimens are available in any herbaria of these two named species and I am convinced they were not based on any material collected from the Himalayas. Rather, these names seem to be misapplied to the Himalayan species by several authors.

Carriere (1867) described yet another species as **C. cashmeriana** Royle based on a young plant cultivated in France and supposedly unknown in the wild or possibly native to Tibet. The original description of **C. cashmeriana** is quite vague, the species is described as having pendulous branches, glaucous foliage and acute leaves. No other morphological characteristics such as male and female cones are listed in the type description. Unfortunately, no type herbarium material is available for the name **C. cashmeriana**.

Further, Carriere (1867) cites the name **C. torulosa** Gordon in synonymy. The **Cupressus** described by Gordon (1858) is described from northwest India and would thus not seem to refer to the weeping eastern Himalayan cypress from Sikkim and Bhutan at all. The description by Gordon (1858) seems to be more typical of **C. torulosa** Don from the western Himalayas. One might suppose that the weeping branchlets and acute leaves described in the type description of **C. cashmeriana** might allude to the eastern Himalayan weeping cypress, though without further details in the description this seems very uncertain. Other Asiatic **Cupressus** species have variously been described as having pendulous branchlets and acutish leaves, hence Franco (1969) included many synonyms under one species. What Carriere (1867) originally had in mind when describing **C. cashmeriana** seems quite undeterminable and was almost certainly not based on material from the eastern Himalayan region. Long (1980) states that **Cupressus** cultivated in Bhutan and Sikkim lack the pale glaucous foliage of the plant in Europe under the name **Cupressus cashmeriana** .

Mitchell (1972) well describes the cultivated plants in Europe long known under the names **Cupressus cashmeriana** and **C. torulosa** var. **corneyana** (or C. corneyana). The former is described as having pale glaucous foliage, the latter is described as having yellowish foliage and twisted branchlets. These features are not at all typical of herbarium specimens of cultivated **Cupressus** in the eastern Himalayas. Hence, Silba (1981) recognized three separate entities here. After seeing further herbarium material at Edinburgh I realized this even further. The earliest herbarium specimen from cultivated trees in Europe accurately labeled **C. corneyana** I could trace is **Shuttleworth s.n.** (BM) from southern France. The Shuttleworth specimen is typical of **C. lusitanica** Mill. in leaf and cone characteristics. Similarly, in raising seedlings of cultivated trees labeled **C. corneyana** in England, France and Australia I have found that these always had 3-4 cotyledons. The cotyledon number is thus typical of the New World cypresses, especially **C. lusitanica** (Silba, 1983).

In conclusion, the name **C. corneyana** was in my opinion based on odd cultivated specimens of **C. lusitanica** in Europe. The name **C. cashmeriana** is untraceable to any Himalayan material and was only vaguely described in the type description.

Cooper (1933) was the first collector that suggested **Cupressus** may be wild in Bhutan. Later, **Cupressus** was finally described wild in the eastern Himalayas in Bhutan and described by Long (1980). From what is explained above a new name should be published for the **Cupressus** endemic to Bhutan which has thus far never been validly published.

Cupressus himalaica J. Silba, sp. nova.

Arbor 20-45 m. alta. Ramulis longe pendulis ramusculis confertis, plane distichus, juvenilibus subcompressis adultis torulosis. Folia polymorpha, glandulosa; juvenilia acuminata, squarrosa, glauca, 2-3 mm. longis, lateralia conduplicata mediana subcomplanata; adulta convexa obtusa, apice adnata, 1-1.5 mm. longis. **Flores masculi** 3-5 mm. longis et 2-2.5 mm. latis, staminibus 14-18. **Strobilis** ovulatis 12-20 mm. longis et 15-17 mm. latis, **squamis** 8-10.

Type: Bhutan, Norbding, below Pele La, 2250 m., **Grierson & Long 1079** (Holo-E).

Paratypes: Bhutan, Dewangiri, **Griffith 27** (K); Bhutan, Dukye Dzong, N.W. of Paro, 2300 m., cult., **Grierson & Long 234** (E); Bhutan, Drug ye Dzon, Pao Chu, 2400 m., Cult., **Ludlow, Sherriff & Hicks 16226** (E, BM); Bhutan, Mongar, 1800 m., **Grierson & Long 1984** (E).

A graceful tree 20-45 m. tall. Branches drooping, divided into long flattened chain-like segments. Foliage polymorphic, non-glandular; juvenile acuminate, somewhat glaucous, 2-3 mm. long, free at the apex; adult leaves bluntly acute, 1-1.5 mm. long, light or grassy green. Male cones oblong-cylindric, 3-5 mm. long by 2-2.5 mm. wide with 14-18 scales. Female cones dark brown, subglobose, 12-20 mm. long by 15-17 mm. wide, scales 8-10, umbos inconspicuous. Seeds with small wings.

Cupressus himalaica grows as high as 3000 m. in its native habitat in Bhutan.

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